

Proceedings of the 21st International Conference  
Current Trends in Public Sector Research

Proceedings of the  
21<sup>st</sup> International Conference

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Masaryk University  
Brno 2017

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Current Trends in Public Sector Research

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Proceedings of the  
21<sup>st</sup> International Conference

# Current Trends in Public Sector Research

Šlapanice, 19–20 January 2017

Masaryk University  
Faculty of Economics and Administration  
Department of Public Economics

Brno 2017

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## **Suggested citation**

AUTHOR, A. Title of paper. In: Matějová L. (ed.) *Proceedings of the 21st International Conference Current Trends in Public Sector Research 2017*. Brno: Masaryk University, 2017. pp. xx-xx. ISSN 2336-1239. ISBN 978-80-210-8448-3.

The publisher assumes no responsibility for proofreading and editing of the contributions.

All papers were reviewed by external reviewers and Programme Committee.

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ISBN 978-80-210-8448-3

ISSN 2336-1239

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## Prologue

It is our pleasure to have been invited as keynote speakers at the 2017 Conference on “Current Trends in Public Sector Research” organized by Masaryk University’s Department of Public Economics. We are delighted to provide a prologue to these annual proceedings.

As contextual background, public policies reforms seek to modify the way in which collective arrangements in the public sector are organized. Reform proposals aim to change ‘form’ and to re-arrange the distribution of costs, benefits and valued resources. In the health sector, three issues regularly appear among proposals for reform – issues of cost, access and quality. The proposals for reforms in healthcare financing focus on change in revenue and expenditure; the reforms in services address the questions “Who gets what, when, where and how”; and the reforms in quality of healthcare aim to improve patient experiences and outcomes of the health services.

Reforms of healthcare delivery are prompted by concerns about costs and efficiency as well as responsiveness and equity. They seek to reallocate services across levels of care by, for example, giving primary care more responsibility for public health programs. Some reforms focus on quality by introducing a range of initiatives at all levels. Others are linked to the rise of the New Public Management movement with strategies that blur the boundaries between the public and private. Reforms of financing are often prompted by concerns about rapidly rising costs of health care and their impacts on government budgets. Some reforms aim to align with adjustments in resource generation, particularly through public-private partnerships.

In his keynote, based on observations about public-private partnerships in comparative fieldwork, Professor Björkman reviews issues of compliance among those responsible for delivering health care services in terms of communications, capability and disposition as well as ways to reduce resistance by surveillance, inducements and sanctions.

In her keynote, Professor Okma describes the fragmented nature of health care in America and outlines the 2010 Patient Protection and Affordable Care Act (known as Obama-care). She then focuses on proposals of President-Elect Donald Trump during and after the 2016 presidential election as well as the likelihood of their success. She observes that public policymaking is not just a matter of rational choice by rational actors selecting policy options after weighing the costs and benefits of each option; it is also the result of political battles among candidates eager to be seen as ‘different’ from competitors or predecessors by framing policy problems and solutions in a ‘new’ way. To complicate public policymaking further, the outcome of the process is often far from the initial proposal due to intervening factors, commonly labeled the “ideas, interests and (political) institutions” that affect the shaping and outcome of public policies. All of those played a role before, during and after the 2016 American presidential election.

The issues raised in the keynotes parallel themes presented during the conference sessions on (I) Public Administration and Public Sector, (II) Public Finance, and (III) Public Services and the Non-profit Sector. We commend the Conference organizers for the program and the selection of papers in this volume that address current trends in the public sector and that also serve as a basis for future research.

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**SESSION I:  
PUBLIC ADMINISTRATION  
AND PUBLIC SECTOR**

# Smoker vs Non-Smoker. Who Bears the Costs?

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## Abstract

It applies to many kinds of goods that the society must resolve the issue of costs arisen due to their harmful use. A typical example of such goods is tobacco products, which are subject to excise duty in the European Union countries. The question is whether the collected taxes are sufficient to cover costs originated by the consumption of tobacco products. To provide an unbiased answer to this question, we use objective hard data and simple calculations. We try to identify average social costs per consumed cigarette and average tax receipts per consumed cigarette in the EU while applying the maximum time in which the data are available. The results show that the costs exceeded the receipts by the average of EUR 0.22 per cigarette in years 2008 to 2015. Moreover, the difference grows during the mentioned period. This means that the EU society clearly bears a substantial part of costs of individual harmful consumption of a part of population, which is a market imperfection that is difficult to eliminate by the public sector.

*Keywords: tobacco; cigarette; smoking; tax receipts; social costs*

JEL Classification: H21

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## 1 Introduction

The social costs of tobacco use are the subject not only of many common discussions but also professional calculations whose results most frequently show costs expressed in monetary units, a share in GDP or in total health care costs. Taxation of tobacco products is a subject of harmonization process in the European Union. Member states have only limited opportunity when forming tax policy in this area. Therefore, in contrast with previous researches, it is appropriate to pass over national consumption and regulation specifics and hold the issue in the European Union level.

The aim of this research is to select an objective value of costs of tobacco consumption and to verify the assumption that the social costs of tobacco consumption in the European Union countries are not covered by the collected taxes levied on tobacco products. The research shall result in determination of the difference between the above-mentioned costs and the tax receipts and in the formulation of recommendation for the EU tax policy and the EU legislative framework.

The determination of costs of cigarette use is dealt with by Jha and Chaloupka [14]. These authors first classify the cost analyses related to smoking into three main types. The first one is the economic cost-benefit analysis (ECBA), the second one GDP-based social cost analysis (GSCA) and the third is expenditure-based cost analysis (EXBA).

The mentioned analyses suggest that if we want to quantify the costs or consequences of smoking, we must consider not only the costs of tobacco consumption, but also its benefits. If we intend to quantify net costs of tobacco consumption, we must subtract the social costs expended on non-smokers from the total social costs of tobacco users. Only after knowing the difference, shall we get the information value concerning the rate and adequacy of taxation of cigarettes.

The above authors also provide a summary and results of analyses showing health care costs of tobacco users, and their share in the gross domestic product in many countries of the world. This is the reason why the achieved results substantially differ; the direct costs of health care in developed countries range from 0.08% to 1.15% GDP. These data do not include external costs of smoking or costs arisen due to productivity loss and others.

A unique work in this area is that of Sloan et al. [17], who present an excellent overview of eighteen individual and institutional studies that quantify costs of smoking. The studies show total costs of smoking, which are divided into health care and other costs. An example of other costs may be the productivity loss in consequence of illness and death. They also quantify costs per tobacco user, per pack of cigarettes, and per resident, and the share of such costs in GDP.

Although the work calculates with amounts of costs in the year 2000 (entry data are from the years 1966 to 1999), the results are much varied. This may be attributed to differences in the analytical approaches of the respective studies, the time factor, different methods of health cost quantification, various sources of the data, range of consequences of smoking considered etc. The average costs of smoking per pack of cigarettes were USD 6.82, the maximum amount considered was USD 18.40, the minimum amount was USD 2.96 and the median was USD 5.75. The proportion of costs of smoking in GDP ranges from 0.70 % to 4.30 %, whereas the average value is 1.70 % and the median is 1.50 %.

Sloan et al. also present their own calculations of costs of smoking involving health as well as non-health expenses and loss of productivity caused by illness and death in consequence of tobacco consumption, and determine an adequate selling price of a pack of cigarettes to almost USD 40. The amount includes the price of cigarettes as internal costs of producers and does not include potential benefits of tobacco consumption.

The determination of incomes and expenses of the state budget in view of cigarette consumption is dealt with by Habrová and Hrubá [11]. Their calculations result in the income from cigarette consumption in the Czech Republic in 2003 amounting to EUR 1.81 billion and loss amounting to EUR 2.37 billion (the amounts were converted by the exchange rate of the Czech National Bank valid as of 1 July 2003). Thus, the loss exceeds the income by EUR 0.56 billion. The authors expect that similar amounts shall be recorded in subsequent years.

Sovinová et al. in the final report of a project analyzing the share of smoking in the morbidity and mortality rates in the Czech Republic in the year 2002 and quantifying the economic impacts of curing diseases caused by smoking states that the tobacco consumption contributed to public health care costs with 7.30 %, i.e. EUR 0.41 billion after conversion by the exchange rate of the Czech National Bank valid as of 1 July 2002 [18].

There are other authors who express the costs of tobacco consumption as a proportion in health care costs of the society. Warner et al. summarize the hitherto examination of the proportion of health care costs arisen due to smoking. They conclude that the results, with few exceptions, range from 6.00 % to 8.00 % [19]. Recent research includes e.g. Xu et al. who identified the proportion of health care costs expended on smoking consequences in the amount of 8.70 % in the total health care costs [22].

Different results are offered by Doran et al., who compare benefits and costs of cigarette consumption from the viewpoint of the government in Australia during one year. The benefit in this case is the tax on cigarettes paid by consumers; the cost is health care expenses arisen in consequence of tobacco use. The average annual health care costs per smoker were USD 204 in 1989 and 1990, while the benefits amounted to USD 621[5]. However, the authors admit that in the calculations, they disregarded for instance the costs of anti-smoking policies, monitoring and amendments of tobacco laws, research, raising public awareness, traffic accidents, loss of benefit due to illnesses and deaths caused by smoking or costs of lost opportunity.

Some statements about important economic benefits brought by tobacco industry is disproved by Warner and Fulton [20]. The additional economic benefits of tobacco industry (apart from the collected excise taxes) allegedly consist in the creation of primary jobs, but also of secondary jobs e.g. in the health care sector, which are needed for treatment of harmful effects of smoking.

The Health Statistic Center includes the loss of productivity and health care into the costs of smoking and states average costs in years 2004 and 2006 [12]. The annual costs related to the productivity loss were USD 2,848 and health care costs were USD 3,388 per smoker.

The World Health Organization deals with health consequences of smoking, their prevention and ways of reduction of cigarette consumption. It also quantifies the loss of productivity caused by deaths due to tobacco use in the U.S.A. for one year in the amount of USD

92 billion [21]. Koopmanschap et al. quantify indirect costs of cigarette consumption by the friction cost method that includes productivity losses due to disease and death [15]. Parrott et al. identify costs of one year of life gained by smoking cessation interventions. On the other hand, they cite the results of studies which value an extra year of life gained thanks to cessation of consumption of tobacco products [16]. Jarvis [13], in the report of the European Commission, published the percentage of costs of premature mortality attributable to smoking in the amount of 4.60 % of GDP.

Cunningham mentions other social costs incurred by the production of cigarettes and other tobacco products. 350,000 tons of paper a year is needed for the manufacture of cigarettes [2]. Chaloupka and Warner point out differences of studies which quantify tobacco consumption impacts. They cite a study whose conclusion is a zero or negligible negative impact of cigarette consumption and a study which identifies the need to impose an excise duty of USD 3 to 4 per pack of cigarettes to cover the impacts of tobacco use [1]. The differences are attributable to different methods applied and data sources used. The authors also mention other positive and negative aspects of cigarette consumption, which are often missing in the studies. This particularly concerns the costs related to fires caused by smoking, costs connected with care for low-birth-weight babies, costs of cleaning and maintenance, costs caused by passive smoking of family members and other persons, which, ironically, may be higher than the direct costs that are easier to quantify.

The above-mentioned facts suggest that suitable and often applied instruments for transfer of costs to those who generate them are taxes. This suggestion is also confirmed by the fact that taxes levied on goods with low elasticity of demand (which undoubtedly includes tobacco products) are transferred by manufacturers to end consumers in the form of prices, although they are settled by the manufacturers [3].

## 2 Material and Methods

This work deals with issues related to smoking in the EU countries, and therefore we have to apply the cost ratio index in the form of a share of social costs in a selected objective value representing each of the EU countries. The database of health care costs is incomplete and contains only 55 % of the required records [9]. For this reason, we have chosen the index of a share in GDP, whose values are available without exception [10]. The value of the cost share is 1.50 %, this being an objective result of calculations made by renowned authors and institutions. The value is a median of synthetic results of the unique study by Sloan et al. [17]. The upper limit of overall costs of tobacco product consumption reaches 1.34 % of GDP according to Jha and Chaloupka [14]. If we convert the results of Habrová and Hrubá [11] to the cost share in GDP, we get the value of 1.47 %. On the one hand, we do not consider the results of studies stressing the benefits of tobacco consumption, and on the other hand we do not consider studies calculating with the value of a year of human life. Our choice is certainly not the only correct one; we would label it as a conservative approach to the assessment of social costs of smoking.

To accomplish the aim of the research, we must apply the index of excise tax receipt from tobacco products and cigarette consumption in the individual countries of the European Union. The data have been published by the European Commission [7] and [8]. Three pieces of information are missing in the examined period of tax collection: the year 2013 in Romania, and the last year of the research, 2015, in the case of Latvia and the Netherlands. The missing value of the year 2013 was supplemented using the time series interpolation by multiplying the arithmetic average of adjacent values and the average growth rate of the entire time series. The missing extreme values were extrapolated by means of the linear trend using the least squares method. We also considered adaptive forecasting with higher weight put on values that are closer to the present (e.g. Holt's model). However, the results of the coefficient of determination significantly approximate 1 even for a standard linear trend, and therefore it is fully sufficient for the purposes of this research.

The duration of the time series that we have chosen is eight years, which is a period where all the data are available, beginning in 2008 and ending in 2015. We have included all EU Member States, except Croatia, where the data on tobacco tax receipts have only been available since the year 2013 regarding the late accession of the country to the European Union.

After the selection and processing of data it shall be possible to confront them to identify the difference between the social costs of smoking and the tobacco tax receipts in the EU within the defined time series, which shall be referred to as *ASDP* - average social deficit of the EU countries calculated in EUR per consumed cigarette across the time series *i* covering the years 2008 to 2015.

$$ASDP_{i=1}^n = ASCP_{i=1}^n - ATRP_{i=1}^n \quad (1)$$

*ASCP* are average social costs of the EU countries in EUR per consumed cigarette across the defined time series. *ATRP* are average tax receipts of the EU countries in EUR per consumed cigarette across the defined time series.

$$ATRP_{i=1}^n = \frac{\sum_{j=1}^m TRP}{m} \quad (2)$$

TRP are tax receipts of the individual EU countries in EUR within the list *m* per consumed cigarette across the defined time series, and *m* is the number of the EU countries included in the research, i.e. 27.

$$TRP_i^j = \frac{TR_i^j}{CS_i^j} \quad (3)$$

*TR* are tax receipts of a particular EU country in EUR within the *j* list in a concrete year from the time series *i*. *CS* is cigarette consumption in pieces in a particular EU country within the *j* list in a concrete year from the time series *i*.

$$ASCP_{i=1}^n = \frac{\sum_{j=1}^m SCP}{m} \quad (4)$$

*SCP* are social costs in EUR per consumed cigarette in a particular EU country.

$$SCP_i^j = \frac{HC_i^j}{CS_i^j} \quad (5)$$

*HC* are health care costs expended in connection with the tobacco product consumption in a particular country and a concrete year from the defined time series. *CS* is cigarette consumption in a particular country and a concrete year from the defined time series.

$$HC_i^j = GDP_i^j * 0.015 \quad (6)$$

*GDP* is the gross domestic product of the individual EU countries in market prices in individual years of the defined time series. The value 0.015, i.e. 1.50 %, is the selected level of a share of health care costs related to tobacco consumption in GDP, based on the research conducted so far.

There is another limitation to this study, next to the necessity of determination of health costs. The consumption need not equal the values applied. Such values have been determined based on purchase of tobacco stamps by the manufacturers of tobacco products. There may be differences caused by purchasing an advance stock of tobacco stamps by tobacco producers. The values do not reflect the consumption of illegal tobacco products or cross-border purchases, either. The real shares of health care costs differ in the respective countries; however, in general they grow with the growth of GDP per capita [9]. Unlike the consumption of cigarettes, the index of tax receipt from tobacco products involves also other tobacco products besides cigarettes. Nevertheless, the proportion of other tobacco products is relatively negligible both in terms of consumption and in terms of tax receipts. We have not intentionally included the receipts of general excise tax (value added tax) and we assume that if the consumer had not bought tobacco

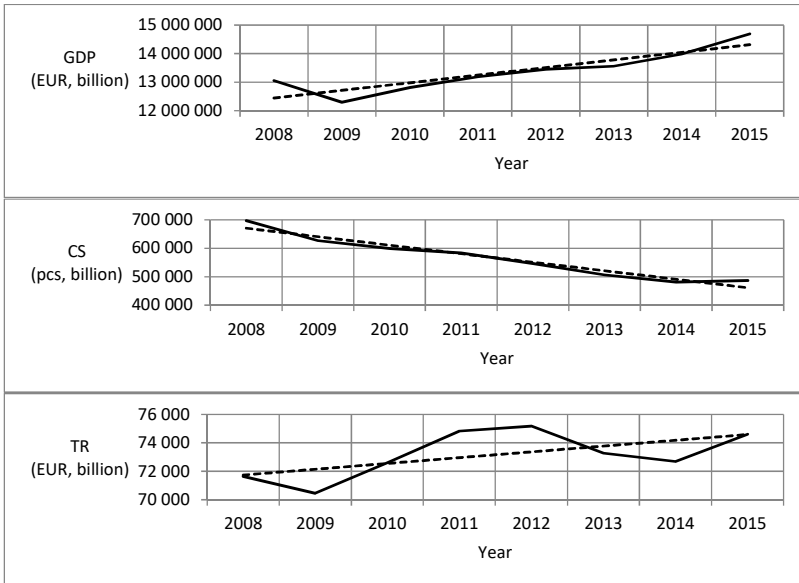


products, he would not have saved the money anyway; he would have spent it on other goods subject to the same basic rate of value added tax as the tobacco products.

### 3 Results and Discussion

The main features used in this research are gross domestic product in market prices (GDP), cigarette consumption in absolute terms, and the receipt from excise taxes imposed on tobacco products. Figure 1 shows the development of the examined indexes including their linear trends in the EU countries.

**Figure 1. Development of processed indexes in the EU**



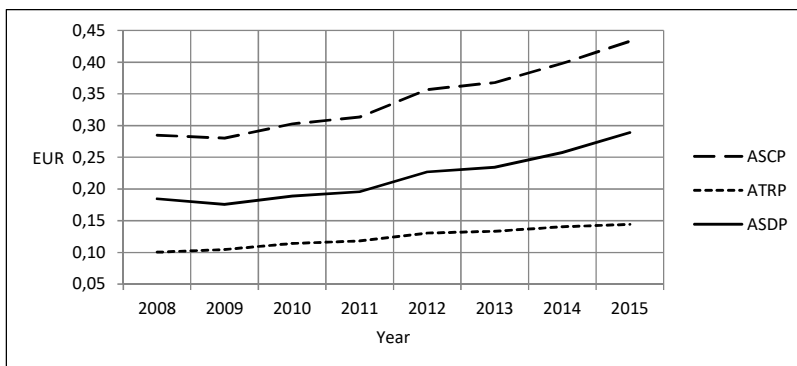
Source: Author

The GDP development except the year 2009 is clearly rising in the examined period. The consumption of cigarettes clearly decreases, although this trend practically stopped in 2015. The total consumption of cigarettes in the EU countries (without Croatia) amounted to half a trillion in 2015. Tax receipts from tobacco have a slightly growing trend during the monitored period. This may be partially attributed to the more efficient collection of taxes or to the reduction of tax evasion. However, it is very difficult if not impossible, to determine the amount of tax evasion and its changes [4]. The most fundamental, objective and undoubted aspect of the growth of tax receipts from tobacco products is certainly the growth of the relevant tax rates across the European Union. From this perspective, it seems that even if the social costs exceeded the receipt of tobacco taxes, the proportion between social costs of tobacco use and the collected funds of public budgets is gradually corrected and the two amounts begin to converge through tobacco excise duties. It may seem slightly disconcerting that the proportion of tobacco excise receipts in GDP begins to decrease, which can be explained by the decrease in the consumption of tobacco products.

Now, we shall use formula (3) to determine tax receipts in the individual EU countries (*TRP*), which shall further be used to calculate the average tax receipts per consumed cigarette in EUR in the EU within the defined time series (*ATRP*) by means of formula (2).

Then we shall determine the health care costs expended in connection with the tobacco product consumption (*HC*) by applying formula (6). This figure shall be used for the determination of social costs in EUR per consumed cigarette (*SCP*) in formula (5). And finally, formula (4) shall enable us quantifying the average EU social costs per consumed cigarette in EUR (*ASCP*).

Figure 2. Costs and revenues per unit including their difference



Source: Author

Figure 2 clearly shows that the average tax receipts per consumed cigarette in the EU (*ATRP*) within the defined time series are rising with no exception. At the same time, we can see the growth of the average social costs per consumed cigarette in EUR in the EU countries (*ASCP*) during the defined time series, with the exception of the year 2009. Moreover, these average social costs *ASCP* exceed the average tax receipts *ATRP* in each monitored moment, and their difference is the average social deficit *ASDP* obtained by application of formula (1). The rise of the average social costs *ASCP* in the period of 2008 to 2015 is more significant than the growth of average tax receipts *ATRP*; the difference between them increased by 57 % in the monitored period. The growth rate of average social costs is 2.12 %; the growth rate of average tax receipts is 0.63 %, and thus the resulting growth rate of the difference between the average social costs and the average tax receipts in the EU is 1.49 % during the years 2008 to 2015.

#### 4 Conclusion

We have clearly confirmed the assumption that the social costs of tobacco product consumption in the European Union countries are not covered by the receipts of tax on tobacco products, this despite the limitations explained in the methodology part of the text (especially measuring of cigarette consumption and illegal cigarette consumption). The truth is that the social costs not only exceed the receipts from taxes on the consumption of tobacco products, but the difference between the two has been increasing. The difference currently amounts to EUR 0.29 (in 2015), whereas in 2008 it was EUR 0.18: the current social costs are EUR 0.43, while the tax receipts are EUR 0.14. The social costs of tobacco consumption in 2015 were more than threefold of the tax receipts from tobacco, compared with 1.5 times of this proportion in 2008.

In this situation, we must recommend that the public sector adopt remedial measures in the form of substantial increase of tax on tobacco products in the EU countries. Although the efforts to harmonize tax systems of the Member States may sometimes seem excessive, any attempts in the area of tobacco taxes must be supported, and the increase of the minimum rates determined

by the Council Directive 2011/64/EU of 21 June 2011 on the structure and rates of excise duty applied to manufactured tobacco must be advocated [6]. The market itself, being imperfect, is not able to include the social costs of harmful consumption into the selling prices of tobacco products, and therefore this task is on the public sector to resolve.

Primarily, we recommend: i) increasing the specific component of the excise duty, which currently should not be less than 7.5 % of the amount of the total tax burden; ii) increasing the minimum amount of the excise duty, which currently should not be less than EUR 90 per 1,000 cigarettes irrespective of the weighted average retail selling price; and iii) the establishment of an absolute minimum excise duty imposed on a piece of cigarette in an adequate amount, which is still the responsibility of individual Member States.

All these recommendations apply to the specific component of the excise duty, because it considers the equivalent damage caused by the differently priced cigarettes better than the *ad valorem* tax. This type of tax can transfer the social burden of consumption of cigarettes, tobacco products and generally harmful goods to their consumers. We must point out the fact that, apart from the social damage, the tax receipts should also cover the administrative costs of the public sector incurred through the collection of the tax and apparently, the costs related to informing the public of harmful consequences of tobacco consumption. The moment when tobacco consumers bear all the costs of their consumption may be the moment of the end of the often-irrational fight between smokers and non-smokers.

An essential task of public administration for the future is to compile and regularly update official calculation of social costs in cooperation with specialized expert institutions. In the framework of the research activities it is necessary to build on current partial non-European studies and this comprehensive study in term of its elaboration in greater geographical details.

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# Ex-Ante Targeting in Lobbying Strategies: An Experimental Study

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## Abstract

As lobbying is currently an activity necessary for many interest groups including non-profit organizations, it is important to analyse a variety of potential strategies lobbyists may apply. We conducted a replication of a previous experiment to see whether theories about the ex-ante targeting of different policymakers hold. In the experiment, either two or three players of two types bid on simulated policymakers in order to succeed. In this article, we analyse two basic strategies – the theories of coalition expansion and counteractive lobbying – in terms of how often lobbyists target ex-ante supporters, the opposition, and undecided policymakers. We also focused on the size of lobbyist expenditures. Our investigation suggests that neither of the investigated strategies prevailed and other strategies may be naturally used by lobbyists.

*Keywords: lobbying; strategy; laboratory experiment*

JEL Classification: D72, C92, L39

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## 1 Introduction

For decades, most decisions made by politicians or public officials in all institutions in the USA and Europe have been influenced by lobbyists. Lobbyists communicate with decision makers and public officials in order to influence them and the public decision-making process. The European Commission defines the lobbying as “all activities carried out with the objective of influencing the policy formulation and decision-making processes of the European institutions” [7]. Transparency International estimates that there are more than 37,000 lobbying entities established in Brussels [10] carrying out actions to influence European institutions and European legislation or regulations. The lobbying entities there vary from small or individual lobbyists to powerful and resourceful organizations with greater power. Many of them not only represent private companies but more often lobby in the interest of non-profit and non-governmental organizations [13]. All of them have one thing in common – they all require the appropriate lobbying strategy to achieve their objectives.

Scholars have been studying the phenomenon of lobbying and different lobbying strategies for many years. Definitions have been offered of pro-active and re-active lobbying strategies [14], offensive and defensive strategies [20], and strategies shaped by the logics of influence, survival, and context [5]. One key element of the strategies is who is being targeted. It might be those who already support the same interest as the lobbyist, those who oppose it, or decision makers who have not yet declared any position regarding the policy [11]. Interest groups need to use a mixture of strategies to achieve their goals, but it is not simple to decide on the optimal mixture and the existing literature is not unanimous. However, there exist theories that address the question of the optimal ex-ante target for an interest group’s lobbying activities.

Decades ago, the prevailing opinion was to focus only on ex-ante supporters of the interest [2] as such people are easily convinced and would readily cooperate with the lobbyist. Not long after this, it was recommended to focus first on those who have not expressed an opinion and later target lobbying activities at policymakers in opposition [6]. The discussion about the optimal ex-ante strategy continued and theories have been developed. Austen-Smith and Wright [1] defined the theory of counteractive lobbying. This theory says that lobbyists start by targeting opponents of their interest to convince them to change their mind. Later, they aim their activities at the ex-ante supporters in order to consolidate their position. In contrast, Hojnacki and Kimball [10] came

up with a different theory – the theory of coalition expansion. They advise lobbyists to first consolidate their position with supporters and then later convince opponents if they have enough resources. However, empirical data show that lobbyists tend to spend most of their resources on decision makers without clear positions [19, 18].

The literature has failed to address situations where different interest groups or lobbyists cooperate. We therefore conducted a laboratory experiment to investigate different *ex-ante* strategies. To investigate these strategies, we chose to attempt to replicate a previous laboratory experiment. Rogers [16] created a lobbying game in order to study the behavior of lobbyists and the efficiency of their actions under different circumstances. We found the study and experimental design interesting enough to endeavor to perform a full replication with just minor adjustments for our conditions. In this article, we present the original design and compare the results with our own investigation.

## 2 Material and Methods

The experimental design is based on the model of the Colonel Blotto game [4], a symmetric game with two players with equal chances of choosing same strategy. In the game, two generals allocate their forces on the battlefield in order to gain dominance and win, similarly as when a lobbyist lobbies for his interest and allocates resources among different policymakers or officials.

The game's construction may seem simple at first glance, but as the two generals or lobbyists may have multiple strategies and battle on multiple battlefields, it is complicated to calculate a clear game equilibrium. Kovenock and Roberson [13] extended the game for two types of players and transformed it into a three player game with two smaller players who should form a coalition in order to achieve their goal and win on the battlefield.

### 2.1 Experimental Design

#### *Game Description*

The experiment consisted of 30 periods in total and was divided into three treatments (with 10 periods each). In the experiment, there were two types of players represented by different colors (yellow and purple). Players were randomly assigned a color at the beginning of each period. In each period, there was always one yellow player and one or two purple players. The number of purple players depended on the treatment.

The players represent lobbyists or interest groups. Policymakers or officials were not active game participants and were only represented as seven different color circles. In each period, there were two yellow, two purple, and three white circles. For the yellow lobbyist, the yellow circles represented *ex-ante supporters* and the purple circles *ex-ante opponents*. Similarly, for purple players the purple circles were *ex-ante supporters* and the yellow circles *ex-ante opponents*. The white circles represented politicians without a position towards the interest of either player type.

In the experiment, each color of players was given 140 tokens (indicated as  $i$ ). They bid  $x$  tokens on one or more of the seven circles (indicated as  $j$ ). The color that bid more on a given circle won that circle ( $z_{i,j} = 1$  or  $z_{i,j} = 0$ ) and the lobbyists who won the most circles gained dominance across different politicians and were rewarded ( $w_i = 1$  if  $\sum_{j=1}^7 z_{i,j} \geq 4$  and  $\gamma > 1$ , or else  $w_i = 0$ ). The bidding on circles was similar to any other auction, but there was an advantage for players to bid on circles of their own color (yellow players on yellow circles and purple players on purple circles). For any amount bid on a circle of the player's color, 10 tokens were added on top of the bid. Therefore, different colors and the existence of the advantage created an environment where the lobbyists were motivated to expend their resources and the policymakers had clear *ex-ante* preferences. Appendix A presents how the screen appeared to subjects in the experiment.

In each period, the players were paid in experimental monetary units (EMU) that were exchanged for Czech korunas at the end of the experiment. The payoff for each player was based

on three aspects – the number of circles won, dominance over circles, and the margin of victory in a circle. Each player of the winning color received 10 EMU per victory. If a color gained dominance (more than 4 wins), each player received 20 EMU per circle instead of 10 EMU. However, the margin of victory in each circle also mattered. Winners received a bonus  $(y_{i,j}^{1/2})$ , where  $y$  is the difference in tokens between the bids) and losers a penalty  $(-y_{i,j}^{1/2})$ . Equation 1 shows the payoff functions.

$$\Pi_i = \begin{cases} \sum_{j=1}^7 f(y_{i,j}) + \beta \sum_{j=1}^7 z_{i,j} & \text{if } w_i = 0 \\ \sum_{j=1}^7 f(y_{i,j}) + \gamma \beta \sum_{j=1}^7 z_{i,j} & \text{if } w_i = 1 \end{cases} \quad (1)$$

### Treatments

As mentioned above, the experiment consisted of three within-subject treatments – *baseline*, *divided*, and *alliance*. The *baseline* treatment was a two-player symmetric game with one yellow player and one purple player. Each was given 140 tokens. The baseline simulated a lobbying situation with two equal interest groups in direct opposition.

In the *divided* and *alliance* treatments, there were three players, one yellow and two purple. The yellow player received 140 tokens and each purple player 70 tokens, for a total of 140 tokens for the purple interest group. These two treatments were identical except for one difference. In the *alliance* treatment, the second purple player was allowed to transfer any amount of tokens to the first purple player before bidding on colored circles. If the second player transferred all of their tokens (70 tokens), the game changed into the same two-player symmetric game as in the *baseline* treatment. The *divided* treatment then simulated a situation where a smaller lobbyist cannot cooperate with a larger one.

The different treatments were designed to answer questions related to different theories of lobbying strategies. We hypothesized that in the *baseline* treatment the subjects would tend to bid first on circles of their own color, next on opposing circles, and last on white circles. In addition, when subjects did not cooperate in the *divided* and *alliance* treatments, they would still bid on circles of their own color and cause overbidding and therefore waste resources – this would apply in particular to purple players. Our hypothesis follows the coalition expansion theory [9] and brings about our first research question: Do subjects prefer circles of their own color to other circles?

The theory of counteractive lobbying [1] raises different questions. The theory predicts that when two interest groups of identical size are in opposition (*baseline*) lobbyists will lobby all kinds of policymakers. On the other hand, when groups cannot cooperate and face a stronger opponent they will tend to focus on their supporters while their opponent will aim its lobbying activities at policymakers with no position and policymakers in opposition. Therefore, we formulated two additional research questions: Do purple players bid more often on purple circles, and do yellow players prefer to bid on white and purple circles rather than yellow circles?

### Procedure

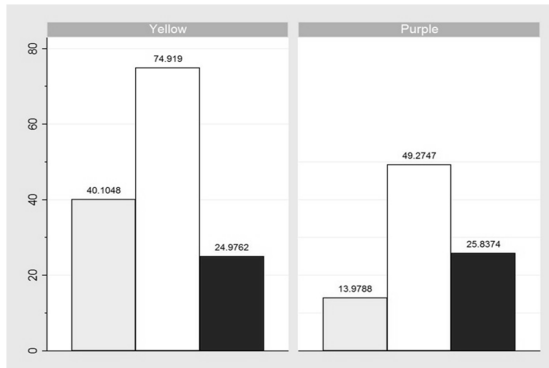
Rogers [18] conducted his experiment in 2012 at Florida State University with 90 undergraduate students. We conducted our experiment at Masaryk University in 2015 with 54 university students. The experiment was programmed with z-Tree [8] and subjects invited through *hroot* [3]. For payment, EMU were exchanged for Czech koruna (20 EMU = 1 CZK). Each session lasted about 100 minutes and subjects were paid CZK 210 on average.

At the beginning of each session, subjects were randomly seated at computers in the Masaryk University Experimental Economics Laboratory. The instructions were read out loud and also handed to subjects printed on paper. Before the experiment, the subjects had to answer control questions to evaluate whether they understood the instructions. The experiment consisted of 30 periods of 3 treatments (differently ordered in each session) and a measurement of subjects' risk aversion [10]. After the risk aversion task, subjects were asked to complete a questionnaire about lobbying and their attitudes regarding lobbying activities. The questionnaire was constructed based on existing lobbying surveys [17, 15].

### 3 Results and Discussion

We start data analysis by looking at the overall behavior of subjects among treatments. We were curious about whether the theory of coalition expansion would hold and so lobbyists would tend to target their supporters, in our setting whether purple players would bid on purple circles and yellow players on yellow circles. As Figure 1 shows, on average both yellow and purple players bid more tokens on white circles than on the other circle types. Their second preference was for circles of their own color. Among all treatments, subjects targeted larger average bids at policymakers with no position and supporters of their own position.

Figure 1. Average bids on colored circles



Source: Authors

This trend also held for players if we look at behavior in different treatments. Both purple and yellow players preferred to target policymakers with no position, but there was a deviation in the behavior of purple players. In *divided* and *alliance* treatments, there was a small difference in the average amount of bids on yellow and purple circles – favoring purple circles by 5.2 tokens in the *divided* treatment and 3.6 tokens in the *alliance* treatment (Tables 1 and 2 in Appendix B).

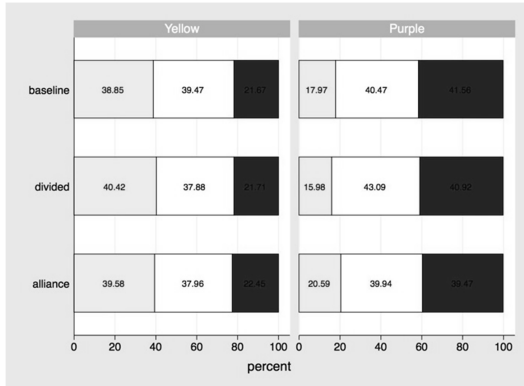
These results answer our first research question. We can observe that the subjects did not show a preference for circles of their own color and tended to privilege white circles over others and so the coalition expansion theory does not hold.

To answer the second and third research questions, we have to look not at how much the subjects bid, but how often. Each treatment lasted for 10 periods and each player faced 7 colored circles (two purple, two yellow, and three white). Figure 2 presents an overview of bidding by yellow and purple players. In all treatments, players tended to bid on white and circles of their own color similarly often – about 40% of bids for each. The remaining 20% of bids were then placed on circles representing opposing policymakers.

Our results show that our second and third research questions should also be answered in the negative. We did not confirm the hypothesis of the theory of counteractive lobbying as we saw that neither did purple players favor purple circles over white when facing a powerful opponent (in the *divided* and *alliance* treatments) nor did yellow players favor white circles.



Figure 2. Proportions of bids on colored circles



Source: Authors

## 4 Conclusion

In this article, we attempted to replicate an experimental design by Rogers [18]. Our main goal was to test two basic theories about whom an interest group should lobby first. The two tested theories – coalition expansion and counteractive lobbying – were not observed in the behavior of our experimental subjects.

Our data contradicts the observations of Rogers [18], who found the largest average bidding on circles of the player’s own color, meaning ex-ante supporters, and therefore determined there was evidence to support the coalition expansion theory. We found that lobbyists spent most of their resources on white circles, policymakers who did not have any ex-ante position regarding the lobbying group’s interest. Moreover, while Rogers [18] found support for the counteractive lobbying strategy, we did not observe any in our data. The behavior of our subjects did not follow these two strategies but did show evidence for the opinion of Dexter [6] that policymakers without any ex-ante opinion would be targeted. This behavior is in line with existing empirical data and is a typical lobbying tactic, as shown by such authors as McGrath [16].

## Acknowledgments

This research was supported by the Czech Science Foundation, project no. 16-08786S “Impact of Transparency of Lobbying on Democratization and Its Consequences”, and Masaryk University, project no. MUNI/A/0996/2015.

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## Appendix

### Appendix A: Screenshot of decision-making screen



NOTE: Translation of the screen:

Upper left corner: Period 1

Upper right corner: Remaining time [sec]

Text on the screen:

In this period, there is 1 yellow player with 140 tokens and 1 purple player with 140 tokens.

Your role is **YELLOW player**.

You have **140** tokens. Please, fill in your bids into the boxes under each circle.

**Remaining tokens: 140**

Source: Authors

### Appendix B: Tables

Table 1. Mean bids by yellow players in each treatment

Treatment	Mean	Std. Err.	[95%Conf. Interval]	
<b>Yellow player</b>				
Yellow circle				
<i>baseline</i>	43.27407	1.186972	38.16695	48.3812
<i>divided</i>	39.87778	4.060587	22.40648	57.34907
<i>alliance</i>	35.57778	.6073876	32.9644	38.19116
White circle				
<i>baseline</i>	74.53704	2.393143	64.24017	84.8339
<i>divided</i>	73.86667	8.135593	38.86204	108.8713
<i>alliance</i>	76.54444	3.575435	61.16059	91.9283
Purple circle				
<i>baseline</i>	22.18889	1.493043	15.76484	28.61293
<i>divided</i>	26.25556	5.572231	2.280183	50.23093
<i>alliance</i>	27.87778	2.989137	15.01656	40.739

Source: Authors

Table 2. Mean bids by purple players in each treatment

Treatment	Mean	Std. Err.	[95%Conf. Interval]	
<b>Purple player</b>				
Yellow circle				
<i>baseline</i>	18.16296	2.168806	8.831346	27.49458
<i>divided</i>	10.65	2.699078	-9.631962	22.2632
<i>alliance</i>	14.16944	3.1325	.6913863	27.6475
White circle				
<i>baseline</i>	71.91111	1.846262	63.96729	79.85494
<i>divided</i>	43.5	3.290161	29.34358	57.65642
<i>alliance</i>	38.07222	4.55335	18.48074	57.6637
Purple circle				
<i>baseline</i>	49.92593	2.483164	39.24173	60.61012
<i>divided</i>	15.85	1.941404	7.496811	24.20319
<i>alliance</i>	17.75833	1.790219	10.05564	25.46102

# Deadline for the Administrative (Review) Procedure at the Office for Protection of Economic Competition in the Field of Public Contracts

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## Abstract

The paper explores the length of deadline for the administrative (review) procedure at the Czech Office for Protection of Economic Competition in the field of public contracts. Administrative proceedings constitute a framework of rules for the application of the rules of law. One of the aspects of administrative proceedings is the fact that these proceedings on one hand, allow the possibility of applying the procedural rights of all parties to administrative proceedings, on the other hand that took place within a reasonable timeframe. Administrative proceedings therefore has a beginning, and the end. Administrative proceedings are terminated by issuing a decision, which is in force. A decision within the statutory period represents an integral part of a transparent review of the contracting authority. Without an effectively functioning administrative review cannot properly operate the entire system of procurement procedures. Said assessment is the subject of this article.

*Keywords: public administration; public contracts; review procedure; Office for the Protection of Economic Competition*

JEL Classification: H83

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## 1 Introduction

Administrative proceedings constitute a framework of rules for the application of the rules of law. One of the aspects of administrative proceedings is the fact that these proceedings on one hand, allow the possibility of applying the procedural rights of all parties to administrative proceedings, on the other hand that took place within a reasonable timeframe. Administrative proceedings therefore have a beginning, and the end. Administrative proceedings are terminated by issuing a decision that is in force.

Administrative proceedings are governed by the Administrative Procedure. Special regulations administrative-legal nature also includes procedural in nature, which take into account physical traits relevant administrative law and take precedence over the general rules of process management, which is contained in the administrative order.

Deadline for a decision contained in the Administrative Procedure Code and mostly no longer contained in the regulations specific nature (specific deadlines are set e.g. In the Law on Free Access to Information). In other words, for the majority of the public administration the deadlines for issuing decisions specified in the administrative order.

Within the wide range of provisions of administrative law for the analysis of deadlines for issuing decisions elected Office for the Protection of Competition and administrative procedures in the field of public procurement [4].

### *1.1 Meaning Deadlines in the Administrative Process*

Deadlines as the passage of time tend to have mostly significant procedural and substantive consequences, and it is therefore necessary from the perspective of participants in these deadlines and run carefully monitored.

## *1.2 Distribution of the Periods in General Terms, according to the Administrative Procedure*

Deadlines in general is divided according to multiple categories. Doctrine refers to the time limits executive character limits of substantive and procedural [3, 10]. Theory states that substantive deadline is the deadline for claiming a procedural deadline to make a certain action in the proceeding. It is the deadline set in relation to the party and its privileges within the time to take action or refrain from certain actions (eg. appeal).

According to § 71 of the Administrative Code, the administrative authority shall issue a decision without undue delay. Deciding to mean:

- handover copy of the written decision to deliver in accordance with § 19, or other act of its receipt, if done the administrative authority itself; on documents or mailer to indicate this fact by saying, "narrated the day:"
  - verbal declaration, if the effects of the notification (§ 72 para. 1 of the Administrative Code)
  - posting a public notice if it is delivered in accordance with § 25 of the Administrative Code or
  - stigma resolution to the file if it is only noted in the file.

However, if the decision cannot be issued without delay, the administrative authority shall issue a decision within 30 days of the initiation of proceedings to which is added the time

- up to 30 days (for a total of up to 60 days) if required an oral hearing or a local inquiry if need someone to call, someone let the show or deliver a public notice to persons who demonstrably fail to deliver, or if it is a particularly complex case
- required to execute a request pursuant to § 13 par. 3 of the Administrative Code, the processing of expert opinions or to serve it abroad.

The time necessary to provide data according to § 6 para. 2 of the Administrative Procedure deadline for a decision is not running (§ 71 par. 4 of the Administrative Procedure Code).

Failure to meet deadlines could not rely on the party that is caused. The transparency of award procedure is not possible without effective (quick) review procedure [2,7]. If it is review procedure longer, it is given uncertainty of procurement entities: state, cities, regions [1, 5].

In analyzing the nature of the deadline for a decision by the Administrative Procedure can be deduced that a riot character, because when it is not connected to missed primary legal consequence in relation to the outcome of the administrative procedure, compared with e.g. the deadline for issuing a decision under the law on free access to information, the expiry of the deadline, it is considered that the administration does not intend to provide information [7].

This article discusses the situation in the Czech Republic.

## **2 Material and Methods**

The aim of this article is done based on law de lege lata analysis of deadlines for issuing decisions and examples in Brno principal established the Office for the Protection of Competition dismantle whether these time limits are observed. After analyzing shall propose measures to improve the current administrative practice of the Office for the Protection of Competition in compliance with these deadlines and will also include proposals to achieve greater efficiency of administrative proceedings by amending the law (*de lege ferenda*).

In the analysis of all elements and requirements imposed doctrine and practice of the administrative process, is one of the necessary formalities in the process speed control, i.e. a final administrative decision in the shortest time possible while respecting the procedural rights of all parties to administrative proceedings. Given that cast doubt on the length of the deadline for issuing a decision, administrative order deadline straight sets. Administrative regulations also contain a procedure for extending the deadline for a decision and instruments of defense against inaction of an administrative authority [11]

Regarding the nature of deadlines for issuing decisions, doctrine and jurisprudence states that it is a period executive character, which actually means that it has exceeded the procedural consequences in relation to the administrative procedure led, respectively. influence on its outcome. Ignoring the deadlines may have a secondary consequence is the fact that a party may, under certain conditions, to seek damages for maladministration by Act No. 82/1998 Coll., On liability for damage caused in the exercise of public authority decision or maladministration and amending Czech national Council Act No. 358/1992 Coll., on notaries and their activities (notary Act). According sentiment. Law is the party entitled to claim damages for delay in the proceedings as per maladministration, which is possible only with the active approach of the parties in the application of the procedure leading to damages [8].

As mentioned in § 71 of the Administrative Code stipulates the deadlines for issuing decisions, which are broken down by the complexity of the case. The administrative body should then decide (to give a decision)

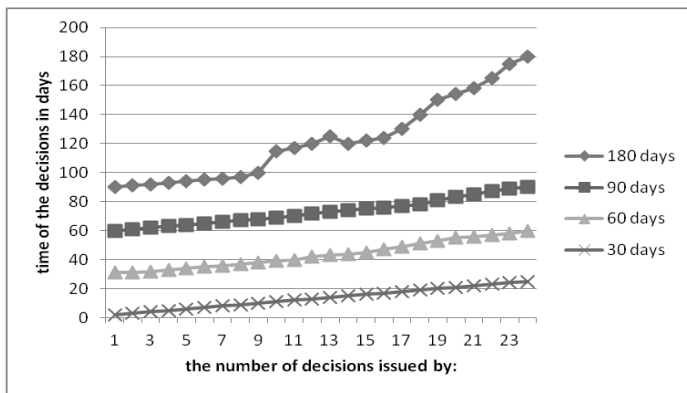
- in simple cases without delay,
- in other cases within 30 days
- in particularly complex cases within 60 days.

Not in all cases, however, the administration of these disciplinary deadline respect. From my own experience shows that these deadlines are simpler administrative matters in the parish, publishing documents and other certificates and certificates respected. In this respect, the administrative authorities can not criticize anything and does not make sense for these things simpler to analyse deadlines. It is different in a complex and unusual administrative matters. Analysis was performed when the administrative procedure, review the acts of public authorities Public Procurement Office for the Protection of Competition, which are generally more complicated things from the legal and can be difficult even after the comprehensiveness of the evidence if necessary. obtaining additional evidence base, said criterion should be decisive in relation to the assessment of the complexity of the case [6].

Analysis was subjected to the decision of the Office for Protection of Competition for the period from 1 January 2015 until 31 March 2015, which came into force 80 decisions. This number includes both the decision of the first instance decision and II. Degree [9].

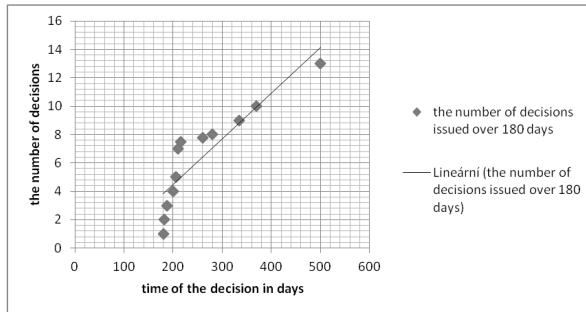
Simple sum of days required for the release of each of the analyzed decisions based on the total length of both proceedings 8,292 days, which amounts to an average of 104 days to issue a single administrative decision in one instance. Even from this cursory view suggests that the deadline for a decision by the Administrative Procedure are significantly exceeded. Refer to the following charts:

**Figure 1. Decisions issued within 180 days**



Source: Author

**Figure 2. Decisions issued within a period of over 180 days**



Source: Author

**Table 1. Statistical divisions into classes of 30 (days), then simplified overview gives the result**

Class interval (days)	0-30	31-60	61-90	91-180	180-480
The absolute frequency (number)	1	26	22	24	12
Relative frequency (%)	1	33	26	30	14
Cumulative relative frequency (%)	1	34	59	88	101

Source: Author

### 3 Results and Discussion

Regarding placed limits and statistical operations, it is necessary within the framework of objectivity noted that a decision published on OPEC is detectable when the administrative procedure was initiated and when the decision was issued. For the purposes of this analysis are taken into account the number of days between the time milestones. Its flaw is that it does not always correspond to the actual state of affairs. E.g. deposit required to initiate proceedings on a proposal to be lodged at the date of initiation. If not, the petitioner is invited its composition, if necessary. It is challenged to eliminate other procedural defects in the petition, and she would have time until the deadline for the administrative decision should not be counted. On that does not alter the fact that even during periods of reading about 10 days on bail or eliminate defects in the proposal, the average period for issuing the decision is still out "understanding" and the concept of Administrative Procedure. Time to remove potential defects is not from the text of the administrative decisions detectable.

This analyse is contained in figure 1 and figure 2 and table 1. The proceedings in this case lasted 477 days and for its extreme not to partial analysis included.

The above analysis was conducted compliance deadlines in administrative proceedings in the review of public contracts. In view of the above analysis, we can state that the administrative procedure is used for the widest range of activities of the authorities. Under normal administrative activities (eg. the activities and practices of documents, registers, residence, and other classic administrative activities) are the deadlines for issuing decisions or taken action to end the official activities entirely satisfactory, and a 60-day period actually covers cases factually and legally complex, mostly with foreign legal element.

In contrast, the special administrative proceedings conducted by the Office for Protection of Competition exhibit deficits in compliance with the deadlines for the issuance of an administrative decision, which is due to possible improprieties Administrative Procedure as procedural regulation in this area, work is also incorrect administrative practices, the work probably overburdened Office or the way it is decisions.

We can conclude from figure 1 and 2 and table 1 that in the 30-day period was completed just over 1% Management (literally 1 case), the acceptable time of 60 days, then only 1/3 of the cases. Within half year, the Office decided in 87%, the remaining 13% then lasted 6 to 16 months.

The conducted analysis shows that none of the types of contracting authority, as it lists § 2 of the Act on Public Contracts, not for the length of administrative proceedings dominant, scattering duration is more or less comparable and can say that the kind of the contracting authority has no influence on the length of proceedings.

Even lengthier appeals procedure is the second stage where the expectable time applicant or sponsor to handle their appeals ranges between 60 - 154 days in an extreme case, as noted above, as well as almost 16 months.

From source OPEC we can conclude following. In the study of administrative decisions in the field of public procurement author came to the conclusion that 2/3 of the text of the Decision form the descriptive part of the parties to the administrative proceedings and follows the well-known quotations legislation and the conclusion of the administrative authority. Decisions are often 10 to 20 pages. In terms of recommendations for improvement can therefore propose a summary of administrative records for about one to two pages, and then present the facts of the administration and the legal conclusions, and thus reduce the content of administrative decision about ½ and simultaneously thereby reducing the time for execution of the decision, which will also be to some extent, to minimize any delay in the proceedings.

Given that this work does not and cannot have, ambitions to be changed on the basis of the entire system of reviewing public procurement and competition, proposed in resolving this issue recommendations to improve current practice. One recommendation is in administrative practice, the other for a change of Administrative Procedure.

In the context of the considerations *de lege ferenda* can propose the abolition of the decomposing management. These considerations have already occurred in the drafting of a new administrative procedure and were ultimately detrimental rejected. In doing so, the Appeals Committee can be translated into a consultative body and expository ministry or central authority and the relevant central government body may have saved internal workforce used to improve decision-making as a whole. Moreover, we cannot conceive Office in the first instance and as chairman two independent instances, always decides Office, which also accepted the decisions of the administrative courts. In accordance with the constant court case law (eg. Resolution of the Supreme Administrative Court in the case file. Ref. 8 Afs 56/2007) is not necessary with regard to the exhaustion of remedies under the Administrative Procedure use procedural means - Institute of protection against inactivity in accordance with § 80 of the Administrative Code - because "the complaint on a particular subject given to him alone is not a defense against complaints procedure specific entity applying to him, not defence." the administrative court therefore considers that the central administrative body as a whole.

#### **4 Conclusion**

The deadline for the administrative decision is of great importance to the legal status of participants in administrative proceedings and frequently the importance of timeliness of the administrative decision exceeds the actual administrative costs and affect the related party relationships such administrative proceedings. An example is the substantive area of the review of public procurement in administrative proceedings, where the course of the administrative proceeding may be an obstacle to concluding the contract of a commercial relationship. Given that the effective management of the procurement procedure under the Public Procurement Act, its length may not exceed two months, the length of any review proceedings should be rather short, which, however, diverges from reality, as previously analysed. At the same time the measures were designed in administrative practices and considerations *de lege ferenda* to remedy the current defective state. Recommendation:

- Simplify content and reducing the scope of the administrative file



- Cancelling the scanning procedure or move the proceedings II. step out of the land of the Office for Competition.

## Acknowledgements

The contribution is processed as an output of a research project SMO: Implementation of new Procurement Directives.

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# Measuring the Conflict between the Municipal Bodies in Slovak Municipalities

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## Abstract

The system of self-government in Slovakia is based on the division of competences between two municipal bodies - the council and the mayor. In order to achieve an effective public administration, the legislator presuppose a cooperation between the two bodies. However, due to a number of factors influencing the relations between the bodies, we can often observe a conflict instead. While the majority of existing studies use surveys as a method for measuring the level of conflict and cooperation in the local government, this paper proposes an alternative method of measurement and introduces a model of indicators of conflict that aims to capture the formal side of municipal politics more accurately than an indirect measurement of perception of conflict is able to. The indicators of conflict were selected by analyzing the legal framework within which the municipal bodies operate, considering the existing characterization of conflict in local government in literature and the use of individual indicators in previous research. Although the model is tailored to Slovak context and the structure and competencies of the bodies in Slovak municipalities, several of the indicators can be used as proposed or modified for the research of municipalities in other countries as well.

*Keywords: self-government; municipalities; municipal bodies; mayor; council; conflict*

JEL Classification: H83

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## 1 Introduction

Local self-government system in Slovakia distinguishes two municipal bodies that are mandatorily formed in every community or city in the country - mayor and local council. By establishing the relations between the two bodies as relations of equality, not a subordination, the legislator presuppose that the bodies will cooperate, therefore „*if the municipal administration is to be executed in the interest of local population, the relations between the municipal bodies have to be based on mutual cooperation, not on „fight“ for power and for gaining predominance in the administration of local matters*“ [9]. However, a number of various factors influencing the relations between the two bodies (political, structural or even personal) often set off a conflict. The councillors' perception of their own role is one of the examples of such factors. [3] claim that if councillors perceive their role regarding the relations with the executive mostly as a role of „balance power“ ensuring that the executive follows the attitudes and interests of citizens, their actions will be much more confrontational as would be the case if they see themselves as a part of municipal government, in which case they will support the executive in order to allow a smooth provision of public services for citizens. [7] identify political affiliation of the mayor as a significant factor influencing the degree of conflict between the municipal bodies. In studies of the states in which there are several different modes of horizontal power division and competence division across the municipalities, the authors also stress the impact of the choice of the particular mode on the degree of conflict (e.g. [8]). Thus, there is a large number of factors influencing the degree of conflict or cooperation between the municipal bodies, yet the fundamental question remains what are the options for measuring the conflict itself.

Todorovski's [11] analysis of relations between the municipal bodies in Macedonia is based mostly on a survey among the mayors and local councillors. The use of surveys can be also found in studies [1] or [7]. However, this type of indirect measurement of conflict - measurement of perceptions of the members of municipal bodies, has several disadvantages. The obvious one is the distortion of data, which may be based merely on subjective feelings of the members not

reflecting the reality. For example, if there is a dispute (which may in fact be an isolated situation) at the time the survey is being carried out, it is highly probable that the perception of the degree of conflict will be overstated in the answers stated in the questionnaire. Another problem is the comparability among the municipalities, since the answers can be influenced by the presence of conflict in the municipality in a reverse way as expected. In fact, it is possible that the reported degree of conflict may be higher in municipalities where the conflict occurs rather rarely, simply because of the higher „sensitivity“ of the respondents to a conflict. Besides that, surveys are often conducted among the members of only one of the two bodies and therefore reflect a one-sided view.

On the other side, the indirect measurement of conflict has its merit since much of the decision-making process in municipalities take place within the network of informal interactions and institutions (various meetings, informal talks etc.) which cannot be captured by a simple factor analysis. For [8] “the study of the governmental process from the conflictual perspective involves measuring the formal and informal power of the competitors, how it is acquired, and how it is used.” It is important to point out that the methods for measuring the formal and the informal part of the conflict should differ. While surveys and interviews are definitely more suitable for measuring the informal side of city politics, the distortion of data explained above induce us to use other methods for exploring the formal face of the conflict.

Therefore, this paper introduces a model for measuring conflict between the municipal bodies in those processes that can be considered as formal and are thus observable and quantitatively measurable. The model focuses on actual use of formal power of the competitors that can be “used against the other competitor”. It does not cover the differences in allotment of formal powers (with the exception of one indicator) across the municipalities, because unlike in American case that Svava examines, the formal powers of the municipal bodies in Slovakia, as will be explained in more detail in the next section, are set uniformly for all municipalities in the country.

The model of indicators of conflict is based on Svava’s [8] understanding of conflict as an escalation of a disagreement when group members with incompatible goals seek to impose their preferences on others. [5] expand on this by adding that conflict arises when interactions become negative and characteristic of blocking behavior and activities that disregard the preferences of other participants. According to [8], *“conflict involves the use of power for offensive or defensive purposes in four ways: (1) to compel others to act or agree; (2) to block someone else from acting; (3) to resist the compulsion of others; and, by extension, (4) to maintain the freedom to act without being checked by someone else”*.

By following this characterization of conflict, the paper analyzes the legal framework within which the bodies operate and search for quantitatively measurable indicators of conflict between the municipal bodies as a phenomenon which, as [8] and [5] point out, may have significant impact on the quality of decisions in municipality.

### *1.1 Structural Setting of the Relations between the Municipal Bodies in Slovakia*

To understand the choice of the indicators of the degree of conflict between the bodies in Slovak municipalities, one must first know the structural setting of their relations. In general, there are two possible layouts of the municipal system - monistic and dualistic structure. In the first case, the executive apparatus of the municipality derives its subjectivity from the subjectivity of the representative body. [9] By contrast, dualistic system can be distinguished by the separate constitution of executive and legislative body with the clear division of competences between them. Due to the system of directly elected mayors, clear division of competences and the fact, that the mayor is a sole executive body (there are no executive committees), Slovakia belongs to the group of countries with the dualistic horizontal structure. In contrast to the legislative rules of many other countries that allow municipalities to choose a different model of the horizontal structure setting or lay down different models for different municipalities based on their population or other criteria, the model is mandatorily uniform for all of the municipalities in Slovakia.

Beside the basic distinction between monistic and dualistic systems, there are several extended typologies of the horizontal relations settings in municipalities. For example [4] distinguish between four different forms of self-government system - the strong mayor form, the committee-leader form, the collective form and the council-manager form. Since, as mentioned above, the mayor is a sole executive body in Slovak self-government system and the legislation does not introduce the positions of city manager or committees with executive powers, Slovak municipalities are closest to the strong mayor ideal type.

By the division of competences, the Law on municipalities defines a different character of the two municipal bodies. While the local council represents a conceptual body, which „*decides on the fundamental issues of the municipality*“, the mayor is an executive as well as an operational body, which carries out the decisions made by the local council and deals with the „*common*“ administration of the municipality. However, insufficient legal knowledge, as well as different interpretations of which matters belong to „*fundamental issues*“ and which to „*common administration*“, often lead to conflict, especially in small municipalities [9]. Particularly in the case of escalated „*factual*“ conflict (how to deal with the local matters), the „*procedural*“ conflict (who should deal with the local matters) attaches as well.

The clear division of competences means that every issue should always be addressed only by one of the bodies. Therefore, the situation that a particular issue can be alternatively addressed by local council or mayor, is not legally possible. [9] The law leaves the specification of some of the competences to internal regulations of the municipality, particularly the Statute of the municipality, the Principles of management of property and the Budgetary rules of the municipality. The content of these regulations cannot contradict the state laws and cannot grant one of the bodies competences that are in purview of the other body. The division of competences of course does not mean, that the interaction between the municipal bodies does not exist and that there are no procedures where there is a need for their cooperation. This paper focuses exactly on such cases of interaction where the conflict can become observable.

## 2 Material and Methods

The paper proposes a model of indicators of the degree of conflict between the municipal bodies in formal decision-making processes and institutions of Slovak municipalities. The method used for the identification of the indicators is a qualitative analysis of the legislation of Slovak republic related to the relations and competences of both bodies, particularly the Law No. 369/1990 on municipalities, Law No. 138/1991 on municipal property, Law No. 253/1994 on legal position and salaries of the mayors and Law No. 357/2004 on conflict of interests. The analysis is supplemented by insights from the Commentary on Law on municipalities [10] and from publication on competence law in municipalities [9]. The choice of the indicators was consulted in interviews with two experts on local self-government in Slovakia, JUDr. Jozef Tekeli, PhD., who works at Faculty of Law of Pavol Jozef Šafárik University in Košice and wrote several books on municipal law and doc. PhDr. Daniel Klimovský, PhD., an assistant professor at Faculty of Social and Economic Sciences of Comenius University in Bratislava. Both experts provided valuable insights into the strong and weak points of individual indicators.

The analysis of the legislation follows the abovementioned Svára's [8] conceptualization of conflict and selects the indicators that adhere to this understanding of conflict as a use of (in our case formal) power in different ways. Some of the indicators were already used separately (even if slightly modified) in previous research in other countries. The added value of this model lies in joining these and other indicators into one model that aims to cover all observable displays of conflict within the formal side of municipal politics in Slovakia.

### 3 Results and Discussion

#### 3.1 Model of Conflict Measurement

##### *Votes for Mayors' Proposals in Local Council*

The basic arena where the interactions between the municipal bodies take place, best observable for citizens as well as for researchers, is a local council session. The session is convened and led by the mayor, who also introduces most of the materials for discussion and ratification by the council. This is mostly caused by the abovementioned different character of the bodies and different level of their professionalization. However, there are differences among the municipalities in formal recording of the proposers. While in some municipalities, the proposals are almost solely presented as mayors', in other municipalities they are often recorded as the proposals of the chief of the municipal office or municipal office departments' leaders. Nevertheless, both are de facto proposals of the municipal executive, since, according to the Law on municipalities, the work of the municipal office is managed by the mayor.

The analysis of votes of the councilors for the mayor's (or municipal office's) proposals is therefore a basic method of measuring the conflict between the municipal bodies. However, it is necessary to point out that many of the resolutions passed by the council are rather formal, such as resolutions related to taking various reports and information into account. Therefore, when studying the conflict between the bodies, it is necessary to identify the types of proposals which are controversial in nature. Such proposals are decidedly those related to the fundamental financial and strategic document of the municipality - municipal budget, which is created annually by the municipal office. The second type of proposals often igniting dispute between the bodies constitute proposals regarding the municipal property management. In this case, the choice of the proposals has to be selective to exclude proposals de jure introduced by the mayor or municipal office but de facto being proposals of the individual residents of the municipality asking to purchase a land or a property simply because they desire to build a house extension etc. The third substantial category of the „conflict-bearing“ proposals are proposals concerning the appointment of head positions in municipal organizations and the appointment of municipal representatives in supervisory and executive bodies of the municipal companies. In the former case, the law clearly defines that the appointment of the directors of organizations is in the purview of the council, however, the realization of the competence is conditioned by the mayor's proposal. (ibid.) In the second case, the law does not restrict the proposals to be mayor's, yet the common practice is that they are. Two of the identified “conflict-bearing” categories of proposals were also used in the analysis of conflict between the municipal bodies in Zagreb [6].

The total proportion of rejected proposals may indicate the lack of support of the mayor in the council. By analyzing the individual votes and identifying the number of councilors voting „for“, „against“ or abstaining, it is also possible to identify a „coalition“ supporting the mayor in a council as well as find out the information about stability of the majority across the votes.

##### *The Use of the Mayoral Veto*

The use of the mayoral veto directly connects to the first indicator. While in the first case, the conflict is manifested by the votes of the councilors, in case of vetoing, the role of the „active carrier“ of the conflict passes on to the mayor. The Law on municipalities gives mayor a power to suspend the execution of the council's resolution if he thinks that it is inconsistent with the legislation or that it is disadvantageous for the municipality by not signing the resolution in ten days period set by the law. As [9] explains, the legal formulation does not require the mayor to prove the unlawfulness or the disadvantageousness of the resolution for the municipality and the reason for suspending the resolution is therefore legally irrelevant. The mayoral veto can be overridden by three fifths of all councilors. In his study on the use of the veto by governors in the American states Wiggins [13] found out that the use of the veto depends to a large extent on the political control of the bodies. In states where the executive and the legislative were controlled by

a different political group, the use of the veto was much more frequent. It is therefore evident, that the frequency of vetoing is one of indicators of the degree of conflict between the bodies.

#### *Modification of the Internal Municipal Regulations Limiting the Mayors' Powers*

As stated above, the law leave the specification of some of the competences and processes in the municipality to internal regulations of the municipality passed by the council, particularly the Statute of the municipality, the Principles of management of property and the Budgetary rules of the municipality. While the Statute of the municipality is often just a general document literally reproducing the wordings of the Law on municipality, the exact wording of the Principles of management of property or the Budgetary rules of the municipality tends to differ across the municipalities.

In relation to measurement of the conflict between the bodies, it is essential to focus on the modifications limiting the powers of the mayor. In case of the Principles of management of property, this refers primarily to the change of the limits of value of movable assets and property rights below which the mayor can decide on transfers of the assets and property rights without the approval of local council. Even more important for the functioning of municipality is the designation of the amount of budgetary means decided on solely by the mayor and the amount by which the means can be exceeded or held by the mayor without the need for approval of the local council included in the Budgetary rules of the municipality. The law leaves the entrustment of these budgetary measures to mayor in the hands of the council, mostly because the local council does not hold sessions on a permanent basis and therefore cannot operatively react to the situations emerging in the municipality. For example, if the council does not allow the mayor to execute any budgetary measures without its approval, the mayor could not decide on the use of the financial resources even in the case of unexpected emergency situation and would have to wait until the next council session which would have a significant impact on normal functioning of the municipality. [9] claims that the extent of these measures “*is in fact conditioned in many cases rather by the character of factual relations between the local council and the mayor*”. Therefore, it is presumable that in the case of conflict between the bodies, the amount of resources that can be decided solely by the mayor would be reduced by the council. This holds for property assets in the Principles of management of property as well as for the budgetary means in the Budgetary rules of the municipality.

#### *The Number of Councillors' Proposals for Budgetary Changes*

The following indicators refer to the conflict between the bodies indirectly and might be a consequence of other phenomena or processes in the municipality. Therefore, their relevance to the measurement of conflict needs to be empirically tested.

The first of such indicators is the number of councillors' proposals for budgetary changes. As was mentioned above, the budget is the most important strategic document of the municipality and is prepared by the municipal office managed by the mayor. Thus, the assumption is that the councillors' proposals for budgetary changes indicate their disagreement with the mayor's decisions on use of the municipal financial resources. The problematic issue with this indicator is that the exact form of the budget formulation process depends on its setting by the particular municipality and in accordance with that other subjects, such as the council committees or town district committees, can be involved in various stages of the process. On the other hand, the decision on the final version of the budget always lies with the municipal office (and therefore on the mayor), which decides which requests and proposals of other subjects will or will not be present in the final document introduced at the council session. In addition, since councillors can participate in the process of budget formulation before it reaches the council session, the councillors' proposals introduced during the session may rather represent a political demonstration and therefore display the conflict between the bodies.

#### *The Mayor's Salary*

According to the Law 253/1994 on legal position and salaries of the mayors, the local council is authorized to designate the exact resources for the mayor's salary within the limit set

by the law. Furthermore, the council is obligated to debate the mayor's salary every calendar year. [9] points out that "*defining the mayor's salary is commonly one of the most "sensitive" agenda points of the council's session*". The definition of mayor's salary is in fact often a political demonstration displaying the relations between the municipal bodies. Thus it is possible to assume that while decreasing the salary (or its initial setting to the lowest possible value) expresses the conflict between the municipal bodies, increasing the salary displays more likely an opposite character of the relations. The need for empirical testing of this assumption reside mostly in the fact that other factors, particularly the financial situation of the municipality, can influence the decision of the council. In reality it is possible that even in municipalities where the conflict between the bodies is practically non-existent, the council decides to lower the mayor's salary to save financial resources because of the poor financial shape of the municipality.

#### *Imposing a Fine on Mayor*

The council, according to the Law 357/2004 on conflict of interest, can impose a fine on mayor if the mayor states incomplete or misleading information in the Asset disclosure or violate the legal restraints on protection of the public interest and preventing the conflict of interest. Since the law defines this procedure as a power of the council, not as its obligation, such decision may indicate a conflict between the municipal bodies. Situations of violation of the law by mayors are not uncommon, for example, the analysis [12] shows that as many as 133 mayors broke the provision not to act as a member of a supervisory or an executive body of a private company in electoral term of 2010-2014. The quality of the Asset disclosures, which are often incomplete and non-specific, is also a common issue presented on the regular basis in the media. However, this indicator of the degree of conflict should not be used separately, since without a detailed and time-consuming analysis it is not possible to identify the cases where there was an actual breach of the law by the mayor and therefore the council even had an opportunity to fine him.

#### *The Number of Interpellations of Mayor*

The Law on municipalities gives councillors a right to interpellate a mayor. On the case of Polish parliament, [2] illustrates that interpellations are often used by opposition politicians in order to damage the credibility of the ministers and to improve their prospects in the next elections. The number of interpellations therefore may be one of the complementary indicators of the conflict between the municipal bodies. However, when using this indicator in an empirical research, it is necessary to analyze the variability of the interpellating councillors and to exclude the cases when there are many interpellations proposed during the council's sessions but they are proposed by one or a few councillors. Taking this into consideration prevents the researcher from reaching a methodologically incorrect conclusion that there is a high degree of conflict between the mayor and the council as a whole.

#### *The Degree of Legislative Initiative of the Councillors*

The higher degree of legislative initiative of the councillors, similarly to the higher number of councillors proposals for budget changes, may signalize a discontent of the council with the proposals introduced by the municipal government. The study of the legislative initiative of councillors was also used by Todorovski [11] in his study of the executive-legislative relations in Macedonian municipalities. The problematic aspect of this indicator, which cannot be covered by a quantitative study, is that the initiative of the councilor can be in fact used as a political instrument by the mayor. In reality (mostly in cases where there are distinctive political fractions operating in the council), the cases when the mayor uses an allied councilor to introduce a proposal instead of introducing it himself in order to secure a higher chance of its passing are not uncommon.

### *3.2 Discussion*

The proposed model of conflict measurement focuses on formal side of the municipal politics and adds to the literature by joining previously separately used indicators of conflict

(votes, veto, legislative initiative) as well as by identifying other specific indicators related to the use of powers that “make life harder” for the other competitor.

On the other side, the model, which is based on quantitatively measurable indicators, bears a considerable extent of simplification, mainly due to the potency of informal side of municipal politics. It should be understood as a tool for providing an initial broad view on the relations between municipal bodies and used mainly in comparative quantitative research. For studying the relations in depth with coverage of their informal side, some form of surveys or interviews needs to be carried out, as done before [11], [1] or [7]. It is also necessary to point out that this paper proposes an initial version of the model without weighing the importance of individual indicators in order to determine the degree of conflict between municipal bodies, which needs to be done (by expert surveys) in the future.

#### 4 Conclusion

The paper developed an initial proposal of the model of measurement of conflict between the mayors and local councils in Slovak municipalities. The model still needs further specification in terms of weights of the individual indicators in order to be used in an empirical research. By means of qualitative analysis of the legislation, the paper identified eight different indicators of the conflict. First three of them - votes of the council for mayor's proposals (with a conflict potential), the use of the mayoral veto and the modifications of municipal internal regulations concerning the restriction of mayor's competences passed by the council indicate the conflict directly and may be also used separately in an empirical research. Other presented indicators - the number of councillors' proposals for budgetary changes, the change of the mayor's salary, imposition of fines on mayor, the number of interpellations of mayor and the degree of legislative initiative of the councillors can be defined as complementary indicators. They help drawing the “bigger” picture of the degree of conflict between the municipal bodies, but due to the fact that they can also indicate other phenomena beside the conflict, it is necessary to consider their use in an empirical research and to test their relationship with the other indicators first. When using this model in an empirical research of several municipalities, it is also necessary to take the differences among the municipalities, such as different number of councillors, frequency of the council sessions or different quantity of debated proposals, into consideration.

The development of the model of measurement of conflict between the municipal bodies is important not only for the use in an empirical research of the conflict (or cooperation) itself, but also for the subsequent testing of various factors influencing the degree of the conflict as well as for possible research of the impact of conflict on quality of municipal policies. It could also be interesting to compare the results of the measurements using this model and using surveys or interviews in the future and thus take a closer look at the relationship between formal and informal side of municipal politics.

By conceptualizing the measurement of the conflict between the municipal bodies, the paper introduced new possibilities for research and understanding of the actual operation of Slovak municipalities, which remains to be a much understudied area.

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# The Issue of Measuring E-Government Success in Context of the Initiative 202020

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## Abstract

This article deals with the issue that motivated formation of Initiative 202020. Czech Republic lags behind in the development of e-Government and currently is moving to 50<sup>th</sup> place in the ranking of E-Government Development Index evaluated by United Nations. The aim of this Initiative is that in 2020 the Czech Republic will be ranked among the top 20 states. The article sets two goals. In the first place it is analysis of methodology with the objective to say if this measure is consistent enough for setting goals and priorities for next four years. Second goal is to find out possible reasons why our country is evaluated so badly and suggest options what could be done to score better. To achieve these goals, in-depth review of E-Government surveys from years 2003 - 2016 and other available materials, was conducted.

*Keywords: e-government; measure; benchmarking; United Nations; EGD I*

JEL Classification: H54

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## 1 Introduction

Definition of e-government is very broad and changing through the time (e.g. [2], [3], [4], [5], [6]). Nevertheless, when trying to capture the issue of measuring e-government success it should be clear what construct is meant. For the purpose of this article e-government will be defined as the system of delivery of government information and services online via the Internet or other digital means [7], [8]. Reasons for implementation of e-government are different, though the main ones are:

- faster service delivery,
- greater efficacy,
- increased flexibility of service use,
- reducing transaction costs,
- enhanced transparency,
- and so on.

Whatever are the reasons and expected benefits, after the implementation phase and during the operation of the service, measurement of success should be done in order to ensure that the investment is justified. Metrics used to measure the success can be individual, based on the comparison of expectations and results, or collective that compare countries or regions among themselves. Each of the following approaches has its advantages and disadvantages. The advantage of individual evaluation is the focus on those indicators that are really important to the government. Disadvantage lies in isolation of results. No comparison to others means that we can be satisfied with less than is possible or we can have unrealistic expectations. The advantage of collective assessment is the comparison with other countries or regions and the opportunity to learn from the best practices. The drawback is that metrics are universal and if the country is on track in services other than benchmarking evaluated, then the country gets bad reviews even though the actual value of the services can be high. However, collective assessments can serve as the evaluation criterion for international companies when deciding in which country to invest. Country with the lowest barriers and “friendly” public administration will be favored.

The United Nations (UN) E-Government Survey is benchmarking tool comparing all UN member countries (193). Main measurements in the survey are based on two criteria – state of e-government development and e-participation. E-government development index (EGDI) takes

into account specific e-government initiatives, as evidenced by online service index (OSI), telecommunication infrastructure index (TII), and human capital index (HCI). The measure is purely quantitative. E-participation index is qualitative measure that says how relevant and useful are features that allow citizens to voice their views online, give feedback and overall engage in public policy.

Over the last eight years, in the evaluations of the UN in terms of the maturity of e-government, the Czech Republic is getting worse. Although between 2014 and 2016, an increase of three places shows improvement, generally, in those eight years, the Czech Republic dropped by 25 places. Originally leader of Eastern Europe has become average and in some criteria even below average. At least it suggests ranking in E-Government Survey. The goal of this article is to prove if the situation is so critical and if so, why it happened. Analysis of surveys will be done to prove if the measure is consistent and able to be ground for setting strategies for next four years.

## 2 Material and Methods

The article is based on the qualitative analysis and thorough review of eight benchmarking studies from years 2003 [9], 2004 [10], 2005 [11], 2008 [12], 2010 [13], 2012 [14], 2014 [15], and 2016 [16]. First stage of the review tested availability of data. The aim was to find out if the source is complete and able to give all necessary values in all years. Desired variables were: EGD value, EGD ranking, HCI value, HCI ranking, TII value, TII ranking, OSI value, OSI ranking, EPI value, EPI ranking, values for HCI components, values for TII components, and values for OSI components. If some values could not be traced, it was necessary to find another trusted source that would imply.

The second step was to determine the consistency of the E-Government Survey during years. Methodologies of all surveys were reviewed and changes were found. Some problems were discovered, not mentioned in methodology that appeared through the first stage of review, all of them are described in results.

Last step covered the case study of the Czech Republic. All available data were gathered in order to make the comparison with regional, sub-regional and world average. Components of EGD were studied through all years to find out where are hidden causes of problems.

## 3 Results

E-government Surveys are comprehensive materials covering from 100 to almost 300 pages. All studied surveys have common signs. All of them describe the methodology used in a given year, interpret the results - broken down by region, samples of best practices, but also examples of missed opportunities. They also contain tabular data in Annexes. Specific is the thematic focus of each survey, e.g. in 2010 it was devoted to the financial crisis or in 2016 to sustainable development. E-government Survey that measures e-government development in all 193 UN Member States through the E-government Development Index (EGDI) consist of three components weighted in equal manner.

- Online Service Index (OSI) measures the online presence of governments and services provided to citizens online. Selected government websites are evaluated according to four stages of development with the weight assigned to each stage (emerging 7%; enhanced 24%; transactional 30%; and connected 39%).
- Telecommunication Infrastructure Index (TII) is an arithmetic average of five indicators (estimated internet users per 100 inhabitants; number of main fixed telephone; lines per 100 inhabitants; number of mobile subscribers per 100 inhabitants; number of wireless broadband subscriptions per 100 inhabitants; and number of fixed broadband subscriptions per 100 inhabitants), that measure the infrastructure through which citizens can have access to government online services.
- Human Capital Index (HCI) consists of four components (adult literacy rate; the combined primary, secondary and tertiary gross enrolment ratio; expected years of schooling; and

average years of schooling) and measures the educational base of citizens allowing them to access government services online.

The first task was to determine whether the E-Government Survey can be used in all years as the sole source of information for the selected variables. Results are shown in table 1. Eight variables were available in all years, one in five years, two in four years and one only in two years. Missing data were sought in the UN E-Government Development Database.

**Table 1. Availability of E-Government Survey data**

Variable name	Number of results
EGDI value, HCI value, TII value, OSI value, EPI value, EGDI ranking, EPI ranking, Values for OSI components, Values for TII components	8/8
Values for HCI components	5/8
TII ranking, OSI ranking	4/8
HCI ranking	2/8

*Source: Author*

Second step in the review was analysis of consistency of methodology. This part will be divided into two sections. In the first instance were studied changes described in methodology but some changes or problems with results were not found in the methodology. These changes will be reported in second part.

Methodological changes:

- Web Measure Index (WMI) was renamed for Online Service Index (OSI) in 2010. Phases of OSI have changed twice – first in 2008 the phase Networked was changed for Connected with different and much broader specification and then in 2010 the number of phases was reduced from five to four excluding interactive phase. Also in this year was given different weight to each stage. Greater weight was given to development of participatory and integrated transactional services than in the past. The questionnaire for OSI is changing for every time period.
- Human Capital Index (HCI) included two measures in 2003, 2004, 2005, 2008, 2010, and 2012 – Adult literacy and Gross enrollment with the proportion 2/3 to 1/3. From 2014 it comprises two more measures with proportion – 1/3 Adult literacy, 2/9 Gross enrollment ratio, 2/9 Expected years of schooling, and 2/9 Mean years of schooling.
- Telecommunication Infrastructure Index (TII) is the most changed index, which is understandable given the speed of change in information technologies. In 2003, 2004, and 2005 the index remained unchanged and covered five components – Internet users, Online population, Personal computer users, Fixed telephone subscriptions, Mobile-cellular subscriptions, and TV sets. In 2008 TV sets component was omitted and Online population was replaced by Fixed broadband subscriptions. Last changes happened in Personal computer users component that was replaced in 2012 by Fixed Internet subscription and then in 2014 by Wireless broadband subscriptions.
- E-participation index remains qualitative in nature with three parts forming the framework. Nevertheless, questionnaire is reviewed each year and adapted to new trends, which means that caution must be taken in comparing e-participation rankings with past measurements.

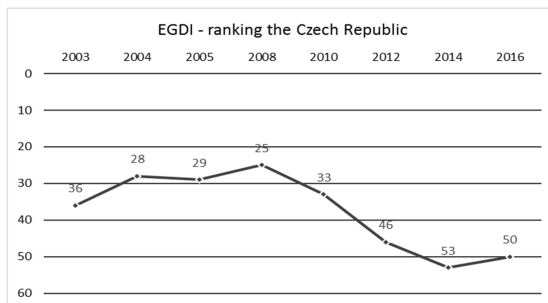
Changes and problems found in surveys:

- In 2008 and 2010 are scores assigned to stages of Web Measure Index given in points, not in percentage as it is in all other years. This can bring doubts about comparability. Data in UN E-Government Development Database are correct and use percentages.
- In 2003, 2004, and 2005 were not available data for HCI components, these data are not available even in UN E-Government Development Database.
- In 2003 and 2004 were measures of TII components related to 1000 persons and from 2005 those measures are related to 100 persons.

- Ranking of e-participation index made the most confusion. If one would take ranking from surveys and would not seek where the problem is, then the rating of the Czech Republic would be very unfavorable and surprising (23, 25, 31, 60, 86, 22, 122, and 76). The reason for these major changes lies not only in the lack of maturity of the Czech e-government in the area of e-participation, but also in inconsistent application of methods for ranking. Over the years were used two types of ranking methods without mentioning it in the methodology. Dense rating was used in 2003, 2004, 2005, and 2012. Standard competition ranking was used in 2008, 2010, 2014, and 2016. UN E-Government Development Database use Standard competition ranking, so the values are comparable. For the Czech Republic it is (45, 42, 47, 60, 86, 56, 122, and 76).

Last step in the review was case study focused on the position of the Czech Republic in international comparison of E-Government Survey. As a basic source of information were taken e-government surveys from various years, but subsequently there will be described projects in the Czech Republic originated in a given period for comparison with reality.

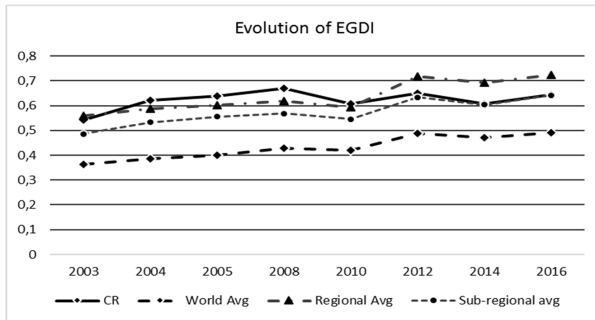
**Figure 1. The Czech Republic in the EGDI ranking**



Source: Author

Figure 1 shows the evolution of EGDI ranking during studied period. It is evident that up to 2008 had ratings improving tendency, with the best result at the 25<sup>th</sup> position. Since then, the Czech Republic worsened by a total of 25 places. Although the order of EGDI has some explanatory value, based on the order we are not able to say whether the situation has worsened, or if we stagnate, and other countries are improving. Likewise, we cannot say whether there are large differences in index values, or the values varies only a little. It is necessary to compare index values to answer these questions. Comparison of EGDI values for the Czech Republic, regional average, sub-regional average, and world average is displayed in the figure 2. Results show that world average is far below Czech values, nevertheless it does not mean that our results are sufficient. To the world average are calculated countries very poor and underdeveloped as well. African countries, small island states and countries torn by wars are also part of the evaluation.

Figure 2. Comparison of EGDI indicator



Source: Author

Much more interesting is the comparison with European and eastern European countries. Czech results were higher than European average until 2010 even if in this year started decline in EGDI ranking, however the decline affected all countries. The reason for low EGDI value for all countries can be found in the change of methodology for calculating OSI. The introduction of different weights for particular stages discriminated countries with mostly emerging and enhanced web presence and the Czech Republic was no exception. The problem appeared in the following evaluation, when other countries reacted and improved their web presence, concerning on transactions and tools for e-participation.

Change in methodology of HCI counting brought another decline in EGDI score for almost all countries. Paradoxically, the Czech Republic benefited by this change and good score covered so deepening downturn in the indicator OSI (see table 2). Survey in 2016 revealed that improvement in HCI indicator is demanding for underdeveloped countries and thus our country can benefit from the high quality education system for some time. However, these countries progress significantly in OSI indicator that raise the whole EGDI indicator in regional, sub-regional and even world average. Even Czech Republic improved the online services but the raise in other countries was much faster and now we are on the Eastern Europe average.

Table 2. The Czech Republic ranking in in OSI and HCI indicators

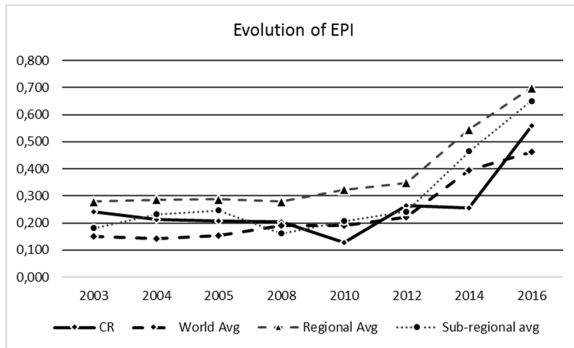
	2003	2004	2005	2008	2010	2012	2014	2016
<b>OSI</b>	56	34	37	21	37	55	91	92
<b>HCI</b>	55	42	42	40	38	40	21	25

Source: Author

The seriousness of the situation is mainly based on two indicators – OSI and e-participation. Low level of online services is the problem that cause low rating in EGDI indicator, however there is another problem that was not articulated by Initiative 2020 and seems much serious. It is very poor rating in e-participation index. E-participation index is a qualitative measure that says how good, relevant, and useful are features that allow citizens to voice their views online, give feedback and overall engage in public policy. Questionnaire for EPI is divided into three parts; e-information, e-consultation, and e-decision-making. E-information covers existence and availability of different archived information and datasets. E-consultation allows citizens to communicate with their elected officials and read archived discussion. E-decision-making means possibility for people to be part of decision process. E-participation can be implemented through number of online tools: community networks, blogs, text messages, newsgroups, online forums, e-mail lists, pools, voting tools, and petition tools. In the survey is evaluated diversity, quality, relevance, and usefulness of those online services. Results of the Czech Republic, given in figure 3, indicates that e-participation is the weakest part of Czech e-government. It shows low openness

of the Czech government. What, together with the lack of transparency, creates a bad image of our society. Moreover, in the coming years we can expect a greater emphasis on mobile friendly services, which are largely underdeveloped in the Czech Republic, as assessed in EU eGovernment benchmarking report [1].

**Figure 3. Comparison of EPI indicator**



Source: Author

In order to be objective as possible and to show that Czech e-government initiatives did not stand still, now I would like to present projects that appeared in the period from 2008 when the decline in EGD ranking emerged. The first major project, whose origins date back to 2007, is the CzechPOINT, assisted contact point of public administration, where citizens can obtain a statement from one of the public administration information system, or to convert the document into paper form. They are for people who cannot communicate with the public administration electronically. It is important to realize that in every society there is and always will be a group of such citizens. On the other hand there is also CzechPOINT@home, which is the de facto point of contact for "electronically literate" in the comfort of their home.

Since 2009 is operating data boxes information system, which aim is to change the method of delivery of official documents. The information system of data boxes is operated by the Czech Post. It facilitates communication of public authorities because it's faster and cheaper, and it also provides the secure delivery of the messages. Authorities and business enterprises have to communicate with each other only via data boxes, citizens can use their data boxes to apply for permissions, approvals or licenses but it is not obligatory.

The third big national project held in given period is called Basic registers, which represents central information source for information systems of public authorities. In addition basic registers are central hub for interchange of additional information, related to information, stored in basic registers – e. g. IS of vehicles, IS of drivers, IS of foreigners etc. The main thought behind project is „Let documents circulate through the authorities, not people themselves“. There are four basic registers integrated together (ROB – register of inhabitants; ROS – register of legal persons (companies); RUIAN – register of territorial identification, addresses and real estates; and RPP – register of rights and responsibilities of public authorities).

These are not all projects held in the Czech Republic in given period, many are on the regional level, some of them are more technical and some more process oriented. Summary of all projects can be found in the database of projects in online version <http://projekty.osf-mvcr.cz/en/Lists/Projekty/SearchProjects.aspx>.

## 4 Discussion and Recommendation

Results showed that the EGDI methodology is stable in its basic calculation, which is the average of the three indicators  $1/3 \text{ HCI} + 1/3 \text{ OSI} + 1/3 \text{ TII}$ . However, the changes take place within the indicators. For all of them changes in methodology occurred during the reporting period. This is understandable, because with technology development and possibilities of online services ratings must be also modified. If member countries want to keep high in the rankings, it is not enough to build e-government services, but also see how they are evaluated. Based on the study of materials available, I can say that the success of each country is determined by three different factors:

- real state of e-government in given country,
- changes in methodology (mentioned or not),
- changes in the process of evaluation.

First factor need not to be explained. Second factor was mentioned in results. Although all indicators of EGDI were changed, two changes influenced scoring of the Czech Republic. Assignment of the weights to the stages of OSI indicators caused the drawdown in the EGDI range. On the other hand, change in HCI index helped us to score better, respectively covered deepening fell in OSI indicator. Third factor means changes in the actual evaluation process. It is necessary to consider that any evaluation is not objective but express the point of view of the reality. Especially OSI is vulnerable to process changes in two views – findability and language barrier. Evaluators were instructed to take more citizen-centric approach, which means that if features could not be found easily, quickly and intuitively, then a site would score poorly. Interpretation of this instruction can be different for each evaluator and year. Another problem, which may reduce ratings of the Czech Republic is the Czech language. Methodology of E-Government says “the research team was fully equipped to handle the six official languages of the United Nations, namely Arabic, Chinese, English, French, Russian and Spanish, however... the team went beyond this mandate and *made an effort to review each website in the official language of the country, or where that was not possible, in another of the languages available on the site*”. This statement does not guarantee that in each period there will be translator able to help with evaluation of pages in Czech, so the process will be changed. Good example of process changes can be seen in table 3. In 2014 only 53% of websites were evaluated as emerging, although in 2012 and 2016 it was about 100%. This change in evaluation cannot be explained by changes in Czech e-government and I haven't found any proof for changes in methodology, so it has to be some process problem.

**Table 3. Scores for emerging stage of OSI**

	2003	2004	2005	2008	2010	2012	2014	2016
Emerging	75	75	100	100	74	100	53	95

Source: Author

In the preceding text were explained possible factors of success and now I would like to propose some ways, how to affect the success of the Czech Republic in this assessment.

- *Visualize and promote everything that already exists* – online services that are functional should be presented at the main evaluated sites (national portal, e-participation portal, and websites of ministries of education, labor, social services, health, finance and environment). They have to be visible, easily findable and translated into English language.
- *Monitor changes in methodology* – each E-government survey should be monitored for changes in methodology in order to focus Czech e-government policy and actions on the most important themes.
- *Actually develop new online services* - currently the emphasis is given on these online services:
  - whole-of-government
  - e-participation
  - multichannel service delivery



- expanding usage
- digital divide and vulnerable groups
- open government data.

## 5 Conclusion

According to the results of this study must be stated that changes in methodology were consistent and affected all – world, regional and sub-regional average. The survey is quite well documented and accompanied with source data. The fundamental methodology of EGD I indicator counting is stable in its basic calculation, changes occur only within the measures, that form parts of EGD I. Based on these facts, we can take the E-Government Survey as a good source of comparative data regarding e-government. On the other hand it must be said that the survey is not complete because it does not include data from the demand side for the use of online services. This problem was already mentioned in 2010 survey yet there is no way how to realize this part of survey.

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# Measures of Transparent Lobbying: How to Approach It and Evaluate It: A Preliminary Stage

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## Abstract

Although the topic of lobbying attracts many scholars and activists, the evaluation of its quality is underdeveloped. The paper's aim is to propose a comprehensive catalogue of key measures of transparent lobbying that offers the space for later evaluation of the transparency of lobbying regulation and activities for discussion. The authors employed the qualitative analysis of existing approaches, namely the evaluation of "hard" lobbying regulation by the Centre for Public Integrity and recommendations of "transparency" measures by various international organisations, and finally propose their own set (catalogue) of measures that employs both the hard direct rules on lobbying, but also the indirect rules linked to lobbying, and informal rules and voluntary activities are also included.

*Keywords: lobbying; transparency; qualitative approach; catalogue; regulation*

JEL Classification: D72, D73, D82, D85

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## 1 Introduction

The process of explicit direct measuring of the transparency of lobbying so far remains unsolvable until lobbying is regulated. Unfortunately, in reality, the problem is the reluctance of political representation to enforce statutory regulation and the differing approach to regulation of lobbying across countries. This ranges from no regulation, through "soft" regulation (voluntary systems, self-regulation) to "hard" legislative rules. For example, post-communist countries are characterized by less institutional effectiveness and most of them are faced with the problem of a weak (and large) state, underdeveloped civil society and a weak liberal tradition [16]. Currently only 9 of the EU-28 countries have any regulation of lobbying; the others have opened discussion about lobbying regulation, some did not finally pass a law (e.g. Czech Republic) and Hungary even cancelled an act and replaced it with substitute rules on the legislative process [22]. There are however a number of factors (besides regulation) that contribute to the transparency of lobbying: laws on conflict of interests (including the so-called "revolving door" practice), legislative footprint, various statements and declarations of officials and politicians, and/or arrangements for the funding of political parties. Other rules can also be closely linked to lobbying – ethical codes of corporate or interest groups, a public guestbook at public institutions, a public service act, the use of RIA (Regulatory Impact Assessment) and the CIA (Corruption Impact Assessment) in the legislative process, the quality of the legislative process (unjustified amendments, limpets, etc.), public consultation and publication of the list of consultants on government policies, and last but not least electronic auctions, public contracts on the web, fully and comfortably furnished budgets, etc. In other words, transparent lobbying exceeds the efficiency of a single law: it should be part and package of a wider approach to governance, based on the principles of openness, transparency, participation and disclosure.

The standards and measures are widely discussed in existing literature, broadly accepted good practices anchoring the rights to know and participate, effective control and oversight, and open government. Especially in the case of lobbying, there can be various rules and measures introduced. There are various approaches to how to classify rules ([6], [7], [10], [8], [23], [13] and others). There are different reasons for the variety of measures – jurisdictions focus on different

features and characteristics of lobbying to define the rules. First, for effective regulation, systematic regulation should be introduced. In terms of the form, there can be legal rules (hard rules) as well as self-regulatory approaches. Second, for vibrant regulation, both the direct rules (for lobbyists) and indirect rules (for targets of lobbying – politicians and civil servants) and therefore both sides of lobbying activities shall be covered. Third, the rules for lobbying do not cover only one law; rather it is a series of complementary legislation (legal provisions), internal and procedural rules (system arrangement and institutional mechanisms as distinguished e.g. by *Open Governance Scorecard Methodology* published by TI UK (2015)). The linkage between selective and narrow aimed rules in the light of a systemic approach of lobbying regulation is needed. Fourth, the effective control of the lobbying activities should be independent and under public scrutiny.

However to build strong rules on one hand and transparent ones on the other, for all subjects in the industry, is not easy, but is possible. Transparent rules support “fairness” conditions for the profession/activity and can guarantee to some extent also the process aspects of lobbying activity as many academics argue ([10], [3], [11], [14], [9] and others). Current regulatory approaches do not always go this way – there are various measures introduced to deal somehow (directly or indirectly) with lobbying, they are poorly linked with each other (isolated measures) and the systemic approach is lacking. The key issue is the exact and proper fundamental definitions of basic terms used in rules, namely who is a lobbyist, what is lobbying and/or lobbying contact, who is a public office holder/designated officer and others.

The aim of this paper is to propose a catalogue and key elements of “transparency measures” that can support transparency of lobbying activities and that will serve as a platform for evaluation in the future research.

The key methods used in this article are a rather explorative and explanatory one in terms of lobbying rules on one hand and analyses of current approaches of lobbying regulation transparency on the other. Therefore the main part of the paper is a qualitative approach focusing on choosing the fields (groups) of relevant variables describing transparency of lobbying rules. The summarization of all relevant data and variables finally systematically built a more complex picture of various aspects of lobbying (and its regulation).

The paper is organized as follows. The second chapter discusses current approaches to evaluating lobbying transparency – the CPI index and the recommendations for transparent lobbying, and both advantages and disadvantages are mentioned. The third chapter deals with the authors’ proposed categories for how to evaluate transparency of lobbying in its broader scope. The authors conclude with the next steps for catalogue finalization including each variable for subsequent evaluation of transparency of lobbying activities.

## **2 Material and Methods**

Evaluating the transparency in lobbying activities is difficult now, because there is almost no systematic approach for evaluation. If there is attention paid to the lobbying activities, it is mostly caused by several scandals and affairs. The authors thus propose a research design for more complex evaluation of transparency of lobbying rules and activities. For this purpose we combine two approaches that were tried in the past to examine and evaluate lobbying and transparency – the Centre for Public Integrity index of lobbying regulation, and the recommendations of international organisations in the field of transparency and lobbying.

From the methodological point of view, the qualitative analysis of documents, academic papers, existing recommendations of international organisations, as well as the existing measures applied in jurisdictions in terms of lobbying are collected. Although the sampling theory is usually associated with a quantitative type of research, it is suitable for our research due to the limits of the relevant quantitative material based on the formulated research question. This data sample is then analysed in terms of its relevance of content to the lobbying and all recommendations are extended by those furthermore linked to the transparency principle. In the final stage, the data are re-categorised into logical groups for supposed later evaluation.

There were several trials in the past to evaluate the rules in the field of lobbying. The most frequently used schema for evaluation was developed by the Centre for Public Integrity in 2003 when it published a report and methodology for evaluating the influence of legislators [4]. The index currently evaluates 48 criteria in 8 areas and uses the scale from 0 to a variable maximum of 1, 2, 3 or 4 points according to question [5] with the total score of 100 points. The CPI index only evaluates existing rules on lobbying and lobbyists that are explicitly expressed in “hard” forms of regulation – acts and bills (statutory rules) especially. Other aspects of lobbying rules – the indirect ones especially – and of lobbying activities are not covered.

**Table 1. Ideal types of lobbying regulation systems**

	<b>Weekly regulated systems</b>	<b>Medium regulated systems</b>	<b>Highly regulated systems</b>
Registration regulations	Rules on individual registration, but few details required	Rules on individual registration; more details required	Rules on individual registration are extremely rigorous
Spending disclosure	No rules on individual spending disclosure, or employer spending disclosure	Some regulations on individual spending disclosure; none on employer spending disclosure	Tight regulations on individual spending disclosure, and employer spending disclosure
Electronic filing	Weak online registration and paperwork required	Robust system for online registration; no paperwork necessary	Robust system for online registration; no paperwork necessary
Public access	List of lobbyists available, but not detailed, or updated frequently	List of lobbyists available; detailed, and updated frequently	List of lobbyists and their spending disclosures available; detailed, and updated frequently
Enforcement	Little enforcement capabilities invested in state agency	In theory, the state agency possesses enforcement capabilities, though infrequently used	State agency can, and does, conduct mandatory reviews/audits
Revolving door provision	No cooling-off period before former legislators can register as lobbyists	There is a cooling-off period before former legislators can register as lobbyists	There is a cooling-off period before former legislators can register as lobbyists

*Source: [7]*

The index was developed and interpreted subsequently by Chari, Hogan and Murphy in their papers (starting from 2006) and finally in a book on lobbying regulation [6] where the main criterion was to classify countries and states regulating lobbying into three groups (strong, medium, weak) according to the strictness of the rules. Kubová and Pitrová [12] expanded it and updated it for the Joint Transparency Register introduced in 2011. Again, all authors aimed only at countries that have statutory regulation of lobbying and lobbyists. The other “indirect” provisions that can be linked to the lobbying or deeper qualitative aspects of lobbying rules are not in the centre of evaluation and indices. Furthermore, this approach pays more attention to strictness of rules, rather than to the question of transparency.

The second approach we use is transparency measures recommended in connection to lobbying activities. It is a wide range of principles and standards that vary according to the organization that has published them. All of them are a starting-point for framework design of fair lobbying and definitely a source for further discussion about the parameters of lobbying transparency and/or more general a level playing field in a broader scope of the decision-making process. Table 2 summarises the areas of activities and principles that are considered as crucial in terms of the transparency of lobbying.

All of the recommendations in the documents mentioned in Table 2 describe the key principles, standards and measures that can be introduced in order to support lobbying transparency – not only rules and their interpretation, but also indirectly the transparency of lobbying contacts and lobbying activities of all participants. Although this approach is more qualitative, no specific complex evaluations (rather than measuring) have been published until now. Thus such evaluation offers an advantage in the evaluation that can be applied to the other

rules and instruments influencing transparency of lobbying activities other than a single bill on lobbying. The only exemption in this regard is that TI [20] tried to incorporate some evaluation in this course.

**Table 2. Transparency principles**

<b>International organizations</b>	<b>Documents</b>	<b>Areas of activities and principles</b>
Organisation for Economic Co-operation and Development (2010)	10 Principles for Transparency and Integrity in Lobbying	<ul style="list-style-type: none"> <li>● building an effective and fair framework for openness and access</li> <li>● enhancing transparency</li> <li>● fostering a culture of integrity</li> <li>● mechanism for effective implementation, compliance and review</li> </ul>
Access Info Europe, Open Knowledge, Sunlight Foundation, Transparency International (2015)	International Standards for Lobbying Regulation: Towards greater transparency, integrity and participation	<ul style="list-style-type: none"> <li>● regulatory scope</li> <li>● transparency</li> <li>● integrity</li> <li>● participation &amp; access</li> <li>● oversight, management and sanction</li> <li>● regulatory framework design</li> </ul>
Access Info Europe (2015)	Lobbying Transparency via the Right to Information	<ul style="list-style-type: none"> <li>● the right to information about lobbying</li> </ul>
Transparency International (2015)	Lobbying in Europe: Hidden Influence, Privileged Access	<ul style="list-style-type: none"> <li>● transparency</li> <li>● integrity</li> <li>● equality of access</li> </ul>

Source: [1], [2], [17], [20]

### 3 Results and Discussion

No model fits all [19], [22]. There are more reasons behind the authors' motivation for making a comprehensive list of key categories. First, the lobbying rules cannot be narrowed for lobbying bills only, but other measures and instruments that finally regulate participants' behaviour have to be added. Second, if standards and recommendations are introduced, each of them has to be evaluated in terms of deeper qualitative analyses – the initial binominal values (yes-no/existing-non-existing) have to be replaced by a limited discrete scale reflecting more specifically the quality but leaving space to reflect different countries' backgrounds (law system, laws, informal institutions, context etc.) – until now there is limited use of it. Third, when the recommendations exist, their operation and efficiency are to be evaluated rarely, as well as the question of if – and to what extent – they are fulfilling the main goal set in the beginning (transparency of lobbying mostly). The evaluation and criteria within categories can be used in this respect.

For this reasons the authors propose a catalogue of currently used measures dealing directly or indirectly with lobbying regulation that support the transparency principle in general. All measures are grouped in four logical categories [14]:

1. *Direct rules focusing on lobbyists* in term of lobbying activities and their behaviour, both legal and self-regulation. Those include:

- register of lobbyists – conditions and initial requirements to be met prior to and/or during the registration process, including basic information on lobbyists;
- Codes of Ethics / Codes of Behaviour for lobbyists with effective penalties;
- regular disclosure of lobbyists' activities, especially identifying the date of the contact, matter of lobbying contact, the institution and person contacted, the client/employer of the lobbyist; sometimes financial data will be required;
- open calendars of meetings with all decision-makers.

2. *Indirect provisions rule subject of lobbying* (the targets of lobbying). This category mostly includes:

- Codes of Ethics / Codes of Behaviour for Members of Parliament, Ministers, Employees in the Civil Service;
- revolving doors provisions (pre- and post-employment separation);
- open calendars of meetings (appointment diaries) of all decision-makers;
- Conflict of Interest regulation;
- declaration of (financial) assets, income and/or fact-finding trips.

3. *Sunlight principles and/or anti-corruption tools* are indirect also, but they are supposed primarily as a measure with a different goal rather to be linked only with lobbying and they include:

- clear and transparent rules on legislative process – limitation of individual MPs’ changes, pork barrels;
- rules on Governmental decision-making and decision-making in the public sector;
- rules on consultations with public, civil society, interest groups, professional bodies etc.;
- legislative footprint and/or other declaration of consulted bodies/organizations;
- programme of proposed legislative work;
- Open Government Data (OGD 2007);
- regulation of political parties financing (limits for lobbyists donations and expenditures);
- freedom of information act.

4. *The monitoring and sanctioning system.* Here only general statements can be made – enforcement of the rules should be effective, and the penalties should force subjects to comply with the rules. The key issue is monitoring of activities and there are two approaches to be selected (and combined) – a lot of information can be published and provided to the public, so public scrutiny of the activities is one source of monitoring. Second, there can be a special independent body established that collects all data and publishes only selected information to the public.

In the next step, it is necessary to assign available resources and data that govern and/or characterize the measures and identify specific measures and key elements of the measure, which directly relate to lobbying transparency (Table 3) and supportive measures supporting lobbying transparency indirectly or in a general way (Table 4). The suggested category, data/information, and measurements and key elements should be a subject of expert discussion.

**Table 3. Lobbying transparency catalogue – direct lobbying measures**

Category	Data, information	Measures and key elements of transparency
<b>Lobbyists</b>		
Register	Registers of lobbyists/lobbying	Public accessibility; Types of lobbyists regulated; Number of lobbyists registered vs. estimation of unregistered; Basic data provided.
Codes of Conduct	Codes Annual reports of lobbyists associations	Bans on unethical dealings. Regulation of investigation in terms of breaching the Codes.
Disclosure of activities	Declarations of lobbyists Declaration of politicians and POH	Timely published data. Data on what, who, why and whose interest is represented; list of clients.
Open calendars	Lobbyists web pages and/or declarations	Timely published data on event, persons, subject, results (if any); Electronically accessible for public.
<b>Subjects of lobbying</b>		
Codes of Conduct	Members of Parliament, Ministers, Employees in the Civil Service	Ban on paid (and unpaid) representation of interest groups; Declaration of conflict of interest before voting; Provisions for how to interact with lobbyists.
Revolving doors	Internal rules of authorities	Pre- and post-employment rules.
Conflict of interests	Conflict of Interest Acts Manual for civil servants Civil Service Act	Obligations to declare assets; Basic rules on integrity; Independence of the central authority; Rules for gifts and hospitalities.
Disclosures of politicians/senior public employees	Civil Service Act	Independence of the central authority from political influence.
Appointment diaries	politicians/senior public employees web pages and/or declarations	Timely published data on event, persons, subject, results (if any); Electronically accessible for public.

Source: Authors

**Table 4. Lobbying transparency catalogue – indirect measures**

Category	Data, information	Measures and key elements of transparency
<b>Sunlight principles</b>		
Rules on legislative process	Rules of procedures of chambers	Bulletin/plan of legislative works.
Rules on decision-making	Rules of procedures	Obligation of public bodies to consult with citizens and other stakeholders before a decision is made; equal access; administrative footprint (information from politicians' electronic diaries related to executive decision-making).
Rules on consultations	Rules for consultancy	Obligation of public bodies to consult with citizens and other stakeholders before a decision is made; Online platform for civic participation; Equal access; Request of a meeting with a politician/civil servant by email.
Legislative footprint	Politician's electronic diaries	Meetings with lobbyists; Time spent on the elaboration of laws.
Open Government Data	Public bodies' web sites;	Legal definition on open data.
	National Online Catalogue of Open Data; open data barometer	Data sources relevant for policy analysis; Proactive publication of information.
	Global Open Data Index	Equal access to information and documents for all citizens.
Political parties funding	Political parties funding act and campaign financing rules	Transparent banking accounts; Donations by names; Online publication of electoral founding; Disclosure of annual reports on the internet; Independent auditing mechanism; Account of all campaigns.
Freedom of information	Freedom of Information Act	Systematic monitoring of access to information;
	Global Right to Information Rating Centre for Law and Democracy	Explicit reasons for withholding information; Proactive disclosure. Providing information for re-use.
<b>Monitoring and sanctioning system</b>		
Sanctions	Lobbying Acts Conflict of Interest Acts	Body and/or mechanism for continuous monitoring of lobbying activities; Publicly available information; Bans on lobbying activities; Financial and/or criminal penalties.

Source: Authors

This emerging approach to transparency in lobbying, which should result in a methodology for measuring/evaluating the transparency of lobbying, allows a qualitative evaluation of a transparent public area in its complexity. Due to the evaluation of relatively discrete categories, it will be possible to identify potential weaknesses and focus attention on them in practice. Another important benefit is the creation of a universal approach and comprehensive key measures, on the basis of which it will be possible to compare countries among each other.

## 4 Conclusion

This paper is a particular step of a broader research study and introduces a preliminary stage of specific measures and key elements of the categories that directly relate to transparency of lobbying rules and activities. The new approach combines two well-known previous ways that were tried in the past to examine and evaluate lobbying and transparency, but they have not introduced the specific complex evaluation. In the previous step the measures of transparency, which lead to "fair and ethical" lobbying and the same level of access for all stakeholders to decision-making or seeking government contracts, were identified. On this basis, a catalogue of currently used measures dealing directly or indirectly with lobbying regulation that support the transparency principle was created. This article provided categories, data/information, and measures and key elements of transparency of activities, which might be influenced by hidden interests and/or lobbying, for the discussion. The future research will expand the existing measurements and evaluation of transparency of lobbying by developing missing indicators that will tackle some of the weaknesses of the existing ones and/or rather fill a gap in qualitative evaluation of lobbying according to the principles of transparency.



## Acknowledgements

This paper has been elaborated as one of the outcomes of research projects supported by the Czech Science Foundation, project No. 16-11210S „Corruption Opportunity Space in the Czech Republic“ and project No. 16-08786S “Impact of Transparency of Lobbying on Democratization and Its Consequences”.

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# Measuring the Effects of Open Data on the Level of Corruption

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## Abstract

The Open Government movement has been building around the world with the primary aim to enhance the availability of public data and increase the government's transparency and accountability. Theories of corruption then suggest that higher levels of transparency are associated with lower levels of corruption. Thus, this paper is focused on the potential effects of open data in reducing the level of corruption. For this purpose, different related open data and corruption indices from two different time periods are examined. In contrast to previous studies, the use of open data indices to verify this relationship is new in research on e-government development. Findings indicate that there is a positive correlation relationship between selected corruption and open data indices. Thus, higher levels of open data availability are associated with lower levels of corruption in the compared countries, especially in the case of Open Data Barometer index. It was also found out that the methodologies behind open data indices may affect the results, because they are still evolving due to the increasing effects of open data in the society.

*Keywords: open data; corruption; indices; correlation analysis; regression analysis*

JEL Classification: D73, H11, L86

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## 1 Introduction

In recent years, transparency has become an integral part of a broader Open Government movement in which the government acts as an open system and interacts with its environment [7], [13]. Fighting corruption is a very challenging and difficult. Negative effects on development of gross domestic product, unemployment rate or credibility of the country discouraging foreign investors have been shown as a result of corruption [3], [9], [11]. There can be found a number of anti-corruption initiatives around the world that promote greater transparency and openness with the aim to reduce corruption, increase government accountability and improve the quality of public services [4], [13]. For example, the United Nations' report on e-government has a goal to substantially reduce corruption and bribery in all their forms by promoting the availability of government data, including open data, on online websites, which then helps develop the justice system [13]. Besides that, making government data open is also considered by many to provide greater returns on public investment, help policy-makers address complex problems, creation of trust in government, improve public policies and the efficiency of public services, etc. [2], [14].

On the other hand, simply publishing open data will not necessarily result in a more open, transparent government. Opening data that have no adequate information quality can result in discussions, confusions, less transparency and even in less trust in the government [2], [7], [14]. [11] argue that open government data can help in fighting corruption through novel applications that promote transparency in public services. In similar lines, [9] claim that an important strategy for dismantling corruption can be the providing of easy access to information for all citizens through the use of related initiatives. Therefore, to fully exploit the potential of open data, governments have to follow the basic principles of open data. According to [2], open data should be defined as non-privacy-restricted and non-confidential data which are produced with public money and are made available without any legal restrictions on their usage or distribution. These data should be accessible in both human- and machine-readable formats that allow data to be combined and utilized in different ways using computer programs [2], [14]. [11] also noted steps which different stakeholders must take to promote open data and make their potential a reality.

[7] then evaluated the impacts of open data enabling factors and generating mechanisms in the economic, educational, environmental, health, politics and legislation, social, and trade and

business development. Their results suggest that the biggest impacts of open data can be found in the educational and social development, however, the attention of businesses is still lacking in this area. [14] focused on discovering what factors are critical for the publication and use of open data in a particular practical case. Categories of factors that were most critical for open data publication in this initiative referred to legislation, regulation and licenses, sustainability of the open data initiative, and accessibility, interoperability and standards. Success factor categories that are critical for open data use concerned legislation, regulation and licenses, and success stories.

The matter of corruption is very often solved in the broader context of e-government [1], [3], [5], [9], [12]. The literature focused on e-government in relation to corruption suggests that electronic service delivery can reduce corruption by minimizing the interactions with officials, accelerating decisions and reducing human errors [3], [9], [12]. However, to the author's best knowledge, nobody has yet exploited the effects of open data to support this relationship. This is mainly important if Open Government initiatives are much easier and quicker to implement (publish public datasets through open data portals) than robust e-government infrastructures and services [2], [6], [14].

Therefore, the main aim of this paper is to examine the potential effects of open data on the level of corruption. The main reason for conducting this research study of open data and corruption interrelation is given by the recent development of Open Government and open data movement after 2010 and the increased involvement of citizens in the control of government corruption. To estimate the strength and direction of the relationship between open data and corruption, related indices from two different time periods will be examined.

## **2 Material and Methods**

As stated by [1], different indices should be tested to ensure that the effects of open data are robust across different indices and their rankings. Therefore, established indices will be used in order to measure the relationship between open data and the level of corruption [1], [3], [6]. Furthermore, for changes to be discernable there is a need of a few years' time span [1], [5], [9]. Finally, an adequate data sample is required [9], [12].

Through the last few years, several different indices focusing on the measurement of open data effects were introduced. These are, e.g., the Open Data Barometer index (ODBI) produced by the World Wide Web Foundation (W3F), Open Knowledge Foundation's (OKF) Global Open Data Index (GODI), the OURdata (Open, Useful, Reusable Government Data) Index introduced by the Organization for Economic Co-operation and Development (OECD) and the European Public Sector (PSI) Scoreboard (PSIS) measuring the status of open data and PSI re-use throughout the European Union (EU) [6], [7]. While it is important to obtain an adequate data sample, the ODBI and GODI will be used as independent variables. The OURdata Index was published only once yet and the PSIS covers only the EU Member States. The Corruption Perceptions Index (CPI) and also the Corruption Control Index (CCI) were then used as dependent variables. Those two indices are the most widely used measures of corruption and their validity have been tested by several researchers. A review of these studies can be found, e.g., [12].

The ODBI aims to uncover the true prevalence and impact of open data initiatives around the world. It analyses global trends, and provides comparative data on 92 countries via an in-depth methodology combining related contextual data, technical assessments and secondary indicators to explore multiple dimensions of open data readiness, implementation and impact. The GODI then assesses the state of open data around 122 places in the world and has been developed to help answer such questions by collecting and presenting information on the state of open data around the world to ignite discussions between citizens and governments. Datasets for both these indices are available for the years from 2013 to 2015 and the values range from 0 to 100. Transparency International has published the CPI since 1995. It currently covers perceptions of public sector corruption in 168 countries on a scale from 0 (highly corrupt) to 100 (very clean). Countries' scores can be helped by Open Government where the public can hold leaders to account, while a poor score is a sign of prevalent bribery, lack of punishment for corruption and

public institutions that don't respond to citizens' needs. The World Bank's CCI is one of the six broad dimensions of governance for 215 countries since 1996. It captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests. The CCI takes values between -2.5 (weak) and 2.5 (strong) governance performance.

At first, the relationship between open data and corruption in two different years: 2013 and 2015 will be examined. For this purpose, correlation analysis and a simple linear regression model will be used. Correlations between defined variables will be measured by the value of the Pearson's correlation coefficient. According to [10], several correlation measures (measures of association) can be used to validate the conformity of the rank methods for the indices, such as Pearson's correlation coefficient, Spearman's rank correlation coefficient or Kendall's rank correlation coefficient, Correlation ratio or Mutual information. In this study, Spearman's and Kendall's rank correlation coefficients will be used. Contrary to the Spearman's coefficient, the Kendall's coefficient is not affected by how far from each other ranks are but only by whether the ranks between observations are equal or not [10]. Then, the following regression function will be used to verify the relationship between selected indices. The function is based on the least squares method and was previously applied by [3], [5], and [9]. It is defined as illustrated in the equation (1):

$$corruption\_index = \alpha + \beta * open\_data\_index + \epsilon \quad (1)$$

where the dependent variable *corruption\_index* is represented by the CPI or CCI in both years and the independent variable *open\_data\_index* is represented by the ODBI or GODI. The parameter  $\alpha$  determines the distance of intersection of the regression line with the y-axis (the value of the regression function for  $x = 0$ ). The parameter  $\beta$  is called the regression coefficient and shows the variation of the dependent variable value when the value of the independent variable changes. The symbol  $\epsilon$  is the residual variance, which is a graphical representation of the distance of points from the regression line [3], [9].

The analysis is performed on the sample of 92 countries, regardless of their geographic location or political regime, in order to determine if open data have improved the level of corruption. After the establishment of regression models for the selected years, a relationship between the change in open data and corruption in this period will be explored. Data collection was made through open sources. All calculations and graphics are done in Statistica 10.

### 3 Results and Discussion

At first, relevant statistical indicators for model variables are presented in Table 1. In the case of mean value, there can be seen an increase between 2013 and 2015, only the GODI has decreased because of the changes in the methodology. The higher mean compared to the median shows that the distribution of values for all these indices is skewed to the left, i.e., there are more countries with lower values than higher ones.

**Table 1. Descriptive statistics**

	GODI 2013	GODI 2015	ODBI 2013	ODBI 2015	CPI 2013	CPI 2015	CCI 2013	CCI 2015
Mean	47.85	39.76	32.47	34.09	50.26	50.89	0.28	0.28
Median	43.00	37.50	27.58	28.73	45.50	46.00	0.02	0.09
Std. deviation	16.80	17.21	22.67	24.12	20.28	20.70	1.08	1.07
Minimum	20.00	3.00	0.00	1.43	18.00	17.00	-1.27	-1.55
Maximum	94.00	78.00	100.00	100.00	91.00	91.00	2.39	2.27

Source: Author

Then, the relationship between selected indices in two time periods (2013 and 2015) is examined. Here the null hypothesis defines that the compared variables are not in correlative relationship. Verification of this hypothesis is based on the subsequent comparison of the level of significance with a p-value. In Table 2 is shown a matrix of Pearson's correlation coefficients on the significance level 0.05, giving a value between +1 and -1, where 1 is total positive correlation, 0 is no correlation, and -1 is total negative correlation. Thus, a positive correlation relationship was found among the variables in both years. This led to the rejection of the null hypothesis. It may be suggested that there is a relationship between the level of corruption and the availability of open data as represented by selected indices in the compared countries. The ODBI has also stronger relationship with both CPI and CCI than GODI. Thus, it furthermore suggests that the ODBI is a better predictor of the level of corruption than the GODI.

Table 3 and Table 4 with Spearman rank order correlations and Kendall tau correlations then confirm these results. All the correlations in both tables are significant at the 0.05 level. Indices focused on the level of corruption rank countries similar to each other while indices focused on open data are slightly different. It may be affected by the first release of these indices, because they were both introduced in 2013 and only three rankings were published yet. Also, the methodology of these indices is still not fixed in time and may change to cover more related attributes. For example, since 2015, four new thematic datasets were added to the GODI. Thus, rank order correlations between GODI 2013 and GODI 2015 are 0.767 and 0.593 while rank order correlations between ODBI 2013 and ODBI 2015 are 0.923 and 0.764.

**Table 2. The matrix of Pearson's correlation coefficients**

	GODI 2013	GODI 2015	ODBI 2013	ODBI 2015	CPI 2013	CPI 2015	CCI 2013	CCI 2015
GODI 2013	1.000							
GODI 2015	0.790	1.000						
ODBI 2013	0.851	0.792	1.000					
ODBI 2015	0.796	0.871	0.905	1.000				
CPI 2013	0.679	0.648	0.707	0.735	1.000			
CPI 2015	0.680	0.649	0.705	0.735	0.992	1.000		
CCI 2013	0.676	0.666	0.712	0.752	0.996	0.989	1.000	
CCI 2015	0.645	0.622	0.686	0.704	0.992	0.991	0.991	1.000

Source: Author

**Table 3. Spearman rank order correlations**

	GODI 2013	GODI 2015	ODBI 2013	ODBI 2015	CPI 2013	CPI 2015	CCI 2013	CCI 2015
GODI 2013	1.000							
GODI 2015	0.767	1.000						
ODBI 2013	0.855	0.795	1.000					
ODBI 2015	0.817	0.830	0.923	1.000				
CPI 2013	0.603	0.520	0.708	0.722	1.000			
CPI 2015	0.606	0.548	0.699	0.726	0.985	1.000		
CCI 2013	0.579	0.526	0.728	0.734	0.989	0.982	1.000	
CCI 2015	0.546	0.485	0.706	0.714	0.981	0.984	0.986	1.000

Source: Author

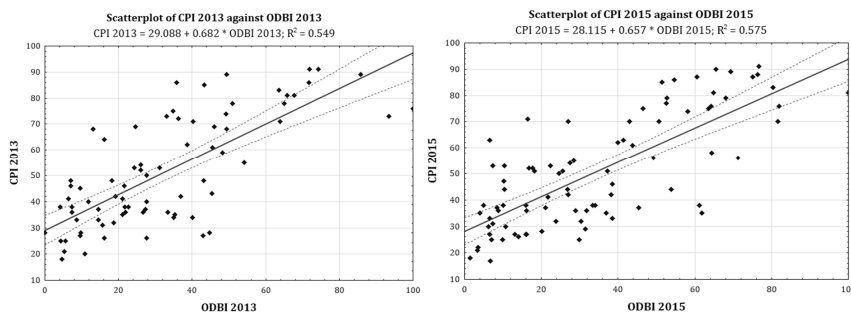
**Table 4. Kendall tau correlations**

	GODI 2013	GODI 2015	ODBI 2013	ODBI 2015	CPI 2013	CPI 2015	CCI 2013	CCI 2015
GODI 2013	1.000							
GODI 2015	0.593	1.000						
ODBI 2013	0.681	0.612	1.000					
ODBI 2015	0.621	0.634	0.764	1.000				
CPI 2013	0.449	0.364	0.523	0.541	1.000			
CPI 2015	0.452	0.392	0.518	0.547	0.913	1.000		
CCI 2013	0.423	0.368	0.548	0.545	0.925	0.895	1.000	
CCI 2015	0.394	0.332	0.519	0.528	0.900	0.898	0.903	1.000

Source: Author

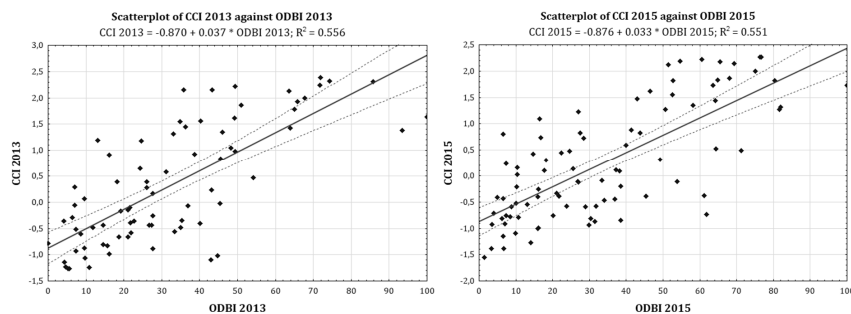
As presented above, the ODBI has stronger relationship with both CPI and CCI than GODI, hence, this relationship will be investigated more thoroughly. Figure 1 shows a simple linear regression model. There is the ODBI on the x-axis and the CPI (CCI) on the y-axis for both years. This positive relationship is then illustrated in the scatterplot, which is explained by the linear regression line. There can be seen better results in 2015, especially in the improvement of data openness on the national level. Figure 2 shows the same scatterplot with the CCI as dependent variable.

**Figure 1. The relationship between the ODBI and CPI in 2013 and 2015**



Source: Author

**Figure 2. The relationship between the ODBI and CCI in 2013 and 2015**



Source: Author

As mentioned above, higher values of ODBI indicate bigger effects of open data initiatives and projects, and higher CPI or CCI values indicate less corruption in the country, i.e., it is perceived to be very clean with strong governance performance and a stable political and economic situation. Focusing on the best performing countries, Denmark, New Zealand, Finland, Norway and Netherlands are among the best performers. Therefore, these countries may serve as a source of practical guidance and policy recommendations for the governing and successful implementation of related initiatives. More detailed view on these data is then given in Table 5. It is focused on the relationship between the changes in open data and corruption in the period of 2013 and 2015. The countries are ordered according to their ranking in 2015 for each index. In the case of the GODI, the change is negative due to the new methodology behind this index. A level of data openness represented by the ODBI has increased in this period by 12.6%. The CPI and CCI have also reported an increase in the mean value, i.e., that the anti-corruption activities are supported by more countries than in 2013. Another finding is that the changes observed in the best performing countries are generally similar across the CPI and CCI while the results for the GODI and ODBI are different, reflecting various approaches in opening up government data.

Furthermore, as this empirical relationship is confirmed, a deeper analysis of the Open Government and open data movement should follow. Some of the recent studies suggest that the availability of open data is increased by implementation of an open data portal [8]. It is a web-based system where an interface allows datasets to be uploaded and equipped with high-quality metadata searchable through defined categories, tags or vocabularies.

**Table 5. List of best performing countries focusing on the changes between variables**

Rank	GODI		ODBI		CPI		CCI	
	2015	Change 13-15 [%]	2015	Change 13-15 [%]	2015	Change 13-15 [%]	2015	Change 13-15 [%]
1	TW	85.7	UK	0.0	DK	0.0	NZ	-2.2
2	UK	-19.1	US	-12.3	FI	1.1	DK	-5.4
3	DK	-19.5	FR	27.7	SE	0.0	NO	-0.7
4	CO	0.0	CA	22.0	NZ	-3.3	CH	1.6
5	AU	1.5	DK	6.6	NO	1.2	FI	-1.9
6	FI	-6.9	NZ	2.7	NL	4.8	SE	-7.2
7	UY	0.0	NL	18.0	CH	1.2	SG	-1.7
8	US	-26.4	KR	31.3	SG	-1.2	LU	-1.6
9	NL	-13.5	SE	-19.2	CA	2.5	LI	15.3
10	FR	6.8	AU	0.5	LU	1.3	NL	-6.1
All countries covered		-2.1		12.6		2.0		26.5

Source: Author

The first limitation of this research should be the composition of indices, especially when corruption is influenced by many factors [1], [4]. Another limitation is that the available data for open data indices are still quite recent and it may be questioned if the results are sufficiently reliable for the intended purpose. However, this study may serve as a basis for further research, especially in the context of the proposed methodology for measuring open data effects on the level of corruption. Further, more consistent results may be achieved by dividing countries into groups according to their population, income level, unemployment rate, etc., as suggested, for example, by the United Nations' report on e-government [13]. Therefore, future research will be focused on various factors which may affect the level of corruption in the context of open data.



## 4 Conclusion

This paper has contributed to the discussion of the potential effects of open data in reducing corruption. Results presented in this paper suggest that there is a positive correlation relationship between selected corruption and open data indices. Thus, higher levels of open data availability are associated with lower levels of corruption in the compared countries, especially in the case of ODBI. Open data may dramatically reduce the time and money citizens need to invest to understand what government is doing and to hold it to account. For this purpose, open data portals are deployed by different levels of government as an important element of most open government initiatives. When coupled with emerging technologies such as social media, it is possible to foster collaboration, engagement, and particularly open data reuse.

However, the ability of open data to potentially decrease the level of corruption is limited to the willingness of government and its institutions to recognize the importance of the Open Government and open data movement and adopt proactive initiatives that promote greater transparency, openness, participation and collaboration of involved stakeholders with the aim to reduce corruption. Some of the recommendations include to review and recalibrate information and data policies, particularly security and privacy, data discoverability, access and reuse; build open data portal and data infrastructure; use data and metadata standards and licenses; and foster research and data communities. Furthermore, it was also found out that the methodology behind open data indices may affect the results, because it is still evolving due to the increasing effects of open data in the society. Therefore, this topic requires continuous research.

Finally, governments have also an opportunity to collaborate more with businesses and citizens in developing enhanced services, and to make effective use of new technologies such as cloud computing, Internet of Things (IoT), mobile internet and big data in the context of greater transparency and accountability.

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# The Value of Public Good. Free Rider Problem

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## Abstract

The objective of this paper is to examine the preferences of consumer goods of collective consumption or willingness to pay for consumption of the goods which brings them benefits and from consumption of which they cannot be excluded ("public goods") and to test the validity of free rider theory. Theoretical framework is based on a critical analysis of mainstream economics theories dealing with public goods as market failure. Methodological framework is determined by experimental economy and partial outcomes of realized public goods experiments. Own economic experiment tests the research question on rate of willingness to pay for public goods and the factors affecting this willingness. More than 60 % of consumers voluntarily pay for public goods consumption. The consumer's gender, education and obtained utility affects the willingness to pay for public goods.

*Keywords: experiment; free rider; public goods; voluntary contribution*

JEL Classification: H41

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## 1 Introduction

The term public good was first defined by Paul Samuelson [24]. The public goods have two attributes, non-rivalry and non-excludability in consumption. A non-rivalry public good is defined as a good, which brings the indivisible benefit and spread it across the whole company regardless of whether individuals want or don't want the goods to expend (e.g. compulsory vaccination). This means that when a good is consumed, it doesn't reduce the amount available for others. This is in marked contrast with private goods (e.g. bread). Another characteristic of public goods is non-excludability. A good is non-excludable if it is prohibitively expensive to keep people from consuming the good after it has been produced. The problem with non-excludable goods is that if consumer cannot be excluded from consuming them, they will free ride and consume without paying, resulting in underproduction of the good [9], [16], [24], [27].

Due to the existence of the free rider problem and the properties of public goods (non-rivalry and non-excludability in consumption), the private market has no interest in the production of these goods, there is, therefore, a realization of public goods in the political market. There are many types of services that people want to be provided, but the opportunity to provide them exists only when the resources are obtained by coercion. The reason for this realization in political market is that consumers did not express their preferences [16], meaning they did not show willingness to provide any equivalent to satisfy their needs, in other words willingness to pay for public good. Although the government has coercive power, while acting as a monopoly, it does not necessarily mean that public goods would be organized or produced by government. The reason is that not always have these decisions been implemented in the spirit of the "public interest", the purely rational economic reason [16], and are associated with a greater or lesser degree of inefficiency [13], [19], which is excused by free rider problem, or the reluctance of the consumers to pay for the consumption of the goods, from which consumption it is not technically possible to exclude them [8], [20], [24].

One of the reasons for this inefficiency is an ex-post evaluation of the benefit of the consumer of public good – the value of the public good [16]. At the same time, as stated by [17], it is necessary to establish an economy liberated from the traditional perception of a man as a homo oeconomicus, man urged by exclusively "economic" motives, in an attempt to achieve the greatest tangible or monetary gain, but to also focus on up to now abstracted behavioural elements of analysed economic problems.

Experimental economics is the new economic sub-discipline which responds to this problem. Experimental economics takes into account exogenous changes in compliance with the rule of *ceteris paribus*, by which it discovers important elements respectively factors of environment, systemic and design variables [13], which influence the behaviour of economic subjects [18]. Experimental economics has also found use in the case of the solving of previously mentioned free rider problem, as a result of a characteristic of public goods, which is non-rivalry and non-excludability from the consumption of these goods [1], [2], [4], [12], [27], [28].

The objective of this paper is to examine the preferences of consumer goods of collective consumption or willingness to pay for public goods which brings them benefits and from consumption of which they cannot be excluded ("public goods") and to test the validity of free rider theory. Methodological framework is determined by experimental economy and partial outcomes of conducted public goods experiments.

The originality of the paper lies in the fact that an economically active side of population was actually involved. Up to now experimenter recruited only students. We also used a new method of conducting our experiment over the internet. We used Google Docs for creating our online experiment. Our experiment and its methodology is also unique in Slovak republic conditions.

## 2 Material and Methods

In our experiment, which was based on the experiments conducted by Mazar, Amir and Ariely [3], [15]. They focus on simple model of rational crime. This model depends on three elements, (1) the benefits that one stands to gain from the crime, (2) the probability of getting caught, and (3) the expected punishment if one is caught. Our experiment consisted similarly to their experiment [15] of the worksheet, on which there were twenty matrices (e.g. Figure 1a). Each matrix had twelve numbers. The task of the respondents was to find two numbers in each matrix, which would after the addition, gave the total of ten.

Figure 1. Matrix task

a)	<b>9.38</b>	<b>6.74</b>	<b>8.17</b>	b)	<b>0.17</b>	<b>2.46</b>	<b>1.78</b>	c)	<b>0.46</b>	<b>1.98</b>	<b>2.38</b>
	<b>5.15</b>	<b>6.61</b>	<b>3.06</b>		<b>2.16</b>	<b>5.60</b>	<b>2.63</b>		<b>0.48</b>	<b>1.79</b>	<b>2.48</b>
	<b>9.71</b>	<b>0.91</b>	<b>4.88</b>		<b>5.16</b>	<b>6.21</b>	<b>6.60</b>		<b>0.58</b>	<b>1.69</b>	<b>2.59</b>
	<b>3.58</b>	<b>4.87</b>	<b>6.42</b>		<b>8.22</b>	<b>8.19</b>	<b>7.54</b>		<b>1.65</b>	<b>0.98</b>	<b>2.94</b>

Source: Authors

The respondents had five minutes to solve all of the matrices, but sometimes there was missing solution (Figure 1c) or there were two solutions (Figure 1b). Their results were checked after five minutes. The participants in the experiment conducted by Mazar, Amir and Ariely were divided into two groups (control group and the anonymous group) [15]. In their experiment the worksheet was checked by experimenter in the control group. After checking the participant's solutions, they got their financial reward. In the anonymous group were worksheets put through the shredder without checking. Respondents should then tell the experimenter how many matrices they have solved. With the results of both conditions, they could later compare the performance in the controlled conditions, in which cheating was impossible, to the reported performance in which conditions the worksheets were shredded and therefore cheating was possible [3].

We also divided our respondents into control (experiment carried out directly in the organizations in the 1<sup>st</sup> and 7<sup>th</sup> group) and anonymous group (experiment via online form created in Google docs in the 8<sup>th</sup> group), but the way of checking was different. The results were checked by us in the 1<sup>st</sup> group. After that we wrote on the worksheet number of correct results and the participants took appropriate material reward from full envelope. The participants of 2<sup>nd</sup> and 3<sup>rd</sup>

examined the results between each other. The respondents of 4<sup>th</sup> and 8<sup>th</sup> group checked their results separately. We asked the participants of 2<sup>nd</sup> and 8<sup>th</sup> group to write down the number of results they thought they answered correctly. Each participant got the worksheet with correct solutions. The experiment took a total of 144 respondents (98 women and 46 men).

Our experiment was conducted in February and March 2016. The subjects of economic experiment were selected groups of students (87 students, 70 women and 17 men) of Economic faculty of Matej Bel University that were heterogeneous in acquired education and in specialization of study and also the economically active side of population (57 respondents). We tested students from all existing fields of study at Matej Bel University (Tourism, Business Economics and Management, Finance Banking and Investment, Public Economics and Services, Public Government and Regional Development) from 1<sup>st</sup> to 4<sup>th</sup> year. We asked students about their gender, year of study and field of study. Economically active side of population was recruited in the following ways: randomly via social networks in "online" experiment (27 respondents for anonymous group) and we also recruited in organizations. This was carried out on the ground of friendly relationships in these organizations and with the approval of employees (30 respondents for the control group). We asked of economically active side of populations, about their gender, the highest level of education they achieved and the number of years in service. We also contacted two public organizations, but our applications were declined.

The experiment was designed as one-shot, when the respondents made decision only one time. Advantage over experiment with multiple rounds is excluding the learning effect from the experiment, because the learning effect is one of the reasons for decreasing the rate of willingness to pay for public goods [28]. On the other hand, the problem with one-shot experiment is that respondents are inexperienced [12]. Our experiment was carried out via the internet. Web-based experiments are significantly less expensive, we can perform these experiments more quickly and target larger and more diverse groups of respondents. At the same time, however, it is necessary to admit that the informative value of the results of the experiment is limited, because it is difficult to verify the identity of participants in the experiments also participants take the experiment less seriously and behave with less risk-aversion [21], [25].

In our experiment, we did not primarily deal with rate of cheating as Mazar's, Amir's and Ariely's experiment [15] did, but our focus was on the willingness of individuals to pay for public goods. In our experiment, we didn't reward our respondents with financial reward but only with hypothetical or material reward. The problem with this kind of reward isn't expressing their real preferences. People are more generous in those situations. In our experiment respondents of the control group received two envelopes; one was full and the other empty. The full envelope contained material reward in the form of eight pieces of sweets, which accounted for the maximum reward the participants could get for finding all of the seventeen combinations of numbers in matrices worksheet. After checking the results, the participants were supposed to pick the appropriate reward from the full envelope (at least 2 correct answers = 1 sweet; 4 correct answers = 2 sweets; ...; 16 correct answers = 8 sweets). In the event that the participant of the experiment found an odd number of combinations, e.g. five, the same rules have been applied, as if he had found only four combinations, meaning he would get only two sweets. The empty envelope was meant for one sweet that the participant would have to give away, as in some sort of tax payment to the public good from the obtained reward.

For the 8<sup>th</sup> group, we have not met with the respondents directly, but we sent them a web link, by which they could participate in the experiment. Firstly, we introduced them the free rider problem, and then the sheet of twenty matrices was displayed on their screens. Their task was to find within five minutes as many combinations of numbers that give them total sum of 10 as they could. The problem with this conducted experiment is that we could not control whether the participants of the experiment actually followed our instructions, and if they followed the five-minute mark. After finding the combinations they should themselves check the results of the experiment. After checking the results, they were supposed to answer few questions. After experiment we asked them about the number of correct answers which they had revealed, the remuneration which they would give themselves, based on how many correct answers they found and the question representing the decision of whether they would contribute or would not

contribute to public goods. The reward in form of sweets in this method of testing was potential earnings that could participants of the experiment get (0 and 1 correct answers = € 0; 2 or 3 correct answers = € 0.50; 4 or 5 correct answers = € 1.50; ...; 16 or 17 correct answers = € 4). The experiment was designed so that the participants had to make effort to get the reward. The experiment was presented as a situation in which the employer requires employees to produce a certain number of products and if more products are produced, in this case, the more correct answers were found, the higher the reward was. Decision to insert one sweet into the envelope, or the decision to pay € 0.50 for public good, should then be seen as a tax income.

We supposed in contrast to theory of public goods and the free rider problem that the respondents or people in general aren't strictly rational, but they are influenced by social awareness [9], [16], [24], [27].

### 3 Results and Discussion

We verified four hypotheses in our research.

*Hypothesis no. 1: We assume that the form of the experiment has an impact on the number of found combinations. In the event that the experiment was conducted anonymously, this will reflect on the number of found combinations.*

The following table (Table .) shows the average number of found combinations in the individual groups; the groups 1<sup>st</sup> to 5<sup>th</sup> consisted of students of the Economic faculty of Matej Bel University, the groups 6<sup>th</sup> and 8<sup>th</sup> consisted of the economically active side of population.

**Table 1. Total results in the individual groups**

<b>Group</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>6<sup>th</sup></b>	<b>7<sup>th</sup></b>	<b>8<sup>th</sup></b>
An average of found combination	4.96	4.94	4.91	3.31	5.80	4.45	5.42	7.37
Rate of willingness to pay (%)	95.00	94.12	45.45	58.33	70.00	90.91	88.89	59.26
Rate of free rider (%)	5.00	5.88	54.55	41.67	30.00	9.09	11.11	40.74

Source: Authors

This hypothesis has been verified, in particular on the basis of the high number of found combinations in the anonymous group (the 8<sup>th</sup> group). We have statistically verified our assumption through factor analysis of the dispersion (One - Way Anova). At the significance level of 0.05, where the  $p = 0.008$ . In this case, the higher the degree of anonymity, the higher was the number of found combinations, which ultimately could be caused by the fact that the respondents when checking their results via the Internet cheated more, as if the experiment was carried out with the participation of experimenter.

Our results correspond also with the results of the experiment conducted by Mazar, Amir and Ariely [3], [15]. In the case of the control group participants solved on average four out of the twenty matrices (in our case was an average of found combination 4.82), while participants in the shredder conditions claimed to have solved an average of six- two more than in the control conditions [3], [15]. In our case respondents in the shredder conditions claimed to have solved an average of 7.33 of the twenty matrices. We also found out that if the rate of anonymity is lower, the willingness to pay is higher. The rate of willingness to pay was the highest (Table .) in the 1<sup>st</sup> group (students of 4<sup>th</sup> year with the field of study of the public economics and services), 2<sup>nd</sup> group (students of 2<sup>th</sup> year with the field of study of the public economics and services) and in the 7<sup>th</sup> group (employees of private organizations). The rate of willingness to pay for public goods was the lowest at the 3<sup>rd</sup> group (composed from all fields of study) (Table .). These results could have been caused due to the fact that our respondents did not know each other.

We also noticed that in several cases the number of correct answers that respondents said they found was actually higher than the number of correct answers they could possibly find. They thought that matrices, which they identified as empty, were also correct answer. But the matrices

that were correct were only those with coloured mark (Figure ). The participants found something as "loophole in the law" and so they were remunerated with a bigger reward. We found out that this incident occurred with seven students in the 2<sup>nd</sup> group and two economically active persons in 7<sup>th</sup> group. The difference was 3.89 material rewards.

We also found out that 31 respondents from 117 (group 1<sup>st</sup> to 7<sup>th</sup>) took higher reward than they should have. The variance was 44 sweets. These 31 respondents consisted of twelve men (three of them were economically active persons) and 19 women (two of them were economically active person). The proportion of men on the difference is 34 percent and the proportion of women on the difference is 66 percent. One of the reasons for this behaviour is model of simple rational crime [3], [15]. Cheating is not necessarily due to one person that is doing a cost benefit analysis and stealing a lot of money. Instead, it is more often an outcome of many people who quietly justify taking a little bit of cash or little bit of merchandise over and over [3], [15]. It is quite similar to free rider problem [9], [16], [27].

Another hypothesis, which we tried to verify, was the assumption that the amount of the reward has an impact on the willingness of respondents to pay for public goods.

*Hypothesis no. 2: We assume that the achieved level of reward has an impact on the willingness to pay for public goods.*

When verifying the Hypothesis no. 2, we used the Spearman correlation coefficient. We can conclude that at the significance level of 0.05, where the  $p = 0.012$ . The hypothesis was confirmed. We therefore assume that the amount of the reward has an impact on whether are the individuals willing to pay for public goods, the lower the reward, the lower the willingness to pay for public goods. In this case, we tried to mentally affect our participants (group 1<sup>st</sup> and 7<sup>th</sup>). We wanted to arouse loss aversion. The general concept [11] is that if two choices are put before an individual, both equal, with one presented in terms of potential gains and the other in terms of possible losses, the first option will be chosen. For example, a man who lost € 100 will be sadder as a man who gained € 100. They had gotten their reward before starting the experiments. After checking their result, we took away "considerable" proportion of their potential reward and then they were asked to pay for public goods. Respondents were therefore able to decide that in case of low earnings the given reward would be "used better", as if they have had to voluntarily hand the reward over for the production of public goods (free rider problem). It is important to imagine this situation, in a same way as we presented it to the respondents, which was not as getting the material reward, but as gaining financial reward, or wage.

As a third, we tested the hypothesis:

*Hypothesis no. 3: We assume that the gender of the respondents has an impact on the willingness to pay for public goods.*

The results may be largely influenced by the proportion of women, who participated in our experiment (98 women from 144 respondents). Given that in this case the selection file wasn't representative (we verified it via a chi-squared test), because in a real-world scenario the genders are divided approximately 50:50, and in our experiment this ratio reached 68:32. But in both cases separately, we have gained a representative data file. The participants were divided by gender. This was approximately 24 percent of men and 76 percent of women, and in our experiment this ratio reached 20:80 (%) at Economic faculty of Matej Bel University. This selection file is considered representative. The proportion of men and women in the economically active population in this case corresponds to the division of the population in the real-world scenario (49 percent of men and 51 percent of women). Therefore, we tested the hypothesis separately only for the economically active population. When testing of the hypothesis no. 3, we have used the Pearson chi-squared test and Fisher's exact test. With the level of significance 0.05, where the  $p = 1.000$  in Pearson chi-squared test (Fisher's exact test  $p = 0.839$ ). We determined that the gender of respondents has no impact on the willingness to pay for public goods. For economically active side of population were results of Pearson's chi-squared test and Fisher's exact test  $p = 0.355$ ). The results for economically active side of population correspond with the results of

previously conducted experiments [12], that women and men in the framework of the experiments with public goods behave similarly.

Lastly, we verified the main hypothesis. The reason, why we tested the hypothesis no. 1., then no 2., and then no. 3., was gradually finding out the factor which impact our participants in the experiment. The factors which had an impact or had a strong effect on participants were anonymity and loss aversion. The factor of gender didn't have any significant effect on participants.

*The main hypothesis: We assume that more than 60 % of consumers will voluntarily pay for public goods consumption.*

Set limit of 60 % was derived from the already performed experiments [4], [7], [13], [21], [25], which determined the rate of voluntary contribution in the range of 40 – 60 % of the maximum possible contribution of the whole group. The rate of willingness to pay for public goods was in our research significant in the first round of these experiments, because until then, the respondents weren't affected by learning effect and the results shouldn't be distorted. The reason for this hypothesis is to confirm the concept of civil duties, or civil liability. Listed concept is mainly based on the works of Freya's [5], [6], which claims that the individuals or citizens are motivated not only by an attempt to maximize their own wealth, but also by the feeling of civil obligation. To verify the hypothesis, we used the binomial test, in which we supposed that more than 60 % of the people or citizens will voluntarily pay for public goods. We reflected this, with a level of significance 0.05, where the  $p = 0.001$ . We accept the premise that more than 60 % of the consumers will voluntarily pay for public goods consumption. The rate of willingness to pay for public goods was on average 75.24 percent in our experiment. We also confirmed difference between theory of public goods and free rider problem, where the subjects are strictly rational and between the results of our own experiment, where the subjects are influenced by the rate of anonymity, social identification, economic position and social status.

#### **4 Conclusion**

The objective of this paper was to examine the preferences of consumer goods of collective consumption or willingness to pay for consumption of the goods which brings them benefits and from consumption of which they cannot be excluded ("public goods") and to test the validity of free rider theory. Methodological framework was determined by experimental economy and partial outcomes of realized public goods experiments. The subjects of economic experiment were selected groups of students that were heterogeneous in acquired education and in specialization of study and the economically active side of population.

The experiment was conducted in similar way as Mazar's, Amir's and Ariely's experiment, but we focused on the free rider problem, which is close to cheating as stated in their experiment [3], [15].

Our research issue was: More than 60 % of consumers will be willing to pay for public goods consumption [4], [7], [13], [21], [25]. The results of the experiment confirmed the validity of our assumption. More than 60 % of people in fact voluntarily contributed to public goods.

The theory of free rider assumes that people make some cost analysis when they are deciding [9], [16], [24], [27]. After that they will make a decision whether they will be willing to pay or not to pay for public goods. In comparison with our experiment we found out that people will be willing to pay for public goods. We concentrated on factors which influence people behaviour. We assumed that there will be a connection (1) between the course of the experiment and the willingness to pay for public goods (anonymity), (2) and a connection between the amount of obtained reward and the willingness to pay for public goods (economical positions and social status) (3) and a connection between the gender of participants of our experiment and the willingness to pay for public goods. The results of the experiment confirmed the validity of our first and second assumption but the result of the experiment did not confirm any connection between the gender of participants and the willingness to pay for public goods. We found that the



factors, which could have affected the rate of willingness to pay for public goods are way of control, understanding of rules, loss aversion in case of low reward, the highest level of education our subjects achieved and the number of years in service. Due to the fact that the subjects of the experiment were not only students, but also the economically active side of population, the informative value of the experiment is higher. At the same time, however, it is necessary to admit that the informative value of the results of the experiment is limited. This is due to the fact that the participants received either the material reward in form of sweets or only a hypothetical financial reward in € and thus their behaviour could be more generous as if it would be in the case where they would receive the real payment. But the results showed that the way of remuneration didn't have so much of an impact on willingness to pay for public goods (Hypothesis no. 1). Our results partially correspond with another experiments [4], [7], [13], [21], [25], but in our experiment we excluded the learning effect and replication, since we tried to replicate the decisive process of our participants so it would match that of the reality.

## Acknowledgements

The research was supported by VEGA under the contract No. 1/0405/15 Programme budgeting as New public management tool.

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# Current Situation of Strategic Governance and Strategic Management in the Czech Republic

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## Abstract

This article analyses the current situation regarding strategic governance and strategic management in the Government of the Czech Republic. It seeks out the causes and factors, which have caused the low level of strategic governance and strategic management within the ministries of the Czech Republic. The issue is analysed from the perspective of organizational and human capacity to perform strategic governance. The study is based on the empirical research on the ministries of the Czech Republic. It identifies the main causes of strategic governance and strategic management failure at the level of the central government of the Czech Republic. These include, in particular, a persistent distrust of the ideas of strategic governance and strategic management and the overall low capacity of the governments of the Czech Republic for strategic governance. The organizational structure of the central state administration lacks the strategic units which generate ideas for supporting strategic governance

*Keywords: governance; strategic governance; strategic management; governments of the Czech Republic; ministries of the Czech Republic; shortfall (deficit) in effective governance in the Czech Republic*

JEL Classification: H10, H11, H19

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## 1 Introduction

Within the theory of the last decade, we find different approaches that deal with the question of how to streamline governance and public sector management (see [4]). In our study, we started from the premise that one of the tools to streamline governance is the implementation of the ideas of "strategic governance" and "strategic management in society." This assumption derives from extension and intension concept of "good governance" (see [9]). Strategic governance and strategic management are, in fact, instruments "to influence the future for the better"[6] and to implement it through a "strategic plan"[10]. The government, which wants to be "at the mercy of events" should be able to anticipate trends and evaluate the consequences of their decisions (and non-decisions) to society. Such activity can be fulfilled by such a government, based on the principles of strategic governance and strategic management (see [19]).

While searching for the theoretical basis for an analysis of strategic governance, however, we confronted the problem of the professional literature not having explicitly addressed the definition of the relationship between the terms "governance" and "strategic governance". Authors who deal with the problem of strategic governance have not defined the relationship between these concepts explicitly. Our investigation was not able to latch onto any reference to a pre-defined relationship between the terms "governance" and "strategic governance". On the basis of existing scientific debate, it is therefore for the purposes of our study, that we will endeavour to define the relationship between the terms "governance" and "strategic governance" in theoretical and conceptual bases, and then to empirically analyse strategic governance and strategic management in the Czech Republic, where we will consider strategic management to be one of the attributes of strategic governance.

This article aims to analyse the current capacity of ministries of the Czech Republic regarding strategic governance and strategic management. The empirical research has been supplemented by the results of structured interviews.

### 1.1 Strategic Governance and Strategic Management (Theoretical and Conceptual Framework for the Investigation)

The starting point for examination of the issue of strategic governance is the concept of "governance" [17]; [18]; [23]; [24]. Governance may be viewed from different perspectives. It may be examined from the perspective of policy-making in terms of the role of institutions, or examined from the perspective of the achieved outcomes [7]; [8] which provide information on how the government is effective in the execution of its activities. The effectiveness of administration of public affairs is dependant on the quality of governance. It therefore makes sense to seek an answer to the question of how to increase the quality of governance.

The phenomenon of governance can also be examined in the light of differing characteristics (properties), such as the content, quality, condition, developmental perspectives etc. In view of these characteristics we speak of "species" (modes) of governance. One of them is "strategic governance". In the literature we find various definitions of the term "strategic governance" as well as different concepts and different approaches towards its exploration. For example, [6] or [19]; [20] define strategic governance by the holistic approach, when they compare a certain existing (current) state ("non-strategic governance") with the target state ("strategic governance"). [13] considers the existence of government strategies, the existence of both short-term and long-term government objectives, formulated government visions and concepts, and systemic incorporation of leading strategic ideas into organisational structures of the government as essential characteristics of strategic governance. [6] moreover, considered being anticipatory an important feature of strategic governance, i.e. influencing the future for the better. [12] in the framework of governance, discuss governance networks and strategic outcomes. They also warn that "strategic outcomes should not be limited to economic outcomes" (2014, p. 118). Another perspective is offered by [4], who delivered a comprehensive assessment of economic and managerial government approaches formed on the basis of the ideas of New Public Management (NPM). [21] combine strategic governance with strategic planning. The aforementioned brief review of the literature dealing with the problem of governance (i.e. strategic governance) shows that there are a variety of theoretical concepts and approaches to studying strategic governance. Their aggregate (but not complete) summary is shown in the table below.

**Table 1. Approaches and views on the idea of "strategic governance"**

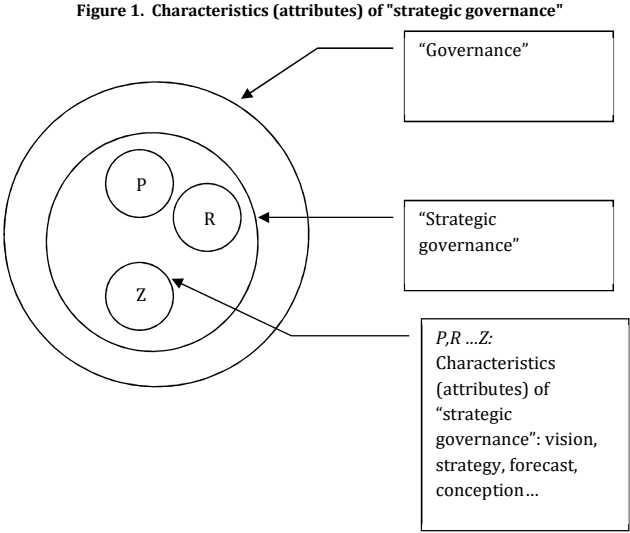
<b>Approaches to the definition of "strategic governance"</b>	<b>A key feature of the "strategic governance"</b>	<b>Strengths and weaknesses of the definition of "strategic governance"</b>	<b>Representatives</b>
Holistic approach	New quality of governance	Holistic, but too general of a concept	[19]; [20]
Anticipatory	Concept of influencing future for the better	Directionality of strategic governance for the future. "Future" is conceived rather declarative, without benchmarks "influencing the future for the better."	[6]
Actor – Network Theory	Governance networks and Strategic Outcomes	Clarification of "a labyrinth of mechanisms and actors", neglecting other characteristics of strategic governance	[12]
"Managerial" approach	Management of changes, linking governance and performance	Measurable results, but strategic outcomes are examined only as economic outcomes, respectively, the result of effective management of the assessed economic criteria	[11]; [1]; [4]; [15]; [22]
Systemic structural approach	Strategic governance as the intersection of the dimension "strategic planning" and the dimension "government"	A clear definition of the relationship between "governance" and "strategic planning". Identifying those elements of strategic governance, although rather static view of the strategic governance.	[13]; [21]; [10]

Source: Authors

From a brief overview of the different approaches of governance, it is clear that, in theory, there are a number of different theoretical considerations on the issue of governance. These views oscillate between the prevailing qualitative view, and the quantitative approach to exploring strategic governance. At the same time, the individual authors and approaches differ regarding what is the key feature of strategic governance. This difference results from the different approaches to strategic governance. Each approach, however, has its strengths and weaknesses. The advantage of a holistic approach is that it attempts to have a comprehensive view of the problem of "governance". On the other hand, however, this approach is too generic and descriptive, with the research focusing on the quality of governance. Other authors focus on one of the partial views, such as economic, management, or structurally functional view of governance. Such a view is (logically) one-sided, however, as it is only focused on a specific aspect (strategic) of governance.

**2 Material and Methods**

For an analysis of the capacities for strategic governance, we have created several models which enable the examination of strategic governance capacity. The logic of the model is based on the assumption that we know the specific characteristics (attributes) of "strategic governance" for example vision, strategy, forecast conception, real existence (absence) of element in the organizational structure dealing with strategic management and strategic planning at the ministry, as is shown in Figure 1.



Source: Authors

These include, in particular, the aforementioned vision, strategy, strategic plans, etc. We shall then denote "all" characteristics of strategic governance by the letters P, R, S, Q, ...Z. The model then takes the form of the following matrix (table 1). The column "type of distribution" (D1 ... DM) reflects how the distribution of characters P, R, S, Q, Z... is within a reporting entity (e.g. a ministry.) Let the reference attributes P, R, S, Q...Z testify to the capacity to perform strategic governance. Let us now devise a model for the case when we examine the capacity to perform

strategic governance at the level of a single ministry. Formalised outputs of such an empirical analysis may be compiled into the following matrix.

**Table 2. Distribution of properties (reference attributes) of the “capacity to perform strategic governance” at the level of a single ministry(actor) Ai**

Type of distribution Di	Reference attribute of strategic governance					
	P	R	S	Q	...	Z
D1	0	0	0	0		0
D2	1	0	0	0		0
D3	1	1	0	0		0
D4	1	1	1	1		0
...						
Dz	1	1	1	1		1

Source: Authors

We determine any presence of the given feature through empirical examination with regard to the content of the reference attribute P, R, S, Q...Z. Reference attributes (feature components) of strategic governance P,R,S,Q, etc. are such characteristics that describe strategic governance and strategic management. At the level of ministries, these may be, for example, relevant documents (visions, strategies, forecasts, concepts) and indicators of the practical exercise of strategic governance and strategic management.

Research results are in turn assembled into a table using binary code. The real presence of the given component attribute is indicated by the binary code 1, while its absence corresponds with the binary code 0. The distribution type Di provides evidence of the quality of the “capacity to perform strategic governance”. Thus, for example, distribution D1 represents the case where none of the reference attributes characterising strategic governance is present (satisfied). The resulting degree of the “capacity to perform strategic governance” is therefore, nil. For such a subject we may confidently state that it has absolutely not adopted the tools of strategic governance. A contrary case is represented by distribution Dz where the given actor exhibits an ideal “capacity to perform strategic governance” in terms of the monitored component features (exhibited reference attributes). In all the reference attributes, it scores a value of one. The presented model is a support tool for internal audits of individual ministries. Top ministerial representatives may use it as a tool to obtain feedback on what capacity the given ministry possesses towards performing strategic governance within the given type of public policy. We shall apply also an analogical procedure when testing the capacity to perform strategic governance at the level of the entire government (respectively, at the level of multiple selected ministries).

For comparison of the capacities for strategic governance and strategic management at the level of individual ministries, we have selected the aforementioned characteristics (indicators) of strategic governance P ... Z. In our particular case, we will be following these characters at individual ministries of the Czech Republic: vision, strategy, forecast, concept (conception) and real existence (absence) of element in the organizational structure dealing with strategic management and strategic planning at the ministry. Our proposed descriptive model uses binary codes 1, 0, which means that it shows the presence of a given character (binary 1) or its absence (binary 0). A table (matrix) then gives the resulting picture of the state of strategic governance and strategic management at the level of the compared ministries. An edited modification of the model is used in the next study to investigate the capacity of ministries of the Czech Republic for the implementation of strategic governance and strategic management.

To fulfill the model data, an analysis of strategic documents from individual ministries of the Czech Republic was utilized. The information was filled in using structured interviews (February-April 2016) with employees from the Ministry of Defense, Ministry of Interior, Ministry of Health, Ministry of Finance, Ministry of Agriculture and Ministry for Regional Development. Sound recordings were made of these interviews. One interview (Ministry for Regional

Development) was conducted, at the request of the respondent, without being recorded. In all cases, the respondents were working in positions as policy workers and decision makers.

### 3 Results and Discussion

In this part of the study, we shall apply the model to compare the capacity to perform strategic governance at the level of all the ministries. Results of our examination are shown in Table 3.

**Table 3. Audit results of the analysis of activities (jurisdiction) and ministerial organisational structures with regard to the performance of strategic governance**

Ministry	Explicitly defined jurisdiction specified by the Competence Act within the domain of				Organisational component within the structure bearing the name "strategic"	Comment
	Vision	Strategy	Forecast	Concept		
Ministry of Finance	0	0	0	0	0	There are analytical departments
Ministry of Foreign Affairs	0	0	0	1	1	Office of strategy, analyses and project management; Department of consular concepts
Ministry of Education, Youth and Sports	0	0	0	0	0	There is a methodology-analytical section
Ministry of Culture	0	0	0	0	0	Unit of cultural policy and concepts
Ministry of Labour and Social Affairs	0	0	0	0	0	In each section there is a conceptual component
Ministry of Health	0	0	0	0	0	Unit of science and research
Ministry of Justice	0	0	0	0	0	Decomposition of sections is not available
Ministry of Interior	0	0	0	0	0	Department of conception and coordination IS
Ministry of Industry and Trade	0	0	0	0	1	Section of strategy and economy of industry
Ministry of Regional Development	0	0	0	0	1	Department of strategy and policy coordination; Department of development and strategy of regional policy
Ministry of Agriculture	0	0	0	0	0	Department of conceptions and department of research and development
Ministry of Defence	0	0	0	1	1	Section of defence policy and strategy
Ministry of Transport	0	0	0	0	1	Department of emergency planning and defence planning
Ministry of Environment	0	0	0	0	1	Unit of strategies; Unit of conceptions; Unit of monitoring and planning

*Note: 1 – yes; 0 – no*

*Source: Authors*

The research results revealed some interesting findings. As is evident from the table, only eight ministries have a component explicitly called "strategic" in their organizational structures. This obviously does not have to mean that other ministries necessarily do not perform any strategic activity. It may, in fact, be "hidden" under activities of other organizational components. Therefore, we have conducted an examination of jurisdictions (activities) of individual ministries as specified by the Competence Act and, through it, derived jurisdictions of the ministerial organizational structures. The analysis shows that most of the ministries of the Czech Republic have assigned tasks (activities) related to the strategic governance in their jurisdictions.

The analysis of organizational structures of ministries of the Czech Republic revealed that no ministries (or the Czech government as a collegial body) within their structures have so-called strategic units, as is common in developed European countries as reported by [7]. Czech ministerial employees themselves, who are in the positions of policy workers, agree that such work would need to be established within the ministries. This is confirmed by the results of our empirical research (interviews) conducted in the months of February to April 2016 with policy workers in the ministries of the Czech Republic. All respondents agreed that for the effective performance of strategic governance, it is necessary to create a component (strategic unit) that will generate ideas to support the strategic management at their respective ministries. Respondent A (Ministry of Health) defined that need as follows: "I think it should be internalized within each ministry ... it should be a stable department or department accounting for enough people relatively" (interview with Respondent A, April 4 2016). Respondent B also expresses the same need from the Ministry of Agriculture.

We note that while the ministry is specific in itself, it has in its structure (or subordinated) about 15 scientific research institutes. Nevertheless, the respondent from the Ministry of Agriculture sees the need to create a workplace of "strategic units". Respondent B answers: "Yes, I think that would be sensible to create such an element" (interview with respondent B, March 31, 2016). Respondent C (Ministry of Defense) sees the point of such work in that, it generates new ideas and at the same time would help to "pass into the everyday practice" (interview with the respondent C, April 16, 2016). Respondent D (Ministry of Finance) sees a key role for "strategic units" in the transfer of scientific findings into practice (interview with respondent D, May 5, 2016). We can thus conclude that policy on the part of workers' demands the need to develop a ministerial department of "strategic units". In the context of the experience of other European countries which has been generalized in the scientific literature regarding the problem strategic governance [10]; [19]; [21] and strategic management (see [2]; [16]) such a provision department at the government level or at the level of the individual ministries (along with the implementation of strategic management) can be considered as one of the factors that can improve the level of strategic governance and strategic management in the Czech Republic.

#### **4 Conclusion**

From the results of the empirical analysis it is possible to make some conclusions. It appears that the problems on the circumstances of the countries of Central and Eastern Europe several years ago were identified by [25]; [5]; [14] in the field of public management, in the Czech Republic continues to remain unresolved. The Czech Republic continues its continuous reluctance of the central government to act strategically. This attitude is manifested in practice as the indecision of governments to solve serious social problems that have long-term social consequences. The Czech government, therefore, deals with only "fleeting events." It constructs its decisions on prioritizing the "present moment", or relying on the self-regulatory function of the market. The result is that the government does not feel the need to strategically govern nor strategically manage. Therefore, either they explicitly reject the idea of a "strategic governance" and "strategic management" as a relic of communist centralized planning (liberal-oriented governments), or by not dismissing the idea of "strategic planning" and "strategic management," (socially oriented governments), but not applying it in practice.



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# Quality of Life Evaluation in Czech Districts

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## Abstract

The article explores regional comparison of quality of life (QOL) in the Czech Republic (CR) districts. In the CR there are 77 districts. A district is a territorial unit mainly used for statistical reporting purposes. This territorial classification corresponds with Eurostat Local Administrative Unit level 1. A set of 32 indicators from economic, social and environmental areas was chosen for the measurement of QOL at the district level. The model was designed for the evaluation, comparison and explanation of regional differences in the QOL. Algorithms of hierarchical cluster analysis were applied for the whole set of objective indicators in the model. The results show that QOL on the district level is very similar across the CR; only the districts located in the highland areas in Šumava (mountains), Jeseníky (mountains) and Krušné hory (Krušné mountains) have lower level of QOL. On the other hand, the highest QOL is observed in the district Capital city of Prague as actually expected.

*Keywords: district; indicator; hierarchical cluster analysis; quality of life*

JEL Classification: C88, H59, H76

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## 1 Introduction

In recent decades the term QOL, or rather well-being gets more and more attention from political representations, professional communities and citizens themselves. In order to make this complex issue somewhat more easily observable it is possible to say that this concept has two dimensions, under various approaches, there is an objective and a subjective dimension [15]. According to [6] it is possible to understand real quality of life as concrete and measurable life conditions of an individual or of inhabitants. Objective QOL is influenced by a number of indicators. Life conditions and a certain life standard also influence to a large extent the possibility to succeed in life for individuals, individuals starting points for possible attainment of certain status of living. Thus living conditions influence also further development of individuals. Life conditions and the living standard mutually overlap and influence each other. Higher material and financial living standards are linked to larger selection of and larger accessibility of specific and higher quality services and products. There are big differences however between objective living conditions and objective standard of living and the subjective perception of this objective quality. These differences are determined socially and psychologically. Some socio-demographic factors as e.g. age, life experience but also generation based specific needs are primarily among the most important factors that influence the subjective perception of the objective quality of life. Following this are also the level of education, type of profession, personality type, personal direct experience with the given environment or passed on information about quality of life in various regions, social status and similar.

The subjective evaluation of the QOL is the most sensitive and the most difficult area of such evaluation. Problems are encountered here that are related with embarrassment to respond to questions about one's own life satisfaction. Other problems in this area are the reliability or objectivity of the provided responses, the issues of relation to the objective QOL and with continuously changing value orientation of individual people and the society as a whole, the issue of measuring the achieved level of one needs' satisfaction and of relevant life objectives and so on.

As it is obvious from the above-stated text the QOL cannot be measured neither easily nor directly. It is a large-scale concept that covers and includes a lot of dimensions (political-societal, social, economic and also environmental) and it is measured by means of indicators and aggregated (composite) indexes of QOL. Any quantitative facts, that are data, which have or can

have a relation to the quality of human life, can become indicators for QOL measurement. According to the UN Commission for Sustainable Development indicators have a number of functions. They can provide explanations, they can simplify and they can provide aggregate information for decision-making, they can help to include natural and social sciences into decision-making and they can help to measure the path to sustainable development. Further they can provide early warning about potential economic, social and environmental threats. QOL indicators are also important tools for translation and transfer of ideas and values [13, 16, 17].

A number of databases and indicators exist both on the world level and in the CR (e.g. the UN Development Programme, the World Bank, United Nations DESA, Eurostat, OECD, [13, 17] that monitor and evaluate QOL from various points of view and aspects. These are, in majority of cases, partial indicators that do not explain the complex QOL issue. This is the reason why compound, in other words aggregated QOL indicators, are used - *Human Development Index, Physical Quality of Life Index, Index of Corruption, Index of Sustainable and Development Index*, and similar.

Basic differences can be observed between the objective and the subjective QOL indicators. Sets of objective indicators focus on anticipated sources of the QOL, subjective indicators are usually obtained from qualitative research. Among QOL objective indicators belong e.g. GDP per Inhabitant, savings, emissions, number of registered cars, and average number of years of education or crime levels. Subjective indicators are such indicators as feeling of happiness, feeling of satisfaction and similar [17].

For the national, regional, or potentially the local level, other types of QOL evaluation indexes are used then are those used for the international level. For these lower levels the international indicators are not statistically observed, or potentially other indicators are more objective and more accurate for this level of observation.

Some authors have researched into QOL on the regional level in the CR. These authors themselves individually selected suitable indicators while being constrained by the availability of the relevant data on the regional level [13, 16, 17]. Abroad e.g. [12].

In the evaluation of the QOL on the regional level there are dramatic differences observed in the approaches to the evaluation, as well as there is a dramatic level of ambiguity. This happens due to alternative approaches taken by various authors, due to socio-cultural conditions, due to different scale and availability of data. One of the causes of this situation is the fact that there does not exist any umbrella organization or recommended methodology for the evaluation of objective QOL. Another cause of this situation on the regional level is also a geographic issue-no consideration is given to the definition of a territory for which it is meaningful to observe the QOL. According to [6] such meaningful territories could be so called commute micro-regions. In the CR such commute micro-regions are territories managed by municipalities with extended administrative duties or ORPs (municipalities that must provide also for some state administration functions). However on this level a number of indicators that could provide objective side of the QOL evaluation are not observed and such observation would require a separate individual research.

For the evaluation of the QOL on the micro-region level we have thus decided to select indicators on the district level (districts). Districts are under the statistical and territory classification Local Administrative Units (LAU) level 1. With regard to the enormous complexity of this issue we deal in this article only with the objective indicators of QOL evaluation-these indicators are from economic, social and environmental areas. The objective is to execute a comparison and an evaluation of QOL amongst the CR districts. For the purpose of the comparison a classification model has been designed. This model utilizes hierarchical clustering algorithm.

Concept of QOL evaluation and it's possible application in decision-making processes is suitable for utilization in each area of public administration. Public administration representatives (at national, regional, municipal level) are able to evaluate QOL differences amongst regions in the CR, to identify their pros and cons and opportunities for improvement, to set the priorities for providing and financing the services based on the established data.

## 2 Material and Methods

For evaluating the QOL at a micro-regional level we had to create a classification model on the basis of cluster analysis (CA). The model works with the CR districts real data sets in year 2014. Data collected by the Czech Statistical Office (CZSO) are analysed [3].

The CA is used for defining clusters of QOL based on the value of the indicators (attributes). CA is an exploratory data analysis tool for solving classification problems [1, 4, 5, 9-11, 19]. The object is sorted into groups, or clusters, so that the degree of association is strong between members of the same cluster and weak between members of different clusters. The task of clustering is then to divide the set of objects into the disjunctive clusters. The decision-making about the object clustering in cluster is realized on the basis of the similarity by application of metric [5]. The basic division of methods is mentioned for instance in [5] and application in [4].

### 2.1 Problem Formulation

The QOL district model works with data for year 2014 for 77 districts in the CR. For the evaluation of QOL in the CR districts based on data availability by that we mean the availability of open publicly available data) 31 indicators were selected and sorted into 3 groups - the set of economics  $E$ , social  $S$  a environmental  $N$  indicators) where  $E = \{e_1, e_2, \dots, e_k\}$ ,  $S = \{s_1, s_2, \dots, s_m\}$  and  $V = \{v_1, v_2, \dots, v_n\}$ . The specification of the complete set of indicators is in Table 1.

Our suggested indicators do not dispute utilization of indicators used with other foreign [12, 14, 18] or domestic studies surveys [13, 16, 17]. For QOL evaluation at district level preference was given to availability of indicators (from open public databases) from three areas mentioned above. These three areas (economic, social, environmental) are covered for QOL evaluation by other authors as well, nevertheless only at regional (NUTS 3) level.

The economic area includes the basic living standard indicator – the Gross Domestic Product (GDP) per inhabitant. In this analysis this indicator is included only on the regional level, because in the CR territory this indicator is evaluated only down to regional level, and not all the way down to the district level. However it can be stated that this indicator also, to a certain extent, illustrates the economic performance of those districts that are part of the relevant regions. Another indicator from the economic group of indicators is the number of registered economic undertakings. This indicator includes both legal entities (e.g. trading companies, joint stock companies, cooperatives, national companies) and physical entities (self-employed persons and private business subjects) registered in the Register of Economic Entities. Further the analysis includes indicators dealing with the job market and unemployment: share of inhabitants in productive age (from 15 to 64 years of age) in the total number of inhabitants, the indicator available open job positions in the district, share of unemployed people – in total this indicator has been since year 2013 the new percentage indicator of registered unemployment. This indicator defines share of accessible job applicants in the age group from 15 to 64 years of age out of the total number of inhabitants in the same age group. This indicator replaces the previously published rate of registered unemployment that compares all accessible job applicants only to the economic active persons. Other selected indicators from the unemployment category are the shares of unemployed people according to the period of their unemployment as it is registered at the Labour office and shares of unemployed people according their achieved level of education. The last two indicators from this economic indicators group are the length of roads and highways in the district expressed in kms and the number of completed flats.

The Social indicators group includes the death rate indicator. It is the number of deceased people per 1000 inhabitants of middle status in the reference period. The indicator infant death defines the number of infants deceased in first 28 days of their lives per 1000 live birth infants during the reference period. This category of indicators includes also the indicators of marriages and divorces where the number of marriages is showed per 1000 inhabitants of the middle status in the reference period, the same applies to the number of divorces. The social area includes also, next to other issues, the accessibility of education facilities in a given district. From this group we have selected the following indicators: number of kindergartens, number of elementary schools

and number of secondary technical schools and grammar schools. From the area of health care accessibility we have selected for the evaluation 2 indicators. They are number of hospitals in the district and numbers of physicians per 1000 inhabitants.

**Table 1. The complete set of indicators**

<b>Indicators</b>	<b>Description of indicators</b>
e1	Number of registered economic undertakings
e2	Number of inhabitants in productive age (%)
e3	Number of available job positions
e4	Unemployment rate – total (%)
e5	Unemployment rate accord. to duration of unemployment – 3-6 months (%)
e6	Unemployment rate – duration – above 24 months (%)
e7	Unemployment rate by education – elementary (%)
e8	Unemployment rate by education – complete secondary with school leaving certificate (%)
e9	Unemployment rate by education – graduate (%)
e10	Total length of roads and highways (km)
e11	Number of completed dwelling units/flats
S1	Death rate per 1000 people/inhabitants
S2	Mortality, infant (per 1,000 live births) (number)
S3	Marriage rate 1000 people/inhabitants
S4	Divorce rate 1000 people/inhabitants
S5	Number of kindergardens
S6	Number of elementary schools
S7	Number of secondary technical/special schools and grammar schools
S8	Number of hospitals
S9	Number of physicians per 1000 people/inhabitants
S10	Number of traffic accidents
S11	Crime - total number
V1	Population density (number of people/inhabitants per 1km <sup>2</sup> )
V2	Area of small protected areas (ha)
V3	Emissions TZL (particulate matter pollutants) (tonnes/year)
V4	Emissions SO <sub>2</sub> (tonnes/year)
V5	Emissions NO <sub>x</sub> (tonnes/year)
V6	Emissions CO (tonnes/year)
V7	Emissions VOC (volatile organic matters) (tonnes/year)
V8	Emissions NH <sub>3</sub> (tonnes/year)
V9	Coefficient of Ecological Stability

Source: Authors

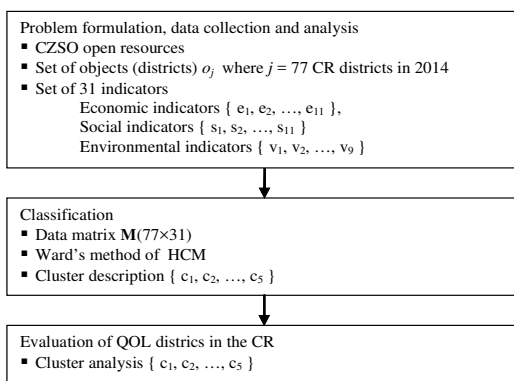
The environmental indicators group includes the indicator of population density. Another indicator in this group is the area of small-protected areas expressed in ha. Such areas are national nature conservation areas, nature conservation areas, national nature heritage and nature heritage. Among the major indicators from the environment category belongs the emissions balance. We selected values of stationary sources emissions according to REZZO 1-3. To this group there belong emissions TZL (particulate matter pollutants), SO<sub>2</sub> (sulphur dioxide), NO<sub>x</sub> (nitrogen oxides), CO (carbon monoxide), VOC (volatile organic matters), NH<sub>3</sub> (ammonia). However they do not include emission of TZL, NH<sub>3</sub> and VOC from building activities, from breeding and farming animals, from the application of mineral fertilizers and from the not observed usage of dissolving agents. The last indicator from the environmental indicators group is the coefficient of ecological stability. This indicator describes the share of ecologically significant areas (forests, pasture land,

marshland, artificial ponds, orchards, vineyards, meadows and similar) to areas of low ecologic stability (build-up surface, arable land, hop gardens and orchards with black wastelands, and similar).

## 2.2 Classification Method

The designed classification model is illustrated in Fig. 1. The model utilizes the set of economics E, social S and environmental N indicators from the CZSO data reported for year 2014.

**Figure 1. Model of QOL evaluation of CR districts**



Source: Authors

To identify similarities between objects on the basis of the observed indicators we can utilize the hierarchical clustering methods (HCM) [7]. The HCM could be divided how the similarity measure is calculated. Single-link clustering method (also called nearest neighbour method), complete-link clustering method (also called the further neighbour method), average-link method etc. are examples of the HCM. The dendrogram is the result of the HCM [10]. It is commonly used to represent the process of hierarchical clustering. It shows how objects are grouped together step by step [5, 19]. A clustering of the data objects is obtained by cutting the dendrogram at the desired similarity level [10].

Based on the results of the various HCMs Ward's algorithm of hierarchical clustering was selected. Algorithms were executed in Statistica program.

## 3 Results and Discussion

Since the indicator GDP per inhabitant is observed on the regional level it was not included into the analysis. By far the highest value of GDP per inhabitant has the Capital City Prague (829 168 CZK). Other regions do not reach even half of this value. Among the remaining regions there are no such significant differences observables. With a certain level of simplification the CR districts could be ranked according to their presence in the individual regions, which would partially illustrate the standard of living demonstrated by the GDP per inhabitant in these territorial units. However, it cannot really be simplified to this level since the GDP values in the individual districts belonging to one single region may differ significantly. The high level of GDP per 1 inhabitant in the region can be caused by a very high performance of few selected districts in the relevant region (capital cities of the regions), while other districts in the same region may significantly lack behind in their performance.

On the basis of [3] the LAU system on the LAU 1 and LAU 2 level the Capital City of Prague is not further separated into smaller units. Since Prague is a municipality, a district and a region

in one, it is different from other regions and its territorial division is thus out of any rules and classification valid for other regions and districts. Prague is divided under the NUTS and LAU systems in the following way: NUTS 2 – Prague is one of the areas, NUTS 3 represents 14 regions-Prague is one of the (administrative unit) regions, LAU 1 represents districts (it used to be NUTS 4), Prague is stated as one unit, LAU 2 represents municipalities (it used to be NUTS 5) – Prague is stated also as one unit.

While analysing QOL in the CR districts including the Capital City of Prague, even when not including GDP, it is assumed that the Capital shall have the best evaluation. It is possible to make such assumption with regard to the fact that the Capital is the principal city of the CR where a large number of economic undertakings is concentrated, it has a large number of inhabitants, it has very good accessibility of education and of medical care and similar.

When modelling the border of distance of objects of maximum 45% was chosen. Ward's method created, in the cluster analysis of districts, in total 5 clusters, (see Table 2). Districts belonging to one cluster are marked as similar from the QOL in these districts point of view. As it is clear from Table 2 in the individual clusters there is uneven frequency of objects.

The district the Capital City of Prague was, as expected, put separately into a cluster, thus it is different from other districts. Further 2 clusters of a smaller size were created including 6 or respectively 7 districts, one cluster of 19 districts was created and biggest cluster including 44 districts was created.

**Table 2. Allocation of Districts to Clusters – Ward's method**

Cluster	Districts	No. of Districts
1	Hlavní město Praha/Capital City Prague	1
2	Frýdek-Místek, Chomutov, Louny, Mělník, Ostrava-město, Pardubice	6
3	Brno-město, České Budějovice, Hradec Králové, Olomouc, Plzeň-město, Praha-východ, Praha-západ	7
4	Benešov, Beroun, Blansko, Brno-venkov, Břeclav, Havlíčkův Brod, Hodonín, Chrudim, Jičín, Jihlava, Kladno, Kolín, Kroměříž, Kutná Hora, Liberec, Litoměřice, Mladá Boleslav, Náchod, Nový Jičín, Nymburk, Opava, Pelhřimov, Písek, Plzeň-jih, Plzeň-sever, Prostějov, Přerov, Příbram, Rakovník, Rychnov nad Kněžnou, Semily, Strakonice, Svitavy, Šumperk, Tábor, Trutnov, Třebíč, Uherské Hradiště, Ústí nad Orlicí, Vsetín, Vyškov, Zlín, Znojmo, Žďár nad Sázavou	44
5	Bruntál, Česká Lípa, Český Krumlov, Děčín, Domažlice, Cheb, Jablonec nad Nisou, Jeseník, Jindřichův Hradec, Karlovy Vary, Karviná, Klatovy, Most, Prachatice, Rokycany, Sokolov, Tachov, Teplice, Ústí nad Labem	19

*Source: Authors*

To evaluate the QOL in the CR districts the input data were used to build a table (Table 3). Table 3 includes the average values of the individual indicators in the created clusters. Thanks to the average values it can be found out which district groups achieve, in the individual indicators, better or worse results. In case this ranking is done for these average values for each cluster for the individual indicators and then average ranking of a cluster is calculated it can be approximately determined in which districts there is higher QOL and which districts lack behind in this respect.

Table 3 illustrates that the highest quality of life is in the district Capital City of Prague. Then follows Cluster no. 3 that is comprised from districts adjoining Prague and by districts Brno-město, Plzeň-město, České Budějovice, Hradec Králové and Olomouc. In these districts there are seats of the regional capitals that generate sufficient number of jobs, qualified labour force and low unemployment. At the same these seats have an extensive network of civil facilities and they do not achieve high levels of environmental indicators. The most numerous is Cluster no. 4 that includes 44 districts with similar quality of life; based on the QOL value it takes the third place. The second most numerous cluster is Cluster no. 5 that takes, based on the QOL value, the last but



one place. In this cluster there are a number of the border districts that due to their location do not reach any more significant values of the economic and social indicators. The last place goes to Cluster no. 2 that comprises of districts Frýdek-Místek, Chomutov, Louny, Mělník, Ostrava-město and Pardubice. In these districts there is the lowest QOL. The QOL in this Cluster is negatively affected by in particular the environmental indicators, the high volumes of emissions from stationary sources (of emissions). In district Frýdek-Místek there is by far the highest value of the CO emissions, and similarly it is in Ostrava-město district. In other districts - Chomutov, Mělník, and Pardubice – above average values of SO<sub>2</sub> emissions are caused by the existence of coal power stations and of other industry plants.

**Table 3. Ranking of Districts Based on Average Indicators Values in the Clusters**

Cluster	Ranking
1	1st
2	5th
3	2nd
4	3rd
5	4th

Source: Authors

From Cluster no. 3 it can be derived that a similar QOL is in the neighbourhood of the Capital City Prague and also in districts including some of the regional capital cities (Brno –město, České Budějovice, Hradec Králové, Olomouc, Plzeň-město) while all these are districts located across the entire territory of the CR. Similar QOL is thereby in, for instance, west-Bohemian district Plzeň – město and in south-Moravian district Brno-město.

#### 4 Conclusion

We are aware of the fact that this executed analysis has its limitations, as described by Heřmanová. Our ambition has not been to design one aggregated QOL indicator on the district level; our ambition has been to demonstrate territorial differences in QOL between individual districts of the CR and also potentially any similar characteristics between these regions. We have decided to work on the district level because the relevant and needed sets of indicators used in this model for the comparison and the analysis are publicly open and available for the district level. That is the advantage of our designed model at district level – it exploits indicators from open database and QOL can be evaluated without conducting any individual research. Moreover model demonstrates lower territorial level of QOL than majority of surveys – usually realised at national or regional level.

The executed analysis and comparison of the QOL in districts of the CR is also influenced by the fact that one of the fundamental economic indicators – the GDP per inhabitant – had not been included in this model since this indicator is not and has not been monitored down to the district level. However, it is possible in any following research to do a cluster analysis with full understanding of a certain managed simplification. In such managed situation the same level of the GDP per inhabitant would be applied to all districts inside one single region. When the indicator GDP per inhabitant was included into the model, obtained results remain without significant change. For this reason regional GDP per inhabitant were not included into the model.

It issues from the analysis that the QOL in the CR is on nearly similar level across the entire territory. Differences are demonstrated in the border districts, in the mountain districts as is for instance Šumava, Krušné hory or Jeseníky mountains (with low QOL) on the one hand and in districts with high quality of life for the Capital City Prague and the adjoining districts and some other districts where are located the regional capitals (Olomouc, Hradec Králové, Brno-město, Plzeň-město a České Budějovice) on the other hand. Another factor that contributes significantly to a lower QOL in some districts are the above average volumes of stationary sources' emissions given by the location of the specific sources of emissions in the district (Ostrava-město, Frýdek-Místek, Chomutov, Mělník a Pardubice).

## Acknowledgements

The elaboration of this article was supported by projects No. SGS\_2016\_023 of the Ministry of Education, Youth and Sports of CR, the project title is "Economic and social development in the private and the public sectors" at the Faculty of Economics and Administration, University of Pardubice.

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# Public Goods Game with Punishment in Anti-Social Groups: Experiment with Dangerous Drivers

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## Abstract

In this paper, we study whether a behavior in Public Goods Game could be connected with subjects' characteristics in real life. Previous research showed that dangerous drivers watching videos of car accidents revealed lower level of behavioral and neurophysiological empathetic responses compared to safe drivers. Our assumption was that Lower empathy in dangerous drivers have less empathy might result in lower cooperation in the Public Goods Game. We took two groups of subjects: group of "safe drivers" and "dangerous drivers" and we made them perform several tests in order to measure their empathy. We also compared behavior of the two groups in Public Goods Game without and with a possibility of punishment. The groups did not reveal different level of empathy in any of the tasks and their level of contribution did not differ on statistically significant level. However, our data shows that dangerous drivers reacted less to a possibility of punishment than safe drivers.

*Keywords: dangerous drivers; empathy; public goods game*

JEL Classification: C91, C92, D87

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## 1 Introduction

In the Czech Republic a significant effort was made to study empathy [27], and one of the options to analyze this elusive concept is to have two groups with likely different levels of empathy perform a task requiring an interaction with another person(s), notably tasks related to experimental economics. This study attempted to compare a group of participants with likely lower empathy, drivers with known reckless behavior, with a normal group. To this end, we used a task which offers a similar choice between cooperating with others and behaving selfishly, the public goods game (PGG), with intent to further understand relationship between empathy levels and behavior.

The PGG belongs to one of the most studied problems in the economics, and was examined intensively from many points of view. The basic dilemma participants face in the classical variant is between sharing their endowment with other people in their group (cooperation), or keeping it for themselves (defection). Neoclassical economics and game theory predict minimal contribution to the group account and maximal possible endowment retained in subject's own account, thus maximizing expected payoff [20]. Studies however consistently find higher levels of cooperation than expected, regardless whether the PGG was one-shot or whether it lasted multiple rounds; see [28] for a review.

In the multi-period PGG [1] or [7] offer an overview of conducted research and report that on average, people start by contributing about a half of their endowment and their level of cooperation declines as game progresses. This holds more steadily in groups where members remain the same (the partner-treatment) than in groups where members oscillate between groups (the stranger-treatment). Multiple explanations were proposed for this behavior, such as confusion [18], social expectations [15] and altruism [11]. The final group dynamics is likely a result of a combination of more factors. The puzzle of the PGG remains an active area for experimental economists and empathy plays a role; see [2] or [8].

A society which wishes to maximize its public good contribution for higher overall wealth often resorts to punishment against members who are perceived as not cooperating sufficiently. Experimental economics implements and tests similar incentives. and one of the resulting games is called a PGG with punishment. In a one shot PGG there should be no punishment, for the same

reason there should be no contribution. Studies, [13] or [25], however show a presence of punishment whenever such option becomes available. When comparing the standard PGG and the PGG with punishment, the result is that the existence of punishment opportunities causes a large rise in the average contribution level in both the stranger and partner treatment.

The situation is more complex in an iterated PGG. Researchers studied the influence of the cost of punishment [16], reputation in the group [6], and also possible rewards [24], with overall results assessed in [2] metastudy. The results show that participants' willingness to punish depends on the cost of the action, and the impact of punishment depends on the group composition and a source of punishment.

The possibility to study a tendency to cooperation or defection, or to administer standard punishment within the PGG allows researchers to compare different behavior of populations, social norms and empathy levels. For example, A study of Herman [17] showed punishment is directed towards non-cooperators in countries of western Europe and North America, while more anti-social forms of punishment are common in countries of Mediterranean or Arab world with different social norms. Schizophrenia patients display a lower prevalence of free riding and distinct decision patterns from healthy subject [9]. This nonstrategic and unexpectedly low free ridings in these patients likely arise from poor integration of cognitive and affective information.

Research also shows that aggression and other maladaptive antisocial behaviors may result from failure to be appropriately guided by the social cues of others, for example by facial expressions. Metastudy made by [23] describe a robust link between anti-social behavior (defined here as those that violate rights or welfare of other individuals) and specific deficits in recognizing fearful expressions.

The research above attempts to form a link between a decision to cooperate or defect in the PGG, between ability to empathize with other subjects (to which facial expression recognition [22] and charity [21] is an established proxy), and between reaction to an option to punish during the PGG. Such a link is indicated in for example [26]. This is an exploratory study, following our previous research [19] on assessing behavior of dangerous drivers when they perform one of such tasks, with intention to utilize gained information about their contribution in a future research, which might use advanced forms of magnetic resonance to understand empathy and the human brain.

We had following hypothesis when conducting the research: (1) Dangerous drivers will show lower levels of empathy measured by tasks such as facial recognition and charity donations, (2) they will contribute less in the PGG and (3) levels of empathy will correlate positively with the PGG contributions. If hypothesis would be confirmed, it would make the PGG a candidate for tasks used in hyperscanning fMRI brain studies.

## **2 Material and Methods**

### *2.1 Participants and Design*

In the experiment participated eighty-eight people, out of which forty-one dangerous drivers, including four women and forty-seven safe drivers, including five women. Dangerous drivers were picked from the pool of drivers who had in the past three years deducted points from driver's license for at least one of the following offense:

- driving under influence of alcohol or drugs,
- driving 20km/h over limit in a city or 30km/h over limit outside a city.

It was possible to recruit such participants due to a majority of the dangerous drivers being clients of the Transport Research Center, which participated in the research. In the past, the dangerous drivers were involved in a car accident and were sent to undergo a psychological therapy at the Center. Participation was voluntary for the dangerous drivers; they were informed there will be a monetary reward. The group of safe drivers was hired through an online job portal. Applicants were asked about all traffic violations for which they had their points in the past three years deducted and we only recruited those applicants with clean records. This was however not

told to applicants in advance. Since the population of dangerous drivers differs from a typical group interested in economic experiments (young college students), we also focused on selecting safe drivers in a way that balanced both groups of drivers in terms of gender, age, income (which was reported subjectively, the participants were asked to pick whether they belong to the low, middle, or high income group) and education.

The experiment consisted of three parts. In the beginning, participants were asked to perform a *Pictures of facial affect* test (POFA), which measured their abilities to recognize facial expressions, taken here as a proxy for affective empathy. After this followed the PGG, first without and then with a possibility of punishment. In the end, participants were offered an opportunity to donate part of their show-up fee to a few preselected charity cases and to fill in a questionnaire.

## 2.2 POFA

In order to observe levels of cognitive empathy, the participants were asked to recognize an affective state of people on 28 photos, consisting of sets of photographs of one actor presenting six possible basic emotions (anger, disgust, fear, happiness, sadness, surprise and a neutral expression), in total seven photographs per actor. There were 4 sets presented, two male and two female actors. This test is based on the work of [12] that have been widely used in cross-cultural studies, and more recently, in neuropsychological research. All images of POFA are black and white. The images are not identical in intensity or facial configuration. A single image was displayed for a period of eight seconds, after which a list of basic emotions (+ neutral) was presented, and participants were to choose the most likely emotion. They were not told correct answers.

## 2.3 PGG

After initial tests followed the PGG. We opted for a stranger matching as a partner matching does not reflect situation on the roads accurately, and also makes members of the group identifiable. An absolute strangers matching would be preferred, but logistical constraints of working with the specific subset of participants prone to dangerous driving, who participate only on voluntary basis, made such option impossible. Our sessions had 8 people each, and we had 11 sessions.

In total, there were 20 rounds (10 without punishment and 10 with punishment). Participants got to read the instructions and their questions were answered before the PGG started. They were also informed that after 10 rounds there will be a change of the rules, but were not told more information.

In each round participants were given an endowment of 10 points and split into two groups of four. They could either keep endowment for themselves or contribute to a “project”. The size of the project, i.e. the public good, was given by the sum of all contributions  $g_i$  to it. The marginal payoff of a contribution to the public good was 0.4 points. The payoff function was:

$$\pi_i = 20 - g_i + 0.4 \sum_{j=1}^4 g_j \quad (1)$$

After all participants made their decision, the results table was displayed, showing total contribution, individual payoff and sum of payoffs from previous rounds.

From 11th to 20th rounds, we added a possibility of punishment after the contribution part (which remained completely the same as in the first 10 rounds). After everyone made their contribution, participants were informed on the screen how much other co-players sent to the public account. By investing a certain amount from their own account, the participants could decrease profits of other people in their group. The costs and its effects were as follows:

**Table 1. Punishment costs and effects**

<b>Punishment</b>	<b>No</b>	<b>Little</b>	<b>Moderate</b>	<b>High</b>
Cost for the punisher	0 points	1 point	3 points	5 points
Decrease of the profit of the punished party in the round	0 %	10 %	30 %	50 %

Source: Authors

Participants could punish more of their co-players in one round. The effects of punishment from other players counted together, however maximal possible decrease of the profit was 100% of the profit in a given round. During the whole experiment participants recognized each other only by numbers which were randomized every round, so that nobody knew who were his co-players, who were the people she punished or by whom she was punished. This precaution ensured that participants focused only on the events of the current round.

### 2.4 Charity

When the 20 rounds of the experiment finished and subjects observed their payoff, they were informed about their show-up fee (150 CZK). They could either keep it or donate any part in any allocation to the following three charities:

- Amnesty International - Czech Republic
- Bone Marrow Transplant Foundation
- Animal Protection League - Czech Republic

Aim of each of the organizations was shortly described and was represented by a picture. Offered charities were similar to the [4], as a wide spectrum of activities decreases a risk of not donating due to disagreement with a specific field or organization.

In order to protect anonymity, all information about participant's choices and about charities were distributed and managed through a computerized lab on the software programmed with the Z-Tree [14] and with standard anonymity procedures. After the charity, subjects answered a short debriefing questionnaire and were confidentially paid their earnings in cash.

## 3 Results and Discussion

### 3.1 POFA Score

We calculated whether there is a difference between the ability to understand emotions by observing how many emotions out of the pictures were participants able to identify correctly.

**Table 2. POFA scores**

<b>Variable</b>	<b>Safe Drivers</b>	<b>Dangerous Drivers</b>	<b>t score for difference between groups</b>	<b>p score</b>
Correctly identified emotions - Average	18.44	19.21	-0.98	0.32

Source: Authors

Due to a low statistical significancy we could not reject a hypothesis of dangerous drivers being less able to observe emotions.

### 3.2 Public Goods Game

The summary results of the PGG follow. We counted the difference of contributions between groups of safe and dangerous drivers as an average contribution in rounds with punishment minus average contribution in rounds without punishment (further "difference in contributions"). We found only insignificant correlations between the PGG behavior and other empathy related tasks.

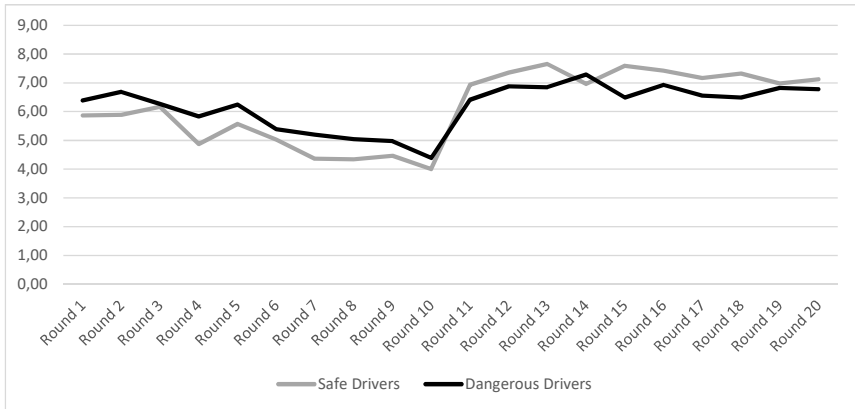
**Table 3. PGG summary results**

Group	Average contributions in total	Average contributions before punishment	Average contributions after punishment	Average difference of contributions before and after punishment
Safe Drivers	6.16	5.06	7.25	2.20
Dangerous Drivers	6.20	5.64	6.75	1.11
Total	6.17	5.33	7.02	1.69

Source: Authors

Development during the game can be seen in the following graph:

**Figure 1. Contributions during PGG**



Source: Authors

It is interesting to note that dangerous drivers kept their contributions more stable across both conditions. The jump in contributions between rounds 10 and 11 can be attributed to the reaction of participants to the introduction of the punishment possibility, and difference between groups is statistically significant.

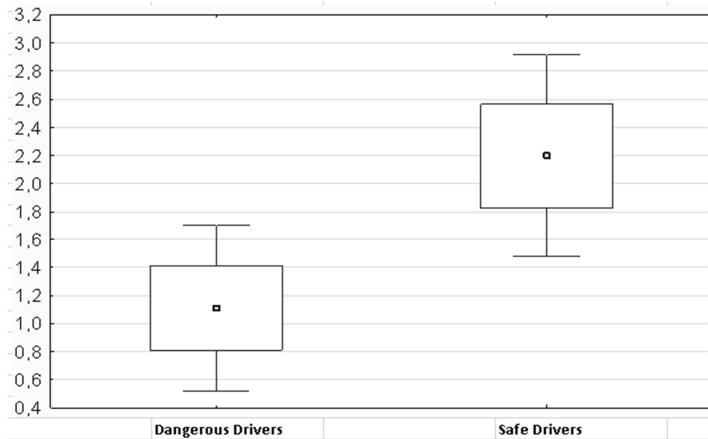
**Table 4. Difference in Contributions Statistics**

Variable	Safe Drivers average	Dangerous Drivers average	t score for difference between groups	p
Difference in Contributions	2.20	1.11	-2.25	0.027

Source: Authors

This difference is not due to outliers, as can be seen in the subsequent chart describing average and standard deviation of difference of contributions in the group.

**Figure 2. Difference in contributions distribution between groups**



Source: Authors

When participants made their contributions to charity, they could contribute any number between 0 – 150 CZK. The groups behavior is summarised and statistical significance assessed with Mann-Whitney test, as data does not have normal distribution:

**Table 5. Difference in charity behavior**

Variable	Safe Drivers	Dangerous Drivers	U score	Adjusted Z	p
Charity contributions	41.4	56.4	4	-1.7	0.09
Number of people who contributed 150 CZK	3	9			

Source: Authors

## 4 Conclusion

When we analyzed POFA scores, charity donations or questionnaire results, we observed two groups of people of the same education, income, generosity and empathy levels. This defied our hypotheses, and indeed the stereotype of a dangerous driver as someone who lacks empathy towards others. The psychologists who assisted us in recruiting alerted us to the possibility that consequences of their actions could elevate empathy of people who endangered others, as was shown in the number of participants who wished to give maximum donation to charities. We however could not extend results of [27] who observed different brain regions activation in dangerous drivers, to these tasks. Another explanation would be external pressure, as dangerous drivers recruited via psychological organisation might have tried to project a positive image by donating.

The contributions and punishments in the PGG of both groups did not differ on statically significant level. This corresponds with previous studies dealing with anti-social subjects, in which contributions in the PGG, ultimatum game or dictator game typically do not differ [5] [10]. For this reason we could not confirm the hypothesis that our group of dangerous drivers displayed lower levels of empathy, and using classification of [24], we could even argue dangerous drivers were more cooperative. Compared with [26], in the PGG it is much more difficult to analyze different aspects of behavior than in the ultimatum game. For this reason the PGG was not recommended to be chosen as a task to be used in the fMRI.



The most interesting result of our research is that we found a difference in a reaction to the risk of punishment. Such a risk of punishment corresponds well to a traffic situation where drivers can also act selfishly or with regard to others, which is why the combination of PGG task and group of dangerous drivers was chosen. That dangerous drivers do not change their behavior when there is a risk of negative consequences suggests a significant external validity of the PGG with punishment, which is something experimental economics should note with interest.

## Acknowledgements

This research was supported with a grant MUNI/A/0996/2015.

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# Trends in Development of the Research Team of Public Research Institution

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## Abstract

Management is the one of important element as a tool for resource management, organizing and other activities leading to efficient and effective achievement of goals and strategies of the public research institutions. Management has an important position in research and development as so-called science management. Human resources in R&D is a key element for successful solving research tasks which needs skills and knowledges of scientists and also research team and excellent scientists are a sign of quality and prestige of public research organizations. This work is focused on the analysis of development of research groups by using the system dynamics and modelling for future forecast of potential development and limits. The input to the model is the data from HR and research projects database concerning to the analyzed research team. We used the simulation software STELLA to organize the formulas and implement them into formal models that can be run on a computer. Based on this analysis can be defined with a particular relevance the behavior of the research team whose aim is to develop in general.

*Keywords: management; team; funding; system dynamics*

JEL Classification: I230

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## 1 Introduction

Management as a set of techniques, methods and procedures should be an integral part of R&D activities of public research institutions. Management of internal resources of each institution or sub-units is a basic prerequisite process transforming inputs into outputs [9]. We can talk about focusing or concentration the R&D towards the set goals. A prerequisite for the functioning of the transformation process is the effective use of internal resources, which are the human, material and technical, financial and informational resources [9]. Management of public research organizations or even individual research team must implement strategic plans through the realization of individual activities [2].

This work is focused on analysis of trends in human resources management and team development depending on the volume and availability of financial resources for R&D. Scientists and also other research staff (technical and support staff) are key element affecting the performance of each R&D unit or organization and are necessary to achieve the milestones fulfilling defined strategy [13]. A successful team has with appropriately defined strategy and is able to achieve the set goals becomes more competitive. Searching and recruitment of scientists, build research teams for specific R&D tasks or projects is an important aspect for the successful achievement of milestones and obtain results which can be the basis for further projects and activities [8, 10].

The research team which was chosen for this work has five-year history. This work maps the team development from its beginning until 2015 (period 2011-2015). Chosen research team operates within a public research institution such as university hospital and focuses on the area of biomedicine. The research team was founded in February 2011 to carry out basic and applied research in the biomedical field. The reference period for this work is the years 2011 - 2015. The financial resources allocated for R&D staff costs are considered institutional funds and grant funds.

The main task of this work is to find and analyze the connection between the personal development of the research team in public research institution and financial resources through system dynamics and modelling which help us to understand dynamics of real-world processes

by mimicking actual but simplified forces that are assumed to result in the system's behavior. Based on the obtained data has been set up model that can predict possible developments of research team (number of research staff) and number of accepted project proposals in future years.

## **2 Material and Methods**

For this work were used secondary data from relevant sources such as HR and projects database. Data were taken from internal records of research institution, especially personal evidence, grants and project evidence, economic and accounting system. These data were subsequently utilize, analyzed a used as a resource of the dynamics model. Data from different systems (HR, projects database and economic system) has been processed into the required format - tables. As a result of this primary analysis were taken various reports and statistics data in tables like number of employees in each month, total year budget and financial sources, number of submitted projects a number of accepted projects in each year, total budget and number of contract research activities. All of these reports, tables and statistic describe the five-year period. From these overviews were interpreted trend curves for subsequent comparison and interpretation of the obtained information.

Data collection was limited to the selected research group focused on basic and applied research in the biomedical field. The data are collected and analyzed for the period from February 2011 to October 2015 with forecasts to the end of 2015. The R&D group expanded from the seven founding key researchers to the current 52 researchers (calculated only employment contract without agreements) during this reference period. The research group is composed of sub-teams, which are composed of the leaders of the teams. Generally the members of the research team are professor, associate professor, postdocs, PhD students, master students, laboratory and technical staff. Members of the team are also invited professors especially from abroad.

Selected research group submitted 81 project proposals (2011 – 5 proposals, 2012 – 17 proposals, 2013 – 12 proposals, 2014 – 22 proposals, 2015 – 25 proposals) during 5 year period. The 16 project proposals were accepted and realized (2011 – 3 projects, 2012 -1 project, 2013 – 2 projects, 2014 – 8 projects, 2015 – 1 project). In this work we included projects submitted by national or international funding agencies and projects supported by internal financial sources.

Collected data were subsequently used to set up the model. We consider financial limits of research organization, absorption capacity of the research group and the success rate of accepted projects. Models help us to understand dynamics of real-world processes by mimicking actual but simplified forces that are assumed to result in the system's behavior. Modeling dynamic systems is essential to our understanding of real-world phenomena [4]. As Pagels noted [11], the computer modeling process is to the mind what the telescope and the microscope are to the eye. Dynamic models try to reflect changes in real or simulated time and take into account that the model components are constantly changing as a result of previous conditions and current influences.

System dynamics was introduced by [3] as a method for modeling and analyzing the behavior of complex social systems, particularly in an industrial context. It has been used to examine various social, economic and environmental systems [18], where a holistic view is important and feedback loops are critical for understanding the interrelationships. The approach has attracted attention in recent years since computer software has become more available to help managers with the modeling of systems and decision making.

System dynamics represents a set of techniques to describe, observe and examine the behavior of dynamic systems. The process of model creation and simulation is computer aided, providing a graphical representation of a model and enabling the inspection of the system state at any time. The computer assisted modeling of a system's dynamics provides the ability to run a simulation several times with different values of the variables, allowing further investigation of the influence of the different factors on the system.

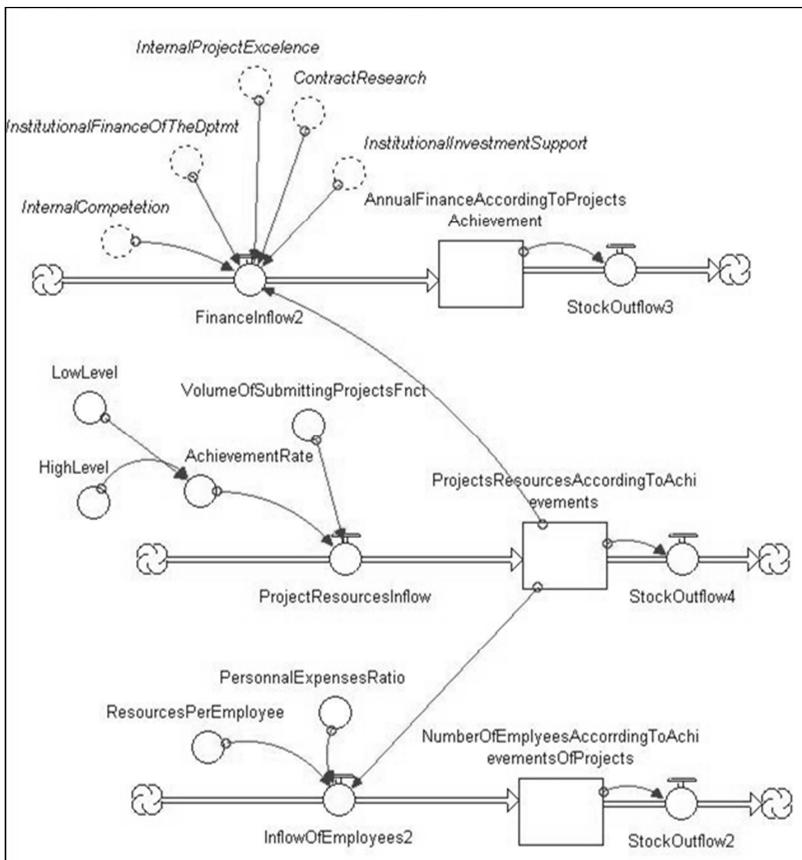
It is important for System Dynamics to be properly used as a method. Sterman [12] writes: "System dynamics is a perspective and set of conceptual tools that enable us to understand the

structure and dynamics of complex systems". System Dynamics is also a rigorous modeling method that enables us to build formal computer simulations of complex systems and use them to design more effective policies and organizations, for example population systems has been simulated in papers [7, 14, 15, 16, 17].

We used the simulation software STELLA to organize the formulas and implement them into formal models (Figure 1 and Figure 2) that can be run on a computer. STELLA was chosen as the software for this research because it is a powerful tool for modelling complex systems and their development in time. Because of the complexity of dynamic systems, the use of formal models and numbers is essential: they help us dispel the complexity of many real-world processes and force us to be specific. The model in STELLA does not need to be trained or run several times. The results of the model are not effected by randomness.

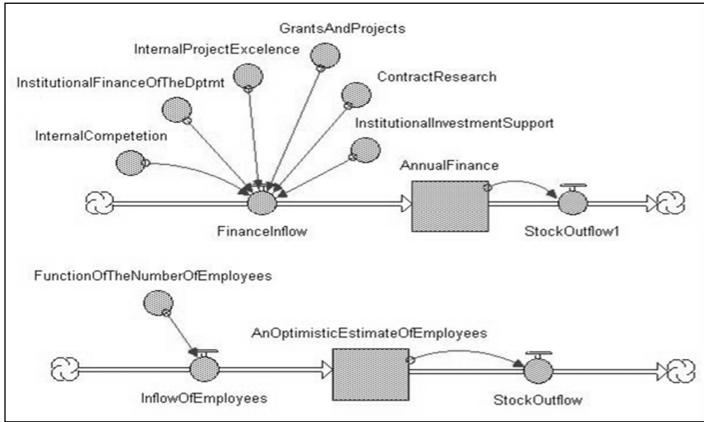
The research staff model consist of basic elements of the Stock and flow diagram, see Figure 1 and 2, such as Stocks, Flows, Converters, and Action Connectors [18]. The input to the model is the current size of the described research team and its five year development.

**Figure 1. Formal model – 1<sup>st</sup> part**



Source: Authors

Figure 2. Formal model – 2<sup>nd</sup> part



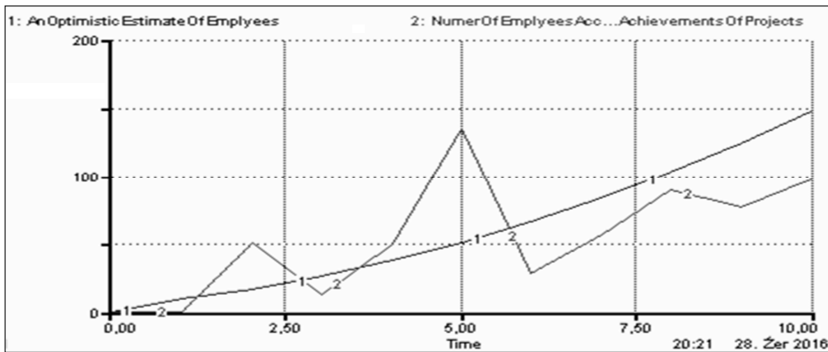
Source: Authors

### 3 Results and Discussion

The collected data were analysed in detail and then compared in order to determine whether R&D funding have a positive impact on the development of the scientific team and its sustainability. Based on the collected and analysed data can be deduced trends across workgroup during reference period (from February 2011 to the 2015). It is a period of almost 5 years (exactly 56 months). Indicators of the employee's number, including the amount of their working time were compiled by months in order to be able to compare the personnel changes to the submission of project applications and new projects starts.

The number of employees (Figure 3) shows two different trends. Line number 1 shows ideal research staff development based on the new research projects (founding) which are accepted in numbers corresponding to the current trend. Line number 2 shows research staff development based on the new research projects influenced by success rate between 10% and 15%. Using defined functions (based on current trend in getting new research projects) and system dynamics was modelled this line number 2 (Figure 3).

Figure 3. Trends in development in number of research staff in years

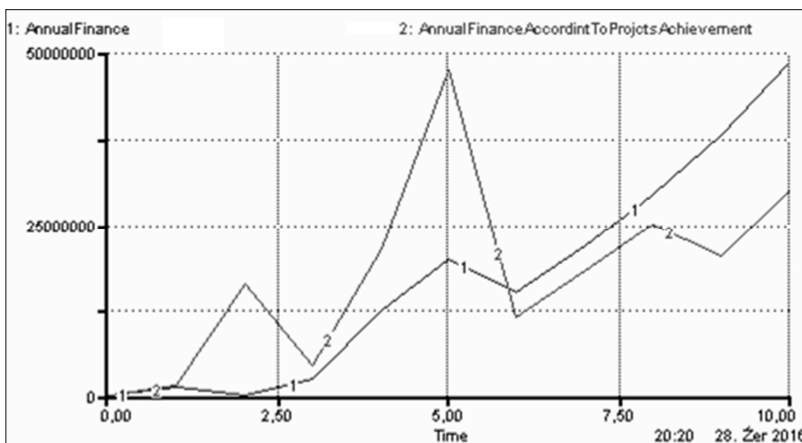


Source: Authors

In this context it should be noted that the budget for the research group was always planned for the calendar year by domestic public research institution and has been throughout the year unchanged. One of the goals of the research group was to minimize the impact on the budget for domestic R&D institution. The research group is trying to retain the requirement on personal costs as a constant with tendency to seek other sources of funding. Reaching this goal has been achieved primarily through new R&D activities – new projects and partly through research contracts. The research group developed while maintaining and even lowering the budget for personal costs and the financial impact on domestic research institution budget. Personnel changes are independent of the influence of domestic research institution. Possible effects on personnel changes was searched within the R&D team based on above assumptions.

During the reporting period were also submitted various grant applications. Grant applications were always prepared for specific calls of relevant providers and according to research group focus. The total budget from all grant applications are modelled and show on the graph below (Figure 4). For the preparation of some new grants were hired new researchers for the positions of investigators of these grants. The largest increases in the number of employees and the sum of working time were monitored around the time of starting new projects. Researchers submitted the most grant applications as they were able to prepare considering the capacity of research team in the first year of existence.

**Figure 4. Trends in development of total budget of all research projects in years**



Source: Authors

In the figure 4 are showed two trend curves with sums of budget (annual) of grant applications. Line number 1 shows ideal trend based on the new research projects (founding) which are accepted in numbers corresponding to the current trend. Line number 2 shows annual total budget from grants/projects influenced by set success rate between 10% and 15%. Using defined functions (based on current trend in getting new research projects), success rate and system dynamics was modelled this line number 2 (Figure 4).

Based on the analysis of team development trends and grants area can be deduced a connection between the new projects, new project proposals and changes in numbers of scientific employees. In case of newly prepared projects, there is usually growth of the number of employees in a short period before submitting the grant applications. The new realized projects have an impact on personnel changes (especially growth) since the start of project realization and further.

Based on the analysis a models, which is part of this work we can define a strategy leading to the development of the research team. An accompanying effect of personnel development is a wide scope of R&D activities in different areas or detailed focus on one topic in its developmental series so called research pipeline. We can say that size of the research team partly determines the absorption capacity (number of projects, which the group is able to prepare and solve in one moment) and its opportunities in R&D activities (especially size and number of these activities). In other words - stagnating team achieved in a short period of its maximum and is not able to realize new projects and solve more R&D tasks that could shifted the team further in the field of knowledge.

Use of grant funding opportunities has a positive effect on the development of the research team, not only for the funding of research activities but also to the development of the research team and development of the research areas [5].

Sharing strategy – sharing research staff with other teams which is based on the analysis seems to be suitable for sustained growth of research teams and their eventual consistency (institutional, national and international) and for increasing the competitiveness of R&D results [1].

#### 4 Conclusion

The subject of the work was to analyze and show the possible future trends of research team development in public research institutions such as university hospital. Based on this analysis can be defined with a particular relevance the behavior of the research team whose aim is to develop in general. R&D is very competitive environment and the main task should be directed to the excellent results and excellence science that are comparable at the international level [6]. Researchers are key element with their knowledges and ideas. Researches are also a key element in the development of R&D institutions and development of science in general. In the context of the public R&D organization or its sub-components strategy is necessary to properly select new team members and achieve the development of the public R&D organization or single team. Team development should be understood as a key tool for improving the competitiveness of R&D results at international level. The positive impact of grant funding to the personal development of R&D teams is evident from the analysis and achievements of this work.

Results of this work using corporate data and system dynamics show that new research team or department can growth up from beginning and dependence on internal financial sources to the success research unit independent of internal financial sources. It also shows positive effect of projects funding on research team development, especially growth in the number of employees which means higher absorption capacity, more potential projects proposals and their success rate.

#### Acknowledgements

This article was supported by specific research "Economics and management aspects of the processes in biomedicine" and "Excellency of UHK FIM"

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# Uses of Performance Appraisal Information: The Case of Trenčín Municipal Office

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## Abstract

Performance appraisal is one of the most complex and at the same time controversial techniques in human resource management in relation to motivational value to public servants. Not that long time ago nearly public servants in the municipalities were paid and advanced in their career based on seniority and thoroughly designed career paths. However, this has changed due to various economic, societal and demographic factors and public sector now reflects the influence of the private sector in terms of performance management. The introduction of the performance appraisal in public service is only one facet of a wider movement towards individualization and an attempt to collect data as well as enhance participation in goal setting and feedback to achieve effectiveness in public organizations. This paper explores the performance appraisal practices at the municipal level on one case of municipal office of the city Trenčín and it provides insight into the concept, approach and methods in a public organization. The study argues that the information from the performance appraisal process is not being utilized to its full potential as NPM suggests.

*Keywords: top civil service; politicization; turnover; Slovakia; Central Europe*

JEL Classification: Z18

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## 1 Introduction

One of the most spread reforms in public administration in the past decades has been the requirement for public organizations to set, track and measure strategic goals, targets and achievements or so called result-based reforms [14, 11]. Performance appraisal is a function of the human resource management (HRM) that became very popular among both practitioners and academicians in the wave of New Public Management. These developments have been characterized by an attempt to systematically incorporate performance objectives and indicators into human resources management and budgeting within an increased focus on defining and achieving organizational objectives and targets. Czech republic and Slovakia are not immune to such trends and as a consequence we can observe reforms in the public sector where management practices and techniques, including performance appraisal are being introduced on both central and local levels [6, 9, 16].

The interest in performance appraisal can be attributed to the acclaimed increase of motivation of the public servants, although there is an ongoing debate among academics about true motives of public servants which are believed to be „unique“ or at least different from regular employees in the private sector [13]. The debate focuses on internal vs. external motivating factors. The arguments of proponents for internal motivation rest on the notion that public type of employment intrinsically motivates individuals because of the attributes of such a job, such as high task significance and creation of or commitment to public value. Researchers in social and economic behavior propose a positive relationship between external – incentive system - factors on actual motivation and thus performance of civil servants with main argument being that motivation can be socially constructed by various tools, including performance appraisal [13]. Regardless of the motivation of the civil servants to work in public sphere, the institutionalization and utilization of the performance appraisal as a tool is on the increase in all OECD countries, both on national and local levels. In fact, OECD [12] shows that twenty years ago civil servants in OECD countries were paid according to the service-incremental salary scales where seniority was the main criterion. By the turn of the millennium, significant number of OECD countries started to

utilize performance appraisal and performance related pay schemes. Therefore, it is crucial not only to understand the conceptualization of the tool in practice but also actual mechanisms of operation and values and thus information that are ascribed to the tool usage.

Nevertheless, most of the prior research on PA systems focus either on theoretical models or on intended practices, mainly designed at the strategic level of organizations. Little is known about the actual enactment or implementation of PA practices. Therefore, this paper aims to look into the practice of one municipal office and through the analysis of the PA system but also documents stemming from the PA system comment on the practice in relation to the information use in the knowledge process of the organization.

### *1.1 Information Use from Performance Appraisal*

The use of performance information is a key factor if we are to develop systematic knowledge about contemporary and future governance in the organization. It can relate either to job-based structures or job analysis (job description) or to person-based structures or competency models. Thus, performance appraisal, and particularly the information stemming from performance appraisal, can fulfill several functions. Performance appraisal systems often involve multiple even conflicting goals [3]. These can include the monitoring of the employees, the communication of the organizational values and objectives to the civil servants, the evaluation of the hiring and training strategies, and the validation of the training practices [1]. Another function of PA is linked to the theories that employees are developmental. In other words, HR practices can increase the value of human capital through development (training, coaching, job rotation, etc.) and PA is a tool for guiding such a development. Yet, another function of PA is to use PA as a tool for making promotion-related decisions where the comparison among individuals is of particular importance in contrast to developmental or remuneration function where the comparison is intra-individual.

However, one of the key functions of the performance appraisal is its link to the remuneration system. Most proponents of the performance appraisal systems argue that the main objective of PA is to identify and motivate strong performers, provide them with the abilities and confidence to work effectively, monitor their progress toward the required performance targets, and reward staff well for meeting or exceeding these. The rationale behind this thinking is very simple: performance appraisal and performance related pay can be used for achieving desired behaviors by creating consequences for such a behavior [4] and in this way boost the efficiency of the organization. These proponents draw on standard economics, particularly the principal – agent view as proposed by Jensen and Murphy [7].

Recent evaluations of experience with performance appraisal tool (e.g. [11]) indicate that the success of PA in the public sector was limited or at least that the empirical evidence is inconclusive in relation to proposition that such an approach has improved motivation and performance within the public sector [2]. The opponents of the PA system argue that the economic theories based on self-interest simply cannot be applied in the public sector scheme where the motivation of the employees is different [13]. Anecdotal, personal but also empirical evidence reflect a wide range of problems with both design and implementation of the performance appraisal that effects the validity of information gathered. Among such problems can be listed measurement accuracy, dysfunctional employee competition, underemphasis of team work on account of individual assessment, gaming of the system, etc. For example, staff performance appraisals are often associated with problems in scoring. A person who scores might be lenient, his scores can be too contrasting or they can depend purely on his personal preferences; or he could have central tendency. Staff performance results might be inaccurate and lead to severe consequences for the organization.

Performance appraisal is thus a controversial tool with as many proponents as opponents. Therefore, many researchers examine what elements of the design of the performance appraisal system might achieve higher effectiveness both in terms of increasing motivation of the employees as well as expansion of available information from the performance appraisal process. One of the elements seems to be a so called *participatory* performance appraisal [15]. Appraisal

participation provides employee the voice into the PA, in setting goals, ratings, documentation or verbal feedback that they disagree with which as Roberts stresses [15] increases the legitimacy of the information gained.

Thus, although researchers on performance appraisal devote themselves into the studies of the appraisal process and the role of the evaluator within performance management realm, few empirical studies have been devoted to the question of the information use from the performance appraisal process in the public sector (most come from the private sector but see for example [2], [11]). This paper aims to fill this gap since understanding the use of performance information is perhaps the challenge that may assist in explaining the success or failure of the tool of performance appraisal.

## 2 Material and Methods

We utilized a case study approach – going in-depth of performance appraisal processes and documents produced in this process of one municipality. Thus, our data are taken from the Municipality of Trenčín for 2015 year when performance appraisals were conducted. The main sources of data were:

- a) Analysis of internal documentation regulating performance appraisal in the municipality
- b) Analysis of the performance appraisal sheets for 2015 (123 sheets for both regular employees of the municipality and top managers of the municipality)
- c) Semi-structured interviews with evaluators conducting performance appraisal

**Table 1. Respondents in interviews**

Respondent	Position	Years of Employment	Gender
R. 1	Head of the human resource office	11	female
R. 2	Head of Legal unit	20	Female
R. 3	Head of Services for citizens unit	16	Female
R. 4	lawyer	6	female

*Source: Authors*

The analysis of the performance appraisal sheets which are being filled out by evaluators on a monthly basis was conducted by utilizing a coding scheme developed for this purpose based on literature review. Since the sheets contain both numerical as well as textual data, we have utilized coding for qualitative part and conducted also quantitative analysis of numerical inputs.

## 3 Results and Discussion

### 3.1 Case Study Context

Municipal office of the city Trenčín employs as of December 2015 149 employees organized into 10 substantive units, office of the mayor and 4 independent positions (chief architect, chief controller, deputy mayor). In Slovakia employee relations (and remuneration) on municipal level can be governed by several legislations and it is up to the municipality to choose which one to take. Thus, there is a law 311/2001 Labour Law, 552/2003 that governs employee relations of employees in public interest, law 553/2003 that regulates remuneration of the employees in public interest and additional laws regulating specific professions (e.g. police, fire-fighters, etc.). Despite the existence of a specific law for employees in public interest, all of the employees of the Trenčín municipality are employed on the basis of the Labour law which is much more flexible than

the rigid and still seniority based grady system of the public service law. The only exceptions are the municipal police officers (40) governed by a specific law.

### *3.2 Change into the Result Oriented Culture at the Municipality*

The reform of 2009 modified the work into result oriented one by contracting a private firm 6wizards consulting s.r.o to assist in the transition process. Head of the mayors office mentioned that one of the reasons for the result oriented reform was the „need to introduce a more equal, effective, motivational and individualized remuneration of the employees with the aim of eliminating discrepancies stemming from the old system of grades based on seniority“ [R1], the other aim being to reach a consolidated fiscal budget after the years of crisis. Thus, the first reform steps targeting introduction of performance budgeting and reform of the remuneration system.

As far as target setting is concerned Trenčín municipality follows the methodology of Balanced Scorecard. The exact procedure of setting targets is described in detail in the internal directive [5] on how to prepare goals and indicators for measuring its achievement. The aim of the directive together with the accompanying guideline [5] is to allow to clearly state measurable objectives that can be objectively evaluated by degree of its fulfilment. Both internal documents were prepared by a contracted private firm specializing on evaluations and measurements. The development of reliable, fair, valid, and useful performance standard is key precondition recognized by several authors [15] to enhance PA system Nevertheless, if it is not accompanied by rater training and support, this can become an obstacle in the implementation. In Trenčín municipality there was never a training conducted and each new manager is introduced to the system by briefing from the head of the municipal office [R1].

Head of the office together with top management prepares on semi-annual basis goals to be fulfilled by each department of the municipality. These are then presented and discussed on departmental meetings between the head of the department and employees. Thus, although the employees validate the set goals, the themselves do not have any input in the setting of the goals or their subsequent evaluation [R4, R3]. Thus, the Trenčín municipality does not follow the current trends of participatory assessment whose key function is to create an atmosphere of trust and open communication [15].

In terms of remuneration reform, it all starts with budget preparation of the municipality which already counts with a fixed amount dedicated to the planned overall volume of variable – performance related - part of the remuneration of all of the employees which accounts for 25-30% of the overall fixed part of the remuneration in the budget. The internal regulation distinguishes between fixed and variable part of employee salary, while the variable part is linked to performance appraisal as introduced in 2009 and conducted twice a year [5]. In addition, the variable part consists of additional two parts: individual and collective, stemming from individual and team assessment respectively. Once the budget is approved by the city council the head of the municipal office divides this amount into individual and collective variable part of the remuneration. The following information is then provided to the head of the human resources unit: a) volume of finances dedicated for the variable part of the remuneration b) percentage dedicated to the collective size from the overall volume of the variable part. Performance bonus is distributed twice a year to correspond with the semi-annual cycle of setting strategic goals in the organization.

The evaluator utilizes five ranking categories from 0-60%, 61-80%, 81-90%, 91-100%, 101-120%, where bottom two are below expected fulfilment of goals and top two are preceding expected fulfilment of goals. There is no forced distribution of the ranking categories. Also, it is quite unusual to see the top ranking category above 100% and also having a 20% range in this category as opposed to next two categories.

The actual performance assessment is noted in an evaluation report (performance appraisal sheet) which is filled out electronically and printed version is archived in the civil servants file for a five year period [R1].

### 3.3 Information Use from Performance Appraisal Sheets

The prime aim of the performance appraisal sheet is to provide information for the variable-performance related part of the remuneration on both regular employees and top management. Therefore, there are two types of performance sheets available. Performance sheets are filled in on monthly bases so that the evaluator can monitor the progress in goals fulfillment. Each evaluator – head of the respective department – has a full autonomy in conducting the performance assessment, providing numerical and verbal evaluation and rank employees accordingly. HR department does not step into this competency. At the end of the performance assessment period an average is being calculated from the previous 6 months assessments and the employee is ranked into one of the five categories. Beside the numeric part of the evaluation sheet, there is also unstructured space for the evaluator where he/she can provide recommendations on the improvement of the performance. The employee signs each evaluation sheet and in this way validates the performance assessment. The internal directive [5] asks the evaluator and employee to jointly put down measures that can improve the performance and goals fulfillment.

When looking into the performance appraisal sheets and the way how are employees being ranked (Table 2), we encounter a common flaw in the system

**Table 2. Ranking of the Employees based on Performance Assessment in 2015**

	Total number of employees	Ranking 1 (under-performers)	Ranking 2 (below standard)	Ranking 3 (standard)	Ranking 4 (above standard)	Ranking 5 (Top performers)
Construction and Enviro	14	1	0	1	4	8
Economic	19	0	0	0	11	8
Legislative .	9	1	1	0	0	7
Office of the Head of Municipality	10	0	0	0	0	10
Clients Office	15	0	0	0	15	0
Social Affairs .	8	0	0	0	6	2
Internal service	24	0	0	0	23	1
Education	4	0	0	0	0	4
Assests Mngmnt	10	0	1	0	6	3
Cultural Affairs and Information	10	0	0	0	7	3
Construction and Enviro	123	2	2	1 (0.8%)	72 (60%)	46 (37%)

*Source: Authors based on performance sheets analysis*

We have noted that the performance appraisal sheet is standardized and relies more on the assessment of the pre-identified objectives which can be expressed in numerical way on a strictly quantifiable basis (see Table 3). The sheet allows also for verbal non-standardized evaluation, nevertheless, that is being utilized only in less than 30% cases. It could be a natural consequence of a skewed distribution when most of the employees exceed the expected goal fulfillment, however, if we look closer we can see that it is more linked to the nature of the top manager: it is only three departments (legislative, clients and education department) that do provide verbal evaluation and they do so systematically for all employees, not only the underperformers. When asked why do they actually provide verbal evaluation, the answer stated that „verbal evaluations are part of the performance appraisal and thus I always fill in this information so that it can become the basis for verbal feedback“ [R2, R3]. Head of the mayors office confirmed that the approach towards verbal evaluation differed widely among departments and therefore the mayor has decided to make this part optional as of 2013 [R1]

**Table 3. Verbal Evaluation of the Performance in the Performance Sheets as of 2015**

Departments	Total number of employees	Numerical Evaluation	Verbal Evaluation
Construction and Enviro	14	9	5
Economic	19	19	0
Legislative .	9	0	9
Office of the Head of Municipality	10	10	0
Clients Office	15	0	15
Social Affairs .	8	8	0
Internal service	24	24	0
Education	4	0	4
Assests Management	10	9	1
Cultural Affairs and Information	10	10	0
<b>Total</b>	<b>123</b>	<b>89 (72%)</b>	<b>34 (28%)</b>

Source: Authors based on performance sheets analysis

Thus, lack of training on this issue, lack of accountability mechanisms result in different approach towards the performance appraisal on the side of top managers that in turn does not provide sufficient space for mutual discussion between the employee and evaluator.

The analysis of performance appraisal practice revealed that Trenčín municipality has adopted PA system that is at the heart of the whole results oriented system and is based on goal setting rather than on standard criteria for a job. The objectives set for an individual act as a basis for an ongoing process on a monthly basis and provides space for a dialogue between the manager and the employee. Thus, Trenčín belongs to few municipalities that measure performance appraisal on regular basis – according to research of Jacko [6], only 32% of Slovak municipalities do so – and in a standardized way – only 44% do so [6]. Nevertheless, the system gives too much attention primarily to outputs as related to set targets. This contradicts to the general move from this perspective towards more competency or social skills appraisal in more general to provide balance in the evaluation. Thus, the diversification of criteria upon which PA is being conducted is a trend identified also by OECD [3].

Trenčín municipality utilizes performance appraisal for only one type of information – its link to performance appraisal pay. And although, there is potential to get more data from it (e.g. for employee development, etc.), it is not done so. In this sense, performance related pay is closely linked to goal setting, not only on individual level but also on team level. Thus, Trenčín municipality is following yet another trend as observed by OECD [3] - utilization of collective schemes to better reflect collective goals achievement.

#### 4 Discussion and Conclusion

According to the proponents of the appraisal process, employee appraisal is rational, objective and accurate process. Our case study has showed that there are lot of games played in the appraisal process for whatever reason which lead to low level of accuracy. This is being manifested by skewed results in performance where most of the employess are over the standard performers. There might be several reasons for this phenomenon which is being observed in other empirical studies and to which quotas or forced distribution are utilized as a remedy. First, evaluators may be reluctant to get into conflict with evaluaees. In fact, the issue of money was cited as a major cause of intentional distortion in ratings (or maybe goal setting, since the actual

evaluation is set for the possibility of exceeding by 20% the setting of goals). Thus, the tendency is to maximize the pay increases for most of the employees to keep them happy and motivated. Second, if there are no mechanisms in place that would follow the performance appraisals more closely by for example scrutinizing or reviewing the PA, then possibly the gaming would likely be reduced. However, this is not the case. Not only there is no such mechanism (the mayors office deliberately provides autonomy in the decisions to the departments with a fixed budget) but also it is not part of the review process of the top managers. Third, there is no genuine effort to develop employees and thus the verbal feedback does not fit into the overall scheme. There is no real will to talk about weaknesses and strenghts in other terms than goals fulfillment. Therefore, the evaluators do not see the reason for filling out the sheet other than pure compliance with the directive in case of three heads of the departments. Finally, Trenčín utilizes only a traditional tool of performance appraisal: superior evaluates its subordinates. Gaming would be reduced if other tools were utilized, such as 360 degree assessments or at least peer evaluation or participation in evaluation. In conclusion, the in-depth analysis revealed some potential problems with performance appraisal which could be compared in further research either in a longitudinal study or across municipalities.

## Acknowledgements

This article is the result of a research project supported by the Ministry of Education under APVV-0880-12 grant scheme "Knowledge utilization in public policy documents".

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## **Interviews**

- [R1] Interview with head of the municipal office (specialist on human resource management) by the authors (vedúca kancelárie prednostu), interview conducted on 22nd February and 11th April 2016.
- [R2] Interview with head of the legislative department by the authors (vedúca útvaru právneho), interview conducted on 16th March 2016.
- [R3] Interview with head of Clients Center, by the authors (vedúca Útvaru klientskeho centra a matriky), interview conducted on 15th March 2016.

# Quality of Life Evaluation in NUTS3 Regions of the Czech Republic and Progression of Evaluation in Years 2000-2015

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## Abstract

This paper deals with the quality of life evaluation in NUTS3 regions of Czech Republic and progression of this evaluation in years 2000 - 2015 based on selected indicators of Czech statistical office. The set of indicators is organized along a lot of areas: economy, safety, health, education, infrastructure, environment, labor market and other. Indicators for quality of life evaluation were selected from survey between Czech inhabitants from various regions, age and from different demographic characteristics in August 2016. Quality of life is evaluated by the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method. The NUTS3 regions of Czech Republic are evaluated by TOPSIS for each year and the result is a ranking of quality of life in regions. Next result is progress of these ranking regions in years 2000 - 2015. The results of QL evaluation show small differences in the assessment of individual regions, even though they are so different.

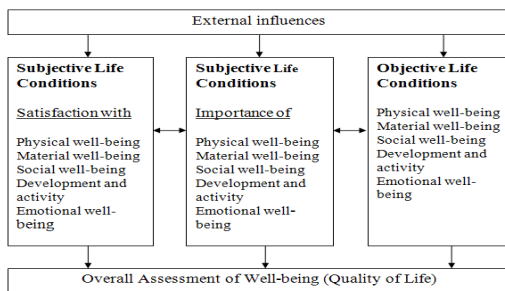
*Keywords:* indicators; quality of life evaluation; NUTS3 regions; TOPSIS

JEL Classification: C69, D89, H83, R59

## 1 Introduction

Defining term quality of life (QL) brings many dilemmas. If we occupy ourselves with defining QL term, we have to consider influence of historical, cultural and social changes, which take place in given society. The definition aptly describes the expert discussions [12], which state that QL: "usually refers to the degree to which a person's life is desirable versus undesirable, often with an emphasis on external components, such as environmental factors and income. In contrast to subjective well-being, which is based on subjective experience, quality of life is often expressed as more objective and describes the circumstances of a person's life rather than his or her reaction to those circumstances." This term refers to human existence, comprehension of meaning of life itself of individual being. Quality of life can be observed through two variables – material and non-material part of human life. Quality of life includes individual way of life, not only individual living conditions, but also living conditions of wider groups of society as a whole. We can use a simple model of QL - in this model there are an objective and a subjective aspect of the QL (see Figure 1) [8], [11].

Figure 1. Model of quality of life



Source: [11]

Among some common traits which are typical for the issue of the life quality research also belongs a fragmentation of definitions, an approach to the evaluation as well as multidisciplinary and multidimensionality [1]. The objective dimension is related to the material securing, social conditions, social status and physical health. It is a complex of economic, social, health and environmental conditions which determine human's life. Social dimension of the QL refers to the fact that an individual perceives his/her position in the society in the framework of his/her culture and the system of values. The final satisfaction with life is in virtue of personal goals, expectations and interests of each individual. QL should be looked upon as a multidimensional variable, which contains information about psychosocial status of an individual which is influenced by, for example, age, gender, education, social status, economical situation or individual's values. QL needs to be viewed as a subjective appreciation of own living situation. QL can be viewed as availability of options, from which an individual can pick during filling his life. [3], [9], [10], [11]

The QL is further determined as a magnitude which comprises in itself the fact how a human being perceives his/her position in society. Individual perception of each human being is basically influenced by [15]: system of values, relationship of an individual to his/her goals, expectations, standards and fears, psychosomatic state of an individual, social relationships, personal beliefs, relationship to key areas of the environment where individual lives. Main goal of this paper is a QL evaluation within the NUTS3 regions in Czech republic, progression of this evaluation in the years 2000-2015 and next objectives are to determine the level of development of QL in individual regions and the conjunction of these results due to other data and researches.

## **2 Material and Methods**

### *2.1 Quality of Life Evaluation in NUTS3 Regions*

#### *Selected Indicators for Quality of Life Evaluation*

For QL evaluating of NUTS3 regions of the Czech Republic was chosen example, whose author is the server [aktualne.cz](http://aktualne.cz) [5]. In this paper is the goal seize and solve this example "by our idea" (in our opinion better) and extend solving problem - goal is the modification and extension of solving problem. In the original article has been selected a total of 24 indicators divided into three groups: prerequisites for a healthy and long life (indicators K1-K8 in table 1), preconditions for a productive life and a decent standard of living (K9-K16) and prerequisites for sustainable development and healthy environment (K17-K8) and QL was evaluated for year 2014. The complete list of QL evaluation indicators is in Table 1.

The first step of "modification article" was the finding, which indicators for QL evaluation are important for inhabitants in Czech Republic. For help of agency STEM/MARK was created survey, whose goal was find important indicators (by inhabitants in Czech Republic). This survey has 7 questions - importance of indicators, knowledge terms of QL and QL evaluation and five demographic questions (NUTS3 region, sex, economic activity, education and age). Demographic data were collected for characteristic of respondents and for next/other research (and for interest too). STEM/MARK's survey [14] held in august 2016 and participated to it 506 respondents (from differently regions, education, age and etc.). Results of the survey - important of indicators are shown in Table 1. In the QL evaluation at server [aktualne.cz](http://aktualne.cz) came out best region Prague (PRA) with ranking 72.5 % and though the evaluations were with relative values, that the quantity has a significant role. With a significant gap is then placed region Hradec Kralove (HKR), Central Bohemian (STČ) and South Moravian (JHM) rated between 54 % and 55 %. Subsequent evaluation of the order of the regions in 2014: Pardubice (PAK) 53.6 %, Vysočina (VYS) 53.56 %, Liberec (LIB) 52.22 %, Plzeň (PLZ) 51.07 %, South Bohemian (JHČ) 50.77 %, Zlín (ZLN) 49.4 %, Karlovy Vary (KVA) 48.09 %. The last trial sites are: Olomouc (OLO) 41.67 %, Ústí n. L. (UST) 34.67 % and Moravian-Silesian (MSZ) 30.97 %. As shown in Table 1, were selected the TOP ten indicators that respondents identified as important - score more than 30% from all respondents. The values for selected indicators for all regions and for the years 2000-2015 we get to the Czech Statistical Office

(CZSO) and the statistical series of individual regions, in a public database and other sources of CZSO.

**Table 1. Selected indicators**

<b>Signification</b>	<b>Indicator (group A/B/C)</b>	<b>Ranking (%)</b>	<b>Important</b>
K1	Life expectancy at birth	50.4	Yes
K5	Doctors per 1,000 inhabitants	49.6	yes
K9	Gross domestic product per capita	47.6	yes
K18	Dust emissions	41.7	yes
K10	Long-term unemployed	37.9	yes
K4	Crimes per 1,000 population	37.5	yes
K24	A household with Internet access	36.2	yes
K12	Median gross monthly wages	35.0	yes
K19	Share of developed areas	31.0	yes
K8	Share of population living in houses connected to public sewage	30.4	yes
K21	Cars per 1,000 population	28.1	no
K15	Number of unsuccessful applicants for the elderly	26.7	no
K23	Proportion of university-educated population	26.7	no
K11	Number of applicants for one position at the labor offices	25.5	no
K20	Waste of companies per capita	24.9	no
K6	Occupational diseases per 100,000 inhabitants	22.5	no
K7	Average duration of incapacity	21.1	no
K14	Value of social aid benefits paid per capita	20.9	no
K2	Total population increase per 1000 population	20.0	no
K13	Number of businesses	19.8	no
K17	Number of small protected areas	18.6	no
K3	Traffic accidents per 1,000 population	13.8	no
K22	Voter turnout in elections to the regional assemblies	13.4	no
K16	Share of the surplus budget to the expenditure in region	12.6	no

*Source: [14]*

### **Data**

Data matrices were compiled for each of the years 2000-2015 by indicators and corresponding values in individual regions. In Table 2 is example data matrix for year 2010.

**Table 2. Data matrix 2010**

1	K1	K4	K5	K8	K9	K10	K12	K18	K19	K24
HKR	78.20	20.06	4.5	74.1	327440	0.01251	20779	0.67656	0.01942	59.51
JHČ	77.75	23.98	4.01	86.3	317054	0.02298	20583	0.40377	0.01053	51.45
JHM	78.09	25.43	4.791	88.3	353184	0.00597	22026	0.45307	0.01971	59.55
KVA	76.16	25.8	3.88	91.4	269199	0.02529	19700	0.48951	0.00965	54.75
LIB	77.51	31.32	3.69	68.2	287144	0.01643	20739	0.53347	0.01656	47.63
MSZ	76.23	31.91	3.90	80.8	311597	0.01940	21455	1.04955	0.02194	53.10
OLO	77.27	21.38	4.39	77.6	285621	0.01339	20323	0.43086	0.01577	51.62
PAK	77.61	17.18	3.80	71.8	308768	0.01075	20009	0.77634	0.01612	55.72
PLZ	77.61	24.20	4.50	78.3	346459	0.01362	21989	0.46067	0.01281	56.56
PRA	78.90	59.14	7.3	99.2	811822	0.00724	30842	2.48558	0.01053	62.16
STĀ	77.43	30.40	3.15	68.7	333679	0.01804	22654	0.80276	0.01947	55.88
UST	75.57	35.22	3.40	81.5	298626	0.01666	21166	0.84420	0.01756	51.68
VYS	78.26	16.86	3.53	84.8	300530	0.02251	20502	0.75745	0.01276	53.01
ZLN	77.34	16.0	3.86	85.6	313137	0.05332	19937	0.37853	0.01820	54.18

Source: Author based on Czech Statistical Office

**Method TOPSIS**

For the QL evaluation in NUTS3 regions of the Czech Republic and progression of evaluation in years 2000 - 2015 was been selected method TOPSIS, because QL evaluation is very complicated issue, then is appropriate to "take the help of" software or programming tools such as expert systems, decision making models or just rule-based systems and using special methodologies and methods. The method TOPSIS is one of Multi Attribute Decision Making algorithms, which is widely adopted. TOPSIS ranks the available networks based on their scores, with the highest being the best solution [13]. It is a multiple criteria method to recognize solutions from a limited set of alternatives. The fundamental rule is that the preferred alternative should have the shortest distance from the ideal solution and longest distance from the negative-ideal solution [6]. TOPSIS algorithm is applied to the network interface selection as follows [7], [13]:

- The value of each attribute are normalized - creating a normalized matrix  $R = (r_{ij})$ :

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^n x_{ij}^2}}; i = 1, 2, \dots, m; j = 1, 2, \dots, n. \tag{1}$$

- The matrix is updated with the normalized values.
- $\sum_{j=1}^n w_j = 1$  Each attribute in the matrix  $R = (r_{ij})$  is assigned a weight  $w_j$  - new matrix  $V = (v_{ij})$ :

$$v_{ij} = w_j \cdot r_{ij}, \text{ where; } i = 1, 2, \dots, m; j = 1, 2, \dots, n. \tag{2}$$

- Determine ideal  $A^+$  and negative ideal  $A^-$  solution:

$$A^+ = [v_1^+, \dots, v_m^+] \text{ and } A^- = [v_1^-, \dots, v_m^-] \tag{3}$$

- This step is to find the best and the worst value for each of the attributes ( $v_i^+$  and  $v_i^-$ ), if the attribute is upward then the higher value is the best and if the attribute is downward then the lower value is the best.

$$v_i^+ = \max \{v_{ij}, j = 1 \dots n\}, v_i^- = \min \{v_{ij}, j = 1 \dots n\} \tag{4}, \tag{5}$$

$$v_i^+ = \min \{v_{ij}, j = 1 \dots n\}, v_i^- = \max \{v_{ij}, j = 1 \dots n\} \tag{6}, \tag{7}$$

- The distances for both best ( $d_i^+$ ) and worst ( $d_i^-$ ) cases are measured:

$$d_i^- = \sqrt{\sum_{j=1}^m (v_i^- - v_{ij})^2} \quad d_i^+ = \sqrt{\sum_{j=1}^m (v_i^+ - v_{ij})^2}, \tag{8}, \tag{9}$$

- The coefficient  $c$  is calculated based on distances  $d$  from the best and worst solutions, given by:

$$c_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad (10)$$

- The case with the highest  $c$  value is selected (is the best).

TOPSIS method was used in this way in 10 indicators for all of regions for each of the years 2000 - 2015. The following section presents the results for the NUTS3 regions of Czech Republic, in individual years and the progress status of regions within the Czech Republic. Weight for indicators was determined 0,1 - for each equally.

### 3 Results and Discussion

QL evaluation results in NUTS3 regions in Czech Republic are shown in Tab. 3. In this table are values of coefficient  $c_i$  in selected years (for example C2001) and ranking for this year in second line (for example R2001). As this table shows, the differences between regions are not significant and we can say that the QL is in all regions alike good. For certain regions, we can see stable development, with some regions "interesting" trend or fluctuations...

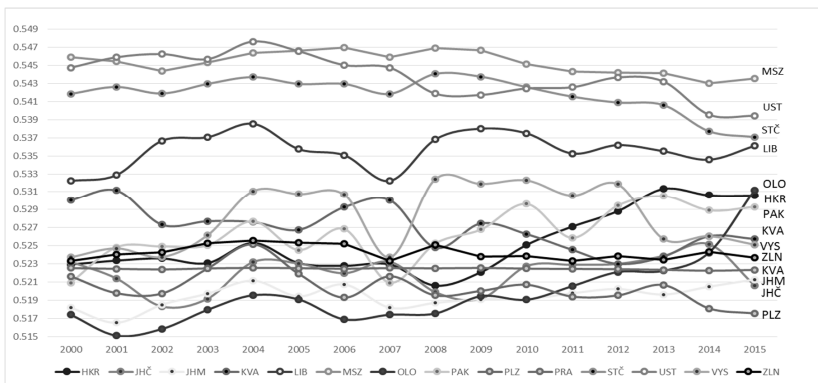
**Table 3. Selected results of coefficient  $c_i$  and ranking regions in 2000 - 2015**

	C2001	C2003	C2005	C2007	C2009	C2011	C2013	C2014	C2015
	R2001	R2003	R2005	R2007	R2009	R2011	R2013	R2014	R2015
HKR	0.52336 9	0.52308 9	0.52308 9	0.52293 9	0.52209 10	0.52711 6	0.53133 5	0.53061 5	0.53058 6
JHČ	0.52140 11	0.51916 13	0.52304 10	0.52322 8	0.51916 13	0.52290 10	0.52387 8	0.52517 9	0.52062 13
JHM	0.51652 13	0.51972 12	0.51943 13	0.51818 12	0.51910 14	0.51976 13	0.51963 14	0.52049 13	0.52128 12
KVA	0.51652 5	0.51972 5	0.51943 6	0.51818 5	0.51910 6	0.51976 8	0.51963 9	0.52049 8	0.52128 8
LIB	0.51652 4	0.51972 4	0.51943 4	0.51818 4	0.51910 4	0.51976 4	0.51963 4	0.52049 4	0.52128 4
MSZ	0.51652 2	0.51972 2	0.51943 1	0.51818 1	0.51910 1	0.51976 1	0.51963 1	0.52049 1	0.52128 1
OLO	0.51652 14	0.51972 14	0.51943 14	0.51818 14	0.51910 12	0.51976 12	0.51963 12	0.52049 11	0.52128 5
PAK	0.51652 6	0.51972 8	0.51943 8	0.51818 12	0.51910 7	0.51976 7	0.51963 6	0.52049 6	0.52128 7
PLZ	0.51652 12	0.51972 11	0.51943 12	0.51818 11	0.51910 11	0.51976 14	0.51963 13	0.52049 14	0.52128 14
PRA	0.51652 10	0.51972 10	0.51943 11	0.51818 10	0.51910 9	0.51976 11	0.51963 11	0.52049 12	0.52128 11
STČ	0.51652 3	0.51972 3	0.51943 3	0.51818 3	0.51910 2	0.51976 3	0.51963 3	0.52049 3	0.52128 3
UST	0.51652 1	0.51972 1	0.51943 2	0.51818 2	0.51910 3	0.51976 2	0.51963 2	0.52049 2	0.52128 2
VYS	0.51652 7	0.51972 6	0.51943 5	0.51818 6	0.51910 5	0.51976 5	0.51963 7	0.52049 7	0.52128 9
ZLN	0.51652 8	0.51972 7	0.51943 7	0.51818 7	0.51910 8	0.51976 9	0.51963 10	0.52049 10	0.52128 10

Source: Authors

We can show results on Fig. 2, which represent the values for individual regions in years 2000 - 2015. It is worth emphasizing, that the graph seems confused, because it contains many curves, which (as mentioned) is not so differently.

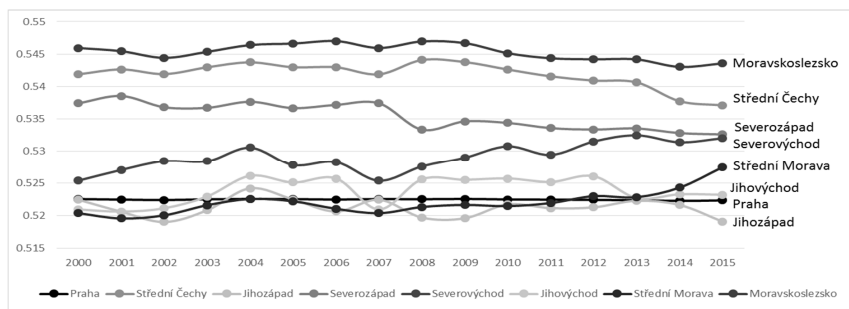
Figure 2. Results of coefficient ci



Source: Authors

Contrary to expectations, did well regions MSZ and UST, which are generally speaking rather taken as a "regions with problems" - in terms of employment, crimes, environment and other. On the contrary, "unpleasant" surprises was born in Prague, which have remained stable value, but in the ranking moves up to around 10th place. This fact can be taken as an advantage of the used method TOPSIS - even when using relative values the quantity had not a big role (compared with aktuálně.cz article). To complement Figure 3 - This figure shows the average rating for the NUTS 2 regions and has been chosen for better visualisation of QL evaluation in this paper.

Figure 3. Results of coefficient ci - NUTS2 regions



Source: Authors

As stated in the section devoted to the results, the results QL evaluation for individual regions were not significantly different, the results can be interpreted as a difference of units percent and results can be interpreted, that all NUTS3 regions in Czech Republic QL are just as good. This result may be however slightly misleading. These presented indexes can be considered "hard data", which do not always reflect the socioeconomic, cultural and geographic disparities various regions and it even though it is a territory of one state or country.

Any objective indicators is difficult to take into account the subjective perception of QL and it is need for a truly objective description of the phenomenon of the quality of life thinking about linking measurement of objective and subjective sides. The fact that indicators show the high quality of life in the region, does not necessarily mean that is high even in the eyes of individual

personalities. It's very similar as is to the subjective perception of poverty. Relative truth is between quality, satisfaction and real fact teetering on a very thin line, which defines specific designated indicators. With the empirical cognition of the reality of life an individual we have to always consider the subjective sides of experience. We must therefore necessarily cogitate, how bring in to the practical reasoning data about objective and subjective reality.

If we extend this idea and results even further, we get to do, that data from objective evaluation (or also "hard data") lead for balanced results if (as in our case) is evaluated one state or country and we have not social, cultural, economic and other differences. In such cases like this can then be considered to involve subjective assessment in QL evaluation, because this fact (that the results for all of regions is not bad) is not means, that the people are satisfied. An important part of it is subjective perception and interest in this "soft data" for use in practice.

In regards to the needs of local regional policy we can use, in considering the quality of life concept, for example, the model that states: "Quality of Life is the extent to which objective human needs are fulfilled in relation to personal or group perceptions of subjective well-being. Human needs are basic needs for subsistence, reproduction, security, affection, etc. Subjective well-being is assessed by individual or group responses to questions about happiness, life satisfaction, utility, or welfare. The relation between specific human needs and perceived satisfaction with each of them can be affected by mental capacity, cultural context, information, education, temperament, and the like, often in quite complex ways. Moreover, the relation between the fulfillment of human needs and overall subjective well-being is affected by the (time-varying) weight of individuals, groups and cultures give to fulfilling each of the human needs relative to others [2].

If we compare the results of the QL evaluation with method TOPSIS and surveys of Czech Television [4] before the regional elections in 2016, where the inhabitants of the region subjectively evaluated QL in NUTS3 regions and its development, we have other results – excellent and very good it feels residents JHM, HKR, PLZ and JHC with the result 58-60%. The worst QL feeling have inhabitants in MSZ, KVA and UST (under 37%). Other regions were around 50%. Improving QL situation feel inhabitants in ZLN, PAK and PLZ (over 50%), People in UST and LIB least about 40%. Other regions were above 45%. As well as the results of TOPSIS method were differences between the regions small, but it turned out as subjective QL evaluation also important.

Table 4 shows the results of QL evaluation with using fuzzy inference systems in MATLAB. With this method, it was necessary to set up an "expert" values that are very bad (value 0) and excellent (value 1). Indicator K1: value 0 = 0/ value 1 = 85 and over; K4: 50 and over/0; K5: 1/10 and over; K8: 0/1; K9: 155000/300000 and over; K10: 0,1 and over/0; K12: 11000/ 35000 and over; K18: 5 and over/ 0; K19: 0,1 and over/ 0; K24: 0/1. As we can see, this method of evaluation also brings other results and, with few exceptions, the differences between regions are small too.

**Table 4. Percentage results of using fuzzy inference system**

	HKR	JHČ	JHM	KVA	LIB	MSZ	OLO	PAK	PLZ	PRA	STČ	UST	VYS	ZLN
2000	21	21	20	20	21	24	19	20	21	20	20	19	20	20
2001	19	21	60	20	23	27	20	21	19	21	20	20	21	20
2002	18	19	60	21	21	27	20	21	24	21	23	21	21	21
2003	18	19	60	21	21	25	21	24	26	21	18	20	20	21
2004	18	60	60	19	21	24	60	21	60	21	18	19	21	19
2005	18	60	60	19	60	23	60	25	60	21	18	27	23	20
2006	60	60	60	20	60	18	60	60	60	21	18	18	18	20
2007	60	60	60	60	60	25	60	60	60	21	19	60	18	21
2008	60	60	60	60	60	19	60	60	60	60	60	60	60	60
2009	60	60	60	60	60	21	60	60	60	60	60	60	18	60
2010	60	60	60	60	60	21	60	60	60	60	60	60	60	25
2011	60	60	60	60	60	21	60	60	60	60	60	60	60	21
2012	60	60	60	60	60	26	60	60	60	60	60	60	60	21
2013	60	60	61	23	60	26	60	60	60	60	60	60	60	21
2014	60	60	78	26	60	60	60	60	60	60	60	60	60	28
2015	60	60	78	60	60	60	60	60	60	60	60	60	65	50

Source: Authors



## 4 Conclusion

As evidenced by this paper, QL evaluation is very difficult problem and for solving of this problematic exist a lot of approaches and methodologies. This fact supports advantage of used rule-based systems, expert systems, multi criteria decision making systems and method of system engineering is useful for solving problems of QL evaluation. Even compared with other methods of QL evaluation showed that subjective QL evaluation cannot neglect and for each method brings different results. Results confirm, that are small differences between regions. For more accurate and better results would be interesting to use other methods. Possibilities for further development of this problem are compared with values of neighbouring NUTS3 regions of Czech Republic. Certainly it would also be interesting to examine the long-term trend from 2015+. As an added incentive for editing and development this problem for greater sensitivity is question of the weight of individual indicators (eventually of areas). The next incentive can be added other approaches or methodologies, for example modification TOPSIS to fuzzy TOPSIS.

## Acknowledgements

This paper was supported by the projects No. SGS\_2016\_023 of the Ministry of Education, Youth and Sports of CR with title "Economic and social development in private and public sector" at the Faculty of Economics and Administration, University of Pardubice.

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# Knowledge Management and Czech Self-Governments. What Indicates Our Survey?

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## Abstract

The paper first introduces the topic of knowledge management in public administration. Its main focus is to summarize main findings of our research focused on Czech self-governments. Although the survey did not bring representative data it indicates that KM is a rather underdeveloped as well as undervalued.

*Keywords: knowledge management; public administration; public management*

JEL Classification: H77, H79, H83

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## 1 Introduction

Knowledge management (KM) is purported to increase innovativeness and responsiveness [1]. Still in 2015 Bolisani and Handzic [2] pointed out that despite its 20 years of history and increasing importance in academia, KM still suffers, like any other "new area", from a problem of "recognition" [21]. Handzic [11] adds that there is no general agreement about the precise meaning and relevance of knowledge management and, furthermore, there is no clear differentiation between knowledge management and the fields like organisational learning and intellectual capital.

The available academic literature clearly shows that KM has been paid growing attention in the international literature in the last two decades. Although the KM literature is not unified when speaking about KM concept, it deals with more or less similar set of main processes when explaining what is going on in KM implementation. The growing body of literature is also dealing with barriers to KM which partly sources from characteristics of tacit knowledge as well as from mindset of employees and difficulties with changing organizational cultures of organizations.

The body of KM literature is growing, but it may be indicated that the literature deals with recommendations and practices for/of private organizations rather than discusses what are the requirements of KM implementation in public administration and public sector organizations (see also [19]), although the public sector is widely accepted as being different from the private sector and has some unique features of its own and thus adaptation of KM practices are beneficial [6]. Still, the key elements (sometimes "components") of KM frameworks seems to be very similar to those discussed in literature focusing on the private sector - people, processes, and technologies (sometimes content is added - e.g. [12], smart city literature works with technology factors, institutional factors and human factors - e.g. [15]).

In some countries (namely Australia and its AS 5037-2005, or Knowledge Management PAS 2001 of the British Standards Institution) specific KM standards were elaborated in order to serve as guides for knowledge management implementation in public organizations with a potential to improve accountability, transparency, inclusiveness (and responsiveness) by more knowledge-intensive activities and processes (e.g. [7], [3], or [12]). Practices of KM are also context-specific ([6], [8], [9], [10]), and a large body of literature have been dealing with specifics and issues of public administration reforms in transition countries from the Central and Eastern European (from the more recent see, for example, [13], [18], [19], [20], [16], [17], [14]).

In the Czech Republic, the knowledge management discipline is rather undeveloped when speaking about available literature focused on public administration as well as research focused on public management. The ambition of this paper is to summarize selected findings of the survey which we focused on selected aspects of KM preconditions and processes in Czech self-

governments – municipalities and regions, or better say, in their main executive bodies – offices. The survey was built on an assumption that although KM is not elaborated in terms of academic books and guides, there is always something from knowledge management in managerial practices of public authorities – or, as the international literature sometimes concludes, the concept of KM is nothing new and has been in practice for a long time, and mostly in an informal manner, and organisations have always used KM practices (in various disguises) to make decisions, and to produce goods and services, though not in a deliberate and systematic manner [4].

The paper was elaborated within a research carried out within the TAČR project "Knowledge management in local and regional development" (TB040MMR008).

## 2 Material and Methods

In the Czech Republic, KM research has been focused particularly on potential of KM and awareness and practices for private businesses. KM in public administration and public sector represents a rather new topic of research in the country. Available research outputs indicated that KM research was rather ICT focused. (technology oriented). From knowledge generation tools particularly benchmarking was given a relatively large attention in research focusing on public management in the country which may be a consequence of its rather high popularity in comparison to other tools and methods linked to quality management in Czech public administration (see [22] and [23]).

Following the KM literature, research framework of the TAČR project and input we obtained through semi-structured interviews with several respondents from municipal and regional offices we prepared a questionnaire survey focusing on Czech self-governments. The survey design reflected a process-oriented definitions of KM which explain KM through a lens of KM processes in organizations (see e.g. [4]). Our questionnaire combined open-ended and questions on perceptions of respondents from municipal and regional self-governments that focused particularly on the following processes usually linked to KM: identification, capturing, storing and sharing. It also included questions focused on what we can call general management environment (or strategic aspects as used by Edwards, 2015 – [5]), KM-supporting tools (people and technological aspects) and barriers.

We addressed the questionnaires to respondents from the following categories of Czech self-governments:

- all 2 903 municipalities with less than 2 000 inhabitants from 6 regions (Jihomoravský, Královohradecký, Moravskoslezský, Olomoucký, Středočeský and Ústecký)
- all 413 larger municipalities from these 6 regions
- all municipalities of the II (393) and III type (205) (in the Czech language they are called "obce s pověřeným úřadem" and "obce s rozšířenou působností" and are distinguished as municipalities that are responsible for larger amount of state administration activities)
- all 138 municipalities with more than 10 000 inhabitants
- all 14 regional offices.

In case of the municipalities we used the database of contacts of the Ministry of Regional Development which contain general contact email (on e-registry office or a mayor). In case of the regions we addressed the questionnaire to all employees on managerial posts (to head of regional offices and heads of individual departments and sub-departments). We used slightly different form of a questionnaire for a survey focused on municipalities with less than 2 000 inhabitants in order to reflect more their specifics and addressed one kind of the questionnaire to them and a slightly different type to representatives from larger self-governments.

The questionnaire survey was carried out from March 10<sup>th</sup> till April 13<sup>th</sup> 2016. Although we had asked representatives to fill our questionnaire 2 times before the survey was closed, the return rate of the questionnaires did not exceed 5 % and we obtained:

- 142 questionnaires from respondents from municipalities with less than 2 000 inhabitants (hereinafter “small municipalities”), 16 % of respondents were employees of municipal offices, 84 % respondents were mayors of whom more than 70 % worked for the municipality more than 5 years and were mayors released from their jobs by their former employees – they are called “uvolněný” in Czech language, structure of respondents is summarized in the Table 1 below.

**Table 1. Structure of respondents from small municipalities (size of municipality)**

Size of municipality	Questionnaires obtained	%
up to 199	25	17.6
200 - 499	43	30.3
500 - 999	41	28.9
1 000 - 1 499	23	16.2
1 500 - 2 000	10	7.0
<b>Total</b>	<b>142</b>	<b>100.0</b>

Source: Author

- 65 questionnaires from respondents from larger municipalities (municipalities with more than 2 000 inhabitants, hereinafter “municipalities 2000+”); more than 60 % of them worked for the municipality for more than 10 years, their structure is summarized in the Table 2 and 3 below:

**Table 2. Structure of respondents from larger municipalities (size of municipality)**

Size of municipality	Questionnaires obtained	%
2 001 - 10 000	29	44.6
10 001 - 20 000	3	4.6
20 001 - 50 000	3	4.6
50 001 - 150 000	9	13.8
150 001 and more	21	32.3
<b>Total</b>	<b>65</b>	<b>100.0</b>

Source: Author

**Table 3. Structure of respondents from larger municipalities (job position of the respondent)**

Job position of the respondent	Questionnaires obtained	%
Regular employee („referent“)	14	21.5
Mayor („starosta“/“primátor“)	8	12.3
Secretary („tajemník“)	14	21.5
Head of Department („vedoucí odboru“)	17	26.2
Head of a subunit of a department („vedoucí oddělení“)	12	18.5
<b>Total</b>	<b>65</b>	<b>100.0</b>

Source: Author

- 71 questionnaires from respondents from regional offices; respondents were from all the 14 regions, more than 66 % of them worked for the region for more than 10 years, their structure is summarized in the Table 4 below:

**Table 4. Structure of respondents from regional offices (job position of the respondent)**

Pozice	n	%
Regular employee („referent“)	16	22.5
Head of the office („ředitel“)	2	2.8
Head of Department („vedoucí odboru“)	18	25.4
Head of a subunit of a department („vedoucí oddělení“)	35	49.3
<b>Total</b>	<b>71</b>	<b>100.0</b>

Source: Author

If a respondent was a regular employee or a head of department or sub-department, they were responsible particularly for tasks from the following areas (because municipal offices of small municipalities do not have more complex structure, we did not use this in the questionnaire for them).

**Table 5. Structure of respondents (area of their responsibilities)**

Municipalities 2000+	n	Regions	n
property administration	13	economy and finance	24
office	13	regional development	22
economy and finance	11	Investments	16
human resources	11	property administration	15
development of the municipality	10	culture, education and sport	13
internal affairs	10	environment	8
transport and roads	9	building construction office	8
environment	9	office	8
IT	9	internal affairs	7
culture, education and sport	7	healthcare	6
internal audit	7	social services	6
Investments	6	legal services	5
legal services	6	IT	5
social services	4	transport and roads	4
trades licensing office	3	trades licensing office	4
building construction office	2	internal audit	3
		human resources	3

Source: Author

We promised the respondents from regional offices (and municipal offices also) anonymity and this was reflected in the questionnaire design. Therefore, we cannot link the structure of respondents to individual regions etc.

### 3 Results and Discussion

We are aware of the fact that the number of questionnaires gathered does not allow for conclusive interpretations of findings. That is why we work with indications in the following text that may bring hypotheses for future research.

Selected findings on the *general management environment and tools used for knowledge identification* are summarized in the following Table 6.

**Table 6. General management environment – overall selected findings**

<b>Instrument</b>	<b>Municipalities &lt; 2000</b>	<b>Municipalities 2000+</b>	<b>Regions</b>
Strategic plan of development	79 %	82 %	94 %
Thematic strategy for development	39 %	69 %	96 %
Program / strategy of development	57 %	58 %	90 %
Community planning	50 %	69 %	71 %
Budgetary prospect	96 %	92 %	96 %
Municipal office development plans	22 %	44 %	91 %
Measurement of customer satisfaction	12 %	37 %	68 %
Measurement of quality of life	18 %	39 %	58 %
Measurement of employees satisfaction	13 %	54 %	75 %
Employees evaluation systém	26 %	69 %	85 %
Description of job positions	13 %	92 %	99 %
Description of work procedures	34 %	55 %	79 %
Educational needs analysis	24 %	61 %	82 %
Mapping and improvement of processes	18 %	44 %	81 %
Process management	19 %	47 %	83 %
Employees performance audit	10 %	29 %	52 %
Benchmarking with other offices	18 %	39 %	87 %
CAF	1 %	12 %	64 %
EFQM	1 %	5 %	40 %
Certification according to ISO 9000	1 %	14 %	48 %
Certification according to ISO 27000	1 %	14 %	26 %
CSR	10 %	9 %	50 %
Local agenda 21	11 %	30 %	54 %

Source: Author

The Table 6 clearly indicates that the larger the office the larger the group of surveyed instruments. However even the larger municipalities may not always have a thematic strategy that would operationalize general strategic plans. They also may not use benchmarking to learn from similar authorities. Also, although the respondents stated that their authority works with community planning, their responds indicate that quality of life and citizen / customer satisfaction are often not measured at least once in two years which goes against the philosophy of community planning. Answers to other questions indicate that long-term plans are not elaborated into a set of more specific aims in the case of municipalities regardless of their size. This may be a reason why similar percentage of respondents stated that long-term plans were not evaluated at least once in two years. Although larger offices work with job descriptions, these descriptions contain specification of required knowledge according to 56 % respondents from larger municipalities (in case of regional offices 85 % of respondents stated so). Only 32 % of respondents from larger municipalities and 46 % respondents from regional offices stated that the descriptions also contain descriptions of relationships with other employees of the office which may hamper knowledge sharing.

Findings on KM enablers (and potential barriers) are summarized in the Table 7 below. Findings on selected aspects of KM enablers supporting instruments and tools related to main KM processes like identification, capturing, storing and sharing are summarized in the Table 8.

**Table 7. Instruments supporting KM (KM enablers)**

	<b>Municipalities &lt; 2000</b>	<b>Municipalities 2000+</b>	<b>Regions</b>
Our office does not have clear KM strategy.	59 %	67 %	35 %
Our office does not have written KM strategy.	-	70 %	43 %
Creation of functional KM system is not among current priorities.	56 %	67 %	37 %
We do not have sufficient internal norms for KM.	55 %	56 %	39 %
Current KM practices are not evaluated sufficiently.	56 %	66 %	48 %
KM does not work and managing employees do not think a change is required.	38 %	43 %	39 %
We do not work with KM because it is perceived as useless time burden.	49 %	47 %	31 %

Source: Author

**Table 8. KM tools – overall selected findings**

	<b>Municipalities &lt; 2000</b>	<b>Municipalities 2000+</b>	<b>Regions</b>
<b>Knowledge identification</b>			
Requirements on job positions are clearly defined.	85 %	86 %	93 %
Heads evaluate activities of their departments regularly.	54 %	71 %	80 %
Evaluation of employees by their superiors is based on clear and known criteria.	57 %	65 %	75 %
Employees evaluation is always reflected in plans for their education.	47 %	58 %	72 %
Required knowledge is assessed only in case of some departments.	-	39 %	31 %
<b>Knowledge capturing and storing</b>			
Necessary knowledge is captured in a systematic way at all departments in order not to lose it.	53 %	55 %	61 %
We have a database of key knowledge of our employees.	26 %	25 %	41 %
When an employee is leaving we use a completion form that also includes a description of tasks in-process and necessary knowledge for their completion.	51 %	57 %	59 %
When an employee passes an important training, he/she always elaborates a report on benefits of the training.	26 %	35 %	55 %
Knowledge is captured in a very chaotic way which hampers its accessibility.	34 %	46 %	41 %
<b>Knowledge sharing</b>			
Knowledge is shared sufficiently among employees of our office.	76 %	56 %	63 %
Key information are stored only in PCs of individual employees and are not shared.	45 %	46 %	30 %
Employees are sufficiently motivated to share their knowledge with others.	69 %	53 %	59 %

Source: Author

The Table 7 clearly indicates that Czech municipalities do not work with clear KM strategies. The reason may be found in the table also – the creation of functional KM system is not often among current priorities and current KM practices are not evaluated sufficiently. Relatively large percentage of respondents from larger authorities stated that KM is perceived as useless and time burden although respondents stated that managers of their offices have sufficient knowledge on possibilities and instruments of KM. In case of some questions regular employees were more critical than their superiors.

The Table 8 indicates that a size of an office may have positive as well as negative effects on KM practices. The larger the office is the more instruments are used. On the other hand, the larger the office is the more chaotic capturing of knowledge was perceived by the respondents in our survey. Although a majority of respondents were satisfied with the level of sharing knowledge among employees of their offices relatively high number of respondents stated that key knowledge is accessible only on PCs of individual employees and is not shared. This may be supported by the insufficient use of intranet. Although the intranet represents a common instrument, our survey indicated that at larger offices often intranet was not used to make the following documents accessible to employees: internal magazine for employees, working materials of individual departments, databases with which departments work, instant messaging instruments). We did not discover any thread of knowledge sharing - employees were not worried to share their knowledge from the reason that they did not trust their cooperatives, because they worry about what will happen in future – will I become expendable? etc.

#### 4 Conclusion

The paper summarized selected findings on our survey that focused on KM practices in Czech self-governments. We are aware that the paper is rather descriptive. We promised to guarantee anonymity to respondents of the survey and used sorting questions as introduced in the section on methodology in the paper. Still we think that the paper present interesting



observations. Although the survey did not bring representative data it indicates that KM is a rather underdeveloped as well as undervalued. KM is clearly often not among priorities in municipal and regional offices and is perceived as useless annoying burden. The survey brought also some contradicting answers which must be surveyed in the future (KM is perceived as useless although managers have sufficient awareness and knowledge on KM according to the respondents, knowledge is shared sufficiently according to respondents but similar percentage of them state that key knowledge is accessible only on PCs of individual employees and is not shared etc.).

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# Transparency of Institutions such as Public Benefit Legal and Accounting Entities in the Czech Republic

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## Abstract

The present paper deals with the global transparency issue of NGO sector in relation to institutions in the Czech Republic. The Civil Code, which entered into force in 2014, introduced the term of public benefit and public benefit corporation in the Czech legislation. It also defined a new legal form of NGOs - institutions that are together with public benefit corporations suitable for the provision of welfare services. The content of this paper includes a characterization of the institutions under the Civil Code and the definition of their duties in relation to the disclosure of mandatory information required by the legislation. For the purposes of this paper, a database of 50 institutions which were newly formed in 2014 or transformed from other legal forms was created. Based on the analysis of the database, this paper aims to evaluate the degree of transparency of the institutions towards the public from the point of disclosing information about the organization's mission, access to current data on organization and organizational documents (founding legal proceedings, statute), providing information about its economic state and other donors on their website. According to the Civil Code and the law on public registers of natural and legal persons, the institutions have an obligation to file some of the above mentioned documents in the collection of documents of the public register; the non-fulfillment of this obligation can be sanctioned.

*Keywords: statute; transparency; institution; annual report; website*

JEL Classification: L31, M41, M42, M48

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## 1 Introduction

Until 2013, the Act No. 586/1992 Sb., on income taxes, as amended, used the term taxpayer for a „non-profit organisation“, which was not founded or established for the purpose of business (Sec. 18 art. 3). The legislation regulating the activities of non-governmental organisations (NGO) in the Czech Republic after 1 January 2014 significantly changed, and the Act on income tax responded to Civil Code and defined in the provision of Sec 17a a public benefit taxpayer. Institutions which could be established after 1 January 2014 and whose main activity is not a business, rank among public benefit taxpayers along with associations, foundations, endowment funds and public benefit organisations.

The aim of this paper is to analyse a sample of 50 institutions in terms of their compliance with disclosure obligations, which are set by the Civil Code, the Act on public registers and the Act on accounting. Part of the analysis is to test the hypothesis that in terms of categorisation of accounting entities institutions are primarily micro accounting entities.

This paper focuses on the current legislation related to institutions in connection with their duty to disclose information in the collection of documents, as well as information published by institutions on their websites. The degree of transparency of NGOs in relation to the state and to the public (donors, clients) is scaled based on how the organisation participates in creating public welfare and the extent to which it uses public funds (subsidies from state budget, subsidies from the budgets of regions, municipalities, etc.) and in the context of globalisation also the subsidies from European Union. [10,11]

Apart from mandatory information in public registers, NGOs publish information about themselves on their websites. The minimum information which an NGO should publish on its websites include:

- mission, purpose (basic idea of the sense of its existence),
- activities through which the mission of the organisation is fulfilled,

- organisational documents and information (statutes, status, founder's deed, names of statutory bodies, organisational structure),
- funding (subsidies from public administration, EU grants, gifts from companies, endowment gifts, donations of individuals, incomes from main activity, income from additional activities),
- economic result of the organisation (balance sheet, profit and loss statement, notes, expenses/costs of managing the organisation, for wages, for the main and additional activity),
- partnership (integration into networks, associations, important partners). [6]

According to the conclusion of NGO transparency study in the Czech Republic in 2012 based on the content analysis of websites of the selected sample of NGOs, the worst situation in the availability of economic information (i.e. accounting statements) is shown for civic associations; low transparency also concerned public benefit organisations, foundations and endowment funds. [5,7]

### 1.1 Civil Code

Act No. 89/2012 Sb., Civil Code which came into force from 1 January 2014, brought into the legislation in the Czech Republic, among other things, a new concept of public benefit legal entity and defined the general criteria for a public benefit. An act that would regulate the status of a public benefit (a government bill on the status of public benefit), was in the end not adopted.

*Pursuant to the Civil Code after 1 January 2014 institutions may be established (Sec 402 – Sec 418).*

The provision of the section 402 defines the institution as follows: „An institution is a legal person created for the purpose of pursuing socially or economically useful activities using its personal and property resources. An institution pursues activities the results of which are equally available to everyone under predetermined conditions.“ Typical characteristics of institution mainly include:

- name of the institution must include the words „*registered institution*“ or abbreviation „*z. ú.*“ (Sec 404),
- the institution may operate a business enterprise or engage in *other secondary activity* (Sec 403),
- the institution is formed by a formation deed or disposition mortis causa - *founding legal proceedings* (Sec 405),
- *an institution is incorporated upon registration in a public register* (register of institutions Sec 407),
- the statutory body of the institution is a director, appointed and dismissed by the board of directors (Sec 408- Sec 412),
- *status* of the institution (may and may not be) is disclosed by filing into the collection of documents of the public register (Sec 413),
- the director of the institution is entitled to a usual remuneration, the offices of other bodies members are presumed to be honorary (Sec 414),
- if the founder's deed specifies that all body members are entitled to remuneration for performance of their duties, *the amount of remuneration provided to the body members is a mandatory information in the annual report* (Sec 416),
- an institution accounts separately for costs and revenues associated with their main activities, the operation of a business enterprise or other secondary activities and the administration of the institution (Sec 415),
- *financial statements of the institution are audited by an auditor* if the founding legal proceedings or status requires so, or if the amount of the institution's net turnover exceeds 10 million CZK. In such cases, the auditor also audits the annual report of the institution (Sec 415),

- *an institution discloses its annual report* no later than 6 months after the end of the accounting period by filing it into the collection of documents (Sec 416),
- *requirements of annual report* are set in Civil Code (Sec 415 and Sec 416), Act on accounting (Sec 21) and Act on public registers (Sec 66).

### 1.2 The Act on Public Registers of Legal and Natural Persons

Pursuant to Sec 1 of the Act No. 304/2013 Sb., on public registers of legal and natural persons, which also came into force on 1 January 2014, the public register is understood as register of associations, foundation register, register of institutions, community register of unit owner associations, commercial register and register of public benefit companies. As already mentioned in the previous subchapter, institutions are formed by their registration in a public register. In the Czech Republic, the public register is an information system of public administration, which is maintained in electronic form by a registration court. The rights and obligations of institutions in connection with the application for registration in a public register, change of the registration, or deletion from a public register, and supplementary information entered in the register of institutions are included in the provisions of Sec 35 - Sec 38 of this Act. When submitting documents to the registry court, the registered persons are also governed by the government regulation No. 351/2013 Sb.

For the purpose of this paper, the mandatory requirements of collection of documents (Sec 66) include founding legal proceedings of the legal person, i.e. institution status and annual report. According to the Act on public registers, the institution's annual report, among other things, consists of:

- financial statements,
- an audit opinion on the financial statements.

Pursuant to Sec 72 of the Act, the registered person has an obligation to submit the documents which should be filed to the collection of documents without undue delay to the registration court. If the registered person does not fulfil its obligations, the registration court will ask the registered person to submit the document within a certain time period. If a registered person fails to obey the notice from the registration court, the presiding judge may impose a disciplinary fine of up to 100,000 CZK (Sec 104); in case of repeated violations under Sec 72 and 104, the registration court can initiate proceedings for termination of the registered person with liquidation.

### 1.3 Act on Accounting

Limit values for *the categorisation of accounting entities* (total assets, total annual net turnover, average number of employees - Sec 1b, Sec 1c, Sec 1d and Sec 1f) are included in the Act No. 563/1991 Sb., on accounting, with effect from 1 January 2016. Since then, the act recognises *large, middle-sized, small and micro accounting entities*. To the same date, the conditions for the preparation of financial statements also changed - accounting entities prepare its financial statements in full or abbreviated form; small and micro accounting entities are not required to prepare statement of cash flows and statement of changes in equity. According to the Act on accounting, *institutions* may keep their books in a simplified form if they are small or micro accounting entities and are not obliged to have its financial statements audited (Sec 9 art. 3 and 4).

Since 1 January 2016 the conditions for *financial statements audit* has also changed; pursuant Sec 20 of Act on accounting, the financial statements of institutions (other small accounting entities) will be subject to an audit if it reaches or exceeds at least 2 values (net assets value of 40 million CZK, total annual net turnover of more than 80 million CZK, average recalculated number of employees 50; values are evaluated for the current accounting period and the immediately preceding period). Pursuant to Sec 21 art. 6 of the Act on accounting, accounting

entities which are obliged to have their financial statements audited are required to prepare *annual report* or a similar document.

Institutions have the obligation to prepare an annual report based on the Sec 416 of the Civil Code , as well as the obligation to file the annual report into the collection of document in accordance with the above mentioned Act No. 304/2013 Sb.

Pursuant to the amended provision of Sec 21 of the Act on accounting, accounting entities which are entered into the register (i.e. in a public register) have *the obligation to disclose their financial statements* in the form, in which it was prepared. If the institution is audited, it has an obligation to disclose its financial statements and annual report after their verification by an auditor. The deadline for disclosure is:

- within 30 days after approval of financial statements and annual report by the relevant authorities and verification,
- no later than 12 months from the balance sheet date of the disclosed financial statements.

According to the *transitional provisions* of the Act on accounting, institutions which are not obliged to have their financial statements audited disclose:

- financial statements and annual report for 2014 by 31 March 2016,
- financial statements and annual report for 2015 by 30 November 2017.

Sanction for breaching this obligation were amended in the Act on accounting and are listed in Sec 37 to Sec 37ab. An accounting entity that is not a business (e.g. institution) commits an offence for example by not having its financial statements and annual report audited, or by non-disclosing their financial statements and annual report. The above mentioned offences can be fined up to 3% of the total assets.

## 2 Material and Methods

During the research, 50 institutions were analysed to 1 September 2016, 17 of which were newly formed during 2014, 32 institutions transformed from associations and 1 institution from public benefit organisation. According to the data of Czech Statistical Office in December 2014, there were 123 institutions in the Czech Republic; in December 2015 there were 388 institutions and in June 2016 there were already 557 institutions, which means that in 2014 40.6% of all institutions were examined and in 2015 12.8%. [12]

The analysis of transparency of the institutions focused on two accounting periods, i.e. on the financial statements and annual report for the 2014 and 2015. The Civil Code sets a deadline for filing the financial statements within 6 months after the end of the accounting period, i.e. for 2014 by 30 June 2015 and for 2015 by 30 June 2016 regardless of the obligation to have the financial statements and annual report audited.

Although the disclosure obligation is regulated differently in three acts, the authors assume that institutions will comply with the deadlines set in the Act on accounting. In accordance with the the transitional provisions of the Act on accounting, institutions which are not obliged to be audited disclose their financial statements and annual report for 2014 by 31 March 2016 and for 2015 by 30 November 2017 (i.e. financial statements and annual report for 2015 may, but does not have to be, stored in the collection of documents to the submission date of this paper).

Institutions which are subject to an audit disclose financial statements and annual report for 2014 in accordance with the Act within 30 days after their approval or audit, but not later than 31 December 2015, for the accounting period of 2015 then no later than 31 December 2016 (i.e. in this case financial statements for 2015 also does not have to be stored in the collection of documents to 1 September 2016).

Based on data from internet, such as catalogue of NGOs [8] and public register, the authors compiled a list which contains names and company identification numbers (IČO) of fifty institutions in the Czech Republic. Based on the name of the institution and its identification number, the transparency of institutions was examined in the context of content analysis using the following two sources:

- webpages of individual institutions,
- collection of documents of the public register of institutions [9].

*Criteria (characteristics) and questions analysed with the content analysis on websites and in the public register of institutions* were as follows:

- does the institution have a website,
- is the status of the institution published,
- are financial statements part of annual report (balance sheet, profit and loss statement, notes, or information on economic results),
- the audit opinion is a part of annual report,
- is the amount of remuneration provided to the body members listed in the annual report (amount in CZK) or it is a honorary post,
- how much is the net asset value,
- what is the amount of total revenue including subsidies for operations and donations recognised as revenues,
- number of employees,
- are important donors listed in the annual report,
- does the annual report include costs and revenues associated with the administration.

### 2.1 Analysis and Evaluation of Information from Websites

Using the institution's name and its identification number, the authors analysed if the institution has a website and its content. Table 1 shows information which demonstrates the transparency of institutions based on their websites and contains information whether to 1 September 2016 the registered institution:

- has a website,
- has its status or founding legal proceedings published on its website,
- has its annual report for 2014 and 2015 published,
- has its donors published on its website (i.e. name of the donor including the donated amount, or only list of names, or donors are not listed on the website).

**Table 1. Analysis and evaluation of information from websites**

Criterion	Website		Status, foundation charter		Donors					
	Yes		Yes		Yes, including amounts in CZK		List of donors		No	
State as of 1 Sep. 2016	No. of instit.	Share in %	No. of instit.	Share in %	No. of instit.	Share in %	No. of instit.	Share in %	No. of instit.	Share in %
		44	88	14	28	10	20	23	46	17

Source: Authors

32 institutions disclosed their financial statements for 2014 on their websites (i.e. 64%) and 27 institutions presented their financial statements for 2015 on their websites (i.e. 54 %).

### 2.2 Analysis and Evaluation of Information from the Collection of Documents of the Public Register of Institutions

When examining the annual report and financial statements for 2014 and 2015 of the individual institutions, the authors discovered facts that are presented in Table 2. All monitored institutions published their founding legal proceedings in the collection of documents. Only 7 of the 50 monitored institutions stored their status (institution may or may not have) in the collection of documents.

Only 19, or more precisely 20 institutions disclosed their balance sheet and profit and loss statement. Two institutions disclosed the value of assets or revenue in their annual report, and this is why the table shows the value of assets and revenue for 20, or more precisely 22 institutions. For the accounting period of 2014, 6 institutions had their financial statements audited; for 2015 it was 10 institutions. From Table 2 follows that 72 % of the monitored institutions did not file the notes into the collection of documents for 2015. It is also not possible to precisely determine how many institutions belong among micro and small accounting entities because 60% of institutions did not disclose their accounting statements.

If we compare the data for 2015 and 2014, it can be concluded that the degree of transparency of institutions has slightly improved in 2015. 38% of institutions disclosed their financial statements for 2015; 20% of institutions had their financial statements audited. The deadline for filing annual reports and financial statements to the collection of documents for 2015 is 30 November 2017, so 62% of institutions from the monitored sample still has enough time to comply with their obligation under the Act on accounting.

**Table 2. Analysis and evaluation of information from public register for 2014 and 2015**

Criterion	2014				2015			
	Yes		No		Yes		No	
	No. of instit.	Share in %	No. of instit.	Share in %	No. of instit.	Share in %	No. of instit.	Share in %
Annual report filed in collection of documents	14	28	36	72	19	38	31	62
Auditor's opinion on financial statements filed in coll. of doc.	6	12	44	88	10	20	40	80
<i>Financial statements filed in coll. of doc.:</i>								
Balance sheet	19	38	31	62	20	40	30	60
Profit and loss statement	19	38	31	62	20	40	30	60
Notes	10	20	40	80	14	28	36	72
Net assets more than 40 million CZK	4	8	16	32	2	4	18	36
Total revenues more than 80 million CZK	0	0	20	40	0	0	22	44
Net assets less than 9 million CZK	10	20	10	20	12	24	8	16
Total revenues less than 18 million CZK	14	28	6	12	14	28	8	16

Source: Authors

### 3 Results and Discussion

Based on the description, analysis and comparison of acts mentioned in chapter 1, it can be concluded that the requirements for transparency of institutions are included in the three acts, and their conditions are in some cases set differently. Apart from collection of documents, information on institution's activity can be obtained from their website.

Authors analysed 50 institutions (registered institutions), which were newly formed after 1 January 2014 or were transformed from associations (in one case from public benefit organisation).



Based on the set criteria (characteristics) and questions for the content analysis of the websites and collection of documents of the public register of institutions (see chapter 2), authors came to the following conclusions:

- all monitored institutions disclosed their founding legal proceedings in the collection of documents,
- only 7 of 50 institutions (i.e. 14%) disclosed their status in the collection of documents,
- 14 institutions filed their annual report for 2014 into the collection of documents (i.e. 28%) and 19 of 50 monitored institutions did so for 2015 (i.e. 38%),
- 6 institutions for 2014 and 10 for 2015 disclosed their audit opinion on financial statements as a part of their annual report (according to the authors, it was a voluntary audit).
- only 19 of 50 institutions (i.e. 38%) fulfilled their obligation to disclose balance sheet and profit and loss statement for the accounting period of 2014,
- 20 from 50 institutions (i.e. 40%) have so far fulfil their obligation to disclose balance sheet and profit and loss statement for the accounting period of 2015,
- for 2014, 80% of the institutions did not disclosed the notes, which are a mandatory part of the financial statements and for 2015 so far 72% of monitored institutions,
- according to available data, no institution has such a high turnover and assets value that any of them would rank among middle-sized or large accounting entity,
- although the authors did not have data on the number of employees for all institutions, according to data released for 2015 and with a certain simplification, it can be estimated that 6 of 19 institution qualifies for a small accounting entity and the remaining 13 falls among micro accounting entity,
- 44 of 50 monitored institutions (i.e. 88%) have a website,
- 36% of institutions did not publish the annual report for 2014 on their website, and for 2015 it was 46% of 50 monitored institutions,
- important donors including amounts provided were presented on the websites of 20% of the institutions, 46% of institutions published only a list of donors, 34% of institutions did not publish their donors, or they have no donors,
- institutions mostly ignored the legal obligation to publish the amount of remuneration paid to board members under the Civil Code; only two institutions specified the amount of remuneration, and six institutions stated that remunerations were paid (this information was included in the notes to financial statements),
- no institution has published the cost of administration.

On 1 September 2016, 9 months passed since the amendment of the Act on accounting and more than 2 years since the Civil Code and the Act on public registers became effective, and the question is if it is sufficient time for the newly created legal entities with respect to the frequent changes in legislation in the Czech Republic?

From the above mentioned facts obtained from a sample of 50 institutions, which for 2014 represents 40.6% of institutions in the Czech Republic, it can be concluded that institutions are transparent to the public, which is interested in their activities – *88% of the reference sample has a website*, on which prevail information about their activities. 32 institutions disclosed their annual report for 2014, and for 2015 it was so far 27 institutions.

Transparency of institutions in disclosing information about their economic results is according to the authors low. *36 institutions have not so far disclosed their annual report for 2014, i.e. 72%*. Similarly bad situation is in disclosing financial statements; 31 of 50 institutions have not *disclosed their statements for 2014 into the collection of documents, i.e. 62%*.

The notes (in accordance with regulation No. 504/2002 Sb., [11] which among other things contains explanatory information on assets, sources of its coverage, detailed breakdown of costs and revenues, number of employees, list of provided and received donations, remuneration amount provided to members of bodies) were in 2014 disclosed only by 10 institutions, i.e. 20%. In 2015 only 14 institutions disclosed the notes, i.e. 28%. The authors hold the view that the institutions should be also obliged to disclose the administration cost.

## 4 Conclusion

Because the majority of analysed institutions do not disclose their financial statements in the collection of documents, it is not possible to draw a qualified conclusion in relation to the categorization of institutions and their audit obligation. Another positive feature is that for 2015 20% of the fifty monitored institutions had their financial statements audited despite the fact that neither of them exceeded the value of assets or turnover set by the Act on accounting.

General conclusions on transparency for 2015 may be subject to another contribution because, as already mentioned above, the deadline for the fulfillment of obligations under the Act on accounting is not yet over, even though in accordance with the two other legal standards it should have already been.

In the Czech Republic is the issue of transparency of non-governmental organizations primarily solved by the Centre for Nonprofit Sector Research, which is currently working on a project Accessibility and Quality of Data on NPO which is focused on the analysis of information obtained inter alia from the public register.

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**SESSION II:  
PUBLIC FINANCE**

# Fiscal Autonomy in the Secessionist Regions

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## Abstract

Secessionism in the European Union is on the rise, yet there is close connection between secession pressures and the fiscal autonomy. In this contribution we analyse secession in terms of the fiscal federalism among twelve NUTS 2 European regions using original dataset based on the regional fiscal, economic, political and demographical data. Secessionist regions are described and compared with the same-status regions in their country. We discuss the differences in the fiscal autonomy degree in the secessionist and non-secessionist regions and the evolution of the fiscal autonomy in European regions. The relationship between secessionist party support and fiscal autonomy is monitored. We have found out, that the new after-secessionist state would be viable from the demographical as well as economic point of view. The secessionist regions show higher degree of the fiscal as well as complex autonomy and their autonomy was increasing in the last three decays. There is very close relationship between the degree of democracy and degree of fiscal autonomy. Furthermore, we discovered that if the region once reached the certain degree of the fiscal autonomy, it is less keen on supporting the real secession.

*Keywords: economic secession; european integration; fiscal autonomy; fiscal federalism; tax autonomy*

JEL Classification: D74, E62, H71, H77

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## 1 Introduction

During the last five years the secessionist pressures of the secessionist and separatist movements in the European Union grew rapidly. Referendum in Scotland in 2014 triggered the chain reaction across the European regions (compare [10]). Secessionist parties won the elections in Corsica and Scotland in 2015 and Catalonia seeks with the growing intensity to receive the independence in spite of the Spanish constitution. Moreover, the British referendum on the withdrawal from the EU, as well as the Ukraine war, attracted attention even to the lesser-known separatist regions from Åland in the Baltic to Sardinia in the Tyrrhenian.

Secession phenomenon is closely related to the fiscal federalism. As Panizza [14] showed, the central government can prevent secession thanks to the decentralisation. Such *fiscal appeasement* [17] is then meaningful from the political point of view if the central government considers secession being the real threat. On the other hand, this policy can also undermine governmental ability to fight secession in the long run [17].

Fiscal decentralisation in the countries with secessionist regions is therefore double-edged sword. On the one hand, it can quieten the secessionist region, which is satisfied with higher level of fiscal autonomy, enjoy higher revenues and lost the fiscal reasons for the secession. This presumably might be the case of Scotland after Scottish independence referendum. In spite of fact that a slight majority was against independence, the threat of secession lead former Prime Minister David Cameron to promise Scotland higher level of fiscal autonomy. Since April 2016 there is new *Scottish rate of income tax* which makes Scotland the EU most powerful subnational state [20]. On the other hand, the fiscal decentralisation might give more power to the local government. For example the tax autonomy provide region with potential instrument for financing the future real secession as was the case of Yugoslavia or Soviet Union in the early 90's [17].

Fiscal autonomy can also result into the *fiscal profligacy* [3], when the regions' expenditures increase because of the soft budget constraint. Nevertheless, some countries prevent fiscal profligacy by the analogy of European Stability and Growth Pact. For example the Italian regions

are subjects to the *Domestic Stability Pact* [6] and Spanish regions should follow the new Article 135 of the Spanish Constitution. According to this article *the Autonomous Communities shall not incur a structural deficit that exceeds the standard established by the EU* [5]. On the other hand, other secessionist regions are not bounded by the similar rules. For example the Finnish Government according to the Åland Self-Government Act [18] cannot intervene into the Åland's spending or budgetary process (with exception of providing the equal social conditions for all citizens). Similarly German *Länder* (individual federal states) were allowed to increase their expenditures without increasing their revenues, which could result into the regional debt increase [16].

At least since Tiebout's canonical paper [20] it is clear, that the heterogeneity of the region's preferences might be solved by the decentralisation. Nevertheless, some of the regions do not accept mere decentralisation but require (from their point of view more effective) secession. The first secessionist party, which based its secessionist requirements on the economic criteria (instead of the romantic secession – compare [10]) was *Lega Nord* in Italy [16].

It is therefore difficult to study secession and ignore fiscal autonomy of the secessionist regions. The aim of this contribution is to analyse the fiscal autonomy in context of the secessionist pressures in the European Union. Firstly the secessionist regions are described and compared with the same-status regions in their country. Then the brief data description is provided. In the third chapter, we discuss the differences in the fiscal autonomy degree in the secessionist and non-secessionist regions and the evolution of the fiscal autonomy in European regions. Last but not least the relationship between secessionist party support and fiscal autonomy is monitored.

## 2 Material and Methods

In this chapter, we explain the selection of secessionist regions in context of their parental countries. Then the basic datasets are introduced. Firstly, we deal with the Regional Authority Index and especially the sub-index of fiscal and borrowing autonomy. Secondly data on the Tax Autonomy are described. Finally, the brief overview of further data as well as statistical methods is provided.

### 2.1 Selection of Secessionist Regions

In the European Union there are at least 37 secessionist movements among 17 countries [9]. However, most of these movements are based on *romantic secession* and just a part of them enjoys voters support. The other symptomatic problem is the lack of regional data on the particular political and economic factors.

For the aim of this study, twelve secessionist NUTS 2 regions (basic regions) in seven Western countries were selected (see Table 1). Each of the regions is compared with the corresponding type of NUTS 2 regions in the country. Using Hooghe et al. classification of regions [7] we distinguish *Standard regions* (S), which cover most of the non-secessionist regions; *Asymmetric regions* (Y), which are regions with higher degree of autonomy in comparison to the others regions [8]; and *Autonomous regions* (A), which are individual jurisdictions.

### 2.2 Regional Authority Index

Degree of the regional autonomy can be measured by the Regional Authority Index (RAI) published by Hooghe et al. [7]. This dataset covers 231 regions in 65 countries in 1950–2010. From the 13 basic variables and 20 components creating RAI Index, we used the following indicators:

- *tier\_fiscauto* – measures the extent to which a regional government can independently tax its population, using the scale from 0 (central government sets base and rate of all regional taxes) to 4 (regional government sets base and rate of at least one major tax (e. g. personal income, corporate, value added or sales tax));

- *tier\_borrowauto* – measures to which extent can a regional government borrow on the scale from 0 (it does not borrow) to 3 (it can borrow without restrictions imposed by the central government);
- *tier\_RAI* – composite index (further denoted as RAI) consisting not only from the two above variables, but also from variables *tier\_instdepth* (autonomy of the regional government), *tier\_policy* (range of policies, for which is a regional government responsible), *tier\_rep* (extent, to which a region has an independent legislature and executive). Those five variables create the index *tier\_selfrule* which ranges from 0 to 18. Index *tier\_sharedrule* (0–12) covers five variables dealing with the authority, which can the regional representatives exercised on the country level. The composed index RAI takes the lowest possible value 0 (no autonomy at all) in the regions of Cuba (from 1959 to 1965) and El Salvador (from 1980 to 1992). The highest value (RAI = 27) reached the index in case of the Montenegro and Serbia in the former State Union of Serbia and Montenegro (existing to 2006) as well as in recent German States (*Länders*).

In addition to these original components of RAI as computed by Hooghe et al, we created the new composite variable *FISRAI*. Variable *FISRAI* consists of the simple sum of variables *tier\_fiscauto* and *tier\_borrowauto* and measures the total fiscal autonomy on the scale from 0 to 7.

**Table 1. List of the secessionist NUTS 2 regions and their parental countries**

Country	Abbr.	Region		Type	
Belgium	BE2	Vlaamse Gemeenschap	Flanders	Y	Secessionist region
	BE	Région	Regions	Y	Rest of the country regions
Denmark	FO	Føroyar/ Færøerne	Faroe islands	A	Secessionist region
	DK	Regioner	Regions	S	Rest of the country regions
Finland	FI2	Åland	Åland	A	Secessionist region
	FI	Aluehallintovirasto	Regions	S	Rest of the country regions
France	FR83	Corse	Corsica	A	Secessionist region
	FR	Régions	Regions	S	Rest of the country regions
Italy	ITD1	Sudtirolo-Alto Adige	South Tyrol	A	Secessionist region
	ITG2	Sardegna	Sardinia	A	Secessionist region
	ITC2	Valle d'Aosta	Aosta Valley	A	Secessionist region
Spain	IT	Regioni a statuto ordinare	Regions	S	Rest of the country regions
	ES11	Galiza/Galicia	Galicia	Y	Secessionist region
	ES51	Catalunya/Cataluña	Catalonia	Y	Secessionist region
	ES21	Euskadi/País Vasco	Basque Country	Y	Secessionist region
	ES	Provincias	Province	S	Rest of the country regions
United Kingdom	UKM	Scotland	Scotland	A	Secessionist region
	UKL	Wales	Wales	A	Secessionist region
	UK	Regions	Regions	S	Rest of the country regions

Source: Authors

### 2.3 Further Data and Statistical Methods

Besides the dataset on the fiscal and regional autonomy, the Regional Statistics by NUTS classification [4] on the regional population and Gross Domestic Product were used. Furthermore, the level of democracy among the countries in question was approximated by the *Democracy Index*

2015 regularly published by The Economist [19]. Democracy Index divides 165 countries into 4 categories:

- Full democracies (12%) with Norway being the best (overall score 9.93);
- Flawed democracies (35.3%);
- Hybrid regimes (22.2%);
- Authoritarian regimes (30.5%) with North Korea being the worst (overall score 1.08).

Table 2 summarizes the ranks as well as overall scores of countries in question.

**Table 2. Democracy Index 2015 in the selected countries**

	<b>Country</b>	<b>Rank</b>	<b>Overall score</b>
<b>Full democracies</b>	Denmark	5	9.11
	Finland	8	9.03
	United Kingdom	16	8.31
	Spain	17	8.30
<b>Flawed democracies</b>	Italy	21	7.98
	Belgium	26	7.93
	France	27	7.92

Source: Authors, [19], [20]

Based on the *European Election Database* [11], data on the voter's support of the pro-secessionist parties in the secessionist regions were collected. Further the regional support of the party, which won in the parliamentary election, was recorded.

For the aim of this study we used the standard methods of the mathematical descriptive statistic (arithmetic means, frequency tables and Pearson correlation) as well as advanced methods (the univariate analysis of variance and cluster analysis).

### 3 Results and Discussion

In this chapter our findings are introduced and discussed in context of the recent literature on the secession. Firstly, the viability of new states after the secession is discussed in terms of the population change, GDP and GDP per capita. In the second part we analyse the fiscal and complex autonomy among the secessionist and non-secessionist region as well as its development in time. In the third part we study the relation between degree of democracy and autonomy. Finally, the relation between the fiscal autonomy and support of pro-secessionist political parties is investigated.

#### 3.1 Size of the New States

To the most crucial factors which are discussed in terms of the secession belongs the size of the nation as well as the size of the economy. The canonical studies of Alesina [1] highlight that there is the trade-off between the economies of scales and costs of heterogeneity. Tables 3 and 4 show that the new countries emerged after the secession would be viable in the European context. In terms of the population, Catalonia would be on the similar basement as Bulgaria and Scotland would not differ from the Slovakia. The break-up would seriously harm just Belgium, which would after the secession of Flanders lost 57% of its population. Spain would lose about half of the population just in case of the simultaneous secession of Catalonia, Galicia and Basque Country.

In terms of the GDP, the most serious harm would once again experience Belgium (58.3% decrease) and Spain (30.2% decrease). On the other hand, the new post-secessionist countries would be still viable with Flanders being on the similar level as Denmark or Basque Country on the same level as Slovakia.

Discussion on the economic secession often mentions that the secessionist regions are being exploited by the level of the country [2]. However, in our dataset only six regions (Flanders, Åland, South Tyrol, Aosta Valley, Catalonia and Basque Country) would have higher GDP p. c. than the



rest of the country after the secession. All others regions would have lower economic level. The highest difference is observed in case of the South Tyrol (39 940 in comparison to the 26 591 for the rest of the Italy) and conversely in the Wales (24 572 in comparison to the rest of the United Kingdom).

**Table 3. The impact of the secession on the population and GDP of the original countries**

Before secession			After secession			GDP [mil. €]		
Rank	Country	Population	Rank	Population	Change (rank/%)	Before secession	After secession	Change [%]
2	France	66 415 161	2	66 090 161	0/-0.5%	2 059 284	2 050 513	-0.4%
3	United Kingdom	64 875 165	4	57 703 612	-1/-11%	2 254 297	2 005 577	-11.0%
4	Italy	60 795 612	3	62 369 165	-1/-3%	1 613 859	1 555 240	-3.6%
5	Spain	46 449 565	6	23 140 614	-1/-50%	1 041 160	726 904	-30.2%
9	Belgium	11 258 434	22	4 844 434	-13/-57%	400 643	167 210	-58.3%
18	Finland	5 471 753	19	5 096 349	-1/-7%	205 268	203 914	-0.7%

Source: Authors

**Table 4. Comparison of the hypothetical new secessionist countries with existing EU members**

New Country	Population	Rank	Comparable Country	Population	GDP 2014 [mil. €]	Comparable country	GDP 2014 [mil. €]
Catalonia	7 401 000	15	Bulgaria	7 202 198	197 004	Ireland	193 160
Flanders	6 414 000	17	Denmark	5 659 715	233 433	Denmark	260 582
Scotland	5 348 000	21	Slovakia	5 421 349	172 744	Portugal	173 446
Wales	3 092 000	25	Lithuania	2 921 262	75 976	Slovakia	75 561
Galicia	2 740 000	27			53 858	Luxembourg	48 898
Basque Country	2 116 000	28	Slovenia	2 062 874	63 394	Slovakia	75 561
Sardinia	1 664 000	31	Estonia	1 313 271	33 256	Serbia	33 319
South Tyrol	517 000	35		429 334	20 649	Estonia	19 758
Corsica	325 000	37	Malta		8 771	Malta	8 093
Aosta Valley	128 000	38			4 714	Kosovo	5 568
Åland	29 000	40	Liechtenstein	37 366	1 354	Montenegro	3 458

Source: Authors, [4]

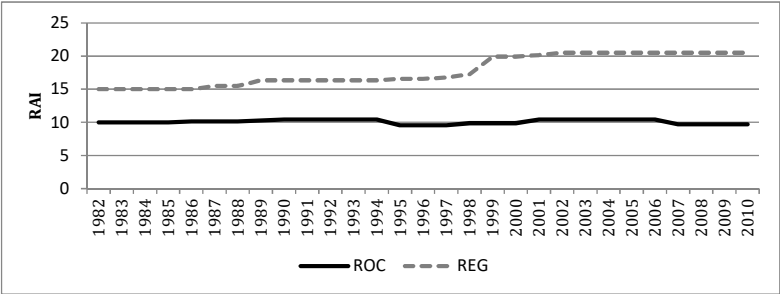
### 3.2 Fiscal Autonomy and the RAI Index

Oates [12] noticed that “the first half of the twentieth century was characterized by a strong trend toward increased fiscal centralization”. On the contrary, as Figure 1 depicts, the autonomy measured by RAI Index increased between 1982 and 2010 by 5.5 on average in the secessionist regions, while it was lower and remained almost unchanged in the rest of the secessionist countries. Opening gap between the autonomy in the secessionist regions and other regions is confirmed also by the univariate ANOVA which shows statistically significant difference between the secessionist regions and non-secessionist regions (see Figure 2). In the secessionist Regions the value of RAI is twice as large in comparison to the rest of the countries (20.7 in comparison to 10.3).

Cluster analysis was used to show the relationship between fiscal and borrowing autonomy. As Figure 3 clearly depicts, there is significant difference between fiscal and borrowing autonomy in the regions of Scandinavian countries. While non-secessionist regions of Finland and Denmark have literally no autonomy, their secessionist regions (Åland and Faroe Islands) have the highest and second highest fiscal and borrowing autonomy. It is in line with the OECD [13] data on the tax autonomy. Most of the other secessionist regions enjoy the higher degree of fiscal autonomy, but their borrowing autonomy tends to be lower. Only the Italian and French secessionist regions

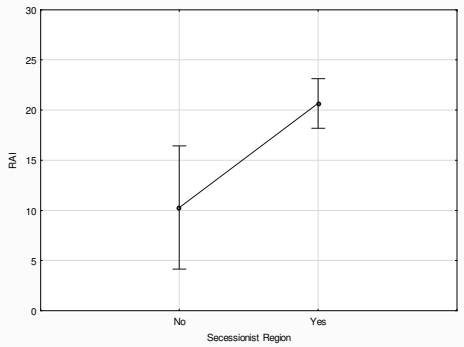
exercise higher level of the borrowing autonomy. Nevertheless, in both cases it is on the same level as in the corresponding non-secessionist regions in both countries.

**Figure 1. RAI Development in 1982-2010 in secessionist regions (REG) and rest of the secessionist countries (ROC)**



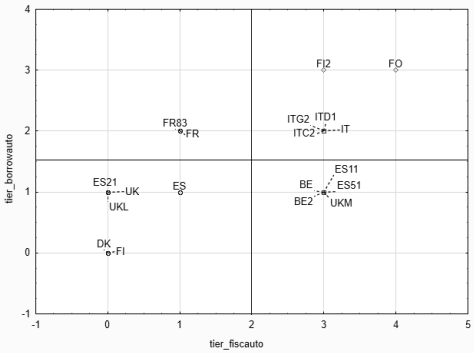
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**Figure 2. Confidence interval plot of Regional Authority Index vs. Regions type (Source: Authors)**



Source: Authors

**Figure 3. Clustering regions using fiscal and borrowing autonomy**



Source: Authors

### 3.3 Democracy, Elections and Fiscal Autonomy

Panizza [15] presupposes that there is the negative correlation between the democracy and centralisation. According to his hypothesis, the dictatorships should be 100% centralised while perfect democracies should be 100% decentralised. Using data on the Democracy Index 2015 and RAI index we just confirmed this hypothesis. There is very high correlation between degree of democracy and the RAI autonomy ( $\rho = 0.60$ ) as well as the degree of democracy and the fiscal autonomy ( $\rho = 0.42$ ), which indicates, that secessionist regions in the states with higher degree of democracy gained also higher level of autonomy.

As Sorens [17] suggested, higher degree of autonomy might be connected to both the higher as well as the lower support of the secession. Regions in our dataset show rather the second possibility: in regions with higher level of fiscal autonomy the support of the secessionist parties in the regional elections is significantly lower. The Pearson's coefficient is negative and, in absolute terms, high ( $\rho = -0.58$ ). In other words, it seems that if the region once reached the certain degree of the fiscal autonomy, it is less keen on supporting the real secession.

## 4 Conclusion

Secession goes hand in hand with the fiscal autonomy. The crucial question for governments in London, Madrid, Rome or Brussel is, if the state government should award more power and autonomy to the regional governments of the secessionist regions. On the one hand, the fiscal federalism can contribute to the calming of the situation. The more homogenous regions might be more viable thanks to their own taxation power as well as their own responsibility over their expenditure. On the other hand, if the citizens in the secessionist regions recognize, that they can successfully rule themselves within the more autonomous region, they simply might to require higher degree of autonomy which can result in full secession.

In this contribution we have shown, that secessionist regions in the seven West-European countries enjoy higher degree of fiscal as well as of the overall autonomy. Moreover, the degree of autonomy is increasing over time and is the strongest in the most democratic regions. Furthermore, the newly formed secessionist states would be viable among their other European counterparts in terms of demographic as well as economic size. Very important finding is, that regions with higher degree of fiscal autonomy support the pro-secessionist parties in the regional election significantly less which indicate that awarding certain degree of autonomy can calm the secessionist pressures.

The importance of secessionism as part of the political economy is continuously growing. It must be studied not only from the ethical, constitutional, juristic and political point of view, but also from the economic perspective. Inseparable part of this perspective creates also the public economy. In this contribution we discussed secessionism through the optic of fiscal federalism and fiscal autonomy. However, it will be necessary to analyse the European secessionism in terms of the public finance (especially public debt, budgetary deficit and tax revenues). The main aim of this paper is to pave the way for such analysis.

## Acknowledgements

This work was supported by the project of No. MUNI/A/0915/2015 funded by the Masaryk University and with the contribution of long-term institutional support of research activities by the Faculty of Informatics and Statistics, University of Economics, Prague.

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# Fiscal Capacity of the Regions and Their SMEs Development: Evidence from Russia

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## Abstract

The purpose of this study was to examine the dependencies between fiscal capacity of 83 regions of the Russian Federation within the period from 2010 to 2015 and development of small and medium-sized businesses in them. For this purpose, the authors formulated two hypotheses: (1) there is a correlation between the level of budgetary expenditures in regions of Russia and indicators of SMEs output in these regions. And that (2) with the increase of the budget expenditures of the region, should increase the economic output of SMEs in the region. To check hypotheses formulated we developed an economic-mathematical models that represent a regression function. The hypothesis (1) was confirmed. This relationship turned out to be negative. The values of the coefficients at  $x$  for year 2015 were positive (3.22 – for small enterprises; 0.68 – for medium enterprises; 1.67 – for individual entrepreneurs), hence, with increasing values of budget expenditures in a particular region the magnitude of SMEs output were also increasing. The increase in economic output of SMEs, located in the region, as well as individual entrepreneurs sales increase, takes place faster, than the growth of budget expenditures, which confirms the hypothesis (2) and is consistent with the findings obtained by other scientists in their researches.

*Keywords: SME; SME development; public expenditures; public finance; fiscal capacity*

JEL Classification: H5, H72, L26, O52, R11

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## 1 Introduction

Economists agree, that entrepreneurship is one of the important drivers of sustainable economic development and growth in the current economy [2], [4], [14], [17]. According to Doh and Kim [5], SMEs play an important role in economic performance all around the world, providing sources for most new jobs and innovations. Figal Garone et al. at their study [13] about the impact of the Brazilian cluster development policy on small and medium enterprises' performance have results show that such policy generates a positive direct impact on it. Harrison and Baldock [16] conclude that any continued constraint in the supply of and effective demand for finance for the SME sector will have significant implications for the overall performance of economies in both developed and developing countries. Edoho [7] in his study found out, that opportunity entrepreneurship has a better prospect of promoting growth, creating jobs and alleviating poverty than a generic MSME policy being currently promoted. Targeted entrepreneurship policy to incentivize opportunity-oriented entrepreneurs would produce greater benefit to the economy and society. Simón-Moya et al. [21] results demonstrate that gaps in survival likelihood between opportunity and necessity entrepreneurship are bigger during times of crisis than they are during growth periods. Bartlett and Bukvič [1] in their research found that the key barriers for SME growth included factors linked to the institutional environment including bureaucracy, and to external financial constraints the high cost of capital. Internal organization and resource issues, and social support through local development coalitions were found to be less important.

Vilensky in his study about Russia [25] states, that so far, a significant portion of budgetary investment in SMES does not reach entrepreneurs. As a result, even the current large-scale Government infusions in this area cannot compensate for the costs associated with unfavorable business and investment climate in Russia. Thus, we can say that the problems solution of increase in efficiency and development of small and medium-sized entrepreneurship requires an

understanding of objective laws of organization in this sector of the economy. Taking into account the specific characteristics of the SMEs sector in Russia, we believe it is important to examine factors, influencing the performance of small and medium-sized enterprises and the key factors of their activity. Taking into consideration the information, mentioned above, the purpose of our research was to examine the dependencies between fiscal capacity of 83 regions of the Russian Federation within the period from 2010 to 2015 and development of small and medium-sized businesses in them. Within the context of our research, the term fiscal capacity means tax and non-tax revenues to fulfill the full spectrum of legal power, assigned to the regional bodies of power and obligations to the population. The increase of fiscal capacity leads to budget expenditures to conduct corresponding works and provision of services. As the result, additional means appear in the region economy, which in their turn, because of multiplicative effect, provide for small and medium business development

## 2 Material and Methods

Based on the results of Baumol, Doh & Kim, Castaño, Vilensky [2], [4], [5], [25], as well as on the results of the authors pilot studies [19], [20], [26], we formulated the following hypothesis.

We hypothesized that: (1) *there is a correlation between the level of budgetary expenditure in regions of Russia and economic output indicators of small and medium-sized businesses in these regions*. A characteristic feature of Russian SMEs is that its products are generally sold on markets in the same regions, where they are produced. This provision applies to goods produced and services provided [20]. Therefore, we believe that (2) *with the increase of the budgetary expenditures of the region, an economic output of small and medium-sized businesses in the region should increase as well*. We assume that the biggest impact on the turnover of the business structures has the indicator that shows such financial and economic processes in the regions, as budgetary expenditures of these regions for the year. It is an integrated indicator because it includes not only the aggregated income from all parts of the budget, but also the degree of participation of the region in federal programs, as well as peculiarities of socio-economic development of the region, determining availability and amount of grants, subsidies and subventions. In addition, the budget deficit is included in expenditure structure in the year studied. Note that the values of the budgetary expenditure of the regions are not directly linked to the performance of the SME sector in the region.

To prove the hypotheses formulated the following work has been done. *At the first stage* of the study, we chose and substantiated the most acceptable performance measure, as the outcome variable, of business structures and factors influencing it. *At the second stage* we identified a causal relationship between the outcome variable and its explanatory factors. *At the third stage* the necessary information base was determined, initial data gathering, processing and forming arrays of information was carried out. *At the fourth stage* we formulated some options of economic-mathematical model, approximating the original data, its specifications, as well as methods and tools. *At the fifth stage*, the experiments were carried out with the purpose to identify models and to estimate unknown values of their parameters according to the original data, to determine the existence of statistically significant relationships between the outcome variable and factors. *At the sixth stage*, we verified the received models, their accuracy and adequacy analysis based on statistical quality criteria. At the final, *the seventh stage* of the study, the authors formulated conclusions, proposals and discussion questions. Our research was based on the following conceptual provisions:

- In the Russian regions the number of entrepreneurial structures is quite high. So, according to the Federal Tax Service in October 2016 in Russia, the country with the population of 146 544 710 people, 5 671 909 small and medium-sized enterprises were officially registered [11]. Description of indicators for each individual enterprise (entrepreneur) and their subsequent aggregation, represents a complex and laborious process. Therefore, we analyzed the activity of entrepreneurial structures, united together on a territorial basis.
- SMEs in Russia operates within the context of a single institutional policy.

- In the regions of the Russian Federation there are businesses that specialize in different types of economic activities, and their markets are also here. Most business entities products produced, are sold on intraregional markets.
- The current criteria of allocating economic entities to entrepreneurial structures have been established in the Federal law "On the development of small and medium-sized enterprises in the Russian Federation" from No. 209/07-FL. In accordance with it, small and medium-sized businesses are legal entities and individual entrepreneurs, registered in the order established. The main criterion for SMEs is the number of employees, which respectively shall not exceed one hundred people for small businesses, and from 101 to 250 people for medium-sized enterprises. Another criteria is the presence of state and municipal property share in the equity of the business, and revenues from sales of goods and services, as well as the carrying amount of the assets.
- The value of economic output (revenue) is determined by objective needs for goods and services produced by SMEs. Therefore, the choice of it as an outcome indicator characterizing the activities of SMEs enterprises in the regions seems logical. According to methodology, accepted by the Federal Service of State Statistics, for legal bodies, such an indicator, as economic output, includes own-produced goods shipped, works and services conducted by its own force, as well as revenue from the sale of outsourced goods when sold. For individual entrepreneurs the corresponding indicator is considered to be the volume of revenue from goods, production and services sold. Thus, small and medium enterprises revenues are calculated as economic output for small and medium businesses, and sales for individual entrepreneurs [10].

To check hypotheses formulated we developed economic-mathematical models that represent a regression function. The authors proposed a methodical approach based on evaluation of regression functions for spatial data characterizing performance indicators of all enterprises together (SMEs) in each of the regions.

Statistics examined for small and medium-sized enterprises, functioning in 2010- 2015 in all 83 regions of the Russian Federation (affiliated territories of the Republic of Crimea and Sevastopol in the calculations are not taken into account). Studies were conducted on the basis of statistical data of the Federal Service of State Statistics, the Federal Tax Service, Federal Treasury, Ministry of Finance of the Russian Federation [8], [9], [12], [23], [24]. While conducting our research, we excluded from the calculation the city of Moscow business structures, for the following reasons: calculated by the Russian Ministry of Finance level of the fiscal capacity significantly (2.6 times) surpassed the national average level [24]; specific structure of small and medium-sized businesses in Moscow differed significantly from the average for the country (number of small enterprises on 1 000 inhabitants in the country is twice higher than on average in the rest of the country, and the share of medium-sized enterprises and sole proprietorships is in one and a half times less than in the rest of the country) [11]. The number of observations used is important, when putting together a model. So, Harris in his work [15] suggested that the minimum number of observations has to be equal to 52. Accordingly, the total number of observations in our study, which is 83, meets the specified requirements. Table 1 shows a fragment of the original data.

**Table 1. The source data for the six regions of the Russia (fragment)**

<b>Region</b>	<b>Budget expenditures, bln. rub.</b>	<b>Small business output, bln. rub.</b>	<b>Medium-sized businesses output, bln. rub.</b>	<b>Sales of individual entrepreneurs, bln. rub.</b>
Belgorod region	79.2	246.5	94.2	135.1
Bryansk region	47.7	174.9	40.0	132.0
Vladimir region	55.4	181.9	53.3	82.4
Voronezh region	106.7	369.1	99.9	233.3
Ivanovo region	40.8	218.8	30.8	77.0
Kaluga region	58.1	180.3	38.1	74.0
...	...	...	...	...

Source: [9], [12], [23]

On the basis of original data, information base was formed for the development of economic-mathematical models, including the value of the outcome variable – SMEs economic output in the region of Russia within a year and explaining - the budgetary expenditures. During the study several types of regression functions were reviewed: linear, exponential, logarithmic, exponential, parabolic. Their construction was carried out in accordance with the adopted methodology [18]. We did the quality of the functions evaluation using coefficients of correlation and determination, DW-criteria, the Fischer-Snedecor distribution and Student-Fischer-test.

### 3 Results and Discussion

Logical analysis of the developed functions showed that power, exponential, parabolic and logarithmic functions poorly describe the source data. So, further we demonstrate the results of linear regression models. Regression function, describing the dependence of economic output of *small enterprises* from the budgetary expenditures by regions of Russia for the year 2015 looks as follows:

$$y_1 = 3.22x - 28.08 \quad (1)$$

where  $y_1$  – small business economic output, bln. rub;  $x$ - budgetary expenditures, bln. rub.

Regression function describing the dependence of economic output of *medium enterprises* from the budgetary expenditures by regions of Russia for the year 2015 are as follows:

$$y_2 = 0.68x - 3.67 \quad (2)$$

where  $y_2$  – medium business economic output, bln. rub;  $x$  - budgetary expenditures, bln. rub.

Regression function describing the dependence of sales of *individual entrepreneurs* from the budgetary expenditures by regions of Russia for the year 2015 are as follows:

$$y_3 = 1.67x - 11.17 \quad (3)$$

where  $y_3$ - sole proprietorship revenues, bln. rub;  $x$ - budgetary expenditures, bln. rub.

Functional logical analysis conducted, showed that they adequately describe the patterns of activity aggregates of small and medium-sized enterprises in the regions of the Russian Federation throughout the range of the changes in the values of factors. Table 2 presents the estimated values for checking the quality of statistics on all three equations, as described in the paper.

**Table 2. Values calculated statistics regression functions**

	<b>F(1)</b>	<b>F(2)</b>	<b>F(3)</b>
The determination coefficient	0.85	0.85	0.73
The correlation coefficient	0.92	0.92	0.85
Values calculated of the Fischer-Snedecor criteria	432	433	199
Values calculated of the t-criteria			
by $y$	20.54	20.80	14.11
by $x$	2.70	2.45	2.06

Source: Authors

Comparison of the calculated values shown in table 2, with those criteria which are represented in the literature, demonstrate that all the production functions have high quality. Thus, correlation coefficients are more than 0.8 and are close to 1. The coefficients of determination characterize the quality of the regression equation. The closer the coefficient of determination to 1 is, the closer to the functional dependency is, between output (revenue) and expenditure of the budget in the regions. According to Draper and Smith, a regression model is successful when the coefficients of determination are more than 0.7 [6]. While the difference between 1 and the coefficient of determination describes the proportion of variance in output



caused by the influence of other factors not included in the regression equation. Table 2 data analysis allows to make a conclusion, that the models (1) and (2) explain 85% variation of dependent variables. Other factors respectively (the size of the region, population base, and other factors) accounted for no more than 15%. Model (3) explains 73% of variation of dependent variables, and other factors accounted for no more than 27%. Other factors were not accounted by us as influencing factors on small and medium enterprises turnover, although it is within our plan for future research. The calculated values of statistics of all functions are much higher than tabular values criterion of the Fischer-Snedecor equal to 3.98 at significance level equal to 0.05. The data in table 2 show that all calculated values of Student's t-test with significance level of 0.05 are higher than tabular values of 1.99 for functions (1) to (3). Accordingly, the hypothesis (1) about the connection between the level of budgetary expenditures in the regions of Russia and indicators, characterizing SMEs volume of production and sales of goods and services in these regions is confirmed. At the same time this connection is regressive in nature. The values of the coefficients with  $x$  are positive (3.22; 0.68; 1.67), hence, with increasing values of budgetary expenditures in a particular region, amounts of SMEs economic output and revenues are also increasing, which confirms the hypothesis (1) and is consistent with the findings of Bondareva and Zatrohova, Tereshchenko and Sherbakov [3], [22]. Thus, we have established the presence of straight proportional relationship of SMEs output, as well as the revenues of self-employed entrepreneurs from the region's budget expenditures. Calculations carried out in the period from 2010 to 2015, showed that the hypothesis of the presence of regression dependency of output and revenues of small businesses in regions of Russia from the corresponding values of budget expenditures was confirmed. It should be noted that in connection with changes in tax assessment, functions turned out to be absolutely similar for small businesses only. Changes in taxations were related to the Federal law of 24.07.2009 N 212-FL «About insurance premiums, paid to the Pension Fund of the Russian Federation, the Social Security fund of the Russian Federation, the Federal Compulsory Medical Insurance Fund», which substantially increased the amount of payments to the funds, which led to a reduction in the number of medium-sized enterprises (they became small enterprises in connection with the reduction of number of employees), as well as the number of self-employed entrepreneurs. Accordingly, their economic output volumes decreased. For medium-sized enterprises and self-employed entrepreneurs for 2010 functions differ significantly.

The increase in output (revenue) of small and medium-sized enterprises, as well as individual entrepreneurs, located in the region occurs more rapidly than the growth of budget expenditures, which confirms the hypothesis (2) and is consistent with the findings obtained by the Doh and Kim [5] in their study. The analysis of regression equations showed that the following correlations are implemented:

$$k_x < k_{y_2} < k_{y_3} < k_{y_1} \quad (4)$$

where  $k_x$  – budgetary expenditures increase, %;  $k_{y_1}$  – small business output increase, %;  $k_{y_2}$  – medium-sized enterprises output increase, %;  $k_{y_3}$  – sole proprietorship revenues increase, %.

For example, when budgetary expenditure in the region, equal to 60 billion. rub. per year [12] (at the exchange rate of the Bank of Russia on October, 2016, this represents an average of 943 million dollars), that is typical for the regions of the European part of Russia, and increased budget expenditures at 10% per year, the expected increase of goods and services produced and sold by SMEs, operating in the region, will reach 11.70% respectively for small business, 10.99% for medium-sized enterprises and 11.13% for self-employed entrepreneurs.

#### 4 Conclusion

At the beginning of our study, we hypothesized that there is a link between the level of budgetary expenditures in the regions of the Russian Federation and the level of output and revenues of small and medium-sized businesses in them. We also suggested that the SMEs output and revenues in the regions should grow with the increase of budget expenditures in this region.

Our results confirmed this. Thus, we can conclude that the expenses of the Federal Center, aimed at improving the financial condition of regions, are effective for the economy. This fact confirms one more time the results obtained by us in the pilot projects [19], [20], [26]. It is also seen from this equation (4), that when regional budget expenditures are increasing, small enterprises economic output is increasing as well to a greater degree, individual entrepreneurs revenues is increasing to some degree, and medium enterprises economic output is increasing to smaller degree. In our further researches we plan to further develop economical and mathematical models, developed in this article. These models can be widely used for monitoring and diagnosing the level of development of SMEs in the regions, as well as to refocus public policy on a high-impact entrepreneurship. This calls for a rethinking of existing policy and programs to address their inherent shortcomings that are consistent with the findings of Edoho [7], Bartlett and Bukvič [1]. A comparison of the estimated values with the level, that was actually reached, allows us to define regions of the country with low and high SMEs output, that is, to conduct the ranking of the territories, and to identify those in which the business sector operates more efficiently. In addition, these models can be used to support the target indicators of plans and programs for SMEs output increasing, which confirms the conclusions reached by Figal Garone et al. [13]. For example, on the basis of three-year plans of regions development, the evaluation of expected production growth of entrepreneurial structures can be conducted. The hypothesis of the possibility of objective laws and tendencies of business entities development when using such an instrument, as regression models, was confirmed as the result of this research. In general the proposed methodical approach is multipurpose and can be used in further research on output and revenues of the sector of small and medium enterprises in the regions of Russia, which is the aim of our future researches.

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# The Financial Crises of Detroit. What Is the Moral for Local Governments in Developed Countries?

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## Abstract

Despite being the most populated city of Michigan and often referred to as „Moto City”, Detroit recalls to us as a “ghost town” nowadays. The former luxurious industrial city faced the biggest local government bankruptcy in the history of the USA in 2013. In case of such a serious financial crisis of a highly reputable city like Detroit, it is reasonable to ask whether an upswing might be expected, and if yes, then what sort of a role its famous automotive industry would play in it? Although the structure and operation of local governmental systems are different from country to country, studying the reasons and consequences of the financial crisis of Detroit may suggest new recommendations that may globally support the sustainability of local governmental systems. The aim of this study is to discover the financial proofs that have led to the bankruptcy of Detroit by using statistics of Detroit’s budget. The main finding of the paper is that individual bankruptcy cases have serious lessons to learn. The biggest challenge lies in appropriate data choice for forecasting insolvency or bankruptcy, as well as in implementing a sustainable crises management.

*Keywords: local government; insolvency; bankruptcy; Detroit*

JEL Classification: H74, H77, G33, G38

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## 1 Introduction

In literature, financial distress of local governments is usually traced back to the high level of local public debt and budget deficit. The problem of public debt has been a research target of several theories.

The theory of public choice identified the reasons for budget deficit in ‘fiscal illusions’. Followers of this theory emphasized the problematics of the lack of information [2, 4, 12, 15, 16, 19]. According to the public choice theorists, as public services are only partly financed from the taxes collected by the local governments in decentralised systems, the consequences of local governmental decisions and programs are more difficult to be evaluated than those linked to the central governmental level [18, 20]. As a result, the electors have no power to impeach the politicians for a debt situation.

The steady-state budget deficit incurring from the 1970s [1] could not be explained either by the Keynesian or the neoclassic theories, but new political economics have managed to discover the reasons for state-specific differences in fiscal performance by studying the decision making process in economic policy (Benczes 2008). According to the theorists of new political economics, the steady-state debt situation can be explained by the following reasons: (1) utilization of debt as a strategic factor, (2) postponing stabilisation, (3) state-specific differences of the political and electoral systems, and (4) a weak or fragmented execution power of governments [3].

Recent studies have highlighted two important peculiarities of local governments’ operation: the operation of localities is dependent on the political budget cycle just like that of the central government [8] and municipalities “copy” each others’ debt activity [9]. Scientific information available on local governments’ bankruptcy is rather scarce. Hruza [13] who performed a pilot study on Czech Republic admits that the issue of local governments’ bankruptcy is not sufficiently explored in terms of public financial management, however, this would require also an accounting reform. Further relevant research is required to properly identify the relevant conditions and settings for the prediction of bankruptcy.

The aim of this paper is to report new theoretical findings that may direct studies of financial distress of local governments in developed countries, based on a review of the financial problems

of Detroit. The methodology of the paper includes a statistical analysis of the budget process of Detroit using financial reports of the city between 2007 and 2015 compared with crises management measurements performed before the cities' bankruptcy in FY 2013. We argue that not only the nature of causes and financial data but also their long-term effects are critically important in this research field.

**2 Material and Methods**

*2.1 Basic Characteristics of the Local Governmental System in the USA*

The United States of America is a federal state. Its constitution does not rule the status of local governments, which means that the regulation of local governments is assigned to the member states. Therefore, no unique regulation is valid for all types of local governments in the USA. According to the United States Census Bureau, there are 5 categories of local governments as described in table 1. [14]:

**Table 1. The categories of local goverments in the USA**

<b>General purpose</b>	<b>County Government</b>	These local governments perform traditional public tasks (e.g. public road maintenance) and provide welfare services (e.g. providing health care services, maintaining public libraries)
	<b>Municipal Government</b>	These local governments have the legally necessary minimum numer of inhabitants for whom they provide public services. In accordance with the „Home Rule Act“, they may take up any tasks not conflicting with other laws.
	<b>Township Government</b>	
<b>Special purpose</b>	<b>School district</b>	These local governments have a higher responsibility for public education of a specific area.
	<b>Special district</b>	These local governments perform a specific public task (e.g. public transportation, garbage recycling, fire alarm).

Source: Author based on [14]

The American local governmental system relies on 3 major revenue cathegories: taxes, service fees for public services and intergovernmental transfers. However, taxes (especially taxes on assets and retail) traditionally have a relatively high proportion within the total revenue. The most important pillar of local governments' operation is the local budget comprising several, seemingly independent funds.

*2.2 The Road from Economic Upswing to Bankruptcy*

The decline of the city was predictable as early as in the 1920s for many reasons. First, the extreme development of the city was attributed to a single industry, namely to automotive manufacturing. Second, the city council did not utilize its legal possibilities to promote the establishment of beneficial relationships with neighbouring municipalities. The explanation for this behaviour is that the „Home Rule Act“ passed by State Michigan in 1909 enabled larger cities to perform their public tasks on their own, without collaborating with neighbouring localities. However, the surrounding cities still built real economic connections with each other, except Detroit. At the beginning of the 20th century, the rapid economic development of the city of Detroit gave rise to the development of plantside quarters homing the workers of the automobile industry. These quarters soon became the downtown area of Detroit. The Wagner Act of 1935 passed by the Congress, forced companies to allow the operation of labour unions. One of the biggest achievements of these labour unions is presumably the Treaty of Detroit signed by the 3 large automotive companies in 1950. The Treaty of Detroit offered widescale welfare services

including wage indexing, employee health care services, and premature pension benefits extended to family members [7]. Similar welfare services have only been offered to workers in the Scandinavian countries before. Meanwhile, racial conflicts intensified, so that the white workers started to leave the downtown, moving out to the suburbs.

Federal housing programs were introduced to solve the problems of low-comfort housing, but this proved to add fuel to the fire by fastening the process of moving to the suburbs, and thus worsening the financial situation [7].

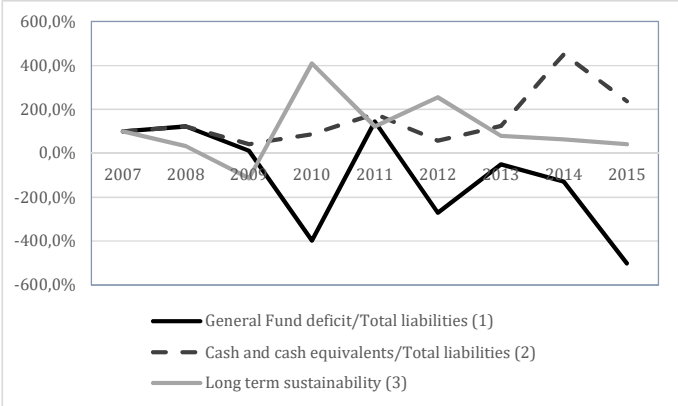
The recession gradually increasing after the 1950s specifically affected the low-skilled blue-collar workers living in the downtown area. The structure of local economy was thoroughly transformed. After the oil crises of the 1970s, automotive companies transferred production to territories where production costs were lower [7]. While in 1950 one per ten employers used to work in the automotive sector, this ratio is 1:50 nowadays. By 2007, 80% less manufacturing companies had been operating in Detroit than did in 1972. Reasonably, retailers also moved to the suburb areas. The decline of the economy proceeded after the millennium, and 50% of the previous jobs were lost in the manufacturing industry between 2000 and 2010.

**2.3 Analysis of the Budget of Detroit**

In order to identify the signs of the crises we used total fund statistics. Based on the annual reports of the city, we summed up numerous fund balance sheet data as well as statement of revenues data for all government funds. To characterize the financial status of the city, two short term indexes were calculated based on general fund deficit/total liabilities (1) and cash and cash equivalents/total liabilities (2). To evaluate the long term financial situation of the city we calculated another index as follows: cash and cash equivalents minus general fund deficit plus net position of government activities, divided by total liabilities (3). The net position of government activities is the sum of net pension liabilities, loans payable, net deferred inflows and outflows on a yearly manner.

Setting FY 2007 as a basis, we calculated changes of the established indexes (Fig. 1).

**Figure 1. Yearly changes of Detroit’s financial performance between 2007 and 2015**



Source: Author based on [16]

If we carefully study the city’s budget, we can detect a clear sign for the upcoming crises (Fig. 1). We argue that a local government goes bankrupt (or becomes insolvent) when it can not meet its financial obligation temporarily. The local budget of Detroit was on a covered path until 2008. Due to the accounting system that contains information on government commitments, we can confirm the downward trend in fiscal sustainability since the net position of government

activities could not cover the annual general fund deficit and cash amount. It is also important that even this downward trend had been achieved by a significant restructuring of revenues and tasks. Despite the efforts on crises management, the figure suggests that the city's operation is supposed to be still uncovered for the following years. Long-term sustainability trend has been positive since 2010, however, it is shrinking, while the trend for government fund deficit is extremely negative. We can also establish that cash and cash equivalents are diminishing over time as a consequence of the crises. Signs of the upcoming financial crisis can be traced back if we analyse the budget of the city:

- Detroit has the third lowest per capita wealth tax base in State Michigan. Upon the per capita wealth tax revenues, the city is ranked 18th among the cities with over 50,000 inhabitants.
- Per capita tax and shared revenues are the highest in Detroit amongst the large cities in State Michigan. Although the city's per capita revenue is increasing, its total revenues decline, and there are no promising signs to reverse this tendency.
- Payment of pensions is becoming an urgent concern in the city. The operation of state pension funds is a local government task in the USA. The city of Detroit is responsible for the General Retirement System and the Police and Fire Retirement System where it has a direct responsibility to pensioners [5].
- The cross-effect of budget funds' management is not transparent. The city is compelled to cooperate with other local governments, but it is in a vulnerable position.
- Despite the closure of the bankruptcy procedure of 2013, many people argue that the city was offered a final chance, but comprehensive reforms had not been made yet.

### **3 Results and Discussion**

What are the lessons to learn from Detroit's bankruptcy? We can distinguish 4 group of reasons that may lead a local government to insolvency.

First, local governments face many uncertainties while executing their public tasks. Municipalities affected by financial distress have to reorganize and harmonize their tasks and revenues posing a burden that is hard to handle. According to international experiences, distress situations tend to last for a long period, which calls for a new regulation, sometimes specifically tailored for the locality concerned [10].

Second, the local economy may also be responsible for local financial crises. Thus, municipalities should establish new models of cooperation with surrounding municipalities and local enterprises in order to make public service provision efficient. When a locality faces a crisis, the problems arising may decrease local revenue base and restrict the local government's capability to rationalize its expenditures.

Third, the on-budget sector also induces unforeseeable problems during crises. Traditional economic decision making or economic behaviour which is considered to be a strength of the municipality during normal operation, tend to have negative effects during crises. Thus, localities need to reconsider the way they operate, as well as the decision making processes and their interactions.

Fourth, local crises management regulations, both preliminary and posterior ones, may cause unexpected crises as well. As supported by international cases, the lack of proper examples and appropriate regulations may contribute to the development of crises.

#### ***3.1 The Structure of Public Tasks***

Financial problems may occur when the local government has no real power to control the sum of invoices to be paid or the time horizon and/or other relevant conditions of payment. Public tasks for which the extent of services cannot be restricted in terms of quantity (e.g. local public safety) or the demands extend to future generations (e.g. defined contribution pension schemes and health care systems) will necessarily produce budget deficit, debt or even off-budget

commitments. As demonstrated by the example of the USA, the employers' allowances to employees, both in the corporate and in the governmental sector, may be supplemented by extensive pension scheme promises that may lead to a decrease of local tax base and induce a rise in tax burdens in the long run. The case of Detroit supports that these commitments are hard to be restructured even during a bankruptcy procedure since the decrease of pensions is not tolerated by the society. Automotive companies made significant promises to their employees in the 1950s, similar to the welfare services provided to the citizens by the Scandinavian welfare states. The so-called "Treaty of Detroit" included wage indexation, employer health care schemes and pre-time pensions extended to family members. Due to the significance of car industry within the economy, these services and schemes soon spreaded into other industries as well, establishing intergeneration risks.

The volume of financial problems is represented by the fact that the per capita income tax was the highest in Detroit in FY 2013 in State Michigan [3], while the per capita income of households was the second lowest among cities having over 50,000 inhabitants (over 300% (!) lower than the highest per capita income in this category).

Cities facing a financial distress usually postpone their payments to future generations establishing the basis for an even bigger crisis later on. This phenomenon is not restricted to countries with insolvency regulation, as a local government may not close down like bankrupt companies. It is the different operation of the local governmental and the corporate sectors to be responsible for this phenomenon [10].

Concerns regarding the recovery of Detroit also seem to be justified by the issues of new local government bonds of 8–30-year duration, placing a burden on local citizens. The restrictions enforced by the laws and regulations aiming to handle local financial problems are typically provisional relating to the time-frame of the bankruptcy procedure. Both local citizens and companies expect that the local government retrieves its role and performs its public tasks as soon as the procedure is closed. However, they fail to reveal the reasons for the distress, and do not search for solutions to avoid similar situations in the future.

### *3.2 Problems Concerning the Local Economy*

The problems emerging from the performance of local economy may affect the relation of the municipality to surrounding municipalities and to other markets within its territory [7]. In case of a significant and permanent crisis of a larger municipality, public service provision (e.g. waste water disposal, drinking water supply) needs to be reorganized in cooperation with the surrounding municipalities. In the long run, larger municipalities may run up such a significant debt, especially via intergenerational transfers, that may lead to the decrease of city size via the fall of local population, requiring the redesign of local tasks regarding operation and asset management. At this point, it is of importance whether efficient cooperation have been or can be established between local governors and the corporate sector managers both at the horizontal and at the vertical levels. The cases of Canada and Germany clearly demonstrate that these mechanisms are responsible for the current stability of the local governmental system [9, 11].

The characteristics of local real estate market may also raise important concerns. Privately held real estates provide a stable tax base for local governments on the one hand, while on the other hand the demand and supply sides of real estates also mirrors local social and economic progresses. An artificial support of the demand side by governmental purchases of real estates is a hazardous approach: the city of Detroit bought more than 66,000 real estates within a year after the crisis of 2011. The management and operation of these buildings soon caused extra expenditures and loss of revenues for the local government.

### *3.3 Problems with On-Budget Operation of Local Governments*

One of the biggest problems with on-budget operation refers to cash accounting of separate budget funds. Functional separation of local governmental activities and the proof of transparency to creditors based on separate budget funds may be considered a wise decision during normal



operation. However, fragmentation of the budget usually leads to operation defaults during a crisis. Unfortunately, beneficiaries of public services financed by these funds do not bear the total costs of services. One reason for this is the inevitable use of a general or central fund to cover the general costs of local governments which is otherwise connected to public services. The other reason is that these funds produce more public service in order to maximize their operation. As [10] suggest there is a risk of negative sum logrolling by these funds. The structure, function and financial operation of these funds basically determines the quality of public services during crises, and thus the efficiency of crisis management. Another problem is the differentiated accounting regulation of these funds for the depreciation of losses and for asset management which again calls for a unification of different regulations and standards.

Financing public services by substantial funds instead of covering these expenditures from a single budget, generates significant resistance during crisis management because the politicians are forced to find solutions to intragenerational financial problems separately (e.g. leasing and pension commitments).

### *3.4 Problems Referring to Crisis Management Regulations*

Social interpretation of bankruptcy or insolvency regulation is conflicting: general spread of these regulations is not expected because of its negative judgement, although it may offer a more efficient tool to handle financial problems as apposed to existing external and internal control mechanisms. We argue that changes to insolvency and bankruptcy regulation may offer a significant solution for governments to support the long-term sustainable operation of local governments. However, the improper use of these tools can even deepen the crisis.

Academic experts have argued that regulation for local governmental insolvency and bankruptcy should not only support the decrease of local debt [10], but also promote a better understanding of the reasons leading to the debt situation and insolvency, as well as offering solutions to avoid similar situations in the future. All countries having local governmental bankruptcy regulation face the general problem that the central governments' role in the balance of local budgets, both in terms of extra revenues and special functions, is established by a court procedure, in a restricted form. Therefore, this procedure is unsuitable for comprehensive changes, neither for the exploration of systematic problems, reasons or antecedents.

Local politicians, the financial manager trusted by the bankruptcy court or the bankruptcy court itself may consider the decrease of debt as the major achievement of crisis management. However, in many cases not even short term solutions are established, not to mention the failure to offer any long term solutions. In case of Hungary, for instance, two localities went bankrupt within a year after the judicial settlement of their first bankruptcy procedure.

Since local governments' bankruptcy or insolvency may concern a wide range of local citizens and entrepreneurs, the central government should participate in crisis management via comprehensive reorganisation programs.

Reorganisation programs are even employed in countries with no local government bankruptcy regulation, but a commitment and responsibility of the central government to handle the local governments' debt obligation (e.g. Norway). These programs should meet the following two requirements: (1) they verify the capability to meet financial obligations relating to debt and (2) provide public services. In general, the latter receives little attention during bankruptcy and insolvency procedures [10], although both the central and the local levels of government have the same interest in a preventive solution. In countries where these measurements come into effect in case of financial problems, the corresponding court, financial manager or reorganisation expert can make a deal with the creditors on restructuring of payments only. Attempts on a possible deal between creditors and debtors failed in many cases in Hungary, Canada and in the U.S. for example, resulting in a partition of assets by court. Beyond restrictions, a centrally organised, preventive reorganisation program should be established in order to avoid financial problems. The reasons for this include the gap between permanent tensions within the decentralisation system and the limits of local economies' capability to generate income. Local and central

governments' crisis management grants should be transferred to a preventive reorganisation scheme that could make savings and support the growth of the local economy as well.

An active participation of the central government would be beneficial even at times of normal operation when no crises threaten, since provisions made during the crises are usually considered as bail-out by tax payers. Central governments should assume some expenditures from the local level, even by discretionary regulations, to stabilize the budget and thus to avoid financial catastrophes. A preventive, individual and pre-defined regulation is clearly different from governmental bail-out, and this approach acknowledges the local governments' significant vulnerability against the local society and economy. Per capita tax revenue tends to be extremely low for local governments affected by financial distress. Recurrent and significant changes to tax keys are also considered as warning signs that could call for the central government's attention to interfere.

#### 4 Conclusion

The financial crises of Detroit has important lessons to local officials in developed countries. Municipalities tend to forget their vulnerability relating to the unfavourable embeddedness into the local economy. There is a need for harmonizing local government strategies with that of the local corporate sector in favour of sustainability. Statistics of Detroit's budget revealed not only the upcoming crises but the imbalance between short term and long term sustainability of public finances for which there is still no solution. Further study on decent indexes and their predictability is a scope of a new study.

Although most countries disregard the necessity of local governmental bankruptcy regulation, case studies support that local governments do need a framework of preventive reorganisation led by the central government. This may be a successful approach to avoid tax base losses and support the rebuild of the municipality.

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# Impact of Fiscal Decentralization on Local Indebtedness in the EU Countries

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## Abstract

Fiscal decentralization is generally defined as shift of responsibilities from central to local government with adequate shift of financial resources. It brings many gains to both central and local government. Universal gain of fiscal decentralization is formulated as higher efficiency in public sector. Implementation of the fiscal decentralization involves augmentation of local authority including power to tax and acquiring own resources also from other as tax sources. Borrowing is an eventual source of revenue but it brings certain threats of growing indebtedness. The paper focuses on investigating the relationship between fiscal decentralization and local indebtedness. The panel data approach covers sample of EU countries. To measure the fiscal decentralization the budget data approach is used. Results of estimations do not fully support basic assumption about the desirable negative effect of fiscal decentralization on local indebtedness.

*Keywords: local government; local budget; local indebtedness; fiscal decentralization; panel model*

JEL Classification: H77

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## 1 Introduction

Fiscal decentralization is often defined as “...the amount of independent decision-making power involved to subnational provision of public services, expenditure and revenue decision...” [2]. Since the 1970s a process of public sector decentralization including fiscal decentralization was implemented in many western European countries [16]. Later, in the last decade of 20.century the public sector reforms were introduced also in former socialistic countries of Eastern Europe [10] and the fiscal decentralization process started in the 21.century early beginnings [9]. According to traditional theory of fiscal decentralization introduced by [11] fiscal decentralization allows local governments to react flexibly on differing local preferences and conditions. Local provisioning of public goods is preferred to uniform. Tailored provisioning of public goods and higher accountability at the local level increases the effectiveness of public sector [6], [7]. In case of hard budget constraint without intensive grant flows from higher level of government to local level, localities alone have to find resources on financing local goods. They could enter the financial market and borrow financial sources. This causes increase of local indebtedness. On the other hand, fiscal decentralization increase responsibility of local authorities, and the raise of local indebtedness is accordingly connected to concrete political incumbent. Excessive borrowing is connected with a problem of moral hazard [4]. These arguments encourage the idea of inverse relationship between fiscal decentralization and local indebtedness.

The paper focuses on investigating the impact of fiscal decentralization on local indebtedness of the EU countries. According to the literature body, this relationship is not clear yet. First, there is lack of studies on local level regarding this relationship. Second, results differ. Local indebtedness as indebtedness of local self – governments is theoretically elaborated in [13] or [14]. Reasons of municipal indebtedness and limits are here represented. Local indebtedness is encouraged by loans, mainly bank loans, issued municipal bonds and repayable financial support [14]. Reasons of growing local debt consist in costly capital investments, feeble skills of local authorities in case of indebtedness or low risk evaluation of local governments by banks, what facilitates the access to bank loans [13]. Limitations of local indebtedness are generally given by “golden rule” of balanced budget, financing capital investments exclusively from capital

revenues etc. Debt service and debt service ratio are related measures mostly set by central government. Although [13] and [14] are both Czech authors, mentioned reasons and limits are of universal scope. Similar argumentation can be found in [3], [8] or [18].

Study of [4] also points out the importance of regulatory limits of local indebtedness given by central authority. In addition, authors argue there is not conflict between local debt regulation and decentralizing borrowing authority. Limits do not restrain the potential fiscal decentralization gains. Access of local governments to financial markets replaces intergovernmental transfer of funds, what counts in favor of fiscal decentralization.

The paper is organized as follows. Firstly the introduction to the research is given. It is followed by description of data and methods used in the second chapter. Basic assumptions are linked to concrete variables defined in a sub-chapter 2.2 and 2.3. Results create basics of third chapter. Conclusions are formulated in fourth chapter. Acknowledgements and references are on the end of the paper.

## 2 Material and Methods

### 2.1 Data and Research Methods

Potential existence of linkage between local indebtedness and fiscal decentralization in the EU countries is here investigated using the linear regression. Panel data approach reflects the longitudinal dataset structure which combines the time series and cross - section units. Regarding the estimation adequacy the panel Pooled OLS, fixed- effect (FEM) or random effects (REM) model are estimated. To avoid the heteroskedasticity and autocorrelation problems the Robust HAC Standard Errors is used in case of pooled OLS and FEM model and Swamy –Arora transformation in case of REM model.

To reveal the impact of fiscal decentralization on local indebtedness the budget data approach is used. Budget measures are collected mainly from the Eurostat database [5], section Government finance statistics from 1995 to 2015. Missing values were amended from the OECD [12] or World Bank database [17].

Dependent variable is consequently local indebtedness indicator (*LocDebt*), explanatory variable is fiscal decentralization. The vector of control variables and corresponding error term complete the estimation.

### 2.2 Fiscal Decentralization Measures and Assumptions

According to [1], the field of fiscal decentralization measures is wide. These measures are defined by several institutions as World Bank or OECD. Some adjusted versions of them are elaborated by [15].

In realized estimations the most frequent fiscal decentralization measures according to World Bank [17] are used. They are mainly expressed as share of local government expenditure/revenue on total government expenditure/revenue items, as is mentioned thereafter. Expenditure decentralization measure (*ExpDec*) is following:

$$ExpDec = \frac{Sub - national\ expenditure}{Total\ government\ expenditure} \quad (1)$$

The same principle of the measure construction is emulated in case of revenue decentralization (*RevDec*):

$$RevDec = \frac{Sub - national\ revenue}{Total\ government\ revenue} \quad (2)$$

Tax decentralization (*TaxDec*) is a measure focussing only on the tax revenue item of public budgets:

$$TaxDec = \frac{Sub - national\ tax\ revenue}{Total\ government\ tax\ revenue} \quad (3)$$

Grant and transfer budget items are used to express a share of sub-national grants and transfers received from other levels of government and total government revenues and grants (*GrantDec*):

$$GrantDec = \frac{Sub - national\ grants + transfers}{Total\ government\ revenue + grants} \quad (4)$$

All mentioned fiscal decentralization indicators are involved to estimations separately. Assumptions about the fiscal decentralization effect on local indebtedness are following. Implementation of fiscal decentralization should reduce local indebtedness:

- Raise of expenditure decentralization causes reduction of local debt. If the share of local expenditures on total government expenditures increases, it can indicate sufficiency of resources on local level although it can also mean an intensive shift of public resources from central to local level through the grants and transfers. Then localities are not pressed to borrow.
- Increase of revenue decentralization influences local indebtedness negatively. Local governments operate with wider sources in sense of local goods provision.
- Increase of local tax revenues leads to increase of local government total revenues and creates a source for financing local goods through local expenditures without pressures on further indebtedness and also creates sources for existing debt principal and interest payments.
- If the share of grants and transfers received by local level from other levels of government on total government revenues including grants increases, localities have additional resources on local goods provisioning and they do not need other resources.

Expected signs of fiscal decentralization variables and their labelling are presented in Table 2.

**Table 1. Basic assumptions about explanatory variables**

<b>Explanatory Variable</b>	<b>Label</b>	<b>Expected sign</b>
Expenditure decentralization	<i>ExpDec</i>	(-)
Revenue decentralization	<i>RevDec</i>	(-)
Tax decentralization	<i>TaxDec</i>	(-)
Grant decentralization	<i>GrantDec</i>	(-)

Source: Author

### 2.3 Control Variables and Assumptions

According to a literature body focusing on local indebtedness, control variables selected and basic assumptions are formulated.

Control variables involved to the research are of macroeconomic and demographic character: GDP growth per inhabitant (*gGDPpc*), inflation rate according to HICP (*infl*), public debt as % of GDP (*PubDebt*), population (*Lpop*), using its log, dependency ratio (*dependencyratio*) as share of population aged less than 15 years and over 65 years on population in productive age and unemployment rate (*unmp*). Main assumptions about influence of control variable on local indebtedness variable are:

- If GDP growth per inhabitant increases, local debt decreases. Economic growth brings resources to public budget, including local budgets.

- If inflation rate increases, local debt decreases. Generally, the impact of inflation rate to public debt is investigated in [9]. Negative influence is here observed. In this paper it is generalized to local level of government.
- If public debt increases, local debt increases too. Public debt can increase in case of insufficient revenues on level of general government. This could reduce intergovernmental grant flows leading to reduction of local revenues.
- If population increases, local debt increases, too. Augmentation of the population increases demand of public spending. Without corresponding increase of revenue it could raise indebtedness also on the local level of government.
- If dependency ratio increases, local debt increases, too. If the number of inhabitants in non-productive age raises without corresponding increase of inhabitants in productive age, it reduces income tax revenues, which are one of the most profitable revenue (and tax revenue, in case of shared taxes) of localities. Such a loss has impact on local budget.
- If unemployment rate increases, local debt increases, too. Motives are similar to those of population and dependency ratio variable. Higher unemployment causes decrease of public revenues and excites pressure on demand of public goods.

Expected signs of control variables and their labelling are presented in Table 2.

**Table 2. Basic assumptions about control variables**

Control Variable	Label	Expected sign
GDP growth per inhabitant	<i>gGDPpc</i>	(-)
inflation rate	<i>infl</i>	(-)
public debt	<i>PubDebt</i>	(+)
population	<i>Lpop</i>	(+)
dependency ratio	<i>dependency</i>	(+)
unemployment rate	<i>unmp</i>	(+)

Source: Author

### 3 Results and Discussion

According to four fiscal decentralization variables, four panel models are estimated. In three of them the fiscal decentralization variable is significant as shows Table 3. Models are overparametrized for better comparison.

The estimation including the expenditure decentralization variable does not support the basic assumption about the negative influence of fiscal decentralization on local indebtedness. The obtained result presents positive relation between investigated variables, what is opposite to the expectation. Here, increasing fiscal decentralization causes increase of local debt. In case of control variables some results support given assumptions and some not. Negative influence of GDP per inhabitant and inflation rate on dependent variable is in accord with expectations. Increase of GDP per inhabitant growth causes decrease of local indebtedness variable. Increasing inflation reduces local indebtedness. Significant positive impact of public debt, population and dependency ratio also satisfies supposed relationship. Their increase raises indebtedness of localities in the EU countries. Negative sign of significant unemployment variable expresses increase of local indebtedness if unemployment rate decrease, what is in disaccord with assumption.

The estimation based on revenue decentralization indicator shows the positive relationship between fiscal decentralization and local indebtedness again. Here, increasing fiscal decentralization causes increase of local debt, too. Results of this estimation do not basically differ from those in case of expenditure decentralization (model 1). Excluding the population variable, all control variables are significant and support given assumptions.

Negative impact of tax decentralization on local debt is observed in the third estimation. Here the basic assumption about the fiscal decentralization advantages finds the support. Other significant variables are GDP per capita growth confirming the expectation about its sign and

public debt with significant positive influence on local indebtedness, confirming the assumption about its sign, again. Other control variables involved to the estimation are not significant.

In case of fiscal decentralization indicator based on grant flows, the indicator is not significant, although its sign is as expected. Control variables GDP per capita growth and inflation rate have significant negative impact on local indebtedness and thus support given assumptions. Dependency ratio variable has significant positive effect as expected. Other control variables involved to the estimation are not significant.

**Table 3. Estimation results**

Model	1.		2.		3.		4.	
	ExpDec		RevDec		TaxDec		GrantDec	
Variable	(REM)		(REM)		(FEM)		(FEM)	
	coefficient	Signf.	coefficient	Signf.	coefficient	Signf.	coefficient	Signf.
<i>intercept</i>	-11.35	***	-10.55	***	8.66		12.17	
<i>gGDPpc</i>	-0.04	***	-0.03	***	-0.03	***	-0.04	***
<i>infl</i>	-0.03	***	-0.02	**	-0.02		-0.04	***
<i>PubDebt</i>	0.02	***	0.02	***	0.02	***	0.02	**
<i>Lpop</i>	0.39	*	0.32		-0.77		-0.95	
<i>dependency</i>	0.14	***	0.13	***	0.16	**	0.13	*
<i>unmp</i>	-0.08	***	-0.09	***	-0.09		-0.09	
<i>ExpDec</i>	6.70	***						
<i>RevDec</i>			8.28	***				
<i>TaxDec</i>					-3.83	***		
<i>GrantDec</i>							-0.41	
<i>R2</i>	0.39		0.42		0.41		0.36	
*** denotes significance at 1% level, ** at 5% level and * at 10% level								

Source: Author

Observed positive relationship between fiscal decentralization and local debt in model 1 and model 2 could be interpreted in expense of fiscal decentralization expected gains. Shift of responsibilities from central to local level of government was extensive or was not followed by adequate shift of financial resources. Consequently this lack of sources should be compensated from returnable sources. This raises local indebtedness.

Additionally, the measures based on share of local government expenditure/revenue on total government expenditure/revenue items are considered as formal measures of fiscal decentralization even if they are most frequently used ones. As [7] or [15] suggests, the third fiscal decentralization measure (tax decentralization) is most appropriate and its impact on local indebtedness is as expected (See model 3.). Moreover [15] designs adjusted measures based not only on tax revenues (because tax revenues include shared tax), but on own tax revenues of local governments or own revenues. Tax based fiscal decentralization indicators are stricter and amend the understanding of the fiscal decentralization real impact.

#### 4 Conclusion

Expected negative influence of fiscal decentralization on local indebtedness in the EU countries is not confirmed. Estimations reveal significant positive impact of expenditure and revenue decentralization on local debt. In case of tax decentralization the impact is positive and support given assumption. The influence of fiscal decentralization indicator based on grant flows is not significant.



Besides the fiscal decentralization there are also other variables influencing the local indebtedness in the EU countries. In all estimations is GDP per inhabitant growth significant and has negative impact on local indebtedness. Its increase reduces local debt. Public debt is significant and has positive impact on local debt. Increasing public debt causes increase of local debt, too. Dependency ratio, as share of population in non-productive age on population in productive age, has significant positive influence on local indebtedness. Effect of inflation rate is negative and significant in estimation focusing on expenditure, revenue and grant decentralization. Unemployment rate is significant with negative sign in case of expenditure and revenue decentralization. Population variable is significant only in case of expenditure decentralization and its increase causes raise of local indebtedness. Assumptions about control variables' influence on local indebtedness are mainly or partially supported by obtained results.

However the reductive effect of fiscal decentralization on local indebtedness is expected, in case of the EU countries results cannot fully support this statement. Suggestion for the future research in this field is headed to regard the particular country specifics as former transitive economy or new member state, small country size, unitary or federative state etc. or exclude of formal fiscal decentralization indicators from research. Adjustment or division of the dataset and potential change of fiscal decentralization indicators could bring other results.

## Acknowledgements

This paper is published within the project VEGA no.1/0559/16 Indebtedness of local municipalities of Slovakia, the Czech Republic and Hungary and its impact on financing of public services.

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# The Inter-Regional and Inter-Industrial Inequality in Tax Yield Rate and Its Connection to Tax System Main Properties: Case of Russia

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## Abstract

We aim to evaluate the internal disparities in tax yield rate and their correlations with main properties of regional tax systems: profitability, volatility and elasticity. The data on 83 Russian regions in 2006-2014 comprises GRP and tax revenues disaggregated by main economic activities and certain taxes and tax groups. For estimation of tax yield rate inequality we calculated the GRP-weighted Gini and variation coefficients and used different techniques of their decomposition. The tax system risk was evaluated by means of the inter-temporal variance in tax yield rate. Ultimately we used power functions and logarithmic analysis for assessment of tax system elasticity, and correlation and regression analysis for determination of interrelations of the tax systems properties. The results demonstrate that mineral extraction tax and the mining industry predominantly contribute to the tax yield rate inter-regional inequality in Russia, while the personal income tax, manufacturing industry and public administration have the largest smoothing effects. For Russian regions tax system we revealed significant direct connection of inter-industrial inequality to the system profitability and elasticity and inverse correlation with its stability. The evidence of interrelation of tax systems properties may be useful for optimization of tax policies at various levels of public administration.

*Keywords: tax system; tax yield rate inequality; risk; profitability; elasticity*

JEL Classification: H20, H21

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## 1 Introduction

Unevenness in distribution of tax revenues is the reality of almost all countries. However, this problem becomes particularly important in geographically diverse countries with huge unevenness in economic potential and development of various regions. It is the case of China [15], Canada [2] and obviously Russia, where inequivalence in tax revenues relatively to economic activity is an inherent result of historically determined specialization of regional economies, "the portfolio" of allocated industries with their own conditions and trends. Our previous research has established a significant direct dependency between the level of development, determined by GDP per capita and the actual tax rate. Therefore, at the stage of tax allocation the degree of regional disparities is only strengthened, enhancing demand for subsequent redistribution of financial resources through the budget system [10]. It also maintains non-equivalence and progressiveness of the tax levying in respect of economic development.

In addition to objective factors mentioned above, the level of taxation in each particular region depends on a set of subjective factors such as the quality of tax administration, manifested in the collectability of taxes, the level of tax evasion and benefit fraud. In Russia, the largest use of tax privileges, including its illegal application, is observed in the VAT refund on exports and equipment leasing operations. Mineral Extraction Tax has also recently become the sphere of some tax exceptions and exemptions. Let alone the disguised part of the "shadow economy", "enveloped wages" and costs manipulation, and actual rate of taxation may be result of the level of conscientiousness and tax discipline, which also differs in regions.

The level of taxation also varies in industries, that is due to their current conditions and selective political approach to their levying. Besides, the non-uniformity of taxation impacts the stimuli of economic agents and enhances the mobility of resources and activities, hence changing

the taxation base of industries and regions. Therefore, tax equivalence becomes an important property of federal and regional tax systems, along with other properties.

The researchers prefer to study such properties of tax systems as stability or risk, buoyancy and elasticity [6; 12]. Stressing difference between the last two, they point out that tax buoyancy characterizes the actual tax revenue return on GDP growth, whilst elasticity is a hypothetical construct obtained by elimination of impact of the changes in the tax regulations [6]. In our research we do not make such an adjustment because its effect is moderate in inter-regional comparison. Note that in the period under consideration, two changes were adopted in tax legislation: reduce in the official rate of the Corporate Income Tax from 24% to 20% in 2009 and modification of the rule of tax base calculation for the Mineral Extraction Tax. Nevertheless, these changes had minor effect on scores of Russian regions in tax systems risk [11]. Besides, making accurate adjustments is a very difficult task because it implies the evaluation of feedback, i.e. responses of economic agents to tax rules changes.

Some authors proposed various approaches to estimation of risks of tax systems [1] and pointed its interrelation with internal differences. A number of studies were focused on the assessment of taxation inequality, others proposed models based on the estimation of the factors' contributions to tax returns unevenness [9].

The *aim of this research* is to evaluate, based on the Russian regional statistics, the inter-regional inequality in tax yield rate and contribution of different sources, certain taxes and activities, to its rate, as well as to evaluate inter-industrial inequality in Russian regions and its correlations with other main properties of regional tax systems: profitability, volatility, and elasticity.

The *hypothesis of our research* affirms that inequality may act as a separate property of tax systems, because it has its own regularities and consequences, as well as it is interrelated with other properties of tax systems.

## 2 Material and Methods

Our analysis is based on the data for 83 Russian regions in 2006-2014, including GRP and tax revenues disaggregated by 8 main taxes and tax groups and 15 main types of economic activity, according to the All-Russian Classifier of Types of Economic Activity. All the information is provided by the official sources: the RF Federal State Statistics Service [13] and the Federal Tax Service of Russia [4]. Current analysis comprises several stages.

1. *Evaluation of the profitability of tax system* and its components by calculation of various tax yield rates, where the main rate is:

$$t_i = T_i / Y_i \quad (1)$$

here  $T_i$  – the total tax revenues of the region "i",  $Y_i$  – the gross domestic product of the region "i",

and  $i = 1, m$ . Then each  $t_i$  is disaggregated: a) by K sources (taxes and their groups):  $t_i = \sum_{k=1}^K t_{ik}$  ;

b) by L industries:  $t_i = \sum_{l=1}^L t_{il} \cdot s_{il}$  , where  $t_{il} = T_{il} / Y_{il}$  – the tax yield rate in the industry "l", and

$s_{il} = Y_{il} / Y_i = Y_{il} / \sum_{l=1}^L Y_{il}$  – the share of the industry "l" in the GRP of the region "i"; c) full aggregation

by regions, industries and taxes:  $t = \sum_{i=1}^m s_i \sum_{l=1}^L s_{il} \sum_{k=1}^K t_{ilk}$  , where  $s_i = Y_i / \sum_{i=1}^m Y_i$  – the share of the region "i" in the total GRP.

2. *Estimation of the level of inter-regional inequality in tax yield rate* using two alternative methods:

- GRP-weighted coefficient of variation:

$$V = \frac{\sigma}{\bar{t}} = \sqrt{\frac{\sum_{i=1}^m (t_i - \bar{t})^2 \cdot s_i}{\sum_{i=1}^m t_i \cdot s_i}} \quad (2)$$

where  $\sigma$  – the standard deviation of the related tax yield rate,  $\bar{t}$  – the GRP-weighted mean value of this variable.

- GRP-weighted Gini coefficient based on the adjusted covariance formula, proposed by R. Lerman and Sh. Yitzhaki [7]:

$$G = 2 \cdot \sum_{i=1}^m Cov(t, F(t)) / \bar{t} = 2 \cdot \sum_{i=1}^m s_i \cdot (t_i - \bar{t}) \cdot (\hat{F}_i - \bar{F}) / \bar{t}, \quad (3)$$

where  $F(t)$  – cumulative distribution of tax yield rate among regions ranked in order of increasing  $t_i$ ,  $\hat{F}_i$  – is a mid-interval of it for each  $i$ -ranked region, calculated as follows:

$$\hat{F}_i = \sum_{i=0}^i s_i + s_i / 2. \quad (4)$$

The mean value of it,  $\bar{F} = \sum_{i=1}^m (\hat{F}_i \cdot s_i)$ , equals 0.5.

3. *The decomposition of the above indices of inequality by resource components* using two alternative techniques:

- Technique, proposed by A. Shorrocks for coefficient of variation [14]:

$$V_k = \frac{Cov(t_k, t)}{\sigma^2} = \sum_{i=1}^m s_i \cdot (t_{ki} - t_k) \cdot (t_i - \bar{t}) / \sum_{j=1}^m s_j \cdot (t_j - \bar{t}) \cdot (t_j - \bar{t}), \quad (5)$$

where  $t_{ki}$  – the contribution of the source “k” to the tax yield rate,  $V_k$  – the contribution of the source “k” to the coefficient of variation, and  $V = \sum_{k=1}^K V_k$ . Here  $\bar{t}_k = \sum_{i=1}^m t_{ki} \cdot s_i$  – is not exactly  $k$ -source mean value when it is weighted on the total base, but not on the own base of the source “k”, and in some cases, like inter-industrial inequality, they do not coincide.

- Technique, proposed by R. Lerman and Sh. Yitzhaki for Gini coefficient [7]:

$$G_k = 2 \cdot \sum_{i=1}^m Cov(t_k, F(t)) / \bar{t} = 2 \cdot \sum_{i=1}^m s_i \cdot (t_{ki} - t_k) \cdot (\hat{F}_i - \bar{F}) / \bar{t}, \quad (6)$$

where  $G_k$  – the contribution of the source “k” to the total Gini, and  $G = \sum_{k=1}^K G_k$ .

4. *The measurement of the level of stability of tax system* is calculated alternatively based on absolute and relative inter-temporal standard deviation for the tax yield rate:

$$\sigma_i^{\text{int}} = \sqrt{\sum_{j=1}^n (t_{ij} - \bar{t}_i)^2 \cdot s_{ij}}, \quad (7) \quad \sigma_i^{\text{int}*} = \sqrt{\sum_{j=1}^n \left( \frac{t_{ij} - \bar{t}_i}{t_j - \bar{t}} \right)^2 \cdot s_{ij}}, \quad (8)$$

where  $t_{ij}$  – the tax yield rate of the region “i” in the period “j”,  $\bar{t}_i$  – inter-temporal average tax yield rate in the region “i”,  $\bar{t}_j$  – inter-regional average tax yield rate in the country in the period “j”,  $\bar{t}$  – inter-temporal average tax yield rate in the country.

5. *Determination of the tax system average elasticity* under assumption of its invariance over time:

$$T_i = a_i \cdot Y_i^{e_i} \rightarrow \ln(T_i) = \ln(a_i) + e_i \cdot \ln(Y_i), \quad (9)$$

where  $e_i$  – GRP elasticity of tax revenues in the region “i”, the slope of the linear function.

6. *Determination of the correlations between profitability, inter-regional and inter-industrial inequality, stability and elasticity of the regional tax systems* by means of regression analysis and calculation of the Pearson coefficients.

In this part to strengthen dependency and weaken heteroscedasticity we have to exclude some outliers. In most cases the splash point is the Moscow city data, where the tax statistics on agriculture does not correspond to the gross value of this industry, and it noticeably influences on inter-industrial inequality estimation. Similarly, in other cases we exclude certain mining territories with extreme outstanding results like Nenets and Khanty-Mansi Autonomous Districts, some Eastern boarder regions like Zabaykalsky Krai and Sakhalin Oblast and one backward region – the Republic of Chechnya. But ultimately we use all information to identify interrelation between elasticity and stability of the regional tax systems.

### 3 Results and Discussion

The first step of our research showed that the largest share of tax revenues in Russia in 2006–2014, namely 83.7%, came from four the most profitable Russian taxes: Corporate Income Tax (23.6%), natural resource taxes, mainly Mineral Extraction Tax (21.4%), Personal Income Tax (21.4%) and Value Added Tax (17.3%). At the same time tax revenues are highly unevenly distributed among Russian regions relatively to their scale of production (the table 1).

According to our estimations, based on Gini and variation coefficients (formulas 2–4), the Mineral Extraction Tax (MET) demonstrates the highest inter-regional inequality in tax yield rate, while the Personal Income Tax (PIT) is the most evenly disposed tax. However, the unevenness of certain tax may be amplifying the general inequality or opposing it, that depends on the sign of their correlations. In the first case it provokes inequality; in the second case it makes a smoothing insurance effect.

**Table 1. The results of assessment and decomposition of inter-regional inequality in tax yield rate, 2006–2014**

Taxes and tax groups	Share in total tax revenues, %	Average tax yield rate, %	Inter-regional Gini	Inter-regional CV	Contribution to inequality (by Gini), %	Contribution to inequality (by CV), %
Corporate Income Tax (CIT)	23.58	5.10	0.207	0.364	7.9	5.1
Personal Income Tax (PIT)	21.40	4.63	0.119	0.221	-4.6	-5.7
Value Added Tax (VAT)	17.25	3.73	0.296	0.539	12.5	10.6
Excise duties	6.34	1.37	0.546	1.252	6.7	-0.6
Property taxes	7.32	1.58	0.153	0.275	0.5	0.3
Natural resources taxes (MET)	21.44	4.63	0.814	2.083	78.5	91.5
Duties	0.20	0.04	0.197	0.352	-0.1	-0.1
Special tax regimes	2.47	0.53	0.256	0.459	-1.3	-1.3
Total	100.0	21.62	0.209	0.454	100.0	100.0

Source: Author

In order to identify these influences we have decomposed the Gini coefficient and the coefficient of variation (CV), using formulas 5–6. The results of this decomposition, also presented in the table 1, clearly demonstrate the predominant role of the MET in regional disparities in the tax yield rate. The VAT proved to be second significant tax, but its contribution to inequality is 6.3–8.6 times less compared to MET, and the role of PIT is evidently smoothing. It is worth to emphasise that our approach, based on weighted functions, takes into account the scale of activity and thereby the volume of tax revenues.

The results of the evaluation of the between and within sectorial inequality in tax yield rate are presented in the table 2. Inter-industrial inequality is caused by considerable variance in industries' performance indicators, their companies' profitability and employees' salaries. Besides, the tax regimes, established for industries, differ. For example, mining industry extracts the natural rent and is imposed by additional tax (MET), whilst other industries with large presence of small and medium-sized enterprises and low-profitable agriculture are subjects to special tax regimes involving some tax exemptions. The table 2 allows to compare the industries shares in GDP and in tax revenues and to spot the differences in their actual levels of taxation. It shows that financial activity and mining are the most tax imposed activities in Russian economy. Furthermore, the tax yield rate in the financial industry is even larger than 1, which is explained by developing crisis and imbedded losses in financial sphere.

**Table 2. The inter-regional tax yield rate inequality in main economic activities and their contribution to total tax inequality, 2006-2014**

Main economic activities (aggregated industries)	Share in GDP, %	Share in total tax revenues, %	Average tax yield rate, %	Inter-regional Gini	Inter-regional CV	Contribution to inequality (by Gini), %	Contribution to inequality (by CV), %
Agriculture, hunting and forestry	4.51	0.51	2.47	0.477	1.306	-0.6	-0.4
Fishing, fish farming	0.24	0.11	10.62	0.165	0.409	-0.2	-0.1
Mining and quarrying	10.68	28.31	57.78	0.268	0.441	86.2	109.1
Manufacturing	17.84	17.36	21.22	0.241	0.484	5.1	-4.3
Electricity, gas and water	3.89	3.11	17.44	0.223	0.418	-1.3	-0.8
Construction	6.86	5.25	16.70	0.289	0.543	1.2	0.9
Wholesale and retail trade; repair	19.42	10.44	11.72	0.143	0.306	1.6	-2.0
Accommodation and food service activities	1.06	0.63	13.09	0.320	0.589	0.2	-0.1
Transport and telecommunications	9.98	7.32	15.99	0.152	0.268	0.9	-0.4
Financial activity	0.61	4.55	163.59	0.136	0.424	1.0	-1.1
Real estate, leasing and services	11.20	9.99	19.46	0.098	0.200	5.4	0.3
Public administration and defense	5.20	2.64	11.09	0.117	0.249	-2.4	-1.5
Education	3.11	1.89	13.28	0.087	0.160	-0.9	-0.8
Health and social services	3.89	1.55	8.71	0.097	0.172	-0.9	-0.7
Other	1.54	6.32	89.79	0.317	0.686	4.7	1.9
Total (excl. undistributed)	100.0	100.0	21.81	0.092	0.480	100.0	100.0

Source: Author

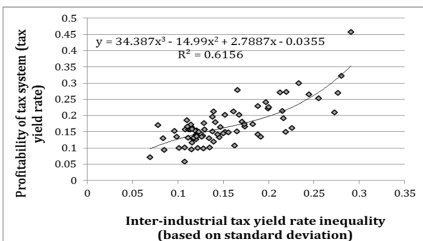
The estimations of inter-regional inequalities in main economic activities, also shown in the table 2, demonstrate the largest with-in disparities in the tax yield rate in agriculture as well as the significant regional differences in accommodation and food service industry, mining and quarrying and construction. The most evenness is observed in education and health industries, and in real estate and leasing, the last appeared unexpectedly.

Keeping in mind that sectorial inequality may amplify or oppose total inequality, we decomposed inter-regional Gini and variation coefficients by activities and obtained an expectable result. Specifically, the greatest contribution to total inter-regional inequality is made by mining and quarrying. Inter-regional disparities in real estate and leasing industry, albeit small, are positively correlated with total inequality thus enhancing it. The tax revenues collected in public administration and manufacturing (according to CV decomposition), on the contrary, provided the smoothing effect. Agriculture, hunting and forestry industry, where taxes distributed most unevenly compared to activity, also ensures weak equalisation of the regions tax yield rate. Note that the differences in estimations obtained by Gini and CV decomposition are attributable to the peculiarities of weighing technologies.

Next we evaluated the inter-industrial tax yield rate inequality in each of 83 Russian regions. This inequality became the second indicator in our regional analysis, when the tax yield rate was the first one. Further evaluations of volatility and elasticity of the regional tax systems by means of the formulas 7–9 have provided us with two additional indicators. By means of the correlation and regression analysis and the method of weakening heteroscedasticity through elimination of slashes in the models we found some substantial dependencies. They are presented on the figures 1–3.

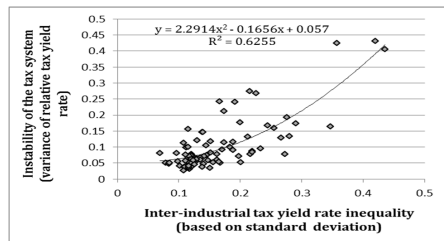
Evidently, regions with higher inter-industrial disparities in tax yield rate on average have demonstrated more profitable and GRP elastic but at the same time more volatile tax systems. However, detailed cross-indicators correlation analysis has revealed that more stable tax systems on average demonstrate GRP elasticity of tax revenues near to 1 (figure 4). Note that the cognate research related to the USA states [3] has not discovered unidirectional tradeoff between tax revenue growth and volatility, and [5] has revealed asymmetric reaction of long-run and short-run elasticities to business cycle in a half of the analyzed Latin American economies.

**Figure 1. Interrelation between inequality and profitability of the regional tax systems\***



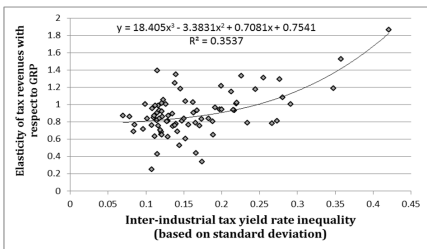
\* Except the city of Moscow, Nenets and Khanty-Mansi Autonomous Districts, Zabaykalsky Krai, Sakhalin Oblast and the Republic of Chechnya

**Figure 2. Interrelation between inequality and instability of the regional tax systems\*\***



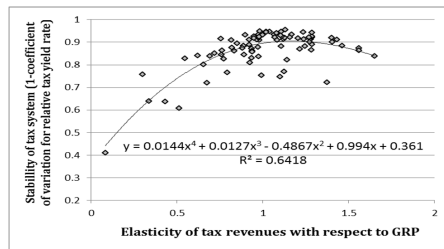
\*\* Except the city of Moscow

**Figure 3. Interrelation between inequality and elasticity of the regional tax systems\*\***



\*\* Except the city of Moscow and Zabaykalsky Krai

**Figure 4. Interrelation between elasticity and stability of the regional tax systems**



Source: Author



At the same time we have not found strong dependency between diversification of regional economy and its tax system stability or tax yield rate equality. Thus, Pearson correlation between volatility (assessed with formula 8) and indicator of industries diversification of economy (calculated on the basis of standard deviation of industries' shares in regional GRP from its shares in country's GDP) is -0.657, but the heteroscedasticity is strong. This result is consistent with [8], who did not find a strong link between diversification and stability of the economy, based on other variables for Siberian Federal District of Russia.

It means that, apart from diversification, there are some other powerful causes of inequality and volatility. One of them is the quality of tax administration in each particular region manifesting in the level of tax collection, use of exemptions and practice of tax evasion.

#### **4 Conclusion**

Below we shall outline our findings and make final remarks.

Firstly, our hypothesis suggesting that internal inequality in tax yield rate is of own importance and may claim to be the self-contained property of tax system, is confirmed. The tax revenues are unevenly distributed in space and between activities within the countries experiencing large internal economic disparities, like Russia, and these types of inequality are connected to each other. By calculations of the GRP-weighted Gini coefficient and coefficient of variation for different taxes distribution we found out that in Russia the largest space unevenness is observed for Mineral Extraction Tax and the least – for the Personal Income Tax. Decomposition of various taxes contributing to inter-regional inequality has just strengthened this conclusion, but has discovered two types of source inequality: amplifying and counteractive.

This finding became more apparent after decomposition of tax revenues by main economic activities and examination of their contribution to tax inequality. Some industries with high inter-regional disparities in tax yield rate, e.g. agriculture, appeared to produce an offsetting effect to total inequality. Meanwhile, mining and quarrying industry proved to be the main source of total inequality.

Secondly, the properties of regional tax systems are apparently connected to each other and to the characteristics of regional economies. We have chosen and examined four main properties of tax system: profitability, inequality, stability and elasticity with respect to GRP and have specified the methods to estimate them. By this way we formed data on regional tax systems and discovered some internal correlations. The more inter-industrial inequality in tax yield rate, the more volatility of the relative tax yield rate in the region. Besides, such systems are more profitable on average, i.e. bring more tax return on regional product, and their average response to economic growth, measured by elasticity, is relatively stronger. However, the most unstable tax systems' elasticity deviates from unity both to the right and to the left.

The results obtained may be applicable in inter-budgetary relationships and improving tax policy and administration. Moreover, they could be useful in management of regional development, in process of optimization of regional tax system performance and in implementation of the structural reforms.

We assume that further extension of the study is possible by the way of assessing the exogenous factors of inter-regional tax yield rate inequality, i.e. finding its correlations with indicators of economic performance, growth and structural, and indicators of taxation itself, both quantitative and qualitative, e.g. discipline. Except for reasons of tax inequality, it could make sense to explore its consequences, its impact on the behavior of economic agents, the movement of resources and the changes in fiscal policy.

#### **Acknowledgements**

The research was funded by Russian Foundation for Humanities as part of project № 15-02-00638, "The relationship between income inequality and economic development in the regions of the Russian Federation".

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# Administrative and Relative Costs of Local Fees. Case Study of the South Moravian Region of the Czech Republic

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## Abstract

Local fees represent one of the sources of own revenues for municipalities in the Czech Republic; and the area in which municipalities have the highest revenue autonomy. Municipalities decide on fees, rates, and taxpayers, ideally while respecting criteria of efficiency and effectiveness. With respect to theory of scale economies, the smallest municipalities do not have to be able to collect local fees effective as in the larger municipalities, with lowest costs. Even the administrative cost of municipality may be higher than revenue of local fees. The paper determines the administrative and relative costs of collecting local fees in municipalities of the South Moravian Region. The results show that administrative and relative costs decrease with population growth and after reaching a certain population limit, however again increase. The population and therefore taxpayers do not only effect on this course but also other factors such as the scope of municipality competences or fee rate.

*Keywords: local fees; administration cost; relative costs; municipality; South Moravian Region; Czech Republic*

JEL Classification: H27, H71, H72

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## 1 Introduction

Local self-government is an accepted layer of government throughout the world. The main issues of local self-government are territorial development and public services delivery according the principle of subsidiarity. This relates to the requirement that there should be similar degree of revenue autonomy to the degree of decentralized service provision.

Each country has its way of funding rules and its model of fiscal decentralization. Local self-government may be dependent on subsidies from the central government and (or) they may have statutorily-defined options for obtaining their own income. Own revenues can be obtained mostly through local taxes or fees, from rent of movable and immovable property owned by local self-government or upon its own business. Roots of own revenue lie in the fact, that the local self-government can use them for purposes which are determined by local self-government. There are most often targets based on the preferences of the population. This finance is not tied to any conditions except for the usual budget rules.

The system of funding of local self-government is also affected by territorial fragmentation of local self-government. Decentralization of state power and fiscal federalism so closely linked together and influence each other (see for example [13]). In the system with a few autonomous units the financing of activities can be set up to more own resources and local self-government may have more opportunities to their acquisition. Conversely, in a system with large territorial fragmentation easier way may be to limit the possibility of acquiring own resources, mainly for reasons of clarity, the control from the side of central government and justice for inhabitants. The result is that political decisions about the allocation of funds can be restricted at the level of local self-government and thus the performance of autonomous activities of local government.

The other problem of own sources of local self-government is that their revenues should be further reduced by costs necessary to their collection. If local self-government has any opportunity to get their own funds for their activities, it should try to follow criteria of efficiency and effectiveness to obtain maximum revenue from them. It can be a problem, especially at the level of the smallest local self-government, usually the lowest level of government in the country (mostly municipalities) which often suffers from shortage of officials and people with expert knowledge and very often also opportunities to acquire resources (see for example [8], [11]).

Additionally, in some cases the revenue from own sources of funding may be lower than the expenditure on their collection and management, especially in the case if it is income from local taxes or fees. If there should be maintained above mentioned criteria, the question is whether the transfer of collection and management of such sources on larger center better meets them. Supporters of this approach usually claim that "bigger is better" and "bigger is cheaper". This concept is involved in the theory of economies of scale (see for example [5], [7]).

The Czech Republic is characterized by one of the highest number of small local self-government in Europe (with France). The issue of funding through own resources is frequent political theme. Discussion most often focuses on the distribution of national taxes between levels of public administration in country; much less attention is devoted to local fees and their importance in the budgets of local self-government, especially of municipalities. The problem also involves the question of the fee rate and construction of its amount, fee revenue towards total cost of collection and the effectiveness of collection, especially at the level of small municipalities.

The aim of this paper is to determine the administrative and relative costs of local fees that arise on the side of the municipality and to discuss some of the factors which the costs can influence. Analyze is performed for the South Moravian Region for the year 2014.

The results show one of the ways how to measure the effectiveness of collection of local fees. Conclusions can also inspire further discussions about territorial structure of municipalities and its reform in the Czech Republic. This analysis is also the initial part of a wider analysis about the costs on collection of local fees in Czech municipalities and their possible relation to various factors (number of local fees, rates, density of inhabitants, range of competences etc.).

## 2 Material and Methods

Costs associated with the existence of taxes or local fees can be divided into two groups – administrative costs and induced costs. Administrative costs are mainly incurred by municipalities (legislative activity, collecting and management of local fees and recovery of arrears) but also by central government (legislative activity, financial control etc.). Induced costs are incurred by payers of local fees (time, bank transfer etc.) and other legal persons. This analysis focuses only on administrative costs of municipalities, namely costs arising from collection and administration of local fees.

List of local fees, rules for collection and upper and lower limits of rates of local fees are regulated by Act No. 565/1990 Coll., on local fees [1]. The municipalities are responsible for assessment, collection, enforcement, inspection and first level appeals for these fees [9].

### 2.1 Administrative Cost of Local Fees

The first part of analysis method is based on study of [10] and [14]. Analyse uses the *coefficient of labor utilization* ( $K$ ).  $K$  determines the percentage of working time of employees that they spend with agenda of local fees. It is used as a conversion factor for total cost incurred on the agenda of local fees at the municipal authority.

Theoretically the measurement of the administrative cost is not too difficult. Main issue lays at perfect determination of cost and its proper measurement. Closely related to this problem, the financial evidence of cost on delegated and independent competences is in public finance of the Czech Republic. The data are available on an aggregate level and the cost cannot be clearly categorized to one of the powers of the municipality. Therefore, the estimation of some data is based on indirect indicators (e.g. share of employees dealing with agenda of local fees, share of working time devoted to local fees problem).

Information about local fees revenues, population and operation cost of municipal authority were obtained from information portal MONITOR of Ministry of Finance of the Czech Republic. These data are based on the Czech budget classification, on the cash principle and current prices. The data about number of employees dealing with agenda of local fees and other agendas and

activities at the municipal authority, their average salary, and the coefficient of labour utilization were obtained from questionnaire survey.

Total administrative costs ( $TCA$ ) contain labour cost ( $N_m$ ) and operating cost ( $N_o$ ) of the municipal office (authority):

$$TCA = N_m + N_o \quad (1)$$

Labour cost include super-gross salaries of employees dealing with the agenda of local fees, employees dealing with other agendas in delegated and independent power; and the salaries of overhead employees of municipal authority. Operating cost consist non-investment costs of municipal authority. To identify the cost has been downloaded items of municipal budget among current expenditure of municipalities and they are involved in §6171. After consultation with accountants of selected municipalities following items were included: 5137, 5151-5155, 5157, 5161-5163, 5168 and 5172. Labour and operating costs were adjusted per number of employees in individual agendas and were recalculated by coefficient  $K$ .

Administrative cost (per capita) is calculated for each municipality and they are compared with their revenues from local fees and relative cost are calculated for each municipality.

## 2.2 Municipalities in the South Moravian Region and Internet Based Survey

The South Moravian Region had 673 municipalities in 2014. The questionnaire survey was completed by 140 municipalities. It is 20.8 percent of all municipalities in region. Table 1 shows the size structure of the municipalities by population in the South Moravian Region and municipalities that engaged in research.

**Table 1. Size structure of municipalities by population in the South Moravian Region (in 2014) and municipalities involved in research**

Size category of municipalities (population)	Number of municipalities in category	% from total number of municipalities	Number of municipalities involved in research	% from total number of municipalities in size category	Share answers of size groups to all answers
1 - 199	111	16.50	26	23.4	18.6
200 - 499	191	28.4	34	17.8	24.3
500 - 999	182	27.1	38	20.9	27.1
1,000 - 1,999	104	15.5	14	13.5	10.0
2,000 - 4,999	62	9.2	14	22.6	10.0
5,000 - 9,999	13	1.9	7	53.8	5.0
10,000 - 19,999	4	0.6	3	75.0	2.1
20,000 - 49,999	5	0.7	3	60.0	2.1
More than 50,000	1	0.1	1	100.0	0.7
Total	673	100.0	140	20.8	100.0

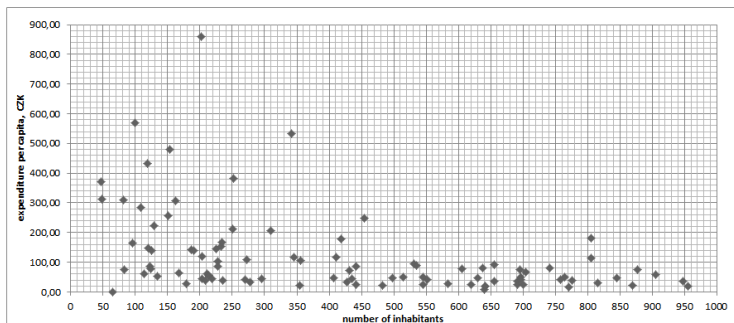
Source: Author

## 3 Results and Discussion

### 3.1 Administrative Cost of Collection of Local Fees

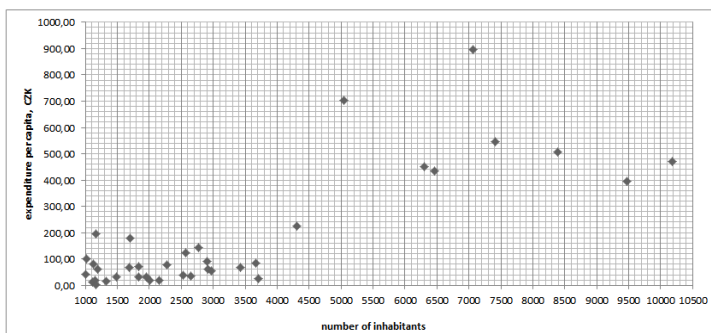
The results of the administrative cost per capita of local fees collection are in Figure 1 for municipalities up to 999 inhabitants and Figure 2 for municipalities with 1,000 to 11,000 inhabitants. The number of municipalities was restricted to larger overview graphs. There are not included the six municipalities over 16,000 inhabitants. The cost per capita is between 500 to 1,000 Czech crowns in these municipalities in 2014.

**Figure 1. Administrative cost per capita of collection of local fees in municipalities up to 1,000 inhabitants**



Source: Author

**Figure 2. Administrative cost per capita of collection of local fees in municipalities with 1,000 to 11,000 inhabitants**



Source: Author

It is obvious that in most municipalities up to 1,000 inhabitants, the expenditure per capita for the collecting of local fees vary up to 400 CZK. There is also clear that the variance of collection expenditure decreases with growing population size. In population size category of 500-999 inhabitants the expenditure does not almost exceed 100 CZK. Finally, more than three-quarters of municipalities have expenditure less than 100 CZK.

However, it showed that expenditure is two or three times higher in some cases of municipalities up to 199 inhabitants than in other municipalities with a population up to 1,000 inhabitants. It may be due to the fact that these municipalities must often employ specialized employees, although their agenda is small and the mayor executes almost everything; and at least municipal office must operate in the official hours. At the same time, these municipalities have a small number of payers of local fees and little or almost no options to higher revenue of local fees.

In the second part of the analyzed data, the similar conclusion can be made for municipalities with population size 1,000 – 4,000 inhabitants as for municipalities up to 1,000 inhabitants. In most cases, the expenditure per capita is to about 100 CZK but there are municipalities which exceed this limit and achieve nearly 200 CZK. Then the cost significantly increases for municipalities with over 4,000 inhabitants. Growth in expenditure can be caused by the fact that these municipalities are already the municipalities with authorized municipal authority or municipalities with extended powers and they provide a part of state administration

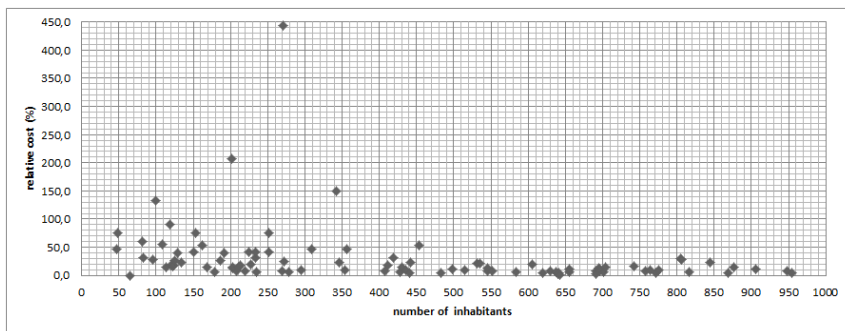
for surrounding municipalities. Therefore numbers of officials increase them and it is connected with the increase of operating cost of municipal authority.

Despite expectations, the analysis also showed that in most municipalities the operating costs also exceeded labor costs per employee in agenda of local fees. This is primarily due to two factors. In the current system of evidence of costs there is not clearly specified that costs are actually related to collection of local fees. Operating costs can be overstated. At the same time, the municipality could pay the extraordinary one-time non-capital expenditure in the analyzed year, which significantly distorts the results of the analysis. And second, the analysis uses a subjective estimate of the municipal authorities about their workload with agenda of local fees. Finally, the analysis does not reflect number of individual tasks by employees within that agenda which they do. And it may also affect the following relative cost.

### 3.2 Relative Cost of Collection of Local Fees

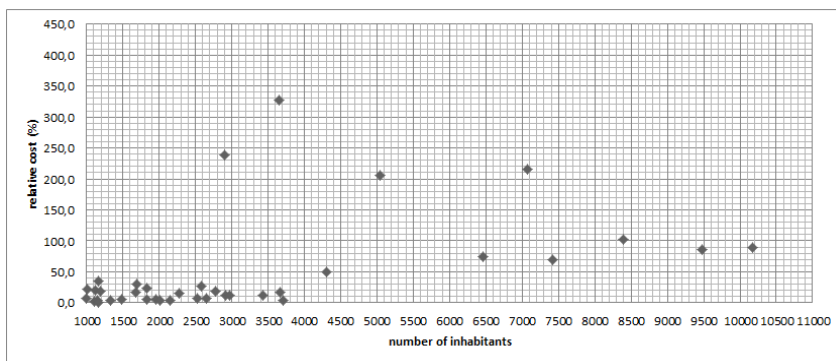
The results of the relative cost of collecting local fees are in Figure 3 for municipalities up to 999 inhabitants and Figure 4 for municipalities with 1,000 to 11,000 inhabitants.

**Figure 3. Relative cost of collection of local fees in municipalities up to 1,000 inhabitants**



Source: Author

**Figure 4. Relative cost of collection of local fees in municipalities with 1,000 to 11,000 inhabitants**



Source: Author

Figure 3 shows that relative costs do not exceed 100 percent in the majority of municipalities with population size up to 1,000 inhabitants. There can be said that population growth to 500 inhabitants means a slight decline of relative cost – then they are below 50 percent. It can be assumed that there is reduced „fixed“ part of the costs as the population increases and thus the number of taxpayers of local fees increase. At the same time there is growth in revenues of local fees. There can be talked about a certain degree of economies of scale.

Stable trend can also be observed in Figure 4, for municipalities up to 4,000 inhabitants. Even in this case, the relative cost moves about 50 percent. Then the cost begins to grow significantly as in the case of administrative costs. There can be defined at least two factors for such results – the size of the area for which the municipality exercises the competences and which affects the number of employees in municipal authority. Secondly, there is seen the limited benefit of local fees to municipal budgets.

In both cases – administrative cost and relative costs, the results of last group of municipalities (over 11,000 inhabitants), however, strongly suffer from the low number of surveyed municipalities. But this problem also stems from the structure of the population size of municipalities in the South Moravian Region.

One of the first studies about administrative and relative costs of local fees was conducted in 2004 by [14]. The other studies usually deal with measurement of administrative costs of national taxes ([2], [3], [4], [6], [16]) [14] found that administrative costs of local fees exceed revenues in small municipalities (up to 400 inhabitants). However, the analysis suffered from a lack of detailed data and small sample of the municipalities. The results in this paper for municipalities in South Moravian Region are similar and show to decline of relative cost for municipalities up to 500 inhabitants, their relatively stable trend in municipalities up to 4,000 inhabitants and subsequently their significant rise.

Local fees have only a small share in the municipal budget in the Czech Republic. Their significance lies in the fact that they are the only source of municipal budget, in which municipalities have revenue autonomy. Decision about their collection is involved in independence competences. Municipality is limited only by the borders of act on local fees. But it may be another negative factor which affects the relative cost – municipalities do not able to use the full potential of fee rates. The above mention fact is primarily a political decision of municipal politician through which politician pursues next re-election. For example, the rate of dog fees reaches only 3 – 10 percent maximum rate which is fixed by law (1 500 CZK) in analysed municipalities.

The results also show one of the disadvantages of decentralization, especially if the territorial fragmentation of local self-government is large as in the Czech Republic. Many administrative processes entail higher costs at the level of smallest local self-government. [12] pointed out that municipal fragmentation is a strong obstacle to better governance and efficient delivery of policies because municipal self-government is not accompanied by measures based on the principle of “functional areas”. Also, according to [15] the territorial fragmentation is one of the major barriers for the decentralization and effective functioning of the local government system in the Czech Republic.

A decision between a greater degree of decentralization and a greater degree of efficiency of public administration in public service delivery is very unpopular, especially in the Czech Republic, as well as with respect to its history. In addition, there is a lack of long-term concept of territorial structure reform in the Czech Republic. Therefore, in this case there can be choose as suitable solution greater cooperation between municipalities so that the net revenue from local fees will be high as possible. Due to the fact that collection of local fees is included within the municipal independence powers, there can be considered about a form of inter-municipal cooperation based on the public law agreement – public contract. Such cooperation already operates in the area of administrative of inhabitants offenses, although it belongs to the delegated powers of municipality. However the system of cooperation can be very similar.

This type of cooperation could reduce at least the operational costs associated with the collection of local fees. They are higher in many cases than the wage costs of employees engaged in agenda of local fees.



## 4 Conclusion

Local self-government needs a minimum amount of administration, especially employees and buildings to even start a “production” in the form of public goods and services. Municipality should be governed own sources by rules of good management and to dispose with resources effectively, in terms of lowest cost and in respecting a certain quality of services, such as performance administrative functions too.

To implement of aims, local self-government use finance which are received based on the model of fiscal federalism in the country. Often it is political decisions than economic. As the results of the analysis show, the administrative cost of collection of local fees is the highest in the smallest and largest municipalities. The relative cost are around 50 percent while they decrease with growth of population up to 500 inhabitants and again grow significantly in municipalities with over 4,000 inhabitants.

Analysis in this paper is the initial part of wider analysis about the cost on collection of local fees in Czech municipalities; the results are based only on a simple approach. However, it is important for a more detailed analysis. Results are limited by several factors. It is primarily: subjective estimate of workload of employees by the agenda of local fees; inability to share the cost of local authority on individual agendas, overestimate of operating cost and impossibility to monitor the number of tasks that employees perform within the agenda of local fees. Therefore more accurate measurements would be necessary to make more precise results. It is necessary to do further analysis to better identify the factors that influence the amount of collection costs of local fees.

## Acknowledgements

The author is thankful to the Grant Agency of Masaryk University for the grant No. MUNI/A/1047/2015.

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# Is There Too Much Solidarity in the Czech Health Care System?

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## Abstract

Solidarity is an important element of every good health care system. Still many issues prevail and its position in health systems is debatable, thus no final solutions could be found, but it frequently calls for scientific discussion and evaluation. This paper deals with health expenditure in international perspective and analyses the dimensions of solidarity in Czechia. System here is perceived as highly solidaristic, however possible introduction of more equivalency should provide primarily better options and real choices for citizen, not forced cost-sharing for necessary care. For financing the universally available care, we should stick to proven public finance methods with respect to the specifics of health care sector. That way the valuable properties of Czech health system such as general accessibility and social responsiveness could be preserved. Higher optimization of the public part of the system could be achieved through the tax and social reform, the private schemes if desired should not be introduced as a partial replacement of public financing, but as an addition to the existing universal care.

*Keywords: health insurance; solidarity; health system; health expenditure*

JEL Classification: I13, H20, H51

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## 1 Introduction

Solidarity is one of the key principles in health systems, the others being responsiveness, best-practice (lege-artis) medicine, stewardship (governance), social and regional availability etc. [16]. As such, it is often overstated, misused, neglected or deprecated, but still without it, the health systems would not work well. The general public opinion on solidarity is often (too) simple: some solidarity should be, but we have to watch our steps in this area since it can be misused. Because of this hybrid nature, scientists have tough task to handle solidarity well, especially in such a sector as health care. Moreover, there is not final solution regarding solidarity attainable, simply because the optimal ratio cannot be calculated in a way that it will be generally acceptable or stable in time. Still in practice, we observe a certain degree of solidarity and in health system compared to social systems in general this degree is usually pretty high empirically. And finally, health care is of such a nature and importance, that if the systemic solution fails and “organized compulsory solidarity” does not work or is low, spontaneous solidarity action sometimes takes place, although it is highly selective and its volume is not enough to resolve larger issues [7].

This paper aims to define the dimensions of solidarity and show their importance for health system settings in Czechia. Even if this can look like a broad and philosophically rooted aim given the limited space of this paper, the relevance to public finance [13] and public policy is actually very high, though. Very often we hear, that the degree of solidarity should change, that individual responsibility should be increased, that the effectiveness of universally available care is low, and so on. While those approaches have their rationality, they partially rely on assumption that decreasing solidarity and introducing more equivalent schemes of financing and provision of health care shall resolve some of the painful issues of health care system in Czechia. That is however just an imagination or theoretical concept, which does not have to and often did not fully work in OECD countries, especially when it was forcefully implemented [11]. Main research questions that are valid for this paper are:

- What are the dimensions of solidarity in health and how can they be classified?
- What is the status of citizens in Czech public health insurance and how does it relate to the system settings?
- How can be private health expenditure be utilized in (Czech) health policy?

- Which ways can be recommended for further changing the current ratio of public and private health expenditure if desired?

## 2 Material and Methods

The paper first performs theoretical analysis of dimensions of solidarity as an elementary principle of social policy [8]. Given the controversial nature of the core solidarity concept, we chose various but relevant aspects so that the important characteristics of solidarity in health systems can clearly emerge to the reader. We consider this as a highly appropriate approach compatible with methodology of social policy [14]. Then the current setting of the Czech health insurance payments, as we empirically see it, is viewed through the mechanisms of public finance and fiscal policy [10]. This shows us the character of income solidarity in Czech health insurance. Further, we use data for OECD countries' health expenditure [12] to compare the relative expenditure on health in national economy, the share of public expenditure on overall health costs and identify selected trends. This way we are consistent with previous research findings seen recently in relevant literature [6] that Czech Republic has had one of the highest share of public financing in overall health expenditure within OECD and low co-payments. Based on this analysis, the recommendations for public policy are given that generally comply with guaranteed (universal) health system model with possible voluntary individual extensions. In this sense the paper can be viewed as partially normative, which is somewhat predictable since this model has had long successful tradition in Czechia and possesses many unique attributes that (neo)liberal health system models struggle to achieve, thus being in some form preferred in majority of OECD countries today [11], [15].

## 3 Results and Discussion

It is obvious that only on the principle of individual utility, which is preferred in common markets at the microeconomic level, health financing cannot work well – that would result in the availability of quality care only for selected social groups, limited periods of life and certain diseases. In this context, the solidarity principle appeared in health care. Two tiers of this solidarity appear and are inevitable. The first one is based on the solidarity between rich and poor (solidarity in income), second one based on the solidarity between healthy and sick people (solidarity in health). The second one is even more important for health policy than the first one. It is so because the risks selection in health is ethically, economically and medically highly problematic and thus is not recommended to be allowed at all in compulsory schemes, targeting community rating(s) in health insurance. The main reasons are ethical, medical, legal and economic and have been specified in more detail earlier [9].

Health, but also partly the income solidarity is significant by itself – largely independently of what the funding and financing model is chosen. Unfortunately, a number of healthcare system designs has tried to solve this problem through "increased efficiency", "decreased degree of market failure" or "smart design". That is certainly commendable and it can improve internal functioning of the system, but not enough: each comparison fails somewhat, but it is as if increased efficiency highway construction does not address whether people will be able to buy gasoline and the placement of highway signs.

In other words, solidarity in health is determined primarily by the nature of health as a socio-economic form. We will not help ourselves by hiding these facts - it mainly concerns the differences in the (default) state of health (medical history) population, which we can essentially only cover or compensate (or theoretically left aside, then undermining the health status of population in general). The ultimate form of health risk compensation is a single flat insurance premium "per capita" (like in Switzerland or partially in Netherlands as a "nominal" premium, but those countries are rare in OECD perspective), which completely blocks out the initial state of health from the perspective of the insured individual costs. But if we want to have multiple entities providing the universal range of health care, then when the big health status and costs

differentiation of the pools of insured is present we still have each entity to allocate such resources, with the risk profile (i.e. better yet cost indexes, which is not quite the same thing) its clientele (pool of insured). If we do not want this or we cannot do it, then we still have a possibility of a very general classification of health risk according to the criteria of group (community rating), e.g. age, or degree of disability, or make pre-paid (savings based) products. While this is not an actuarially perfect in relation to the individual risk, it allows to create products for financing the needed care (covering the risk) of different social groups and answer to goals of policyholders, especially at non-profit or shared profit basis (social entrepreneurship).

However, even this may not be enough: especially if the country is not very rich and there is higher income inequality, then such an insurance the poorer people or larger families simply cannot afford and thus we cannot implement it this way universally. If we want to compensate for this, one has to use common elements of tax techniques and collect required premiums as a percentage of personal income. This technique formerly largely met the characteristics of the social health insurance, while today a universal kind of health care consumption and the absence of a ceiling on health insurance premiums breaks this principle [15] and recently we talk more about "earmarked" (hypothecated) health tax [3], making those discussion relevant even in countries that utilize general taxation like Great Britain [5]. If we do it this way, we need not, in principle, the system being subsidized from the state budget for the poor and large families (which would be the case for the "per capita" or community rating based premiums). Still it provides access to health care as well as the availability of health "goods" the same way as other mixed goods using simple redistribution by common public finance mechanisms. Of course, high-income population groups will absolutely pay more for that system the same way as they do in common proportional (or even progressive) taxation mechanisms.

Naturally, the application of the solidarity principle to some extent blocks the possibility of individual valuation effects, because – as in other areas of social policy – here go equivalency in terms of "value" investing in health and solidarity in terms of redistribution of these effects against each other [7]. It can therefore distinguish what part of health care we are thinking of. Regarding universally available health care, which is in terms of availability and quality irreplaceable, there we cannot help ourselves much: the criteria for its use and consumption is not generally the (financial) equivalence, although some may be devising schemes that would allow more recognition to individuals that have responsible approach to their own health. Regarding individually demanded (optional) health care, the situation is somewhat better, but even there is not much work around the issue of differences in the health status of individual clients (at least when entering the respective product schemes) and therefore efforts to community rating (but no longer income solidarity) are also relevant here.

On the other hand, the question of solidarity relates primarily to entering the system and method of financing, another thing are the effects that are obtained due to a functional health. There we can think of that they were more "encapsulated" into the system; better (more equivalent in sense of individual utility) it probably can work in private schemes, which theoretically can (partially) improve the position of the individual which these effects in terms of its productive application obtains. It is a certain reincarnation of effects that underpin Grossman's health investment model [4] in terms of individual expenses, only it is transformed into sophisticated patterns that enable it to utilize within group and product schemes. However, if we remove a bit of "universalistic purism" in public health insurance we can utilize in public parts of the system to some extent health insurance/tax reliefs (parallels for bonuses used in private insurance) for those who take their participation in the system responsibly and realize the positive externalities effects of healthy life style and effective disease management. Specific techniques of these motivations are beyond the scope of this paper; it is however clear that "thanks to" the presence of principle of solidarity they will never achieve the full equivalence. However, it is not necessary to achieve that ideal in health care – when we agree on that, the presence of "some" solidarity may not be a problem. Because in the end, the solidarity principle (especially in health) can serve as a functional element that makes the health system work better and in more socially inclusive way than fully equivalent schemes that are in health naturally exclusive, more expensive and socially selective.

When we focus on income solidarity, we enter domain of public finance settings regarding collecting contributions for health financing. Since we do not deal with private utility, public policy has power to set those compulsory payments arbitrarily by law, targeting to collect the total amount needed for universal health care financing. Currently, the health insurance contributions are at the level of 13,5 % paid from the health insurance base, which differs among social groups. They are:

- Employers and employees – gross wage
- Self-employed – 50 % of their profit, e.g. income minus the costs related to their achievement (or the fixed percent of “presumed costs” applies).
- Persons without taxable income – minimum wage
- “State-insured” persons – fixed amount set and changed arbitrarily based on public choice (by the government)

This typology means, that different social groups pay different contributions and this differentiation serves as a factor of social policy measures for the burden placed on them. This is especially prominent in the case of self-employed persons, which appeared in the 1990’s and this differentiation was one of the key factors of supporting their existence in national economy. This is not to say that their position should be equal to employees as they have less social and legal protection, but it is a matter of consideration how big their advantages shall be and which measures are taken. To make an actual example, currently the settings are approximately like this:

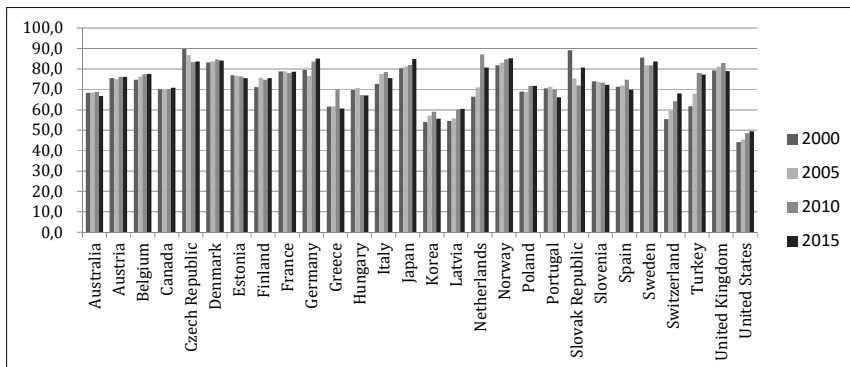
- Employed person with average income in 2015 27 000 CZK pays 1215 (4,5 %) + 2430 (9 %) = 3,645 CZK
- Self-employed person with profit 27 000 CZK pays 13,5 % from (50 % of 27000) = 1,823 CZK (which is coincidentally the minimum assessment base for health insurance)
- Persons without taxable income pay  $0,135 * 9900$  (minimum wage) = 1,337 CZK
- Government pays for state insured persons = 870 CZK

From those calculations, it is clear that economically this system struggles with the public finance principles [2] in several areas. First, self-employed persons pay half what the employed do, not counting the fact that those who are side self-employed even do not have obey the minimum assessment base. Second, the amount that is paid by the government for state insured persons is approximately one quarter what the employed do, and that is a result of arbitrary setting this amount. Third, health insurance is paid only from § 6 and § 7 income categories (law No. 586/1992 Coll.). While this can be linked to the application of social insurance mechanisms that are linked to work income rather than overall income in general, it is debatable if it should stay this way or not.

How do these calculations link to solidarity? It is simple: the payments’ settings of public health insurance determine the character of income solidarity in Czechia. We can see, that we have more (or additional) solidarity “between social groups” than between rich and poor (although the members of e.g. employees group for sure have higher incomes on average than e.g. state insured). This is especially prominent related to the state insured persons with higher social incomes like pensions (which are not taxed in Czechia) or multiple children benefits. Moreover, what is even more important, this setting of health care system actually limits the possibilities of introducing more equivalency among social groups, since e.g., when average employee pays the calculated amount for universally available care through health insurance, and then it is hard for him to buy another (additional) care privately. Therefore, the settings of public payments into health system is highly important; not only as a resource for health budget, but also as a part of personal budget constraint.

The dimensions of solidarity could be assessed also through international comparison of basic health expenditure indicators. The most obvious is the share of public (or compulsory contributory) expenditure in total health expenditures, which is shown (for selected OECD countries) on the following figure.

**Figure 1. Share of public expenditure on total health budget, %, 2000, 2005, 2010, 2015**

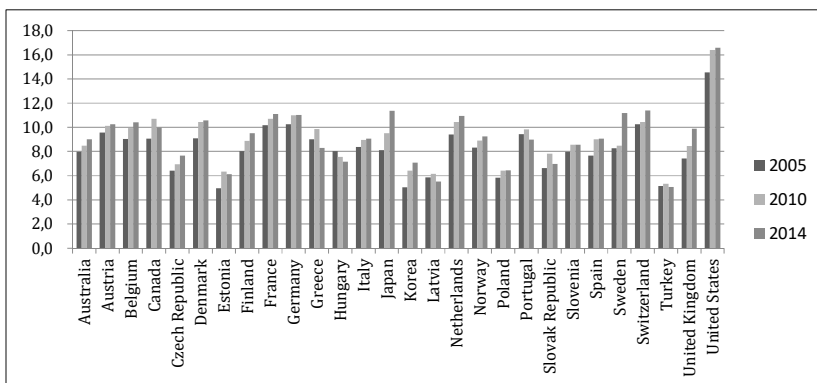


Source: [12]

Figure 1 shows that over 15 years, with the exception of the Netherlands, this share remained relatively stable and the fluctuations were mostly within 10 percentage points, e.g. one tenth of the health budget. In addition, it shows that the Czech Republic is within a group of countries that have high share of public expenditure on health – above 80 percent. But we can also note that during the last 15 years this share has been decreased slightly, in 2000 being nearly 90 percent, so the trend can be characterized as slightly decreasing the role of public (compulsory and to vast extent solidaristic) financing.

Another relevant data is the common health expenditure ratio to GDP indicator, which is shown on the next figure. We chose one year smaller interval for last year (2014), because only rough estimations are available for 2015 at the time of the conference.

**Figure 2. Share of total health expenditure on GDP, %, 2005,2010,2014**



Source: [12]

Even in this form, Figure 2 shows what is important for this paper. The Czech Republic ranks within the countries to those with smaller share of total health expenditure to the general economic performance measured by GDP. Even if we see slightly increasing trend of this indicator, similar is true of majority of other OECD countries (with stabilization in recent years for some like Germany or USA). By the way, the large differences between countries support the statement

about multifactorial causes of the health expenditure (and system effectiveness) level. We can still say that countries with more centralized or government-budget based system tend to have lower share of health expenditure on GDP (which was a rule of health economics e.g. 20 years ago), but the case of United Kingdom or Denmark shows that even those can now be compared to system with more decentralized institutional structure with autonomous health insurance budgeting like Germany, France or Switzerland.

In this sense, we can imply that even if the Czech system might have problems with internal effectiveness, statistical data support at least keeping the public expenditure at current level, and possibly increase the private expenditure if it is desired by public policy in order to decrease total solidarity and increase total equivalency. This finding or recommendation largely differs from what is perceived in public (and sometimes even scientific) discourse, where it is often suggested to directly decrease the share of public financing and this way create room for private schemes (e.g. "pay for commonplace illnesses so that the more serious could be paid through solidarity").

#### 4 Conclusion

Answering the question that is the motto of this paper is, as it happens in science, not straightforward. For sure, given the ratio of public and private expenditure on health and the character of health insurance in Czechia, the health care system can be classified as having high degree of solidarity and strong public finance foundation. Since every citizen is included in the system and no discrimination according to health status takes place, the basic prerequisites for modern guaranteed universal health care system are fulfilled.

We pointed out that solidarity itself is a broad and important concept for health care. Going deeper, we can find generally two main forms of it: solidarity in health and solidarity in income. Both of them could be set independently when designing the character of public financing and/or private schemes. We can see the solidarity in health (or "initial" health status when we talk about system design) as even more important than income solidarity for medical, ethical and legal reasons – nobody chooses/makes up his illnesses or genetic material and the health risk classification should be avoided on individual (citizen) level whenever possible. Despite this fact, the health status can be influenced by individual behaviour and lifestyle and that behaviour (not primarily health status itself) could be to some degree recognized by techniques of positive motivation (like health tax reliefs or bonuses in private schemes) in the system, although they also change degree of solidarity perceived.

Setting income solidarity can utilize common public finance options like poll tax, social insurance, proportional taxation in earmarked form or even progressive taxation when general taxes are utilized. As for the "solidarity between social groups" given by the settings of health insurance system in Czechia, it is worth noting that the current setting is a historical and political compromise par excellence and sometimes has little logic comparing with the public finance principles. Still public choice can keep it that way if it wants to and paradoxically some mechanisms are working quite well even now, because they compensate for exogenous factors like the position of self-employed in the tax system, the large share of state insured persons in the population or seeing (public) pension as a social benefit. On the other hand, if bigger tax reform takes place, it is an opportunity to change health insurance parameters too, either going the general taxation way as it is done e.g. in Great Britain, or utilizing the earmarked taxation principle as a social health insurance evolution (as it has gradually been happening e.g. in Germany). It means, that even the public financing techniques can be optimized using new approaches so that they suit the current health policy needs better. However, those reforms should respect the specifics of health care [1] and its significance for economy and citizens – sometimes we can see proposals that look nice on first sight, but omit them.

In Czechia, the share of public expenditure on total health expenditure is high in comparison with other OECD countries, but a slight decrease of this share during last 15 years has been observed. Total health expenditure remains relatively low. If we call for more equivalency because of that high share, it should be done if desired by introducing more equivalent financial schemes



above the current levels, not decreasing the volume of public expenditure that currently flows into the system. This way can in the long run the ratio between public and private expenditure change slightly more in favour of private one, but the public part will be able to cover the necessary care without diminishing its quality or accessibility. Considering the private expenditure or simply "solidarity changing", we have to distinguish what we want to achieve. Whether we want to regulate the system by introducing co-payments (effectively forcing the people pay for the care they need with some regulative effect), or if we want to create schemes that provide additional (private) utility in health for those who demand it and want to pay for it. For sure, current medicine in majority of branches can offer voluntarily available care and services above the universally needed range and this could bring benefits to those people who can afford them. However, we have to recognize that by nature, they can be socially selective and thus the equity issues can arise again, especially when the Czech wages (incomes) stay at current level. Still it is worth to analyse them in future research, because if designed well, some of their weaknesses could be minimized.

## Acknowledgements

The paper has been prepared within the project "Current trends in development of financial markets", supported by the Institutional support for long-term strategic development of research organization University of Finance and Administration in 2016.

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# Disproportions in Application of Book and Tax Depreciation of Municipal Semi-Budgetary Organizations

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## Abstract

Semi-budgetary organizations represent a specific legal form used by the state and municipalities to ensure welfare services to citizens. These organizations mainly manage the assets passed to them by their founder. The article aims to highlight the disproportion between the obligation of municipal semi-budgetary organizations to use book depreciation for profit and the prohibition of the application of tax deductions for determining the tax base. On the example of hospitals founded by the Moravian-Silesian Region authors show the crucial financial impact of discriminatory legislation on the economy of municipal semi-budgetary organizations. There are introduced some "alternative" ways of solving the situation described in the article. The paper is based primarily on analysis of existing and new proposed legislation in the Czech Republic. Theoretical knowledge from literature review was used for arguments to propose solutions. It is based primarily (but not only) on own experience and knowledge of authors.

*Keywords: municipal semi-budgetary organization; assets; depreciation; tax*

JEL Classification: H83, K34, K40, M41, M48

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## 1 Introduction

The article aims to highlight the disproportion between the obligation of municipal semi-budgetary organizations to use book depreciation for profit and the prohibition of the application of tax deductions for determining the tax base. As a part of the goal we would like to identify the current legal status of book depreciations, stabilized by the the public sector accounting reform (hereinafter "the reform"), and the same for tax depreciation. The reason for writing the article is a current legislative proposal, which should allow municipal semi-budgetary organizations to use tax depreciation. Such a change has been for a long time rejected by the Ministry of Finance. Currently, however, the draft of the amendments to the Law on Income Tax is discussed by the Parliament of the Czech Republic. Authors express strong support for enforcing the application of tax depreciation for all budgetary organizations without distinction.

### 1.1 Brief Characteristics of Municipal Semi-Budgetary Organizations in the Czech Republic

According to current Czech legislation, local governments establish semi-budgetary organizations for such activities in its scope which are usually non-profit and whose size, structure and complexity require a separate legal personality. We can meet a similar legal form of municipal organization only in the Slovak Republic, with respect to the common history of the both states. [14] mentions the hallmarks of municipal semi-budgetary organizations such as the following.: it is a legal entity of public law; it is not covered by a comprehensive legislation; within the main (i.e. public benefit) activity it is (usually) non-profit; as a legal form it is universally applicable and unlike other legal forms, it can be used in principle for all kinds of public benefit activities of the municipality or region; although it can already own assets, the disposition of assets and the economy in general is significantly influenced by a founder [5]; is connected to the budget of the founder, when among other things, manages the funds (contributions to service) taken from the budget of its founder. As reported by [7], the legal form of semi-budgetary organization has existed for many years as some relic of the past. Local governments and the wider professional community for a long term require a legislative basis for a different kind of legal entity that will be better suited to the needs of public administration. According to [4], if there is a necessity of

legal entity wholly owned by municipalities (regions) to provide an economic (business) activity, it would be appropriate to consider the legislative enactment of the institute of a public company, so to speak, in the narrowest sense. Any "ideal" new type of municipal legal entity has not been found (created) yet.

### *1.2 Public Sector Accounting Reform in the Czech Republic*

[19] defines accounting as an established precise information database with a meticulous inner structure. The creation on the historically first Act on Accounting in 1991 was a reaction to recording of economic activities in the new market economy being formed. [12] comment on public sector accounting and its information value. Public sector accounting did not give realistic information on property and financial situation. [16] accounts for the necessity of the reform by real economic processes of the environment which form the development of the theory and practice of accounting. By Resolution of the Government of the Czech Republic No. 561 of 23rd May 2007, the transition from the cash principle to the accrual principle as of 1st January 2010 placed public sector accounting into the environment of the 21st century. The declared aim of the reform is to create conditions to efficiently procure correct, complete and timely information on economic situation of the state and relevant accounting entities. [2] emphasize the inevitability of a worldwide shift of state sector accounting from the cash concept to the accrual concept. The reform introduced cardinal changes into public sector accounting [21]. The Act on Accounting defined a new term "selected accounting entities", which includes semi-budgetary organizations. They gained the accounting entity status and with it the duty to meet the requirements of faithful and fair depiction of the accounting subject and financial situation. [3] appreciate the changes in state sector accounting as they lead to a higher quality of public finance monitoring and property management control. The announced benefits of the reform are in making the management of public sector organizations more accessible to the public. [6] point out the negative aspects of the reform; deviation from the schedule and ambiguous legal regulations caused many uncertainties. Municipal semi-budgetary organizations constitute the largest group of selected accounting entities. They manage the property entrusted to them to take care of with due diligence. Analogous organizations exist – due to the shared history – only in the Slovak Republic. In Slovakia, they are also considered to be accounting entities and they keep double-entry accounting records. Territorial administrative units establish semi-budgetary organizations to provide public services for citizens [13]. The founder defines the terms of operation for the semi-budgetary organization regarding its main and economic activity.

### *1.3 Long-Term Asset Depreciation*

Fixed assets are a part of the property of a municipal semi-budgetary organization. The assets which are used for a long time gradually wear out [20]. Depreciation expresses the decrease in value of assets. Fixed assets can also contain assets which cannot be depreciated by the accounting entity. Depreciations are divided into book and tax depreciations. [18] points out the economic basis of depreciation. Expenses decrease the economic benefit of an accounting entity.

### *1.4 Book Depreciation*

According to the Act on Accounting, it is a requirement for accounting entities; by applying depreciation the prudence concept is implemented. [9] mention the situation of a semi-budgetary organization managing entrusted assets which are owned by the founder, but are depreciated by the semi-budgetary organization. Depreciation can be started no sooner than on the first day of the month after it has been put to use. Long-term intangible assets and long-term tangible assets include items with useful life longer than one year and which have been appraised [10]. Technical appreciation, which increases the value of assets, is also regarded as a long-term tangible asset. A municipal semi-budgetary organization compiles and updates a depreciation plan, which takes the expected useful life into account. When an asset is put to use, a semi-budgetary organization

performs categorization of long-term assets and places it into one of seven depreciation categories. Long-term assets including technical appreciation are depreciated while they are in use according to a depreciation plan throughout their useful life. Stocktaking might reveal that the depreciation plan does not correspond to the expected useful life. In this case the depreciation plan must be adjusted. After the assets are categorized, a method of depreciation must be selected. In 2016 there is the choice between the straight-line, units-of-production and component method of depreciation. As stated by [20], the straight-line method is used most often due to its simplicity. Depreciation must, however, faithfully reflect the wear of an asset throughout years, and this method might not always deliver. The other methods of depreciation – units-of-production and component – are more complicated. The component method is intended only for constructions, apartments and commercial premises, immovable cultural monuments, individual tangible movable objects and sets of tangible movable objects and technical appreciation. All these methods of depreciation depict the subject of accounting faithfully and fair. It is possible to combine the methods. The duty to perform book depreciation of long-term assets is connected to the reform.

### *1.5 Tax Depreciation*

Applying tax depreciation is not mandatory for the payer. Depreciation is defined as including depreciation of payer's assets which is related to obtaining taxable income into expenses for obtaining this income. An enumerated deprecator can apply tax depreciation, which decreases the income tax base. Tax depreciation represents the maximum amount a payer can include into tax deductible expenses. Tax depreciation can be used for tangible and intangible assets. In 2016, municipal semi-budgetary organizations are still not listed in the Act as a deprecator, only state semi-budgetary organizations managing state property. For this reason, no semi-budgetary organization whose founder is a territorial administrative unit can include depreciation according to the Act on Income Tax into tax deductible expenses.

## **2 Material and Methods**

The paper is based primarily on analysis of existing and new proposed legislation in the Czech Republic. Theoretical knowledge from literature review was used for arguments to propose solutions. The analogy has been used to indicate the depreciation of semi-budget organizations in the Slovak Republic. Deduction has been used for shaping proposals on the existing legal situation. There are used information from the practice of public administration in the article. It is based primarily (but not only) on own experience and knowledge of authors. By this approach, authors want to fill Průcha's [17] idea that the aim of administrative science is to constantly ensure improvement of public administration, both in terms of its legislation, as well as areas of its real implementation.

### *2.1 Development of Legal Regulation in the Czech Republic*

According to § 28 para. 1 sentence first Law on Income Tax, as amended to July 19, 2009, fixed assets were depreciated by taxpayer who had ownership rights to that property, state organizational units authorized to manage the state property and state organizations authorized to manage assets of the state. From January 1, 2003, there was a situation where semi-budgetary organizations, which were transferred from the state to the region (municipality), could not claim the tax depreciation for assets which they have been entrusted to use by the foundation charter. Assets of municipalities and regions is therefore apparently discriminated by the law in comparison with the state-owned property. There were artificially created unequal conditions of competition between comparable (particularly in terms of provided services) organizations established by the state and established by regions or municipalities. A secondary consequence of this disparity was the loss of the natural function of depreciation as a source of the investment

fund for municipal semi-budgetary organizations. Because of the prohibition to apply tax depreciation, tax burden of these organizations grew.

On July 20, 2009, the amendment of the Law on Income Tax came into effect. Deputies amendment to § 28 para. 1 adds the words "and the organization established by local government unit competent to manage the assets of its founder." The former Finance Minister expressed his opposition to the proposal. However, the proposal gained the necessary support and was adopted by the Chamber of Deputies and then also approved in the Senate. The approved proposal accurately reflected the long-term requirements of municipalities, regions and their organizations on tax emancipation of state and municipal semi-budgetary organizations. There was absolutely no doubt, among the professional public, that on the basis of the amendments to the Act, municipal semi-budgetary organizations are classified under a legislative abbreviation "owner", established in § 28 para. 1 of the Act. These organizations are thus entitled to use tax depreciation on the assets entrusted to them by the founder [11]. Naturally, still under the condition of use of these assets to the achievement of taxable income. The Ministry of Finance, however, in October 2009, issued a statement on the amendment that the tax depreciation of fixed assets is always applied only by the owner of the property. The wording of the law after the amendment, according to the Ministry of Finance, only confirms this possibility by explicitly specifying another type of owner - organizations established by local authorities. Municipal semi-budgetary organization may therefore continue to apply the tax depreciation of fixed assets used for achieving taxable income only if it acquired the property into its ownership (e.g. by contract or inheritance). This organization cannot in any case apply tax depreciation of assets owned by the founder that is only passed to it to take care of it [22]. The Ministry of Finance has sent that opinion to the relevant Tax Directorates to proceed according to it. Most of the founders let decide the semi-budgetary organizations whether to apply or do not apply tax depreciation of assets owned by the founder. Founders of organizations recommended them caution and the need for consultation the procedure with a tax advisor. Most of the municipal semi-budgetary organizations, therefore, despite the clear wording of the law after the amendment, did not apply tax depreciation in the case mentioned above.

On October 10, 2013, the Senate adopted legal provision no. 344/2013 Coll., on changing tax laws in connection with the recodification of private law and amending certain laws, which has been effective since January 1, 2014. This legal provision contains a legislative change of § 28 para. 1 of the Law on Income Tax, which, among other things, excludes again category of municipal semi-budgetary organization competent to manage the assets of the founder from the list of taxpayers eligible to depreciate fixed assets. So, for these organizations has returned again similar situation as it had been until July 20, 2009. Neither according to the law, are they not entitled to apply tax depreciation of assets transferred to them which belongs to the founder. There is not any mention of the reasons for this modification in the explanatory memorandum to the draft of the amendment.

## *2.2 Application of Tax Depreciation by Semi-Budgetary Organizations of the Moravian-Silesian Region*

On the example of hospitals founded by Moravian-Silesian region we want to show the financial impact of discriminatory legislation on the economy of municipal semi-budgetary organizations. We have chosen this region because it is one of those that in a long time protest against a discriminatory approach to the taxation of municipal semi-budgetary organizations. Moravian-Silesian Region establishes the total of six hospitals in the legal form of semi-budgetary organizations. Hospitals represent the group of semi-budgetary organizations which manage the property of the region in the greatest extent. Authors obtained following data relating to regional hospitals directly from the Moravian-Silesian Region as their founder.

Only some hospitals founded by the Moravian-Silesian region joined after 2009 the application of tax deductions, after discussing the correctness of the procedure and the potential risks with a tax adviser. A change in legislation since January 2014 induces for hospitals a significant increase of tax on taxable corporate income, what leads to influence their profit.

Hospitals are very specific units that operate on a heavily regulated market. In most countries there are two types of hospitals – profit and non-profit ones [1]. Semi-budgetary organizations in other sectors have respected the opinion of the Ministry of Finance and did not apply the tax depreciation because of prudence. The reason was also that the impact of the new rules into their economy was not so crucial. Regional council each year stipulates that purpose of the part of the approved contribution, which is paid to organization, for the relevant year is intended to cover the depreciation of tangible and intangible assets. Part of the contribution is clearly intended to cover book depreciation of entrusted assets. Related expenses (depreciation) may be excluded from certain tax unacknowledged in such a way that they are not deductible items increasing the tax base and thus tax revenues. Hospitals have legally different tax regime and contribution to the operation is taxable income. If part of the contribution is clearly intended to cover the book depreciation of entrusted property, then the related expenses (depreciation) up to the amount of the allowance may be used as expenses incurred to generate, assure and maintain income, thus reducing the cost base and the tax itself. The possibility of using these procedures has been approved by the Ministry of Finance. The method based on the use of the designated purpose of the contribution is used in hospitals. Due to the disproportion between the amount of book depreciation of assets and the amount of contribution to the operation, this method has a positive impact on their tax obligations only in a lesser extent. The amount of the tax depreciation of hospital established by Moravian-Silesian region, achieved in a tax year (calendar year) is in the aggregate amount about 185 mil. CZK. In the 2014 and 2015 tax period, for 6 regional hospitals the impossibility of using tax deductions in the tax base causes at 19% tax rate on corporate income tax burden of this tax in the amount of about 26 mil. CZK. [23]. That amount represents both a negative impact on the profit of these hospitals in the form of settlement of income tax and, secondly, a significant outflow of funds from these hospitals.

### *2.3 Depreciation of Tangible and Intangible Assets in the Slovak Republic*

As we mentioned above, analogous organizations to Czech municipal semi-budgetary organizations exist – due to the shared history – only in the Slovak Republic. In accordance with the current legislation, state semi-budgetary organizations and municipal semi-budgetary organizations are established, if the founder decides to, to carry out the tasks of the state, a municipality, or a higher administrative unit [8]. A municipal semi-budgetary organization is a legal person, keeps double-entry accounting records, is a taxpayer and can apply tax depreciation. According to the Act on Accounting, long-term assets are depreciated in accordance with accounting concepts and accounting methods in compliance with a depreciation plan. According to the Act on Income Tax, long-term assets can be depreciated by the owner or by the payer who has been entrusted with the management of the property and who uses it in accounting records. That is the legal situation of all semi-budgetary organizations in Slovakia. Therefore, municipal semi-budgetary organizations in the Slovak Republic have the duty to apply book depreciation and the right to apply tax depreciation.

## **3 Results and Discussion**

### *3.1 Other Possible Solutions*

Local governments have already tried to find possible solutions of the legal discrimination of municipal semi-budgetary organizations before 10 years, at the period after the takeover of state-funded organizations. [15] elaborates following possible solutions:

- Donation of selected assets of the founder (region or municipality) to semi-budgetary organization, resp. currently a free transfer under the Act on Municipal Budgetary Rules.
- Rent of selected assets owned by the founder to semi-budgetary organization based on a lease agreement under the Civil Code with setting the annual amount of rent at the level of the annual tax depreciation.

- Conscriptio of money into the regional budget, based on a combination of conscription into the founder's budget by the Act on Municipal Budgetary Rules and a contribution to the organization's activities in the required amount.
- "Transformation" of semi-budgetary organization into a legal form of Business Corporation. By inserting into the capital, the assets become property of the company and there is no obstacle to the application of tax deductions. It is a purely political decision of individual local governments, whether to implement it.

All described solutions represent, however, a sort of "emergency" response to the wording of the law (until July 19, 2009 and again from January 1, 2014), resp. to the interpretation given by the Ministry of Finance (from October 20, 2009 to December 31, 2013). Some regions have tried to enforce change of the rules through their legislative initiatives. However, these attempts always ended unsuccessfully.

### *3.2 Current Draft Amendments to the Law on Income Tax*

On July 21, 2016 the Government submitted to the Chamber of Deputies a draft law amending some laws in the tax area [24]. The proposal, surprisingly, contains solution of described problem, which corresponds exactly to the requirements of cities and regions. It is proposed to modify the definition of persons entitled to depreciate and to include here again "municipal semi-budgetary organization or semi-budgetary organization of voluntary association of municipalities on the assets entrusted to them by its founder". There is underlined just disproportion between municipal semi-budgetary organization and state semi-budgetary organization, which is entitled to use tax depreciation on the assets entrusted to it by the founder, in the explanatory memorandum to this proposal. The existence of this disproportion is justified by historical different viewing at the relationship of state semi-budgetary organizations and government departments which have established them, and the relationship of municipal semi-budgetary organizations and their founders (cities and regions). In this context, the semi-budgetary organization of the state has been more perceived as an integral component of the state. Entrusting of assets to state semi-budgetary organizations has been treated as a similar right to the right manage the assets of state organizational units. In favour of the changes is also given the current legislation of the budgetary allocation of taxes, when the income tax paid by municipalities and regions flows into their budget. This means that the application of tax depreciation, which reduces the municipalities and regions tax base, is only the administrative burden for them and many of them does not use it in practice. Additionally, the income generated by using the assets is exercised by these semi-budgetary organizations. Thus, municipalities or counties in this case does not have the income related to entrusted assets against which they would apply the tax depreciation. It is therefore appropriate to allow those semi-budgetary organizations to apply tax depreciation. The petitioner argues that there is no reason for a different tax treatment of municipal semi-budgetary organization and state semi-budgetary organizations in case of entrusted assets. It is proposed to enable the municipal semi-budgetary organizations to use tax depreciation not only according to their own property but also to assets entrusted to them by their founder. In the case of the entrusted assets the semi-budgetary organization will depreciate, not a founder who is the owner of the property.

### *3.3 Summary of Authors' Results*

Based on the above authors systematically summarize their main findings as follows:

- municipal semi-budgetary organizations constitute the largest group of selected accounting entities, they manage the property entrusted to them to take care of with due diligence;
- there is no reason for a different tax treatment of municipal semi-budgetary organization and state semi-budgetary organizations in case of entrusted assets;
- the financial impact of discriminatory legislation on the economy of municipal semi-budgetary organizations is substantial;

- solution of the problem in the Slovak Republic may be an inspiration for the future in the Czech republic;
- current draft amendments to the Law on Income Tax may finally eliminate the long-term discrimination of municipal semi-budgetary organizations.

#### 4 Conclusion

In the present paper, we focus on the topical issue of disproportion of application of book and tax depreciation by municipal semi-budgetary organizations. We have worked on issues of reform of the accounting, definition of book and tax depreciation, including basic comparison with the situation in the Slovak Republic. Due to the reform, all public sector organizations are on the equivalent level from an accounting point of view. Book depreciation is strictly determined by accounting standard, including definitions, general rules and methods of depreciation. The Act on Accounting stipulates the obligation of entity with ownership right to the assets to depreciate it and also the obligation of entity managing state assets or the assets of the territorial government to depreciate it. According to the Law on Income Tax, fundamental condition for the tax relevance of their costs is using it to generate, assure and maintain income. The Act sets out number of clarifications and rules governing this basic thesis of the tax deductibility of expenses. One of such clarification is also the rule which does not allow municipal semi-budgetary organizations to apply tax depreciation. Despite the fact, the tangible assets, thus excluded from depreciation, undoubtedly serve to generate, assure and maintain income (not tax exempt income). Without tangible assets, which could not be effectively tax depreciated, would (especially) health care organizations have not been able to achieve the related taxable income. On the other hand, practically all income of health care organizations is a subject to tax (in this sense, it is income). Municipal health care organizations cannot apply totally objective load (tax depreciation of tangible assets directly related to achieving it) to determine the tax base. As it is evident from the example of health care organizations of the Moravian-Silesian Region, the impact of discriminatory treatment into their economy is fundamental. Therefore, the problem has been actively solved by regions, municipalities and their associations. A number of activities have been taken to highlight the problem and encourage the relevant authorities to amend the Act. There are described some alternative solutions, to which some municipalities have acceded, or at least have thought about. If the proposed amendment to the law is approved, the long-term discrimination of municipal governmental organizations will finally be eliminated. By authors, this definitely should be evaluated positively.

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# Cultural Expenditure in the City of Prague and Its Districts

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## Abstract

All three tiers of government in the Czech Republic are engaged in the funding and provision of culture. In order to shed some light on the division of their authorities and mutual interactions and coordination there is presented a first part of a case study of the Capital of Prague which evaluates the distribution of public cultural expenditure between the City of Prague and its 57 districts and among the districts themselves between 2011 and 2015. The role of the districts is quite limited as they realize only about one fifth of the cultural expenditure and their role is really supplemental in case of grants and transfers to own organizations. There are significant differences among the districts which cannot be explained neither by the size of the districts nor their location.

*Keywords: cultural expenditure; multi-level governance; Prague*

JEL Classification: H77, H72

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## 1 Introduction

Cultural sector in the developed countries is characterized by the mixed public and private ownership and supply. Cultural sector encompasses arts (performing, visual and literature), heritage (museums and build heritage) and creative industries (music, publishing, film and broadcasting). Cultural facilities are often owned publicly and managed by the public administration, others are private organizations supported by direct grants and/or by indirect financial means such as reduced taxation or lower than market rents [10]. Public support of culture is significant in the Czech Republic: Public cultural expenditure amounted to 36 bill. CZK or 2.15% of total public expenditure in 2014 [3].

Many sectors are governed by more tiers of government at the same time [5]. This is especially true in case of culture, when all tiers of government – local, regional and national – exercise some roles and responsibilities at the particular territory.

The system of multi-level governance applied in the Czech Republic is fully in line with the Type I Governance as defined by Hooghe and Marks [7], i.e. nested jurisdictions when one and only one relevant jurisdiction is present at any particular territorial scale. This creates significant challenges for the intended research of the cultural expenditure and cultural policy in general as the unit of analysis is the individual government rather than the individual policy [7].

There are important normative and positive questions about the allocation of authority across multiple tiers of government and about their mutual interactions. The focus of this paper is mostly positive and it is based on a case study of cultural services in the Capital of Prague. As a first part of a broader research it is limited in two ways: first it deals only with two tiers of government – the city and district levels, hence the national government level is omitted so far. Second, it compares the exercised authority of the city and the districts using the financial (accounting) data and leaves out the analysis of the existing policy documents and another data sources.

The purpose of the paper is to analyze the volume and structure of public cultural expenditure in the Capital of Prague and to evaluate its distribution between the City of Prague and its 57 districts and among the districts themselves between 2011 and 2015. “City of Prague” means the city wide government as opposed to the “Capital of Prague” which encompasses both the City of Prague and all the districts.

Public support of culture is related to the fact that culture has next to private benefits significant public benefits resulting from the ability of culture to improve the quality of life.

Governments at all levels also try to promote through provision of cultural services a certain image for their citizens [6 and 10]. Neither the citizens nor visitors of the Capital of Prague care about the division of authority and financing among the city and the districts as long as they are satisfied with the provided cultural services.

There are no unambiguous criteria for assignment of authority among different tiers of government. Economic models of optimal size of jurisdiction assume that there are no spillovers, i.e., that exclusion of non-residents is possible at low costs [4]. This is however impossible in case of cultural services and it is likely that in absence of policy coordination across jurisdictions the individual jurisdictions will tend to free ride on the provision of cultural services and hence underprovide them [12] expecting that their citizens will consume services provided by other jurisdictions. The existence of spillovers is a potential difficulty with decentralized provision [4], i.e., in our case provision of major cultural services by the districts.

The districts are extremely heterogeneous regarding their size (250–128 thousand inhabitants), character (urban, mixed, almost rural) and the number or density of cultural facilities. Their distribution is in line with the Central place theory [2] which argues that locations differ in centrality. Out of the 682 cultural facilities located in the Capital of Prague 41% are located in the district Prague 1 and 84% are located in the ten central districts [8]. This unequal distribution is again a reason against decentralization.

Therefore, it is to be expected that the districts play only a supplementary role in financing cultural services in the Capital of Prague.

The first section of the paper describes the data and methods used in the presented analysis. Next the results are presented and discussed. Finally, the conclusions are drawn together with proposals for further research.

## 2 Material and Methods

Our analysis is based on financial data collected by the individual districts and the Capital of Prague in the form of a Statement on budget execution Fin 2–12 M for the years 2011–2015. The statements contain all revenue and expenditure of the individual jurisdictions recorded on the cash principle and classified according to the valid Budget classification [11].

Cultural expenditure is defined according to the functional classification – headings 331 Culture, 332 Heritage, 336 Cultural administrations and 339 Other. With exception to broadcasting there are covered all the elements of the cultural sector as defined above. While the budget classification itself is very detail, majority of expenditure both in case of the districts and the Capital of Prague is recorded on the budget line “others”. This prevents any further analysis focused on the individual areas of culture.

Using the economic classification, we distinguish the following categories of expenditure (Table 1).

**Table 1. Economic classification of cultural expenditure**

Type of expenditure	Specification	
Current expenditure	Transfers to own organizations	Budget lines 5331, 5336 a 5339
	Grants	Heading 52, 53 and 54 and with exception of Transfers to own organizations + budget line 5194 – in kind gifts
	Purchased services	Budget line 5169
	Other current expenditure	Remaining budget lines in class 5
Investments	Class 6	

Source: Author based on [4]

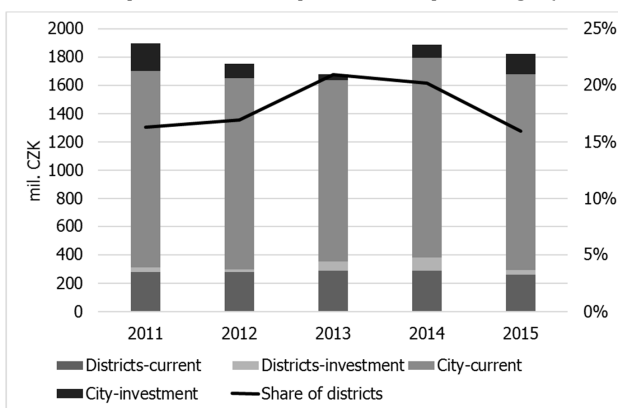
Expenditure of the districts is the sum of expenditure in the 57 individual districts. Expenditure in the City of Prague is the difference between expenditure in the Capital of Prague and the sum of the individual districts.

The data are analyzed using the pivot tables, correlation analysis, difference of means test, charts and a visualization through a map, which was created in ArcGIS.

### 3 Results and Discussion

Cultural expenditure of the Capital of Prague fluctuated in the last five years between 1.7 and 1.9 billion CZK (Figure 1). The share of investment was between 6 and 12% and the share of the districts was between 16 and 21% with the peak in 2013 and 2014 partly influenced by the higher districts investments in those two years. The situation is quite stable over time with no major changes neither in the volume nor in the structure.

Figure 1. Cultural expenditure and its components in the Capital of Prague (millions CZK)



Source: Author

Comparison of the structure of the current expenditure shows significant differences among the city and the districts. In case of the city the major expenditure are transfers to own organizations (69%). The city currently operates 17 own organizations such as Divadlo na Vinohradech, Symfonický orchestr hl. m. Prahy FOK or Městská knihovna v Praze.

At the same time the city provides significant grants to both public and private providers of cultural services. There are annual and multiannual grants and so called partnership in the area of theatre, music, dance and nonverbal art, fine art and photography, literature, audiovisual art and others [9].

The major expenditure type in the districts is the purchase of other services, i.e. the districts purchase various cultural services directly at the market. Its share oscillated between 36 to 42% of current cultural expenditure with the peak in 2014, i.e. the year of local council election suggesting there may be political budget cycle (compare with [1]).

Only ten districts operate own cultural organizations. There are in total 16 such organizations and comparing to the organizations operated by the city they are very small.

Similarly, to the city the districts offer various grants. The praxis is very varied - while some districts offer special culture and art grants, most of the smaller districts have one universal grant program for various activities including leisure or neighborhood activities. Other current expenditure contains for instance expenditure related to direct, i.e., internal, provision of cultural services such as salaries, purchase of material and energy or maintenance.

The share of the districts in case of Transfers to own organizations was only between 7 and 9% and in case of grants 10 to 12%. On the other hand, districts purchased 94 to 98% of the services.

**Figure 2. Structure of current cultural expenditure (millions CZK, 2015)**



Source: Author

Table 2 and Figure 3 highlight the differences among the 57 districts. Table 2 clusters the districts according to total current expenditure and per capita current expenditure in 2015. There is no prevailing category.

**Table 2. Average current cultural expenditure (2011–2015, number of districts)**

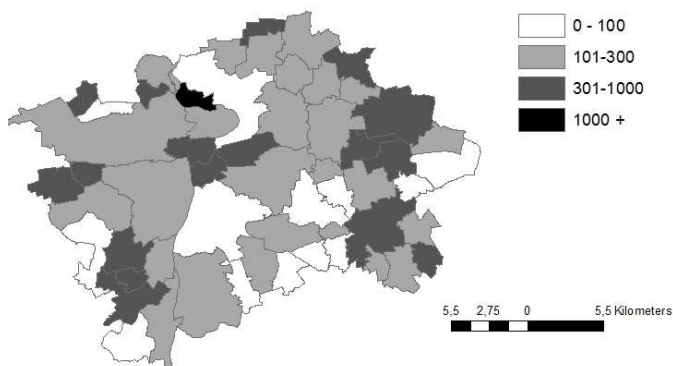
		Per capita expenditure		
		0–100 CZK	101–300 CZK	301–1,048 CZK
Expenditure in millions CZK	0–0.4	9	3	2
	0.4–2	1	13	9
	More than 2	3	10	7

Source: Author

Figure 3 shows volume of current per capita cultural expenditure in the individual districts. The average for the five years' period is shown, however the volatility in the individual years is very low. There is no clear relationship between the per capita current cultural expenditure and either the size of the district in terms of population or its location (center x suburbs). The Pearson coefficient of correlation between the per capita current expenditure and population reaches from -0.08 to -0.19 in the individual years. The difference of means test did not prove significant difference in the current per capita cultural expenditure among the central districts (Prague 1 – 10) and the remaining districts in none of the analyzed years.

While higher per capita expenditure in the central districts (Prague 1, Prague 2 and Prague 3) correspond to the higher number of the cultural facilities, the rest of the picture highlights even further the variability among individual districts' practices and calls for some further research about the determinates of these differences.

**Figure 3. Average per capita current cultural expenditure in Prague districts (CZK, 2011–2015)**



*Source: Author*

#### **4 Conclusion**

Cultural services in the Capital of Prague are financed by both the city and the districts. While there are no universal theoretical guidelines for the assignment of authority among different tiers of government we expected that the districts play only a supplementary role. This is caused especially through the inability to exclude non-residents from the consumption of the cultural services financed or provided by the districts. This situation stimulates the free rider behavior of individual districts and may lead to underfunding and under-provision of cultural services. This problem may be solved by assigning the authority to a higher level of government, i.e. the city level, when most of the spillovers are internalized.

The figures confirm our expectation: the share of districts in the total cultural expenditures of the Capital of Prague was between 16 and 20% and their role in case of transfers to own organizations or grants was even smaller (7 to 12%), hence the districts really play only a supplementary role in this area. On the other hand, the districts increasingly purchase cultural services in the market.

The praxis of the individual districts is extremely varied with no clear pattern across the size or location of the districts. We can find both the examples of very low cultural expenditures suggesting the free rider type of behavior and high cultural expenditure in the suburban districts suggesting the interest to support the local identity or the sense of community.

In order to better understand the multi-level governance in case of cultural services on the territory of the Capital of Prague the research will in its next phases focus on (1) the role of the national government and financial flows from the Ministry of Culture and its two state funds, (2) territorial distribution of grants from the central government, City of Prague and the individual districts and (3) both the vertical and horizontal interactions and/or coordination among the involved governments.

#### **Acknowledgements**

This article has been elaborated as one of the outcomes of the research project “Public finance in the Czech Republic and the EU” supported by the Internal Grant Agency of the University of Economics, Prague, No. F1/1/2016.

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# Does Proceeding Accounting Reform Contribute to Better Cost Control within the Czech State Administration Units?

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## Abstract

The objective of this paper is to examine whether accrued accounting outputs released to external users in a standardized form from 2011 may serve to better internal cost control. The analysis is limited to Czech state administration units because of their importance as a redistributor and a consumer of financial sources and because of their complicated internal structure. Our former findings suggest that aggregated data may serve conveniently for budget negotiations, standards setting or various analytical purposes on the top managerial level. A question is whether these outputs are applicable also for internal managerial purposes which we do not account entirely convenient. To prove or disprove this opinion we examined cost allocation process within a selected cost unit of the Ministry of Defence of the Czech Republic. Our analysis suggests that aggregated financial accounting outputs represent relevant input data source however they are insufficient for managerial purposes within particular state administration units and need to be supplemented with any form of managerial or cost accounting that would allocate relating costs and link them with a place of their origin.

*Keywords: costs; cost allocation; expenses; managerial accounting; state administration*

JEL Classification: H83, H71, H72

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## 1 Introduction

Accounting reform of the public finance proceeding in the Czech public sector last decade has enabled to increase information capability of accounting data significantly. The range of data recorded and released to external users has enlarged broadly, besides these data are registered consistently under the accrual basis from 2011. Primarily this means that expenses and revenue of the Czech public sector units are reported as complete and accrued in the financial statements at present.

A question is whether improved accounting data also lead to better cost control within the public sector because efficient cost management, relating indebtedness control and 3E Concept compliancy were the most frequent arguments for the accounting reform initiation. Implementation of the accrual methodology to accounting of the public sector was launched of course much earlier in some developed countries and former members of European Union. On the other hand, the Czech Republic has realized accounting reform relatively quickly. (By the way strong recommendations of European Union was an additional reason for Czech accounting reform triggering).

In the world implementation of the accrual methodology to the public sector accounting is connected with initiatives known as "new public management". [5] characterized this process among the first as an attempt to introduce performance indicators to the public sector, to decrease expenses of the public sector activities and to improve financial control. Among supporters of this intent may be mentioned also [13] who advocated the accrual basis and possible advantages of accrued accounting information they saw in improved management, control and analytical process. [7] then supported methodically European reforming process and compared it in single countries.

[3] on the other hand summarized main counter-arguments of the accrual methodology implementation and business-like methods utilization in the public sector area. Main counter-arguments lied in an opinion that both business and the public sector have significantly different



aims, markets and nature of sources. Further there existed some remarks to possible distortions in the case of an application business accounting appraisal methods to the public sector area, a weak link between data transparency and real performance improvement or better budget sources allocation. Despite these objections it can be said implementation of the accrual methodology to the public sector accounting still continues in developed and other countries. There exists also relatively broad evidence of business-like tools utilization in various parts of the public sector however provable facts of cost savings or efficiency improvement are rather missing.

Though some authors advocate benefits of managerial methods implementation – for example [14] or [6], more others point out that real efficiency or performance improvement is rather unproven [11], [17] or [15]. Also opinions on probable reasons of this situation differ among authors. As it was suggested before, some of them ascribe it to business tools unsuitability for the area of the public sector – closely see [3], majority of them attributes it to improper or inconsistent implementation of business tools [11], [16], [4] and some point out also political reasons [1].

It can be summarized that the accounting reform of the public sector proceeds relatively successfully in the Czech Republic. Internal and external users dispose of a set of standardized statements in which also accrued expenses data are included. Small accounting units may probably use these data relatively conveniently also for purposes of internal expenses (costs) monitoring. These units may dispose of limited financial sources, realized activities, number of accounting items or in the case of very small municipalities limited number of personal. In these cases, probably financial accounting outputs may be convenient, some additional data may be traced manually and accounting units will operate with detailed knowledge of environment which on the other hand requires very good orientation in relating problems.

On the other hand, big organizations with complicated structure such as the state administration units in our opinion will not cope solely with expenses data and they will need to allocate expenses to internal components. For these purposes any form of managerial or cost accounting would be needed. Deeper insight to managerial accounting studies and their possible implementation to practice not only businesses but also the public sector can be found for example in [2] or [8].

On the base of the above mentioned facts, the aim of the paper is to analyse the structure and the content of expenses (cost) data from the point of view of cost control requirements in the Czech state administration units. Its partial objectives are following:

- to verify an existence of any managerial or cost accounting system and its organization,
- to analyse the current state of cost data allocation,
- to find out utilization of cost data for managerial purposes.

## **2 Material and Methods**

This study follows our former research concerning financial statements of the state administration units. We examined the content and the structure of the statements and compared them with prior to reform state, businesses, and IPSASs (International public sector accounting standards). As for expenses a very brief review of our findings is introduced in subchapter 3.1. As a starting point of our analysis we assume that financial accounting expense data may serve as a relevant source for subsequent cost allocation.

As main data sources of our theoretical research scientific papers, relating legal regulations and internal directives were used in the paper. In the case of practical analysis expenses data and internal costs data of selected cost unit included into the Ministry of Defence of the Czech Republic were used. These data come from internal databases of the Ministry of Defence, i.e. FIS (Financial information system) and its partial modules, RON (Cost allocation database, and electronic controlling journals).

Used methods encompass bibliographic search of relevant literary sources concerning accrual methodology implementation to the public sector, managerial accounting and managerial methods utilization. Further for purposes of chapter 3 description of existing cost allocation

system, its analysis and synthesis of knowledge were conducted. To find out the real state of cost data utilization for managerial purposes a directed interview with economic service chief of a selected cost unit was conducted. As a base of interview we used our former questionnaire [18] directed to managerial data preparation and their utilization. Directed interview contained 8 close-ended questions in both sections and 2 open-ended questions. In this phase of research questioning was limited to one selected cost unit.

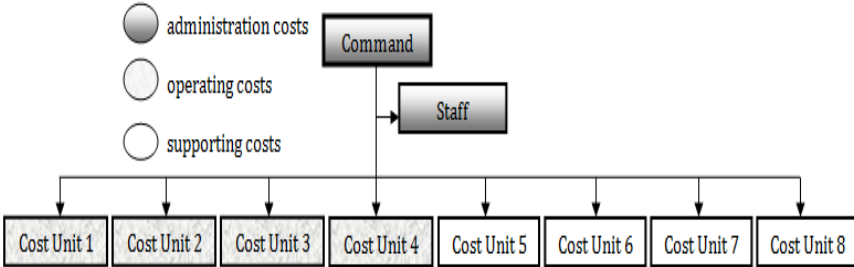
As main limiting condition should be mentioned an orientation of practical analysis to one state administration unit only, specifically the Ministry of Defence of the Czech Republic. This ministry belongs to those that dispose of the highest amount of sources. Moreover, our former research was partly carried out within this ministry and we have relevant internal data at disposal. In the term of the ministry we further limited our research to one cost unit only. Information capability of our findings may be of course limited and for more relevant conclusion would be desired to analyse other components of the state administration too. Even so we believe that the situation concerning costs management may be very similar across the state administration units and so some our findings may have common character.

**2.1 Selected Cost Unit Description**

Analysis of costs was carried out within a selected cost unit (rapid deployment brigade) that was chosen due to its involving to proceeding pilot project – controlling implementation. Cost units of the Ministry of Defence may have various character and carry out diverse activities. They encompass combat battalions, air bases, logistic regiments, logistic security regiments, special forces, general staff, and others. Various unit activities imply naturally different requirements of sources and recorded costs. Our selected cost unit encompasses 8 organizational components, i.e. sub-units or cost units of the 2<sup>nd</sup> level, command, and staff as figure 1 implies.

Command and staff provide the whole cost unit with management and administrative activities and so record mostly administrative costs. 4 cost units of the 2<sup>nd</sup> level ensure combat (operating) activities as firing, tactic, topographic or driving training, 4 supporting units carry out activities as maintenance of the long-term assets logistic support and so on. The model is partly simplified for our analytical purposes.

**Figure 1. Simplified structure of selected cost unit**



Source: Authors

**3 Results and Discussion**

This chapter summarizes main findings concerning analysis of cost data in the Czech state administration. The first part of the chapter summarizes information concerning source expenses data. The second part comments organization of cost allocation system, some questionable points and the current state of cost data utilization.

### *3.1 Input Data – Expenses from Financial Accounting*

Accounting reform has enabled to release a set of standardized statements on a regular basis from 2011. These statements are prepared compulsory under the accrual basis by vast majority of the Czech public sector units, state administration included. Moreover, unlike businesses the forms of statements are mandatory and their patterns are contained in annexes of Decree No. 410/2009 Col. which may simplify their transfer, aggregation, mutual comparison, and control. Expense data are contained mainly in the statement of financial performance in which users can find a detailed information concerning expenses and revenue.

Above mentioned decree prescribes to the state administration units to report expenses and revenue separately for main activities and economic (business) activities. As main activities are regarded those for that accounting unit was constituted. Economic activities include business, complementary or side activities. Not only expenses and revenue but also net income must be recorded separately for main and economic activities while identical generic classification of expenses and revenue is used for both types of activities.

Generic classification separates expenses and revenue into four groups, i.e. expenses and revenue from activity, financial, relating to transfers, relating to taxes and fees. Unlike businesses the public sector units report expenses and revenue separately and the net income is stated at the end of the statement. Income tax is situated at the end of expenses items. Expenses from activity include among others material cost, energies, utilities, services, salaries and wages, insurance, depreciations, repair and maintenance, taxes and others. Revenue from activity may encompass sales of services, goods or product, sales of the long-term assets, fees or others. (For deeper insight see [19]).

Total costs of specific state administration units and their selected generic groups may be used successfully for various purposes on the central managerial level. For example, budget negotiations, total cost development analysis, standard setting and so on as corresponds also with the Ministry of Finance intention [19], [10].

However, these total expense data seems to be insufficient as for internal cost control purposes as our analysis within the Ministry of Defence confirms. There exist several reasons for this claim. Firstly, state administration units such as ministries are too big, they may encompass many internal components with different activities and requirements for financial sources. Without proper cost allocation to internal units of their origin any efficient managerial control seems to be illusory. Secondly, non-existence of clear link between costs and a unit of their origin excludes any functional system of direct accountability which is believed as one of the most serious reason of managerial tools failure in the public sector [11], [15], [16]. Thirdly, total financial statements expenses represent only summary of partial expenses (or costs) recorded by internal units. Without better control inside the state administration unit any analysis of total expenses development would not be relevant. Further some costs are common for more units or sub-units. On the other hand, accrued expenses may serve as very good starting point and source of data for deeper cost allocation in any system of managerial accounting.

### *3.2 Cost Allocation – Data for Managerial Purposes*

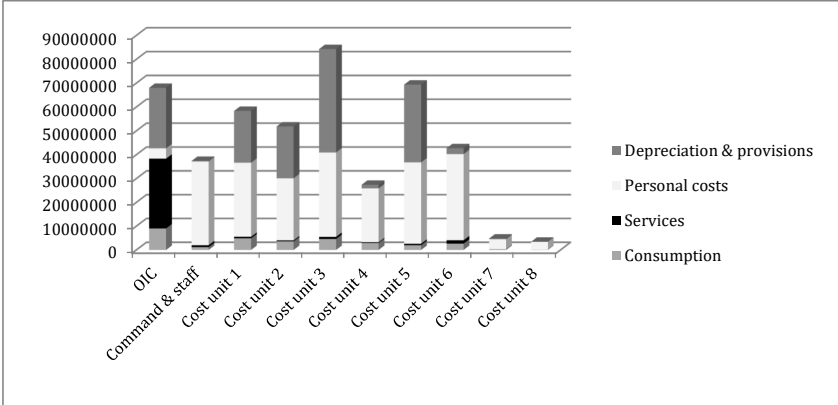
Basic instructions concerning organization of managerial accounting are prescribed in obligatory regulations for the state administration units. Specifically Decree No. 410/2009 Coll. and Czech accounting standards No. 701 Accounts and rules of bookkeeping on accounts and No. 702 Opening and closing of accounting books regulate this area in general features. Czech accounting standard No. 702 enables to organize internal accounting for purposes of the state administration unit and others, including information for the public finance monitoring. This standard further prescribes to organize internal accounting by way of analytic accounts, synthetic accounts of 7<sup>th</sup> and 8<sup>th</sup> account classes, other method, or combination of all above mentioned way. Internal accounts must be integrated to the chart of accounts compulsory. So in our survey we concentrated also on a method of managerial accounting organization. Unlike financial accounting of course concrete organization of managerial accounting is naturally up to accounting units.

It was found that cost allocation is organized by combination of analytic accounts and utilization of other method too in examined cost unit. In fact, it is an enlargement of accounting entries by additional attributes. This means that used analytic classification of costs comes from synthetic gender classification described in previous text shortly with their completion by attributes as target or activity, type of financing, closer identification of property and so on. At present however costs are allocated to sub-units only, additional attributes as target or activity are not used systematically.

Cost allocation is solved within the pilot project of controlling implementation in the Ministry of Defence. This project consists of four steps and in the course of the first financial accounting expense entries are allocated to our selected unit monthly. As figure 2 implies expenses are allocated not only to the cost unit but also all to its sub-units via analytical accounts and numbering codes of sub-units. Because of various character of activities, the structure of costs varies among sub-units significantly. Command & staff for example shows the highest share of personal costs on total costs and cost unit 3 because of high amount of the long-term assets (combat vehicles) demonstrates also the highest share of depreciation & provisions. For this reason, total costs of unit 3 achieve more than 80 mil Czech Crowns. Costs are generally classified to 4 groups, i.e. personal, depreciations & provisions, services and consumption. As for personal costs, their allocation proceeds automatically. Depreciations & provisions are allocated manually at present. Services include centrally ensured portion of energies, maintenance, IT services and others. Described process proceeds in the second step of allocation process. We have found that within the second step more than 80 % of depreciations and almost 90 % total costs is allocated to units that are responsible for their origin or administer relating assets.

The rest of costs (see figure 2) marked as OIC (other indirect costs) include services (mainly repair and maintenance of buildings), depreciations and & provisions (relating to buildings and weapons mostly), consumption of material difficultly subsumable, and personal costs (maternity leaves and so). These costs (something above 10 % of total) continue to the third step of allocation process. They are not solved at present for the reason of their difficult and laboured processing. The fourth phase finally should allocate administrative and supporting overheads.

**Figure 2. Total costs of the selected cost unit in Czech Crowns for 2015**

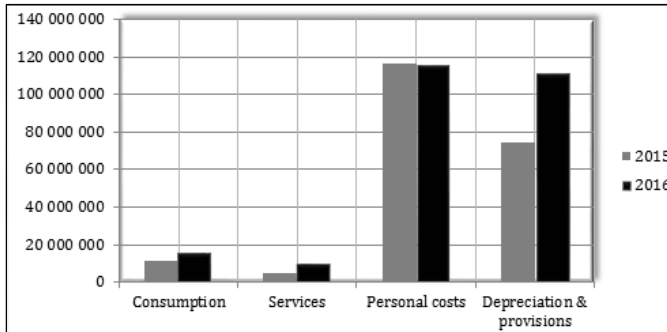


Source: Authors with utilization of FIS MoD data

Proper allocation of costs may improve cost calculation and planning, mutual comparison, control or standard setting. Figure 3 illustrates year-on-year comparison of main cost groups for the first half of the year. It is evident that personal costs development is stable, higher differences occur in the case of depreciations. A question is whether analytical potential of cost data is fully utilized. As directed interview with economic service head of examined cost unit and our former

analysis suggest budget expenditures monitoring is still preferred rather than cost control. In fact, budget expenditures are approximately about 1/3 lower in 2015 than costs as our analysis revealed. The main difference lies in depreciations that are included in costs but not in expenditures. Economic service head is positively responsible for financial sources, their planning, allocation, realization and control. At the same time, he should be synergic or co-responsible for fulfilment of cost unit goals. Adequate cost monitoring may serve as a proper instrument in this process.

**Figure 3. An example of year-on-year cost comparison in selected cost unit in Czech Crowns**



Source: Authors with utilization of FIS MoD data for the first half of the year

Cost allocation realised through controlling implementation process in the Ministry of Defence from 2014 represents univocally a step forward because financial accounting outputs are reported as aggregated for the Ministry of Defence as a whole and so they cannot serve efficiently as a data source for internal analysis, planning or 3E concept monitoring. These expense data are accrued and standardized however lacking of detailed information. On the other hand, our analysis suggests some questionable points:

- The whole cost allocation process is relatively costly and time-consuming (hardware equipment, IT solution, changes in organizational structure of cost units, personal training,). Similar problems were recorded also by other authors for example [11] which in the case of inconsistent controlling implementation would signify only spending of financial sources without any major practical effect.
- Often changes in strategic managerial concepts complicate managerial accounting implementation and utilization of cost data for managerial purposes. It was found that from 1991 to 2013 more than 20 strategic documents were published by the Ministry of Defence. Controlling implementation project results from Conception of economic management from 2013 [9]. It would be desired to continue in implementation of chosen conception despite changes of political representation and relating changes in top management. In opposite case waste of financial, personal and other sources threatens.
- Other indirect costs as centrally ensured services relating to buildings are not allocated to sub-units at present. In the case of examined cost unit, they constitute about 10 % of total costs which could be tolerable however in the case of other cost units they would represent even higher share. In our opinion it would be desirable to think about their allocation by way of any convenient allocation basis such as number of personal, exploited area. Possibly it would be desirable to allocated at least services relating to buildings utilization.
- It would be desirable to finish cost allocation process and assign also administration and overhead cost. As proper cost basis a number of personal or time weight could be used in our opinion.
- It would be desirable to think about cost allocation not only in relation to cost units and their sub-units but also to realized activities or programmes, at least the most important of

them. Some projects realized by the Ministry of Defence are important, expensive or repeated and it would be desired to monitor their costs separately. Moreover, if we want to evaluate them from the point of view of 3E Concept obeying. Poor monitoring of the state administration programmes and projects in majority developed countries was signalized also by vast research of OECD [12].

- Cost allocation and controlling implementation should be followed by direct accountability for costs [11], [16], [12] formation setting and efficient incentive system [6]. Any portion of saved costs should be left to cost units for their utilization. In the situation when public sector managers are aware of the fact that saved budget sources will be irretrievably return to the state budget seems difficult to motivate them to savings. This state of course is not typical only for Czech state administration but practically all parts of the public sector all over the world [1], [6] and others.

#### 4 Conclusion

The accounting reform of the public sector that similarly as in other developed countries proceeds in the Czech Republic too improved information capability of the public sector accounting data significantly. They are now recorded systematically under the accrual basis, standardized, harmonized among the public sector, and reported to external users on a regular basis. They may be successfully used for various purposes on the top managerial level (time development analysis, mutual comparison, budget negotiations, standard setting).

However, these data are entirely insufficient for internal managerial purposes. They are not allocated neither to internal units and sub-units nor to realized activities. The situation is urgent primarily in the state administration that dispose of significant amount of sources and very complicated structure. Accounting the fact that cost savings and increase of efficiency of the public sector were among the most frequent arguments for the public sector reforms it is evident that the accounting reform should continue within the public sector units by setting any system of managerial or cost accounting that would link recorded costs with a place of their origin.

An analysis within the Ministry of Defence of the Czech Republic has revealed that cost allocation is solved from 2014 in the term of a pilot project – controlling implementation. At present majority of direct and a portion of indirect costs are allocated to a cost unit that are chose for purposes of our analysis. Costs are further allocated also to its 9 sub-units. This process represents evidently an important step forward to efficient cost control but there arise also some questionable points to solve.

For example, costs are not allocated to any activities or realized programmes. In respect to some expensive or long-term activities it would be desirable to allocate costs also to them. Some portion of other indirect costs is not allocated because of difficulties with their identification and proper allocation basis selection. It would be convenient to allocate at least major of them (maintenance and depreciation of buildings for example). As proper allocation basis an exploited area could be used. As very important assumption of cost allocation functionality we consider setting any convenient system of accountability and incentives.

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# Old-Age Pension Concepts, Pillars and Regimes and Their Impact on Statutory Retirement Ages

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## Abstract

Comprehensive old-age pension systems correspond to the respective welfare regimes. There is no “one fits all” solution for erstwhile and/or current old-age pensions. The former (disability and merit) old-age pension concepts were taking account of the prewar economic and social conditions and in this respect, they are instructive even today. Current pension theory and policy puts distinguishing solidary pillars from insurance pillars in the foreground. The contribution analyses application of different concepts of old-age pensions under the different times and conditions. The methodology concentrates on the comparative analysis of the retirement systems in this direction, in particular on the role of the statutory retirement ages. We find that the current Czech public old-age pensions are extremely inconsistent with any standard retirement system and/or welfare regime. Under these conditions it is even not easy to improve any single important parameter of this system only, incl. the statutory retirement age, which is practically the only visible parameter of the Czech old-age pensions for their participants.

*Keywords: old-age pensions; welfare regimes; retirement age; czech pension insurance; pension reform*

JEL Classification: H55, J14

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## 1 Introduction

The Czech Expert Commission for Pension Reform approved a “Proposal of a revision system of setting the retirement age threshold”. As the control parameter, the Commission suggests introducing a percentage share of the life expectancy above retirement age threshold (RAT) in respect of the average life expectancy for people who have reached the RAT, calculated as the simple arithmetic mean of these average expectancies for men and women with two children, and setting its reference value at 25%, i.e. one quarter of their average life expectancy. The control parameter’s permitted deviation from the control parameter’s reference value is considered to be a deviation lower than one percentage point, i.e. the margins of tolerance consist of an open interval of 24-26% [12]. Currently, there are two statutory retirement ages in the Czech “pension insurance”:

- 63 years for men, 62 years and 4 months for women without children, ... 58 years and 4 months for women with 5 or more children, subject to a vesting period of 32 years (35 after 2018) – this retirement age is the above-mentioned RAT
- 68 years, subject to the vesting period of 20 years (15 years without alternative periods).

The question is if these retirement ages reflect any basic concept of pensions, not only because of the differentiation of mentioned lower retirement age by gender and the number of children, but mainly due to the relatively high vesting period at the higher retirement age. In fact, it is mainly the result of mechanical cuts in pension expenditures in the recent past.

The average length of drawing an ordinary old-age pension in Czechia has been growing over a long period: in 1990 it was 16 years, in 2000 20 years, 22.8 years in 2010 and 24 years (comprising 19.4 years with men and 27.5 years with women) in 2015 [5]. These data indicate also a significant gender inequality in the present Czech system of “pension insurance”. The above-mentioned reference value 25% holds this year (2016) for men reaching the statutory retirement age 63 years.

The EU Council has repeatedly recommended that Czechia should accelerate the increase in the retirement age: “the statutory retirement age is planned to increase over the long run but too



slowly in the medium term" [7]. The Czech government refused to do so, arguing that the current pace of increase of the retirement age corresponds to the life expectancy development; consequently, the average period spent in retirement is not higher than in most other Member States [7].

The paper's objective is to confront the Czech retirement ages policy, within the framework of the Czech public pensions, with the international pension theory and policy. In the current Czech situation, it is necessary to perform a principal qualitative system analysis of old-age pension concepts, in the context of the entire pension policy or potential pension reform.

## 2 Material and Methods

The statutory retirement age plays the most striking role in the disability concept of old-age pensions, applied in a strict form in the original blue-collar social pension insurance. The old-age pension is understood "only" as a special case of disability pension: it was based on the presumption of disability of individuals from a given, statutory age. It applied also under the pre-war Czechoslovakia: "An old-age pension is just a disability pension, only it is not necessary to examine the disability." A consistent disability pension concept also excludes overlapping pensions and earnings – if a pension beneficiary was not disabled and manifested it by a working activity, he/she automatically lost pension entitlement.

The disability pension concept also reflected an overwhelming superiority share of disability pensions in the total number of pensions. In Germany, before the World War I, at the retirement age of 70 years in the blue-collar pension ("disability") insurance, the share of disability pensions amounted to 92%; old-age pensions were paid on average for the period of about 7.5 years. The benefit ratio (average old-age pension divided by national average earnings, NAE) in 1891 amounted to 18.2% [4]. The old-age pension was understood as a living contribution, e.g. in a family of children at the countryside.

When introducing the German blue-collar pension insurance, the retirement age of 65 years was considered, eventually, due to the financial reasons, the age of 70 was preferred; a reduction to 65 years occurred in 1916. In our country, this insurance was introduced in 1926, disability was assumed at a blue-collar worker from the (retirement) age of 65. In 1926, the average life expectancy of a Czechoslovak man aged 65 was 11.37 years and of a woman 12.02 years.

A merit concept of the old-age pension emerged before the disability concept – in the period of commencement of the state provision of civil servants. Under this concept the old-age pension needs to be "earned": the old-age pension entitlement arises based on working for the relevant number of years or after an appropriate period of insurance. Applying "a presumption of merit" comes from the earned right to retire after a certain number of years of service. Unlike the disability concept, there is primarily no fixed retirement age, but the vesting period. This does not preclude a pension reduction after fewer years of service. From a logical point of view, this old-age pension concept represents basically transferring the principles of private insurance – working (dis)ability is irrelevant here. The merit concept is also typical for the insurance of white-collar employees.

In our country, the National Insurance Act (1948) unified pension systems and introduced a dual retirement age, depending on the length of insurance: if the vesting period reached 20 years, a person could retire at the age of 60. The retirement age of 65 years was the second alternative, conditioned by the vesting period of 5 years. From 1957 the retirement age of 55 years was introduced for workers in the first category (underground miners and pilots) and women. The world rarity is the differentiation of the female retirement age by the number of children, introduced from 1965: 57 years for childless women, 56 years for women with 1 child, 55 years for women with 2 children, 54 years for women with 3-4 children, and 53 years for women with 5 or more children.

The coexistence of two retirement ages reflects the combination of the disability and merit concepts of the retirement age in the social insurance system. A higher retirement age (e.g. 65 years) is subject to a short vesting period, which in this respect represents only a "technical

minimum” for the entitlement to retire – and, therefore, it is clearly a disability concept of the old-age pension. A lower retirement age (in our country 60 years from 1948) was subject to 20 years of insurance, which in then forthcoming communist regime was not difficult to achieve – therefore, it was a commencement of the transition to the merit old-age pension concept.

Today’s Czech retirement ages do not reflect a clear concept of old-age pension or a combination of them, not only because of the differentiation of lower retirement age by gender and the number of children, but due to the relatively high vesting period at a higher retirement age. Therefore, we cannot talk about the application of the disability concept and the realization of the merit concept is very complicated. This is mainly the result of mechanical cuts in pension expenditures in the recent past.

In the past 50-70 years, there have been significant changes in the advanced economies as well as in the whole society. Currently, old-age pensions are significantly higher on average and they are paid considerably longer. In relation to the retirement age, prolonging life expectancy in general and specifically of seniors is essential. The pace of ongoing prolonging life expectancy is now approximately two months every year. Today, nobody explains the existence of old-age pensions by the presumption of disability. The number of old-age pensions’ beneficiaries is considerably higher than the number of disability pensions’ beneficiaries. In addition, present pension systems are considerably more complicated – they have multiple pillars, generally with different retirement ages. Several authors write about two groups of primary objectives of retirement systems, instead of the disability and merit concepts of the old-age pensions; pension systems should [1]:

- Provide insurance against low income and wealth in old age and offer a mechanism for consumption smoothing across one’s life („piggybank“ function of pensions), and
- Relieve poverty and redistribute income and wealth („Robin Hood“ function of pensions).

From a conceptual standpoint, it is optimal when these two contradictory functions of old-age pensions correspond to two different pension pillars: social (solidary) pensions and earnings-related (insurance) pensions.

In terms of terminology, the disability and merit concepts of old-age pensions are based on the history of these pensions. In contrast, the solidary and insurance concepts correspond, in terms of terminology, to the current typology of basic pension systems – in terms of construction of old-age pensions, which also includes the issue of statutory retirement age. It is useful to distinguish between basic pension welfare regimes that are also reflected in the approach to the retirement age.

### 3 Results and Discussion

Several different typical pension systems have been developed, which are the result of historical development of economic and social policies in the OECD countries. Several standard systems may be observed among them, which can be considered the application of basic welfare regimes, as defined by Esping-Andersen [6]. Thus, we distinguish liberal, conservative and social democratic welfare regimes. We expand the range of pension models by a neoliberal regime that has developed since the 1990s. The choice between these welfare regimes is a matter of public choice. Ideally, each pension system should be based on one of these welfare regimes.

The classical liberal regime rejects any significant state intervention in the social sphere, it includes no public pensions. The modern liberal regime already recognizes a special, tested old-age pension; which is not understood (only) as a social assistance benefit. The “Age Pension” in Australia is a model of such a means-tested old-age pension, which provides – together with means-tested supplements and rent assistance – the income exceeding the risk of poverty line used in the EU (60% of median income), even with the poorest seniors! In several developed countries, however, we can find a significant, universal (flat-rate) old-age pension, which is considered an expression of modern liberal pension welfare regime. “Superannuation” in New Zealand, tax-financed and providing income beyond the OECD poverty line (50% of income median), is a paradigmatic flat-rate old-age pension. These concepts of solidary pensions also

include a fixed, statutory retirement age. The Australian Age Pension is provided to men and women from the age of 65; from July 2017, this retirement age shall increase every 2 years by half a year up to 70 years (in 2035). The New Zealand Super has a fixed statutory retirement age of 65 years; after its increase from the previous 60 years during the period of 9 years: New Zealand consequently experienced a sharp rise in labor force participation rates among older people over the period 1991-2001 [9].

Conservative pension welfare regimes represent a mix of various retirement concepts – for different social groups. They include both the civil servants’ security schemes, segmented social insurance schemes, and originally voluntary occupational pensions. These schemes may reflect the specificities of the given social group, in respect of the risks covered by the social security, as well as its power (influence) status. Retirement ages in these regimes – in general – differ, already regarding different conditions of life of individual social and professional groups.

The original blue-collar disability insurance included old-age pensions based on the disability concept, with old-age pensions at a low subsistence level. This changed after World War II, e.g. in West Germany, with the pension reform from 1957, the conditions of the main blue-collar and white-collar old-age insurance schemes were unified, the basic amount of blue-collar pensions was abolished. Instead of the previous prevailing blue-collar concept of old-age pensions as a tool to remove poverty of old people, a concept of the pension as a replacement of the lifetime average (net) wage was announced, respectively, to be more precise, maintaining the previous standard of living, considering the reduced needs in the old age; all this under the assumption of a lifelong gainful activity (45 years). A link of the pension to the paid premiums was strengthened significantly, the merit/insurance concept of old-age pensions won completely also in the blue-collar old-age insurance.

The basic system of social pension insurance in Germany includes today more than 85% of gainfully employed persons. Another 9% of these people are civil servants, with their separate pension system. Some self-employed persons participate in social pension insurance, while others have special social insurance systems and for others a voluntary private Rürup pension was set up. Farmers, miners, railwaymen and sailors have separate systems. Overall, we can distinguish about 10 systems.

In numbers, the disability pension in West Germany was until 1972 the major newly granted pension, only after this year the old-age pension relatively starts dominating. The reform of 1972 introduced a “flexible” statutory retirement age of 63 years for those insured for the period of 35 years – the real effect was non-shortening the old-age pension at this (earlier) retirement; a real average retirement age subsequently dropped by more than two years [2].

Currently, old-age pensions from the German social insurance are higher than full disability pensions. Generally, it applies that a full disability pension amounts “only” to 30-34% of a previous gross wage [13]. In a general sense, a subjective risk is the reason. A basic formula for the calculation of both pensions is the same, however in the case of a disability pension not all years up to the statutory retirement age are added, but only up to the age when early retirement is possible (currently 60 years) and yet a discount for retirement before the age of 63 years at a rate of 0.3% per month continues to be applied; the discount may not exceed a total amount of 10.8%. These discounts can be considered system reductions also regarding the durations of unemployment, considered when calculating old-age pensions.

The construction of the German social old-age insurance is now dominated by the merit/insurance concept of the old-age pension. A pillar or another component providing universal or means-tested pensions is not part of the conservative (segmented) social pension insurance. If pension from the social old-age insurance is insufficient to cover the basic living expenses of old or disabled persons, basically, these persons need to ask social assistance of a general type.

The social-democratic welfare regime is often characterized by the dominance of universal benefits. This characteristic would match the universal (flat-rate) pension as a fundamental pillar of the social-democratic regime. That was also originally in the countries with a social-democratic orientation. In this sense, we could define a classic social-democratic pension regime as a model based on a (higher) flat-rate pension.

Modern social-democratic policy is to an important extent focused on the middle class. Indeed, modern social systems in developed countries, in principle, secure the needs of the poor classes of the population, especially in the old age. Differences are more in the forms and in the degree of utilization of more or less graduated social assistance benefits. If the goal of modern social-democratic policy was to provide workers with more than a basic universal old-age pension, then that could happen only in the form of earnings-related pensions. The interests of the social democracy electorate are easiest to enforce by a uniform, universal social insurance. In practice, then by increasing blue-collar pensions to the level of white-collar pensions. However, an essential component of a modern social-democratic pension regime is also a robust solidary pillar. A flat-rate pension with a “supplementary” earnings-related pension can be considered the original social-democratic pension regime.

The Swedish pension reform implemented from 1999, primarily significantly modernized universal social old-age pension insurance by the introduction of the NDC (notional defined contribution) product, supplemented by a robust “guarantee pension”, increasing low NDC pensions. Modernization of this social-democratic regime consists in putting a stronger emphasis on universal social insurance, and the introduction of automatism of adapting pensions to demographic and economic development. The existence of quasi-mandatory occupational schemes reflects the situation in the labour market, which social-democratic parties need to respect. Trade unionists are predominantly their voters.

NDC is a modern system of social insurance, recommended since 2003 by the World Bank as a “core” (main pillar) of the “Pan-European pension system”. Solidary pensions and private pensions are two “wings” of this system. NDC assumes the insurance technique of FDC (funded defined contribution) private systems; apart from fully funded financing. The pension saving is the first phase of this social insurance: premiums paid are deposited in a client’s personal account and (collectively) valorized. The second, “pay-out” phase begins by the transformation of the client’s account balance to the lifelong old-age pension, according to strict actuarial principles, taking the expected life expectancy of clients of the respective age into account. The statutory retirement age in the Swedish NDC scheme is set within the range of 61-67 years. The system is transparent and understandable, with automatic stabilizers. This insurance concept of the old-age pension can be identified as state-of-the-art. The statutory retirement age plays a secondary role in it – it is set by the interval, in principle, it is not necessary to speak about early retirement.

The “guarantee pension” is a significant complementary pension pillar in Sweden, the statutory retirement age of 65 years applies here; no early retirement is possible. This fully corresponds to the solidary concept of the old-age pension. In practice, the Swedes retire typically at the age of 65.

The neoliberal welfare regime is based on the hypothesis that the (more or less) mandatory private pension savings or insurance are significantly more favourable than the social pension insurance, already due to a general nature of private enterprise. The investment risk, in principle, is borne fully by clients. The basic pillar of mandatory private pension savings must be complemented by a public solidary pillar.

Thanks to the reform launched in 1981, Chile was an icon of the neoliberal pension regime. According to the original ideas a more significant state regulation was not assumed. The Chilean state had to correct these ideas gradually and significantly. Although the basic scenario of the neoliberal Chilean reform seemed to be relatively simple, the practice was quite different because the system is unintelligible for the clear majority of clients. Most Chileans have no idea how much they pay in commissions, how their money is invested, or how their benefits would be determined at retirement. Only one-fifth of the participants have the faintest idea about how much money they held in their accounts, even within plus or minus 20%! Financial illiteracy is a big problem, and not one confined to Chile [10]. However, the problems rest in the neoliberal pension welfare regime, not in “nation’s failure to educate its citizenry about how their pensions work”, as Mitchel states. High fees of pension companies represent the major problem, the market mechanism had to be replaced by a robust state regulation and, finally, the state pension company is being established anyway. Former Chilean governments paid no attention to different “normal” retirement ages of men (65 years) and women (60 years) and the use of different male and female mortality tables

by life insurance companies. A standard solidary pension pillar was introduced in Chile only in 2008; the retirement age here is 65 years.

The disability and merit concepts of the old-age pension originated as part of conservative pension welfare regimes. A “harder” disability concept was applied in the blue-collar insurance, with the level of old-age pensions substantially lower than it was for disability pensions. Moreover, the structure of the benefit in this case reminded more a social assistance than an earnings-related benefit of social insurance. On the contrary, the merit concept was applied in white-collar systems of social insurance in the private sector, not to mention civil servants’ pensions, at which a concept of providing service income even after leaving the active service was originally applied. Those major systems of the conservative pension welfare regime gradually united after World War II, the relative amount of blue-collar pensions increased and in the major social insurance systems, the insurance principle prevailed as a basic principle.

The original disability concept of the old-age pension vanished from blue-collar insurance systems and it appeared in a new form of solidary pension in universal state pensions systems, in the form of a flat-rate and/or means-tested pensions. Solidary pensions are recommended by modern pension theory as one of the (three) basic pension pillars, as an essential complement of universal public insurance pensions (of the NDC form best). A unified statutory retirement age, without an “early” retirement is typical for the solidary pensions pillars. In contrast, an actuarial adjustment of the pension amount according to the age of the pension applicant is no problem in the insurance pensions pillar. The statutory retirement age may be defined as an interval. A fixed statutory retirement age, supplemented by the provisions on the scope and terms of early or later retirement represents an older alternative of the interval retirement age (connected with continuous adjustment of annuitization divisors to anticipated life expectancy of the individual cohorts). Either way, the statutory retirement age is the most visible parameter of the pension system and one which sets a clear signal for people in making economic decisions [11]. The design and concept of the retirement age is of essential significance for both pension pillars and for the pension system as a whole.

The Czech “pension insurance” is an entirely nonstandard public pension scheme. Particularly from the legal perspective, it may be viewed as social insurance; however, with predominant intra-generational redistribution or solidarity, as appropriate. The OECD once even included Czechia in the cluster of countries with the highest “progressivity index”. These public pensions are fully financed from the state budget, as any other public expenditure program. The pension “insurance premiums” represent the state budget revenue, a pure tax; no legally declared link of such “insurance premiums” to budgetary expenditure for pensions exists.

The flat-rate “basic amount” of the pension is a constituent part of all Czech public pensions; it was developed through transformation of the state compensation allowance since 1996, which was introduced (“on a temporary basis”) in 1990, as a social compensation for the one-off abolition of the former negative sales tax, initially for all citizens (like a small unconditional basic income). One year later, this cost-of-living allowance was restricted to children and non-active pensioners while, just a few years later, it was fully “incorporated” into universal child benefits – and into all pensions as their “basic amount”. This basic amount has its separate position in the pension system (beneficiaries of all pensions get it), now it is defined as 9% of NAE and therefore indexed each year separately, too.

From the technical point of view, the Czech “basic amount” of the pension is not an analogy to the basic amounts of old-age pensions in the historical workers’ social pension insurance schemes which were characterized by an overall low level of pensions. It was thus a redistribution device within the blue-collar pension system. With the increased level of blue-collar pensions, the purpose of this basic pension amount got lost. In our country, this basic amount was last in existence under the 1948 national insurance act and later it was replaced by the introduction of bend points and reduction coefficients for higher earnings in the calculation of old-age pensions (as in US pensions).

The second component of all Czech pensions is the “percentage amount” of the pension which is, as a rule, significantly higher than the basic amount; its minimum level is 770 CZK. The

percentage amount in old-age pensions is calculated from average earnings (since 1986) valorized to the present wage level and then reduced by the mentioned reduction coefficients.

“The complex construction of the pension scheme lacks transparency to a point, where it is de facto absolutely incomprehensible for intended addressees.” [3]. The paradigm pension reform is, more than advisable. Unless the government wishes to considerably change the “progressivity” of the existing public pension pillar, it is possible to divide it into two pillars: solidarity pillar and universal social insurance, preferably in the form of NDC. Both pillars may or shall also differ in some significant parameters – such as the retirement age, among others. The role of the solidarity pillar may well be fulfilled by the tax-financed flat-rate pension, with a substantially higher rate than 9% of NAE. The alternative periods of insurance may be replaced by state or other contributions to individual accounts – within the NDC scheme. It is also possible to use special housing benefits for seniors – as significant income component for low-income seniors. The insurance contribution rate for the NDC scheme would be much less than 20% and could be paid solely by employers under the existing Czech conditions.

#### **4 Conclusion**

Both merit and disability concepts of old-age pensions reflect in different ways the role of the statutory retirement age under different welfare regimes. The fixed statutory retirement age, based on the presumption of disability, emerged in the framework of the blue-collar disability insurance system in Bismarck’s Germany, and found the application in the Czechoslovak blue-collar pension insurance, too. After WWII, the disability concept changed in solidary pillars, which are typical of the liberal, original social-democratic and, ultimately, neoliberal welfare regimes and which may secure old people even at the level exceeding the EU poverty line. In contrast, the merit old-age pension concept converted in the post-war reforms fundamentally into earnings-related pension pillars, which are typical for conservative and newer social-democratic welfare regimes. For more than 10 years, the World Bank has been recommending the NDC as a major pension pillar based on the actuarial equivalence and modern pension technique, which includes the statutory retirement age defined as an interval, e.g. 61-67 years. Solidary public pensions with a fixed statutory retirement age, e.g. 65 years, are one of two supplementary pension pillars. These constructions also support the extension of seniors’ working activities and the interest in higher pensions.

The strongly deformed Czech “pension insurance” is virtually to a very high degree a flat-rate pension. Basically, the only intelligible parameter of our “pension insurance” is the statutory retirement age, which is still significantly differentiated by sex and number of children. The research on the retirement age is already rather complicated due to the absence of a clear concept of our single public pension pillar. Under these conditions the “Proposal of a revision system of setting the retirement age threshold”, approved by the Czech Expert Commission for Pension Reform, tries to improve a detail in a non-standard old-age pension provision only.

#### **Acknowledgements**

The paper has been elaborated within the project “Current trends in development of financial markets”, with the Institutional support for long-term strategic development of research organization University of Finance and Administration in 2016.

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# Fiscal Federalism and Personal Income Tax Redistribution: Case of Russia's Regions

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## Abstract

The purpose of this study is to create a calculation mechanism for differentiation of personal income tax revenues between budget levels. For research purposes the authors tested the hypothesis: when distributing revenues from personal income tax between Federal and regional budget levels, it is possible to use the calculation mechanism, taking into consideration a number of delimitative criteria. Economic analysis, synthesis and the analog approach allowed to quantitatively interpret seven theoretical criteria dividing income tax within levels of the budget. Using time-series methods, quantitative and correlation analysis, integral indicator we evaluated each criteria received for 83 regions of the Russian Federation for the period between 2010 and 2014 and identified the possibility of splitting revenues from personal income tax between the Federal and regional budgets. Nizhny Novgorod region, one of the regions of Russian Federation, was taken as an example in the course of study. Methods of factor analysis allowed to test the algorithm built for dividing tax revenues, confirming their relevance and significant value. As a result of the study, the authors identified two main features of the distribution of personal income tax in Russia between the Federal and regional budgets, at a ratio of 10% to 90% or 20% to 80%, respectively. These changes in fiscal federalism policy would create additional incentives for the development of the economy in Russia and improve the quality of life of the population.

*Keywords: personal income tax; budget; tax redistribution; tax revenues; fiscal federalism*

JEL Classification: H21, H230, H61, H77

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## 1 Introduction

Creating the perfect fiscal system characterized by self-sufficiency of each level, stability, flexibility in relation to the economic situation is a challenge for many countries [4]. The basis of the budget of any country, any level is tax revenue [9], [14]. Tax differentiation into levels of the budgetary system according to expenditure needs in most countries proved to be a failure in connection with growing budgetary imbalance [11], [17], [21]. The issue of budgetary tax revenues and ways of its solutions is often discussed in the current scientific researches [2], [3], [5], [18], [22]. Some authors focus on changing the approach to distribute certain taxes between levels of budget [1], [11], [19], others offer to upgrade the entire system of tax deductions [4], [5], [7]. There are three basic models of allocation of tax authority in international practice:

- federal tax receipt with subsequent separation between levels of budget;
- sharing the same tax base;
- permanent tax attachment for specific level.

Authors such as [18], [1], [19] support a separate use of tax sources, and [8], [15], [3] - the combined (parallel) use of tax bases. Other [7], [10], [16] scholars offer simulation of budget revenues using all three models of tax authorities at the same time. Russian legislation, like many other Federal States, defines only the theoretical aspects of distribution criteria for tax revenues, but there is no clear approach to how a certain criterion [13] is defined (calculated). At the moment, according to legislation in effect, revenues from personal income tax are subject to assignment to the regional budgets of Russian Federation at the ratio of 85%, the rest (15%) of tax revenues are distributed among local municipal districts of different types. This ratio is often revised by the legislators. Taking into consideration high population mobility, quite an unfavorable situation is formed in the country. For example, if a taxpayer is registered in Smolensk region, but he actually works in Moscow, then the PIT, that his employer is withholding, is



assigned to the budget of the city of Moscow, and not Smolensk regional budget. Since within the last two decades there is a tendency of workforce migrating to the federal centers (Moscow, Saint Petersburg) from the regions of Russian Federation, then we can observe the problem of tax revenues shortage in regions and municipalities. This fact or presents an obstacle for self-administration system development in the country, and brings down population social support and its life level.

Therefore, the goal of our study is to create a calculation mechanism of differentiating of personal income tax (PIT) between levels of budget. To achieve the goal: we have developed a system of indicators, basing ourselves on the Caplan and Norton Balanced Scorecard [12], characterizing the distinguishing criteria; chose the cumulative indicator to compare time series data; calculated indicators for 83 regions of the Russian Federation for 2010-2014; using weight theory we divided personal income tax revenue percentages between regional and Federal budget in all regions of Russia; reviewed and tested the developed algorithm for consistency.

## 2 Material and Methods

Contemporary scientists are actively discussing the issue of taxes, which are a major revenue source available to the government, such as personal income tax (PIT). Interest to the PIT is stipulated by the fact, that it is one of the taxes, which covers the greatest number of taxpayers.

According to official statistics provided by the Federal Tax Service of Russia, PIT amounts to an annual average of 40% of revenues in the consolidated budgets of subjects of the Russian Federation and about 10% in the Federal budget of the Russian Federation [5]. Since all the economically active population is considered to be the payer of income tax, the fair and rational use of the income from it can have a significant impact on the revenue part of the budget. It should be noted that among scientists and experts, there is no consensus about optimality level of decentralization of PIT and other budget-forming taxes [14], [21]. It is possible to adduce «pro» and «contra» arguments (for inclusion in own revenue budget sources at the appropriate level) on a permanent or long-term basis of this tax for different levels of Government:

1. Revenue from personal income tax is usually closely correlated with revenues from other taxes. However, in most developed countries (as well as in Russia), the tax base of PIT is relatively evenly distributed throughout the country, thereby providing compensation effect on tax potential of regions. This is a serious argument in favor of fixing it for the regional level [3], [4], [15], [18]. The following arguments are in favor of the necessity of this tax securing within Federal budget:

- services financed from the Federal budget, to which all the population of the country should have equal access, regardless of their level of income or place of residence [4], [19];
- progressive tax performs an important function of income redistribution, assigned to the Federal Government [1], [9], [10];
- personal income tax can be used as a tool of social and macroeconomic policies, and therefore must be secured within the Federal level [7], [14], [19].

Personal income tax immobilization for regional level affect the spatial distribution of the productivity factors [13], so the mobility of tax bases is often used as an argument against the PIT transfer to the regional level [1], [7], [11]. Analysis of current scientific literature showed that specific distribution algorithm has not yet been established. So, in the papers of De Rooy [4], Montero & Picón [15], etc. it is proposed to redistribute taxes based on accepted theoretical criteria. Gomez & Granados [7] and Jenderny [10], when allocating taxes, including income tax, propose to take into account the size of the tax potential of the region. Creedy and Mellish [3] express one of the main distribution ideas – division of tax by levels through changing the regional part of the rates, as it is done in the United States, Canada, Japan, Switzerland and some other countries. Naseem and Reesor [16] recommend to take into account the investment activity of the territories when entrusting them with their own tax revenues. Pereira & Pereira [18] suggest, when creating a model, to take into account regional social needs (social burden); and Rasellet al. [19] suggest to take into account the relationship of the income tax revenues and the welfare of

the population. Taking into account the results obtained by the authors listed, as well as the results of the authors pilot studies, we formulated the following hypothesis:

*When distributing revenues from personal income tax between Federal and regional budget levels, it is possible to use the calculation mechanism, taking into consideration a number of delimitative criteria.*

We refer to these criteria:

- high tax bases mobility, greatest stabilization potential and scope of tax base, easy tax exportability - according to these criteria personal income tax should be secured within Federal (national) level;
- uniformity of distribution of the tax base, its relationship with the welfare of the population - according to this criteria, we assume the possibility of referring personal income tax revenues to regional level of the budget system [20].

During the research for the distribution of revenue from personal income tax between the Federal and regional levels of the budget we developed methods for calculating according to seven distribution criteria:

- 1) Tax Base Equality Indicator (TBEQI) - the ratio of the tax base and tax amount of individual taxpayers registered in the territory of each region.
- 2) Tax Base Immensity Indicator (TBII) is the ratio of the tax base to the amount of tax revenues in the region. The second option is calculation in relation to overall income in the region.
- 3) Tax Base Stability Indicator (TBSI) - the share of tax in the main indicator of a country's development - in GDP.
- 4) Tax Base Efficiency Indicator (TBEI)- the ratio of the amount of the additional payments received in the course of tax audits and the amount of tax paid.
- 5) Tax Base Disbalance Indicator (TBDI) - the ratio of personal income tax and regional budget expenditures.
- 6) Well-Being Indicator (WBI) - the ratio of the tax base and a level of incomes of the population in a particular region.
- 7) Tax Base Mobility Indicator (TBMI) is the ratio of the tax base and the number of organizations in the region [20].

All indicators were calculated within 5 years during the period of 2010-2014 for 83 regions of the Russian Federation according to the official data of the Federal TaxService [5]and the Federal State Statistics Service. For the purpose of our study it was very important to determine the extent to which each indicator is constant for a particular entity in terms of several years. Therefore, in order to identify the time series dynamics coefficient of variation was used what reflected degree of dispersion values.

### **3 Results and Discussion**

Ratio characterizes the homogeneity of data, provides a comparative evaluation of aggregate. As a consequence, the coefficient of variation identified regions of the Russian Federation with the most stable and least sustainable criteria. As a borderline, we used a recognized statistical boundary of 33.3%. If the obtained value was lower than this indicator, the set was considered homogeneous, or inhomogeneous otherwise. In our case the homogeneity means *the stability of the data* used in the calculation, and therefore *stable data provide tax allocation to the regional budget and data instability* may indicate *the need for additional control, centralization and, consequently, the allocation of tax to the Federal level*. We calculated 7 indicators, according to distributive criteria, then an integrated indicator - the coefficient of variation (time series) was calculated. An example of the calculation was made for one of the Russian regions- Nizhny Novgorod region. It is presented in table 1.

**Table 1. The value of indicators defining the distributive criteria for the allocation of personal income tax for the Nizhny Novgorod region and the value of the coefficient of variation for years 2010-2014**

The indicators in ascending order	Tax period (yaer)					The coefficients of variation, %
	2010	2011	2012	2013	2014	
<i>TBEQI</i>	0.98	0.87	0.65	0.67	0.86	34.5
<i>TBII</i>	0.13	0.14	0.11	0.15	0.17	24.2
<i>TBSI</i>	0.02	0.07	0.03	0.04	0.10	41.3
<i>TBEI</i>	0.76	0.43	0.86	0.15	0.23	28.9
<i>TBDI</i>	0.54	0.40	0.32	0.41	0.25	27.6
<i>TBMI</i>	0.47	0.56	0.29	0.75	1.02	35.4
<i>WBI</i>	0.35	0.44	0.54	0.41	0.68	26.7

Source: Authors

According to table 1, the variation in terms of efficiency, imbalance, immensity, relationship with the welfare indicators, is less than 33.3%, which means the possibility of distributing tax revenues in favor of the Nizhny Novgorod region budget. In terms of uniformity, stability, mobility indicators – it is in favor of the Federal budget, because the value is more than 33.3%. Using the data in table 1, we made the distribution of income tax revenues between the Federal and regional levels of the budget. To achieve this we use the theory of determining weight indicators. For the compilation of the weighting system we transposed indicators in descending order of importance. For us the significance of descending would mean the removal of the threshold values in 33.3%. Bearing in mind that the lower the coefficient of variation, the more stable the system is, it will be enough for us to arrange the values of coefficients for each subject in ascending order. After that we can take advantage of the proposed formula for calculating the weight of each indicator:

$$a_i = \frac{2 \times (n - i + 1)}{n \times (n + 1)} \quad (1)$$

where  $a_i$  - the  $i$ -th indicator weight,  $i$ -the number of indicator for a specific region,  $n$ - the number of indicators.

For example, for the first index the weight will be:

$$a_1 = \frac{2 \times (7 - 1 + 1)}{7 \times (7 + 1)} = 0,25 \quad (2)$$

Then for the distribution of the personal income tax between the Federal and regional budgets based on weights of each criteria, we will add weight to those that relate to the Federal or regional levels budgets consequently. Nizhny Novgorod region results are presented in table 2.

**Table 2. The value of the weights coefficients of variation for Nizhny Novgorod region. Match the value of indicators and budget levels for the Nizhny Novgorod region**

No	The coefficients of variation, %	Indicator	Weight of the coefficient	Recommended level of budget
1	24.2	<i>TBII</i>	0.25	Budget of the region
2	26.7	<i>WBI</i>	0.22	
3	27.6	<i>TBDI</i>	0.17	
4	28.9	<i>TBEI</i>	0.14	
5	34.5	<i>TBEQI</i>	0.11	Federal budget
6	35.4	<i>TBMI</i>	0.07	
7	41.3	<i>TBSI</i>	0.04	

Source: Authors

According to table 2, adding weight indicators related to the level of the budget, we find that: Share of revenues to the regional budget = 25% + 22% + 17% + 14% = 78%

Share of revenues to the Federal budget = 11% +7% +4% = 22%

Thus, according to the results of our studies, we propose for the Nizhny Novgorod region to reallocate proceeds from the personal income tax between regional and Federal budgets in the ratio 80% (in the regional budget) to 20% (Federal budget). It is worth considering that now personal income tax in Russia is not transferred to the Federal budget. Similar actions were carried out in all regions of Russia. We divided all Russian regions into 8 groups with a 10% revenue magnitude (9.87%), using the Sturges formula and the magnitude of the variation (table 3).

**Table 3. Groups of Russian regions according to the share of personal income tax revenues to the Federal budget and regional budgets (fragment)**

Group	The recommended share of revenues to the Federal budget	The recommended share of the revenue to the regional budgets	Regions	The current ratio of revenues to the Federal budget and regional budgets
1	4.5% - 14.5%	85.5% - 95.5%	Regions: Ivanovo, Smolensk, Tula, Tver, Ryazan', Yaroslavl', Archangelsk, Rostov, Saratov, Ul'yanovsk, Republics: Tatarstan, Kareliya, Agigeya, Kabardino-Balkariya, Severnaya Osetiya, Mariy-El, Udmurtiya, Territories: Krasnodar, Stavropol', Altay, Primorskiy,	
2	14.5% - 24.5%	75.5% - 85.5%	Regions: Nizhny Novgorod, Vladimir, Kaluga, Kostroma, Belgorod, Kursk, Kaliningrad, Leningrad, Amur, Cities: Moscow, Sankt-Petersburg Territories: Krasnoyarsk, Kamchatka, Khanty-Mansiisk	
3	24.5% - 34.5%	65.5% - 75.5%	Regions: Omsk, Tomsk, Orel, Tambov Republics: Dagestan	
4	34.5% - 44.5%	55.5% - 65.5%	Regions: Lipetsk, Vologda, Astrakhan', Kirov, Chelyabinsk Republics: Ingushetiya, Komy, Chechnya	
5	44.5% - 54.5%	45.5% - 55.5%	Regions: Penza Republics: Karachaevo-Cherkessia, Mordoviya, Altay, Bashkortostan Territories: Perm, Nenets	
6	54.5% - 64.5%	35,5% - 45.5%	Republics:Kemerovo	
7	64.5% - 74.5%	25.5% - 35.5%	-	
8	74.5% - 84.5%	15.5% - 25.5%	Autonomous area: Chukotka, Yamalo-Nenec	0% to the Federal budget, 85% to the regional budgets (except for some types of activities)

Source: Authors

As it can be seen from table 4, in the regions of Russia there are two options for personal income tax distribution between the two levels of budget- Federal and regional - 10% to 90% or 20% to 80% are acceptable.

Thus, the higher tax potential of the territory, calculated according to seven distribution criteria is, the lesser amount from PIT revenue is transferred to the Federal Budget. And vice versa, the lower tax potential of the territory is, the more difficult it is to collect PIT in this region, and the greater amount of revenue from PIT is transferred to the Federal Budget. Such distribution system will allow to increase regions motivation in personal income tax improved collection (for example, by means of tax auditing quality improvement) and to smooth out the existing problems of the regions social underdevelopment. By the same token, the uneven distribution of PIT among

the budgets will be compensated by deduction from other taxes, such as profit tax, excise duty, value added tax. For example, regional budgets do not get any revenues from excise duties and value added tax at present time. This issue is being studied in related researches of the authors.

To verify the above information, we used the fuzzy majority principle in determining weights. For this simple weighting function was selected  $F : [0,1] \rightarrow [0,1]$  and we took into consideration that the function will only accept two border values 0 (0%) or 1 (100%), then there are  $F(0) = 0$  and  $F(1) = 1$ . In this case, for seven coefficients of variations according to different distribution criteria for personal income tax we've got the following system:

$$\left\{ \begin{array}{l} a1 = f\left(\frac{1}{7}\right); a2 = f\left(\frac{2}{7}\right) - f\left(\frac{1}{7}\right); a3 = f\left(\frac{3}{7}\right) - f\left(\frac{2}{7}\right); a4 = f\left(\frac{4}{7}\right) - f\left(\frac{3}{7}\right); a5 = f\left(\frac{5}{7}\right) - f\left(\frac{4}{7}\right); \\ a6 = f\left(\frac{6}{7}\right) - f\left(\frac{5}{7}\right); a7 = 1 - f\left(\frac{6}{7}\right) \end{array} \right. \quad (3)$$

We assumed, that the value of the first weighting coefficient in this case corresponds to the weight obtained by Fishburn's formula,  $f\left(\frac{1}{7}\right) = 25\%$ .

Using the second degree polynomial as  $f(x) = ax^2 + bx + c$ , since the function must satisfy the conditions  $F(0) = 0$  and  $F(1) = 1$ , we got:

$$\left\{ \begin{array}{l} f\left(\frac{1}{7}\right) = a * \left(\frac{1}{7}\right)^2 + b * \left(\frac{1}{7}\right) + 0 = \frac{a}{49} + \frac{b}{7} = 0,25 \\ f(1) = a + b = 1 \end{array} \right. \quad (4)$$

Solving the system we got, that  $a = -0,88$  and  $b = 1,88$ . Thus, using the weights of the first coefficient, we identified the polynomial factors that will be used to determine the weights of the remaining 6 coefficients:

$$f(x) = -0.88x^2 + 1.88x \quad (5)$$

Bearing in mind that  $f(1/7)=0,25$ , we substituted this value to the system (3) and by solving it, we got weight value, presented in table 5.

**Table 4. The value of the weights coefficients according to the fuzzy majority principle**

No.	The coefficients of variation, %	The indicators	Weight of the coefficient	Recommended level of budget
1	24.2	TBII ( $a_1$ )	0.25	Budget of the region
2	26.7	WBI ( $a_2$ )	0.36	
3	27.6	TBDI ( $a_3$ )	0.10	
4	28.9	TBEI ( $a_4$ )	0.09	
5	34.5	TBEQI ( $a_5$ )	0.08	Federal budget
6	35.4	TBMI ( $a_6$ )	0.06	
7	41.3	TBSI ( $a_7$ )	0.04	

Source: Authors

In accordance with the fuzzy majority principle (table 4), revenues from personal income tax could be distributed between the budgets of the two levels as follows:

The share of revenues to the regional budget =  $25\% + 36\% + 10\% + 9\% = 80\%$ ;

The share of revenues to the Federal budget =  $8\% + 6\% + 4\% = 18\%$ .

Thus, as in the case of the weight definition according to the Fishburn's formula, distribution, based on the fuzzy majority principle, the ratio turned out 80% to 20%, respectively, in regional and Federal budgets. However, that Fishburn's model has no economic evaluations, we tested these indicators through multiple regression equation. Then, using tabular form for level of significance (F-test), compiled by Fisher at different degrees of freedom, we identified the

importance of built model. Calculations on the earlier data showed that when the significance level  $\alpha = 0.0005$  the actual significance (F-factor) exceeds 35.77 - which exceed table value ( $F_{tabl} = 3.44$ ), therefore, the regression equation is statistically significant, like the built model in general. To assess the reliability we also calculated the average relative error of approximations as:

$$A = \frac{1}{7} \times \sum_{j=1}^7 \left| \frac{y_i - y_i^*}{y_i} \right| \times 100\% \approx 0.41276\% \quad (6)$$

Approximation error within 5-7%, shows a good selection of models to the source data. Because in our case  $A < 5\%$ , we can say that model built by the authors has a fairly high accuracy.

The successful examination of this algorithm confirmed the possibility of personal income tax revenues redistribution in Russian Federation between Federal and regional levels at the ratio of 10% to 90%, or 20% to 80%. Recalculating of PIT return for 3 territorial entities out of the 83 (Nizhny Novgorod, Moscow and Leningrad regions) taking into account the algorithm proposed showed the increase of the Federal Budget own revenues up to 4% and decrease of subsidized burden on regional budgets up down to 0.56%.

#### 4 Conclusion

Our results suggest that formulated hypothesis about the possibility of redistribution of personal income tax in Russia between the Federal and regional levels of budgets based on the calculation methods which take into account the number of dividing criteria, is confirmed. An econometric model built by least squares method allowed to determine weights for income tax distribution between regional and Federal budgets. Post-audit analysis confirmed the feasibility of proposed algorithm. The results of our study confirmed findings of Bruce et al. [1], De Rooy [4], Jackson & Brown [9], Pereira & Pereira [18], that it makes sense to keep personal income tax within Federal budget in order to carry out State social policy. On the other hand, our findings contradict the results of Naseem & Reesor [16], Hassan & Bogetic [8], Ferrando et al. [6], in which they offer exceptional income tax division between the regional and local levels. Such conclusions are only valid for those countries whose payment of personal income tax doesn't take place in a place of employment, as in the Russian Federation, but in the place of residence of the taxpayer. For Russia the high mobility of tax base and the essential role of personal income tax in taxation of the population determine the need for Federal Regulation [11], [20]. At the same time, as the continuation of our study, we plan to make a differentiation of tax revenue at three budget levels, i.e. split the part that according to results of our calculations, falls on the regional budget-between the regional and local level.

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# Registration of Sales. How to Measure Its Impact on Tax Revenues?

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## Abstract

Registration of sales is currently most visible measure taken against tax evasion in the Czech Republic. It is expected to rise tax revenues, as the hidden income is expected to decrease. The calculation of estimates of increase in tax revenues is part of the RIA report, which is standard legislative procedure. We discuss the methodology used in the RIA report for the calculation of increase in tax revenues. We argue that the basic variables (estimates of shadow economy and tax evasion) are not used correctly and point out other questionable issues in the methodology. We find problematic that the methodology is not described in sufficient detail, which could also influence our findings. In fact, proper description of methodology is a key, as only then it can be discussed properly and improved for further application.

*Keywords: registration of sales; shadow economy; tax evasion; regulatory impact assessment*

JEL Classification: H2

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## 1 Introduction

Registration of sales introduced this year (2016) in the Czech Republic is currently, shortly before its implementation, number one topic for affected businesses, but also for tax and general public.

It has been introduced as a measure against tax evasion “*to help to restore fair competition among businesses while ensuring tax revenue of the state, without the need to raise taxes.*” [10] As a measure against tax evasion, it was generally well received emphasizing the importance of proper implementation [e.g. 13]. On the other side, it is being criticized by some as too extensive measure (often in connection with VAT ledger statement) imposing unjustified administrative burden to small business and entrepreneurs who are not the main contributors to tax evasion, possibly leading individuals from the shadow economy to unemployment offices. [e.g. 17, 18]

Registration of sales, also addressed as “fiscalization”, has been implemented in several European states including mainly (but not exclusively) central and eastern European countries [19, 3]. Czech system took its inspiration mainly in Croatian experience [19].

What are expected pros and cons of the registration of sales? The registration of sales should provide data to tax administration and reveal income hidden in shadow economy. The shadow economy is difficult to evaluate as it is hidden from its definition; however, some estimates are used in the discussion both for impact estimates and for comparing Czech and Croatian economy as the “model country” [17, 18]. Just the fact that the data must be reported should lower the amount of hidden income. Further, the tax authority should be able to focus tax audits more effectively after the data assessment. As the benefits for the tax administration are quite clear, the benefits for the taxpayers have not been clearly stated. It is mostly formulated as “level playing field” benefit for the honest taxpayers, and unnecessary to raise taxes, as the tax revenues will increase with better collection. Specific administrative benefits following the data collection, such as pre-calculation of tax, has not been introduced yet. In general, the better the taxes are collected, the better for the society as a whole. This “general public benefit” argument can be overlooked by the taxpayers, as it highly depends on the trust in government and on the satisfaction with public services [4]. As for the drawbacks, the tax authority must be prepared for the amount of data which brings technical and human resources challenges and creates administrative costs. On the side of the taxpayers, the administrative costs are expected to be insignificant and partly covered by special tax relief. With the “level playing field” argument, the dishonest taxpayers should suffer loss from losing the opportunity to cheat, providing the possibility to cheat would decrease



dramatically. In this context, the role of the costumers is highly relevant and their possible obligation (currently not stipulated in Czech fiscalization system), willingness or motivation to demand and take over the receipt. [26]

The registration of sales is being implemented gradually in four steps. With the first phase approaching, questions arise in connection with its application. Tax administration presented extended methodological instruction at the very end of August 2016, trying to overcome some of the problems [9], at the same time being criticized that such methodological instruction came too late to assure smooth implementation. First phase is due on December, 1<sup>st</sup>, 2016 and involves entrepreneurs and businesses in field of accommodation and food services. It concerns around 46,000 subjects in hotel and restaurant industry [19]. Second phase, due on March, 1<sup>st</sup>, 2017 includes retail trade and wholesale involving approximately 192,000 businesses [19]. Followed by the third phase (March, 1<sup>st</sup>, 2018) and the fourth phase (June, 1<sup>st</sup>, 2018) involving all other entrepreneurs amounting to roughly 300,000.

All generally binding law is part of regulatory impact assessment (RIA) in the Czech Republic. [24] The process of RIA is important part of the legislation process, as the overall impact of the new legislation and all its benefits and drawbacks should be taken into consideration. In the Czech Republic, the RIA report is prepared by the responsible state institution that proposes the norm, which might bring possible bias into the estimation. In some countries, this is prevented by taking into the process independent body. [5] As the impact evaluation provided within RIA is important base for the decision on further persistence of the law itself, the methodology of the prior estimates should be properly described, as well as the *ex-ante* and *ex-post* estimates of the impacts should be compared later when the law is already effective.

The registration of sales was also part of the RIA process. [19] Within the RIA report on registration of sales (further just "RIA report") the cost was calculated as CZK 370 mill. for the implementation of the information system and CZK 300 mill. for its operation (excluding the salary costs for additional controllers). According to the report, the benefits for the state budget should reach roughly CZK 16 bill. The report estimates increased tax revenues of CZK 17.5 bill. and on the other hand calculates the decrease of tax collection due to the tax relief of CZK 5,000 for each individual who is obliged to report his cash sales (about CZK 1 bill. in total) and due to reducing the VAT rate on restaurant services (CZK 0.5 bill.).

The aim of this paper is to discuss suitable methodology for measuring the impact of implementation of registration of sales on tax revenues in the Czech Republic, the possible reliability and information power of *ex-ante* analysis used in process of regulatory impact assessment for registration of sales. Our focus will be on estimates of undeclared sales and the resulting VAT losses. These would, in the opposite perspective, represent the potential additional VAT revenues to be achieved by registration of sales. Our discussion in this paper regarding the methodology used within the process of RIA is important, as the resulting estimates produced by this methodology play important role in decision on new legislation. We do not aim to evaluate overall impact of the registration of sales, neither to assess the registration of sales as such.

## 2 Material and Methods

For the decision whether to implement the proposed law, the *ex-ante* predictions of the impact of the new law are important.

The *ex-ante* estimates of potential increase in tax revenues resulting from any anti-tax evasion measure directed at lowering shadow economy may use some estimates of tax evasion supposedly existing before its implementation. Additional tax revenues would correspond with the previously existing tax evasion as this should be eliminated. Additional income tax and social security contributions (further "SSHI") would be collected by the tax administration from the newly reported income no longer concealed from the tax authorities. More VAT and excise duties would be received by the tax authorities from the effected and now also honestly declared sales. Further, the concealed income could have potentially created illegal funds which could have been

used to employ workers illegally without paying income taxes and SSHI. Thus, even more income tax and SSHI should be collected after the registration of sales comes into force.

Potential increase in tax revenues should be calculated as the product of additionally declared tax base and effective tax rate. The ways how to estimate the income tax, SSHI and excise duties revenues differ from the method of VAT calculation due to the differences in their tax bases. This general estimate of revenues must be prepared and interpreted with caution, as the tax base can be influenced by behaviour of subjects after the implementation of the change, such as movement from the shadow economy to unemployment, or by other related changes, such as changes in tax rates.

Further, we discuss the data and methods to be used for the estimate of the proportion of the hidden sales as it is important to correctly assess the additionally declared tax base and elaborate on the method to be used to predict the increase in VAT collections.

As tax evasion is a hidden activity by its nature, it is difficult to estimate it due to lack of data. Tax evasion is closely related to shadow economy. Both these phenomena are being estimated and the methods used for the estimates are described in literature [e.g. 6; 7; 11]. Tax evasion is usually expressed as percentage of theoretical tax liability which would be collected if no evasion existed. The shadow economy is reported as percentage of GDP.

### *2.1 Shadow Economy Estimates*

The shadow economy includes various types of activities and only some of them can be classified as tax evasion. The main two activities which are part of the shadow economy and at the same time they represent tax evasion are underreporting of income and illegal work. On the other hand, tax evasion does not necessarily always have to fall into the shadow economy [27]. For example, VAT carousel fraud is not regarded as shadow economy as it does not produce any real products. It is criminal activity abusing the VAT system [16]. When using the percentage of the shadow economy or tax evasion to adjust the tax base, one should always consider what number he uses and for what purpose.

The other important issue is the reliability of the estimate. The most familiar estimates of the shadow economy are published by Friedrich Schneider [22]. They are based on the so called MIMIC method that uses variables that potentially influence the shadow economy as for example tax rate, tax moral, etc. [21, 25]. The shadow economy in the particular country is then estimated by econometric modelling based on comparison of the explored variables in various states and using some existing absolute estimates of the shadow economy calculated by different methods; usually monetary methods [8]. The MIMIC estimate of the shadow economy would not change after implementation of the registration of sales as such measure is not part of the equation used for modelling.

Thus, in our opinion the MIMIC estimation of the shadow economy should not be used for prediction of the additional tax revenues after implementing the new legislation. We would prefer the estimates of the shadow economy prepared by the Statistical Office as they are based on real data gathered from the entrepreneurs and households [14].

For the assessment of percentage of unreported sales also the proportion of the payments in cash should be taken into account as these are of course the most vulnerable. The statistics of payment methods are often processed by card companies [23].

### *2.2 Tax Evasion Estimates*

Some authors derive estimates of tax evasion in the income tax area from the estimates of the shadow economy by calculating a proportion of actual income tax collection corresponding to the percentage of the shadow economy [2]. We do not believe that this way is appropriate as it uses the non-reliable estimates of the shadow economy (as explained above).

The most reliable estimates of income tax evasion are produced by financial authorities based on their internal data from the tax returns and random tax audits [12] but these are not

being processed by all countries. The problem with hidden taxpayer however persist, as typically only registered tax payers would be chosen for random control.

On the other hand, the estimates of the VAT gap are published each year for all EU states and the methodology is well described [1]. It is based on the National Accounts data collected by Eurostat. The method of the VAT gap calculation could be considered as reliable. However, it is not structured per the type of VAT evasion. We believe that the VAT gap estimates can be used when predicting the impact of the planned anti-avoidance measure, in our case the registration of sales, on the future VAT revenues. But only on condition that the part of VAT gap arising from unreported sales is distinguished.

### 2.3 Predicting VAT Revenues

The VAT base from the macroeconomic point of view is the household consumption plus the intermediate consumption and accumulation of fixed assets by the entrepreneurs, companies and public bodies that cannot claim the input VAT deduction on their purchases. These are for example small entrepreneurs (VAT non-payers) or financial institutions, hospitals, etc. The registration of sales would influence mainly the household consumption and the purchases of the small entrepreneurs. We assume that financial institutions and other exempt companies and public bodies do not use cash for their purchases. The final consumption would increase by the percentage of sales that was hidden prior to the registration of sales. But not all goods and services for final consumption are bought from VAT payers. Therefore, to estimate the new VAT base, the increased final consumption must be multiplied by the proportion of VAT payers among the suppliers.

Original VAT base could be taken from the VAT returns (but there is not the split of sales to households and other VAT payers). The National Accounts, particularly the input-output tables, are more convenient as they show the household consumption divided into the categories of CZ-CPA. However, they already include estimate of the shadow economy. So the numbers would have to be adjusted accordingly.

The proportion of VAT payers is known to the tax administration but only about the numbers of companies and individuals and not their turnover. Therefore, it is quite complicated to estimate their proportion on sales and even more complicated to estimate the increase of this percentage after implementation of the registration of sales. We should also bear in mind that prior to the registration of sales some businesses were not VAT payers due to underreporting their sales and thus not reaching the registration threshold. Thus the part of the original VAT base represented by the intermediate consumption of these non-VAT payers would decrease as they register to VAT and start to claim the input VAT on their purchases.

Concealed sales must be assumed either from the estimate of the shadow economy (the part representing the unreported income) or from the VAT gap (only the part being the unreported income). If such division is not possible, the estimated percentage of hidden sales would have to be derived from surveys as mentioned above.

Effective VAT rate would be the weighted average rate applied on the goods and services in the particular CZ-CPA category. This is necessary since the goods and services in one CZ-CPA category may be subject to different VAT rates [15]. The simple general formula for the estimation could be:

$$AVR = [(OHC \times HS) \times PVP - IMC] \times WAVR \quad (1)$$

Where:

- AVR = additional VAT revenues
- OHC = original household consumption (can be ascertained for each category of CZ- CPA individually)
- PVP = increased proportion of VAT payers after registration of sales
- HS = percentage of hidden sales

IMC	= intermediate consumption of previous VAT non-payers
WAVR	= is weighted average VAT rate, the calculation must be made from the prices including VAT as reported in National Accounts

### 3 Results and Discussion

Proposers of RIA report for registration of sales used three methods to evaluate potential increase in tax revenues related to higher collection of taxes. [19] The first one is based on the experience from Croatia, the second one uses the estimates of the shadow economy and the third one employs the estimate of the VAT gap.

The first method is in our opinion the most elaborated. It uses the actual data from Croatia where the registration of sales has been already implemented. The authors of RIA report claim to adjust the reported increase of sales in Croatia to the conditions of the Czech Republic and they come to the 9.3% increase in sales for retail sector excluding the sales of motor vehicles (CZK 104.5 bill.) and 27% increase in sales in restaurant and hotel industry (CZK 16.1 bill.). They process the data from tax returns to achieve the expected increase in the VAT revenues from retail sector excluding the sales of motor vehicles in the amount of CZK 4.7 bill. and the VAT revenues from restaurant and hotel industry in the amount of CZK 0.8 bill.

Proposers of RIA report do not describe their methodology in detail but they mention that they consider the proportion of VAT payers and the average VAT rate. Average VAT rate is calculated from different rates applicable on the goods and services within the relevant industry. It is not clear whether the estimates take into consideration the changes in the intermediate consumption of businesses that are subject to registration of sales. It can be expected that the businesses being forced to reveal all their sales would also deduct all their purchases. Prior to the registration of sales, they probably adjusted their evidence in order not to record higher costs than sales. It could be expected that they made their accounting and inventory records more authentic by not including part of their expenses. From RIA, it is not apparent whether this fact was regarded.

Furthermore, the estimate of the increase in personal income tax revenues is CZK 5 bill. and in corporate tax revenues is CZK 2 bill. The authors of RIA report unfortunately do not explain their methodology for these two assessments. It is not clear whether they regard only the increase in sales or also the shift from illegal to legal work.

It is not clear from RIA report whether some other adjustments were taken to consider specifics of the Czech environment, as the argument of comparing different economies can be raised.

The method based on the estimate of the shadow economy is in our opinion not correctly used. The authors of RIA report calculate the absolute volume of the shadow economy in the Czech Republic as CZK 596 bill. (15.5% GDP as per the estimate [22]). Then they skip to the estimate of the Czech statistical office regarding the individual industries. But then they do not apparently use it and come to an (unexplained) estimate of CZK 400 bill. of the shadow economy in the industries affected by the registration of sales. From this number, they achieve the estimates of the tax revenue increase by calculating pessimistic (1%), conservative (3%) and optimistic (5%) estimate of decreasing the shadow economy. The conservative approach leads them to CZK 12 bill. of tax revenues (3% of the decrease of shadow economy). This calculation is, in our opinion, wrong. The decrease of the shadow economy would in the most simplistic estimate represent only the tax base and it would have to be multiplied by the tax rate. So, the resulting tax collection would certainly be much lower. However, the concrete detailed estimation methods would have to be much more sophisticated and differences for VAT and income taxes would have to be considered.

The third method based on the VAT gap starts with the assumption that the final consumption of households, which represents around 60% of the theoretical VAT liability [1], is also responsible for 60% of the VAT gap (i.e. VAT evasion). This assumption is according to our opinion not correct as larger part of the VAT gap is probably created by carousel fraud [12, 20].

Nevertheless, the authors of RIA report do not follow this argumentation link anyway. Instead, they calculate the potential VAT revenues from the expected reduction of total VAT gap by approximately CZK 27 bill. This amount represents the decrease from current Czech VAT gap of 22% to 15% of the theoretical VAT liability (average proportion in the EU). The authors of RIA report believe that such a reduction of the VAT gap could be reasonably expected after the registration of sales. But they do not analyse the structure of the VAT gap with regard to the industries where the registration of sales will be implemented. They do not consider the proportion of cash payments in the particular areas or participation of VAT payers.

They suggest that VAT gap would be reduced in steps. But this is not supported by the gradual implementation of the registration of sales as they do not split the VAT gap into industries but they arbitrarily determine the percentages as follows. In the first year after the registration of sales, the VAT gap would be decreased (i.e. the VAT revenues increased) by 10% of the total amount previously calculated - CZK 27 bill. Thus, in the first year, they come to the estimated VAT revenue increase of CZK 2.7 bill. In further years the VAT gap should shrink more significantly by 25%, 40%, 50% and 60% of the total amount of CZK 27 mill. This calculation results in the VAT revenues increase in the second year by CZK 6.75 bill., in the third year by CZK 10.8 bill., and in further years by CZK 13.5 bill. and CZK 16.2 bill.

#### **4 Conclusion**

RIA report is important document within the legislation process, as it considers potential impact of new legislation. The *ex-ante* estimates that must be provided within RIA report are problematic. Usually there is lack of data and great deal of different influences. The proposers of RIA report are in difficult position. They are required to quantify the impact of the new legislation as much as possible, usually within limited time frame. At the same time, they are forced to process with the new law according to political assignment, being concurrently the legislators themselves.

In the RIA report related to registration of sales, the estimation of increase in tax revenues is presented so that total impact of registration of sales can be calculated. The increase in collection of taxes follows the estimates of income that is expected to be no longer hidden. Calculations based on the estimates of hidden income are even more problematic, as the reliability of input variables that are taken as a base for further calculation can be questionable.

We argue that data on shadow economy and tax evasion estimates used as base for calculation of increase in tax revenues are not used correctly. Further we point out questionable methodology applied for the calculation of the revenues. We propose basic formula, which could be used for the calculation of the impact on revenues as a starting point for further more elaborated methodology.

Our findings could be partly caused by poor description of the methodology, which we find particularly alarming. Better methodology description would allow for independent review of the presented estimates and further discussion. This could increase reliability of the estimates in future, as it can be expected that registration of sales is not the last measure against tax evasion.

#### **Acknowledgements**

This article has been elaborated as one of the outcomes of the research project "Public finance in the Czech Republic and the EU" supported by the Internal Grant Agency of the University of Economics, Prague, No. F1/1/2016 and the research project of the Faculty of Finance and Accounting, University of Economics in Prague, which is realized within the institutional support of University of Economics in Prague No. IP100040.

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**SESSION III:  
PUBLIC SERVICES  
AND NON-PROFIT SECTOR**



# Governmental Subsidies and Transparency of Nonprofits: Friends or Enemies?

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## Abstract

Nonprofit organizations report different transparency levels according to their main organizational characteristics. It is assumed that organizations co-operating with the public sector and receiving governmental subsidies in a larger extent should also exhibit higher level of transparency. Therefore, this paper objective is to clarify image of transparency in such organizations (N=22) which are the most subsidized from the government. The data were obtained with use of content analysis that was conducted in four main domains: existence of organizational website, availability of statutes, quality and extent of strategic statements, and access to economic information on organization. Findings showed low level of transparency in the area of strategic management and also overall lower level of transparency of nonprofits oriented on sport activities.

*Keywords: transparency; Czech Republic; not-for-profit sector; nonprofit organization; content analysis*

JEL Classification: H20, L31

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## 1 Introduction

Today, the transparency is one of the real issues of the nonprofit sector, not only in the Czech Republic. Nonprofit sector was considered, by Salamon and Anheier [12], to be one of the biggest innovations of 20<sup>th</sup> century. If we consider representative government as one of the most significant social invention of the 18<sup>th</sup> century and the bureaucratic apparatus for the achievement of the 19<sup>th</sup> century, then private volunteer activity resulting in civil society organizations is the most significant social change in the twentieth century. We could add to Salamon and Anheier citation that in 21<sup>st</sup> century plays primary role especially organizationally transparency in all sectors of economy going in hand with easy public control through information and communication technologies.

Transparency itself is a very complex term. Alnoor Ebrahim [5] notes that it is: (1) Relational in nature and is constructed through inter- and intra organizational relationships. (2) Complicated by the dual role of nonprofits as both principals and agents in their relationships with other actors. (3) Characteristics of transparency necessarily vary with the type of nonprofit organization being examined. (4) It operates through external as well as internal processes, such that an emphasis on external oversight and control misses other dimensions of accountability essential to nonprofit organizations. Pospíšil [11] add that even the principle of transparency is recognized in general, Czech nonprofit organizations still contend with many problems and the reality is insufficient. The reasons lie in three facts: (a) vague content of transparency resulting in quandary in its application, (b) deficit of proper data and knowledge about the situation in the nonprofit sector, and (c) the absence of a discussion that would set requirements for legislation and separate the debate on transparency and the debate about reporting.

In recent years, Czech nonprofits transparency was frequently involved in many public debates initiated from both, the Czech government (for example project Moneyval) as well as nonprofit itself (assessment of nonprofit reliability by AVPO ČR, Nonprofit of the Year by NROS). However, only few research studies were conducted. For example study focusing on organizational transparency realized on the sample of 2,400 nonprofits was realized by the author. In addition, there are some studies focusing on transparency in Czech [3] [13] or Slovak Republic [9]. Despite mentioned efforts as well as recent positive changes in legislation going to

increase of transparency, the Czech nonprofit sector suffers from a bad reputation in public. Czech president Miloš Zeman even called these organizations as leeches of the state budget.

Obviously, and as it was already remarked by Ebrahim [5], transparency is related to the character of the organization. The reason why the transparency is required lies mainly in fact that nonprofits are, in majority of cases, not funded from their own activities, but rather by their donors – individuals, businesses, or state. In doing so, the individuals and businesses as donors, can handle their finances relatively freely. Vice versa, the government is being controlled very strictly according to legislative limitations as well as via public. Therefore, precisely the relationship between state and nonprofit organizations should claim higher transparency. Aforementioned problems apparently uncover the main objective of presented paper – to identify and qualitatively describe current level of transparency of nonprofits which are significantly subsidized from government. Moreover, to find whether there are significant differences in transparency according to the nature of organization and possibly what are reasons for them.

## 2 Material and Methods

### 2.1 Research Sample

Sample for research consists of 22 nonprofit organizations supported from the government budget with amount exceeding 50 million CZK (approx. 1.85 mil Euro) in 2014. Thus, these organizations dispose of the highest trust of the Czech government and its institutions. The list of these organizations with other details is included in Table 1.

**Table 1. Nonprofits as recipients of more than 50 millions CZK subsidies from government budget in 2014**

Name of the recipient of subsidies (N=22)	Sum of subsidies (thousands CZK)	Number of subsidies	Funding for one subsidy (thousands CZK)
Fotbalová asociace České republiky	336 586	12	28049
Česká unie sportu, z.s.	155494	13	11961
Člověk v tísni, o.p.s.	145418	99	1469
Český atletický svaz	141077	18	7838
Horská služba ČR, o.p.s.	127912	8	15989
Český olympijský výbor	117577	9	13064
Český svaz ledního hokeje z.s.	117393	9	13044
SPORTOVNÍ AREÁL PRAHA	117384	3	39128
Slezská diakonie	105764	95	1113
Český tenisový svaz o.s.	99918	15	6661
Autoklub České republiky z.s.	99620	13	7663
Svaz lyžařů České republiky z.s.	89742	13	6903
NADĚJE	89734	71	1264
Diecézní charita Brno	84562	122	693
Česká basketbalová federace, z.s.	82334	15	5489
Česká obec sokolská	79199	6	13200
Armáda spásy v České republice, z.s.	69303	49	1414
ČESKÝ SVAZ CYKLISTIKY z.s.	67330	15	4489
ENKI, o.p.s.	64147	5	12829
Český volejbalový svaz	62258	11	5660
Česká katolická charita	53890	15	3593
Český svaz kanoistů	53559	9	5951

Source: [14]

As it is obvious from the list above, the majority of the sample is made of by organizations oriented on sport activities (68 %), organizations providing social services (23 %) and other organizations (9 %).

## 2.2 Construct of Transparency and Used Method

For organizational transparency identification was used a construct made on the basis of other studies of author [1] and one other foreign study [6]. It is important to note that this construct is developed as the very minimum which transparent organization should present about itself. Methodology is based on the content analysis. This kind of analysis conducted in online environment is a part of Internet mediated research [7].

**Table 2. Description of construct of online transparency and methods used for data collection.**

Area	Important Transparency Aspects	Method of Data Collection
Web existence	Website enables 24/7 transparency of the organization to all the public	Searching through internet browsers on the basis of organizational name; content analysis of website
Statutes	Basic organizational document. It outlines organizational direction, bodies, rules and control mechanisms in accordance to legislation	Searching on the organizational website. If not available on the organizational web searching through the Internet browsers
Strategic statements	Existence and clarity of strategic declarations as: mission, vision and values. These statements should enable not only definition of future objectives, but also a some level of its achievement	Content analysis of website and/or organizational document available online; analysis of individual declarations
Economic information	Access to financial statements as balance-sheet and income and loss statement. Access to information about donors	Content analysis of website

Source: [1]

Table 2 points out basic examined areas of transparency, and also should briefly present the reason why these areas are crucial for organizational transparency. First assumption of transparency is organizational *presence on the website* where all the organizational information could be stored. Research studies, according to Kenix [9], do not confirm a contribution of the Internet to increased people participation in civic activities, but the Internet is an appropriate tool to increase trust of public in the nonprofit organizations.

The second area of transparency is availability of *organizational statutes*. Statutes can be considered as the most important document of the organization as it outlines organizational details, its legal form, organizational bodies including control mechanisms and others [8].

Next aspect of transparency is information on *strategic direction* of the organization. Strategic statements are crucial not only for proper functioning of an organization and for setting of organizational goals, but also when the goals are set out, the public can transparently see, whether the goals are gradually accomplished or organization deviates from the planned route [5]. Recent studies of the author [1], [2] found that some organizations intentionally set either very general or very specific goals. However, in such setting of goals is very difficult to control the progress of the organization in its strategic development. These goals cannot be a subject of control.

Obviously, *economic information* belongs also among the key aspects of nonprofit transparency. Especially in case of organizations donated in large volumes from state budgets. Analysis of such information can lead to conclusion whether donated funding was used properly, effectively and efficiently, or not.

### 3 Results

#### 3.1 Analysis of Governmental Subsidies

Football Association of the Czech Republic with more of 336 milion CZK of subsidies from governmental sources held the exceptional position. There are other eight organizations with state support exceeding 100 milion CZK: Czech Sport Union (česká unie sportu, z.s.); People in Need (Člověk v tísni, o.p.s.), Czech Athletics Federation (Český atletický svaz); Mountain Rescue Service (Horská služba ČR, o.p.s.); Český olympijský výbor (Czech Olympic Committee); Czech Federation of Ice Hockey (Český svaz ledního hokeje, z.s.); Sports Complex Prague (Sportovní areál Praha) and Silesian Diaconate (Slezská diakonie).

Analysis of governmental subsidies showed that among these organizations are mainly sport oriented organization (15 organizations out of 22), than social work oriented organizations (5 out of 22) and organizations with other orientation (2 out of 22). Converting mentioned into funding distribution, the differences according to orientation of nonprofits are even bigger. Sport organizations have obtained 74.0 % of funding among the most funded organizations. Social work oriented organizations got 17.1 % of support and organizations oriented on other activities only 7.5 %. Also, looking at the amount of average subsidy and average number of subsidies per year, it is clear that distribution of funding to sport organizations is much less complicated than to organizations with other focus.

Significant differences found in organizations according to their activity focus can be also found according to legal form. Legal form of association is the entity mostly supported from governmental resources. In 2014, associations have received more than three quarters (75.4 %) of all the money distributed to organizations researched. On the other hand, among different legal forms results showed smaller differences in complexity of funding administration. The lowest number of subsidies is submitted by public beneficial organizations (37.3 in average), on the other hand the church organizations are receiving around 77 subsidies per year.

Details of analysis of governmental subsidies to Czech nonprofits are included in Table 3.

**Table 3. Analysis of governmental subsidies according to organizational aspects**

<b>Researched Area (N=22)</b>	<b>Number of organization in the sample</b>	<b>Amount of funding</b>	<b>Average subsidy (thousands CZK)</b>	<b>Average number of subsidies per year</b>
<i>Organizational Orientation</i>				
Sport	15	1747383	10340	11.3
Social Services	5	403253	1146	70.4
Other	2	209565	2015	52.0
<i>Legal Form</i>				
Association	16	1778508	6329	46.8
Public Beneficial Organiz.	3	337477	3013	37.3
Church Organization	3	244216	1053	77.3
<i>In Total</i>	22	2360201	x	x

Source: Author

#### 3.2 Results of Online Transparency

Transparency of nonprofits was researched in the areas outlined by developed construct. Overall results on transparency of organizations are summed up in the Table 4.

**Table 4. Results of online transparency of nonprofits which received more than 50 millions CZK from governmental budget in 2014**

Name of the recipient organization (N=22)	Web	Statutes	Strategic Statements <sup>1)</sup>	Annual Report	Economic Statements <sup>2)</sup>	Donors
Fotbalová asociace České republiky	•	•	•			
Česká unie sportu, z.s.	•	•	•			
Člověk v tísni, o.p.s.	•		•••	•	•••	•
Český atletický svaz	•	•	•	•	••	
Horská služba ČR, o.p.s.	•	•	•		••	
Český olympijský výbor	•	•	•	•	•••	• <sup>3)</sup>
Český svaz ledního hokeje z.s.	•	•	•			
SPORTOVNÍ AREÁL PRAHA						
Slezská diakonie	•		•••	•	•••	•
Český tenisový svaz o.s.	•	•	•			
Autoklub České republiky z.s.	•	•	•			
Svaz lyžařů České republiky z.s.	•		•••			
NADĚJE	•	•	•••	•	•••	•
Diecézní charita Brno	•	•	•••	•	•••	•
Česká basketbalová federace, z.s.	•	•	•			
Česká obec sokolská	•	•	••			
Armáda spásy v České republice, z.s.	•	•	••	•	•••	•
ČESKÝ SVAZ CYKLISTIKY z.s.	•					
ENKI, o.p.s.	•			•		
Český volejbalový svaz	•	•	•			
Česká katolická charita	•	•	••	•	•••	•
Český svaz kanoistů	•	•	•			

Notes:

1) Each dot represents some of these strategic statements: mission, vision, values or ethical code

2) Each dot represents some of these economic information: income and loss account, balance sheet, audit

3) All donations received through organization's subsidiary Česká olympijská, a.s.

Source: Author

*Websites* were found available in almost all organizations researched. The only one exception was organization SPORTOVNÍ AREÁL PRAHA. There are no other online information available about this organization, except personal details and short (and very general) description of its purpose in the register of associations.

*Statutes*, the main document which defines organizational purpose, activities, rights and obligations of members, organizational bodies, and other details were found in 17 out of 22 organizations researched. There were not big differences found in the availability of statutes according to orientation or legal entity of the organization.

*Strategic declarations and its clarity*. There were four kinds of strategic statements included in research: mission, vision, values and ethical code of conduct. Mostly organizations have available mission statement (16 out of 22 organizations). Sport oriented organizations have usually placed this mission only in the statutes and not available as a part of website. Organizations with focus on social services provision have had usually missions presented directly on the website. Several organizations worked only with purposes, or tasks. Four organizations, mainly socially oriented, have made ethical codes of conduct. Only three organizations from the sample worked with vision and two of them used values. Strategic declarations were much more frequently used and processed properly in other than sport organizations. While sport organizations have formulated typically mission statement, other organizations (mainly with social focus) have worked out at least three statements (most frequently mission, values and ethical code of conduct). Qualitative analysis of the content of individual mission and its clarity showed that organizations do not understand the function of mission in the same way as it is outlined in the management literature. All researched organizations rather have formulated these statements as a description of activities, thus question

‘what do we do?’, instead of theoretically correct justification of their activities and answering the question ‘why do we exist?’.

*Annual report* represents the summary of organizational information in a given year. In relation to current legislation (and obligation of nonprofit to process an annual report) is very unexpected that only 10 out of 22 organizations (45.5 %) have published this report on their website. Repeatedly, the results vary significantly among sport organizations (3 out of 15 organizations with available report), social service organizations (5 out of 5) and organizations with other focus (2 out of 2).

*Economic statements* should be, in accordance with the accounting act, included in the annual report. Therefore, it is obvious that the percentage of organizations with available statements is similar to the previous findings. However, the organization ENKI, o.p.s. (with the focus on applied research and environmental issues) has not published their economic statements in the report, so only 9 out of 22 organizations (40.9 %) published them. The most frequently was published profit and loss statement and balance sheet (9 cases), in less cases was published an audit of bookkeeping (7 cases). Availability of economic statements differentiated according to focus of the nonprofit organization. Economic details were published by only three sport organizations (3 out of 15), these organizations were: Czech Athletics Federation, Czech Olympic Committee and Mountain Rescue Service of the Czech Republic. On the other hand, in organizations with other activity focus were these statements available in 6 out of 7 organizations. Information about donors was openly published in 7 out of 22 organizations (31.8 %). It was one organization among sport oriented ones (1 out of 15) and 6 out of 7 among other oriented organizations.

#### 4 Discussion and Conclusions

Analysis of funding and the content analysis of the organizational transparency in the sampled nonprofit showed following:

1. In structure of the most funded organizations by government predominates sport oriented organizations – by the number of organizations included as well as (and even more) by the amount of distributed money. These sport organizations do not meet minimal standards of transparency; they recorded much worse results in comparison to organizations providing social services. Moreover, these sport organizations receiving this funding with lower administrative effort than it is in organizations with other focuses. The bad transparency result on the side of sport organization is supported by the study of Transparency International published in 2015: “Only 14 out of FIFA’s 209 football associations publish the minimum amount of information necessary to let people know what they do, how they spent money and what values they believe in”. [14]
2. In structure of the most funded organization by government predominates legal form of association; in much lesser extent are represented forms of a church and public benefit organization. Seen it from the angle of transparency, associations as legal form dispose of the simplest regulations with very little legal requirements on transparency.
3. Resulting from the content of strategic declarations the strategic direction of organizations is rather short-ranged (focus on activities) than long-ranged (focus on benefit to society and justification of organizational existence).
4. Moreover, the majority of researched organizations do not meet minimal standards of transparency, and as is very likely they also do not meet legal standards. Unfortunately, the real state of situation is very hard to be monitored from the side of the researcher (or public). The best opportunity and also obligation should lie on the side of the donor – the government.

With regards to presented findings can be assumed that Czech government is spending substantial amount of its funding in a very irrational way. Managers of smaller nonprofits would wonder how easy is to reach on massive state funding without published annual report or

published economic details on organization. In addition, the results are also unexpected due to the fact that the nature of work of researched organizations is quite similar in sport as well as social oriented organizations. The majority of them held the role of "umbrella" organizations as they are transferring their money, experiences, information, marketing practices, accounting regulations, etc. to their local branches, no matter we talk about footballers or charities. There is just one big difference, the latter mentioned are - in their business - able to respect certain minimum level of transparency.

It can be strongly recommended to public donor institutions to look more carefully onto organizational transparency and management professionalism in organizations before the distribution of governmental budget, mainly in case of sport oriented organizations.

The topic of transparency itself, as well as its application in nonprofit sector offers a lot of possibilities for future research. Questions like following and others should be addressed: Why only sport and social services are supported so much? Where are the cultural, educational, or environmental organizations? What about conflict of interests among representatives of organizations? What is an effectiveness of use of state funding? How the government measure returns on money invested to nonprofits? Exceptional attention should also be given to a paradox of sport organizations as entities with very low transparency, but very high volume of state subsidies. Today, and in the Czech specific context, it does not look like that governmental funding and transparency of nonprofits are being good friends.

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# Delivery of Healthcare through Public-Private Partnerships: A Case Study from Spain

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## Abstract

This paper analyzes the experience of the regional government of Madrid (Spain) in delivering healthcare services through public-private partnerships. Our research shows that overall the program implemented in Madrid from 2004 to 2007 can be considered successful: the projects were built on time, there were no cost overruns, and as of late 2016 all six hospitals built within that program have been in operation for almost a decade. However, an in-depth analysis of the mechanism of payments to the concessionaire shows that the amount of availability risk transferred to the private sector was in practice almost negligible. As the transfer of risk is a key driver of efficiency, this finding raises questions about the performance and management of the contract and suspicions that the potential benefits of using PPP are not being accrued. The paper also suggests some points for further research.

*Keywords: healthcare; public-private partnership; hospital*

JEL Classification: H44, M19

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## 1 Introduction

Public-private partnerships (PPP) have been extensively used to provide social infrastructure during the past two decades [10]. The motivations of governments for embarking on PPPs for the delivery of public infrastructure are manifold, and include on-time and on-budget delivery as well as access to private project management expertise [18, 9]. This paper analyses a case study of using PPPs for building and operating hospitals in Madrid region (Spain).

In 2004 the regional government of Madrid decided to increase significantly the number of hospitals in the region through a PPP program. The program consisted in building six hospitals with an estimated total investment of €550 million (see Table 1). Each project included the concession for the design, construction, financing and operations of the hospital with a concession period of 30 years. In these six hospitals the medical services are provided by the public sector but non-medical services are provided by the private concessionaire.

This paper analyses the experience of Madrid regional government with these projects. It shows that overall the program can be considered successful in the sense that the projects were built on time, and cost overruns did not arise. The available evidence indicates that all hospitals are operating normally. However, an in-depth analysis of the mechanism of payments to the concessionaire indicates that the amount of availability risk transferred to the private sector has been negligible.

In addition to the projects analysed in this paper, there are four more hospitals in Madrid region that have been procured as public-private partnerships. They entered in operation between 2007 and 2014. The main difference with the ones analysed in this paper is that the concession includes not only building the hospital and maintaining it but also providing the medical services.

This paper represents a first step in analyzing the experience of the regional government of Madrid with the use of PPPs for the delivery of healthcare services. The paper is aimed at policy makers, practitioners involved in planning these kind of projects as well as private sector managers involved in this sector. It is important to recognise that there are other PPP projects for hospitals in Spain where not only the non-medical services but also the medical services are

provided by the private concessionaire [1]. However, these PPPs are outside the scope of this paper.

**Table 1. PPP projects for hospitals in Madrid in which the medical services are provided by the public sector**

Hospital	Contract awarded	Financial close	Date of operation	# Beds	Assigned population as of 2009
Coslada	June 2005	July 2006	Feb. 2008	94	169.335
Arganda	June 2005	Oct. 2006	Feb. 2008	32	164904
Parla	May 2005	July 2006	Feb. 2008	47	146.451
San Sebastian de los R.	June 2005	n.a.	Feb. 2008	83	299.988
Vallecas	June 2005	April 2006	Feb. 2008	69	325.205
Aranjuez	June 2005	Dec. 2005	Feb. 2008	8	69.891

Source: [3]

## 2 Material and Methods

We do not aim to provide findings that can be generalized, but rather to provide some insights that can be useful both for policymakers and researchers. We use the case-based research method, which is a particularly relevant research approach for acquiring in-depth knowledge about contemporary social phenomena. Following the method of data triangulation, the empirical data for this study was collected from a number of sources, which enabled us to cross-check and verify information stemming from several sources.

The empirical data for our research were collected through interviews with representatives of the stakeholders involved in the projects, as well as written sources provided by public sector representatives, and information taken from databases. Unstructured in-depth interviews were adopted as a means of investigation for this study. One problem we have faced when doing this research is that official data in Spain regarding PPP contracts are released with some years of delay. As a consequence it has not been possible to gather data since 2009. Another problem we have encountered is the lack of available data about the financial performance of the concessionaires.

### 2.1 Literature Review

According to many scholars, PPPs are supposed to improve the efficiency and effectiveness of public services [5]. Some studies provide evidence of this advantage of PPP projects compared to traditional procurement [16]. However, other authors claim that evidence related to PPP projects has been mixed: some projects have proved to be a cost-effective method of delivering public services while others have failed to provide the expected gains [12].

Within the abundant literature on PPP projects, we have focused on two points particularly relevant for our research. First, PPPs are often seen as a key method of avoiding time- and budget overruns in infrastructure projects because they integrate key project elements into a single contract structure, optimize long-term incentives, and let each of the partners do what they do best [7].

Second, risk transfer from the public sector to the private sector is a crucial component of PPPs. Key risks commonly discussed in the literature on infrastructure PPPs can be grouped in various categories [13, 2]. Some of them relate to the site where the infrastructure is being built, such as geological risks and delay in obtaining all the required permits. Other relevant risks are directly related to the construction process, mainly cost overrun and delay in completion (also known as construction risks). Once the infrastructure has been built, two main categories of risks arise: revenue risks and operational risks. The most relevant factors relating to operational risks are operating cost overruns, delays or interruptions in the operation, and shortfalls in service quality, which is a key element in our research. Finally, financial risks include factors such as loan approval, fluctuations in interest rates and payments being eroded by inflation, whereas the most

common political risks are changes in legislation and political interference with the contract and/or deliveries [15, 11].

The use of PPPs for healthcare delivery has been widely analysed in the literature. Torchia et al. [17] provides an exhaustive review of this specific set of literature and questions some aspects of these programs such as their effectiveness, efficiency and convenience. Cruz and Marques [4] provides another comprehensive review of the literature about the use of PPP to build and operate hospitals.

### 3 Results and Discussion

#### 3.1 Implementation of the Program

Overall the program can be considered successful. According to Hodge and Greve [6], the concept of success can be framed around the following drivers of efficiency: competition for contracts, optimal risk sharing, and scope for innovation. In this section we focus on the first one and in the next section we analyse risk transfer. The third driver included in the definition of success provided by Hodge and Greve [6] is not analysed in this paper.

According to the information gathered for this research, the projects were built on time, cost overruns were not relevant, and as of late 2016 all hospitals have been in operation for almost a decade.

#### *Competition for the Contracts*

One positive aspect of the starting phase of this program is that there was strong competition for the projects with 8 to 10 full detailed bids for each project. The criteria for awarding the contracts are shown in Table 2. We have identified three main groups among the companies that submitted bids. The first one consists of Spanish infrastructure and services operators such as Acciona, Sacyr and FCC, with broad experience in construction and concessions. The second group is composed by medium-size construction companies. Finally, the third group of companies were Cajas de Ahorros (regional savings banks), such as Bankia and Cajamar.

**Table 2. Awarding criteria**

<b>Criteria</b>	<b>Weigh</b>
<i>Economic offer</i>	28%
Maximum amount per year (CMA)	18%
Financial structure	7%
Percentage of variable amount	3%
<i>Technical offer of the services</i>	24%
General assessment of the Consortium	4%
Specific assessment of the services	20%
New hires linked to the contact	20%
Technical offer of the project and construction	28%

Source: [3]

These projects benefited from the sound financial conditions prior to the global financing crisis of the late 2000s. The financial structure is very similar in the six cases: high Debt/Equity ratio, presence of both Spanish and foreign banks among the lenders, low cost of the loans, and long maturity (see Table 3).

**Table 3. Financing of the projects**

Hospital	Banks	Investment (M€)	Equity (M€)	Debt (M€)	D/E	Maturity (years)	Cost of the loan
Coslada	BPI, Lloyds	93.1	14.3	78,8	85/15	n.a.	n.a.
Arganda	Popular, Bankia, Dexia, Helaba, Lloyds	71.0	8.2	62,8	85/15	27.5	Euribor+0,95%
Parla	BancoSabadell, CaixaBank, Depfa Bank, Lloyds	83	11.8	71,2	85/15	n.a.	n.a.
Vallecas	Santander, Banco Sabadell, Banesto, Catalunya Caixa, IKB Deutsche Industriebank AG, KfW Bankengruppe, Liberbank, NCG Banco	120.5	22.9	97,6	81/19	28.0	Euribor+0,65%
Aranjuez	n.a.	57.5	8.6	48,9	85/15	n.a.	n.a.

Source: [8]

### *Speed of Completion*

From November 2004 to March 2005, the feasibility studies for the construction and operation of the six hospitals were approved by the regional government of Madrid. In March 2005, following this approval, the regional government launched the call for tenders. After that, in May and June of 2005 the contracts were awarded. Finally, the hospitals were inaugurated in 2008. The process total duration was less than four years, as shown in Table 1. This period of time is significantly lower than usual in providing hospitals by the public sector in Spain [14]. According to the interviews conducted for this research, there are two main reasons for the speed of this process. On the one hand, the Spanish procurement process for PPP projects is quite simple and allows short periods of time for the subsequent steps. On the other hand, there was a lot of political interest in inaugurating the hospitals before the following regional elections.

Another relevant finding of our research is that the construction cost of the hospitals was quite similar to the cost estimated in the bids, as shown in Table 4.

**Table 4. Construction cost**

	Cost of construction estimated in tender phase by concession companies	Increase of the cost of construction due to the modification of the design	Cost of construction including modifications
	A	B	A + B = C
Coslada	93.4	1.1	94.5
Arganda	71.0	6.0	77.0
Parla	84.5	2.3	86.8
San Sebastian de los Reyes	109.8	2.8	112.62
Vallecas	109.3	6.1	115.4
Aranjuez	58.5	0.8	59.3

Source: [3]

### *3.2 Payments to the Concessionaire*

The six hospitals analysed in this paper have an availability-based payment mechanism that is calculated monthly. The concession period is the same in the six contracts (30 years), starting the day the contract was awarded. The services provided by the private concessionaire include: 1) Cleaning of the building; 2) Security; 3) Catering; 4) Management of sanitary wastes; 5) Maintenance of the building; 6) Gardening; 7) Laundry; 8) Sterilization; 9) Disinfection; 10) Internal and external transport; 11) Management of supplies; 12) Administrative staff.

The system of payment to the special purpose vehicle (SPV), i.e. the concessionaire in charge of building and maintaining the hospital, has two sources of revenues:

- Revenues from commercial services such as parking, food service and vending machines.

- Revenues from the availability-based payment. A maximum amount per year is defined in the contract, and can be reduced if the services are below the standards of availability and quality.

A crucial element of these PPP projects is how much availability risk has been transferred to the private sector. Our analysis shows that the deductions applied to the variable amount due to insufficient availability or quality standards have been almost negligible (see Table 5), questioning the real availability risk of the concession. An official report of the audit court of Madrid points out that the decrease in the maximum amount per year was around 0.1% in 2009 [3].

**Table 5. Deductions applied to the variable amount due to insufficient availability**

Name	Maximum amount per year, 2008 (MEur)	Deductions (Eur)	%	Maximum amount per year, 2009 (MEur)	Deductions (Eur)	%
Parla	13.2	592	0,004%	13.4	9,235	0,069%
Vallecas	14.7	3,634	0,025%	14.0	24,957	0,167%
San Sebastián de los R.	17.1	219	0,001%	17.5	7,060	0,040%
Coslada	14.3	1,944	0,014%	14.6	10,174	0,070%
Aranjuez	84.7	315	0,004%	86.0	15,394	0,179%
Arganda	94.3	0	0,000%	95.7	8,329	0,087%

Source: [3]

Regarding demand risk transfer, our analysis shows that the modifications of the maximum amount per year due to changes in the demand have been very low. Only 10/20% of the total amount can be modified by demand changes. Moreover, in case of modifications the changes in the amount varies from 1% to 3% of the maximum amount per year, as shown in Table 6.

Finally, our analysis also shows that the weight of commercial revenues in the total of the revenues is not significant (see Table 6).

**Table 6. Total revenues of the concessionaire in 2008 and 2009**

Hospital	Revenues of the SPV, 2008 (MEur)	Revenues from commercial services (Eur)	%	Revenues of the SPV, 2009 (MEur)	Revenues from commercial services (Eur)	%
Parla	13.4	196,988	1%	13.2	263,170	2%
Vallecas	14.8	109,475	1%	15.1	203,988	1%
San Sebastián de los R.	17.5	443,081	3%	17.9	449,600	3%
Coslada	14.6	233,935	2%	14.7	297,097	2%
Aranjuez	8.5	59,865	1%	8.7	142,002	2%
Arganda	10.0	592,742	6%	10.0	465,941	5%

Source: [3]

## 4 Conclusion

This paper reviews the experience of the regional government of Madrid in delivering healthcare services through public-private partnerships. Our analysis shows that all six hospitals of this program were built on-time and without relevant cost overruns. However, the scarce availability risk that has been effectively transferred to the private sector may be subject to criticism. It was not possible to gather data about the financial performance of the concessionaires, but according to the interviews conducted for this research the concessionaires were obtaining a modest return, arguably because of the strong competition for the projects that there was at the bidding process. Another relevant point of these projects is that none of the six contracts has been renegotiated. The findings of this paper can not be generalized but they provide useful insights about the use of public-private partnerships for building and operating hospitals as well as how risk transfer works in this kind of projects. Further research should be

conducted to analyze how the financial performance of the concessionaires would be if the deductions due to failures in the quality of services provided by the concessionaire were higher. Another interesting point for further research would be the influence of political factors in deciding how many hospitals were going to be built as well as their location.

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# Inequalities in Geographic Distribution of Doctors and Hospital Beds in 13 European Countries

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## Abstract

The objective of this study is to measure the inequalities in the geographic distribution of doctors and hospital beds in the European countries. The unit of analysis is the NUTS 2 region. In total, 13 countries were included in the sample (Austria, Bulgaria, Czech Republic, France, Hungary, Italy, Norway, Poland, Portugal, Romania, Slovakia, Spain, and Turkey). All data come from Eurostat. The Robin Hood Index was calculated for selected countries to measure regional inequalities in the distribution of doctors and hospital beds among the NUTS 2 regions. In 10 of 13 countries, the differences in regional distribution are higher for doctors than those for hospital beds. Three highest regional inequalities in case of doctors were found in Slovakia, Hungary, and Turkey. In case of hospital beds, the highest inequalities were identified in Portugal, Spain, and Poland.

*Keywords: health system; geographic distribution; Robin Hood Index; regional statistics; NUTS 2*

JEL Classification: I10, I14

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## 1 Introduction

The market allocates health resources according to willingness and ability to pay, not according to real health needs of local population. This means that a supply of health services will be concentrated in rich areas, whereas poor areas, albeit being those with greatest health needs, will not be served adequately. However, the European health systems are mostly publicly funded and are highly regulated, so the unequal distribution can be a likely consequence of wrong public regulation than a free market. The geographic inequalities in many European countries are clearly the results of state planning, so the question on efficient use of resources in public sector can be questioned. In the public health system, the equal access to services is one of the main objectives of national health policy. Therefore, any variation in the distribution of resources may be understood as an inequality or inequity whether it be a consequence of market or wrong regulation.

The existence of significant differences in health resource inputs, health expenditures, the utilization of health services, and health outcomes have been documented by a lot of studies from various countries of the world. For example, [6] assessed the distribution of mental health services in Norway between 1979 and 1994. There are 19 counties in Norway, with a population ranging from 76,000 to 500,000 in the capital (Oslo). The purpose of the paper was to assess whether or not variations in the cross-county distributions of personnel had become smaller or greater, following the 1980 financial reform. The distribution of mental health services was estimated for all personnel in specialized adult psychiatric services and for physicians and psychologists. According to [6], both relative and absolute variations in mental health services were reduced in Norway over the observed period.

[3] studied the trends in the distribution of general practitioners in Australia between 1986 and 1996. They used crude mortality as a measure of community need for medical services. The Robin Hood Index was used as a measure of overall distribution. Nationally, the number of people sharing each general practitioner fell by 11% from 1,038 in 1986 to 921 in 1996. However in 41 of 57 areas the number of people per general practitioner actually increased over this period, indicating increasing inequity in the distribution. Over the decade, the number of relatively under-served areas increased from 67% in 1986 to 79% in 1996. Thus, despite the increasing number of

general practitioners overall, the rural and remote parts of Australia became increasingly poorly served.

[1] analysed the regional distribution of outpatient services in the Czech Republic between 1996 and 2002. As a part of the health reform in the first half of the 1990s, the outpatient services, which had been privatized to a large extent, began to be paid on a fee-for-service basis. An unrestricted growth in the number of practices and unregulated volume of services proved quickly to be financially unsustainable. After a few unsuccessful efforts to stabilize the health sector, tight budgeting replaced the open-ended system in 1997. That change provided an opportunity to analyse the impact of changes in the regulatory policy on the supply of outpatient services. The year 1996 was the last year of fee-for-service medicine. The supply of outpatient services was measured by the number of outpatient physicians in full-time equivalents in both independent practices and outpatient hospital departments for each region of the Czech Republic (14 regions). As a measure of health need, the population of the region was used. The Gini coefficient and the Robin Hood Index indicated that the overall distribution of physicians in outpatient services was relatively stable over the period 1996-2002. The higher values of the absolute and relative ranges were caused by the increasing supply of outpatient services in Prague. Total numbers of physicians in outpatient services may hide inequalities within the medical specialties though. For example in psychiatry, there were 12.63 psychiatrists per 100,000 inhabitants in Prague, but only 3.24 in the Region of Zlín. The differences of that magnitude could not be explained by the differences in the health needs, but are rather results of wrong regulatory policies [1].

Most comparisons of health data in Europe take place at the national level. However, there is an increased interest in looking at health data at a sub-national level. This is, to some extent, because of the increased importance of regions in many countries. Regional information allows health professionals and decision makers to better understand the characteristics of their own region in wider context (e.g. [8]). While some regional variations reflect differences in patient needs and/or preferences, others do not. Instead, they are due to variations in medical practice styles, the ability of providers to generate demand beyond what is clinically necessary, or to unequal access to health care services. These unwarranted variations raise concerns about the equity and the efficiency of health systems. The study of [5] presents information on geographic variations in health care utilisation within and across 13 OECD countries: Australia, Belgium, Canada, the Czech Republic, Finland, France, Germany, Israel, Italy, Portugal, Spain, Switzerland and the United Kingdom (England). The analysis focuses on a selected set of high-volume and high-cost health care activities. Health care utilisation is recorded at the patient's place of residence. Hence, the level of use in a given area cannot be explained by patients receiving treatment in other geographic areas. While the analysis in this study does not allow to determine precisely how much of these variations are unwarranted, some of these variations are too large to be explained solely by patient needs and/or preferences [5].

To analyse and assess local variations from the cross-national perspective is also the objective of the European Collaboration for Health Optimization (ECHO) project [7]. More information about this international project is available at the webpage: <http://echo-health.eu/>.

The objective of this study is to measure the inequalities in geographic distribution of doctors and hospital beds in the European countries. We are interested in finding the level of the inequalities, if they vary among the countries, and how they vary between doctors and hospital beds. High geographic inequalities can question the efficiency of public sector in achieving the equality objective.

## **2 Material and Methods**

The chosen unit of analysis is the NUTS 2 region. The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU. The NUTS classification is defined only for the Member States of the EU. Eurostat, in agreement with the countries concerned, also defines a coding of Statistical Regions for countries that do not



belong to the EU but are either candidate countries awaiting accession to the EU or countries belonging to the European Free Trade Association. The NUTS 2013 classification is valid from 1 January 2015 and lists 98 regions at NUTS 1, 276 regions at NUTS 2 and 1342 regions at NUTS 3 level.

All data come from Eurostat [2]. The countries for which the 2013 data on NUTS 2 regions were available were included, with exceptions of Italy, for which the number of hospital beds is from 2012. We excluded Croatia as it is divided only to two NUTS 2 regions. In total, 13 countries were included in the sample (Austria, Bulgaria, the Czech Republic, France, Hungary, Italy, Norway, Poland, Portugal, Romania, Slovakia, Spain, and Turkey). To avoid outliers, we excluded the French overseas territories and Spanish regions of Ciudad Autónoma de Ceuta and Ciudad Autónoma de Melilla. Further, we joined together data on two NUTS 2 regions in cases if the region of the capital was located inside another region. We assume that the population of such neighbouring regions use frequently services in the capital. We use this assumption in three cases: Prague and Central Bohemia (Czech Republic), Wien and Niederösterreich (Austria), București-Ifov and Sud-Muntenia (Romania). After all these adjustments, the sample included 13 countries divided into 155 regions, having population of 361 million inhabitants.

Measures of inequality express the complexity of variation in observed variable by a single number. The widely used measure of inequality is the Gini coefficient. The Gini coefficient is derived from the Lorenz curve, a cumulative frequency curve that compares the empirical distribution of the studied variable with the uniform (egalitarian) distribution that represents the perfect equality. The Gini coefficient ranges between 0, which occurs in case of the perfect equality, and 1, which occurs in case of the perfect inequality. The Robin Hood Index measures what proportion of resources has to be moved from areas with above-average provision to areas with below-average provision to achieve equal distribution. A disadvantage of the Robin Hood Index is that it is not able to register transfers between areas if both lie below or above the national mean. Thus such policy achievements would be undervalued by the Robin Hood Index. However, the main advantage over many other inequality measures (the Gini coefficient included) is its clear interpretation. The Robin Hood Index (RHI) is calculated by the formula:

$$RHI = \frac{1}{2} \sum_{i=1}^n |p_i - y_i|, \quad (1)$$

where  $p_i$  is the population proportion,  $y_i$  is the resource proportion, and  $n$  is the number of geographical areas. RHI is usually multiplied by 100 to be in percentages.

The simple measures of inequality are the ranges, which use only data on the extreme values. The absolute range is defined as a difference between the maximum and minimum observed values per capita ( $x_{max} - x_{min}$ ). The relative range is defined as  $((x_{max} - x_{min})/x_{pop})$ , where  $x_{pop}$  is the average number of units per capita for the entire population. Other measures of this type is the maximin ratio, which is defined as  $x_{max}/x_{min}$ .

By concentrating on the geographical areas with extreme values only, all these indices give only a limited view on the overall distribution and fail to possess many desirable properties of inequality indices required by theory. However, the advantage of the ranges and the Robin Hood Index is that these measures offer more understandable interpretation to wider health policy public than the Gini coefficient and other more mathematically complex measures (e.g., the Atkinson index and Theil's entropy measure which are not described here).

Does the choice of inequality measure matter? Under some circumstances it could; however, there is some evidence that the most common indicators are usually interchangeable. For example, Kawachi and Kennedy [4] calculated the income distribution for the 50 U.S. states and studied the relation of income inequality to mortality. Kawachi and Kennedy examined the following measures of income distribution: the Gini coefficient, the decile ratio, the proportions of total income earned by bottom 50%, 60%, and 70% of households, the Robin Hood Index, the Atkinson Index, and Theil's entropy measure. All inequality measures were highly correlated with each other, and in no instance did the correlation coefficient fall below 0.86 in the absolute value. Kawachi and Kennedy [4] concluded that a theoretical justification for the choice of indicator is

critical in assessing the impact of social and economic policies on income distribution and mortality. However, there is a little evidence to suggest that the choice of indicator will result in an absolutely different conclusion.

In this paper, the Robin Hood Index will be used as a measure of inequality. We believe that it represents the best measure for our analysis.

### 3 Results and Discussion

The basic country characteristics are presented in Table 1. The data relate to regions included in the study only (i.e. without excluded French and Spanish regions). The number of regions and the average size of region in case of Austria, the Czech Republic, and Romania were calculated after joining the capital region and the surrounding region. The largest average size of region was found in Turkey, followed by France. The smallest size of regions (measured by population) was found in Norway. The data on the numbers of doctors and hospital beds per 1000 inhabitants show large differences among the countries, with Austria and Turkey having the extreme values for both indicators (Table 1).

Table 1. Basic country characteristics

Country	Population	Number of Regions	Average Size of Region (Popul.)	Number of Doctors per 1000	Number of Hospital Beds per 1000
Austria	8 451 860	8	1 056 483	5.01	7.67
Bulgaria	7 284 552	6	1 214 092	3.77	6.29
Czech Republic	10 516 125	7	1 502 304	3.69	6.46
France	63 697 865	22	2 895 358	3.35	6.34
Hungary	9 908 798	7	1 415 543	3.18	7.03
Italy	59 685 227	21	2 842 154	3.94	3.41
Norway	5 051 275	7	721 611	4.33	3.88
Poland	38 062 535	16	2 378 908	2.24	6.58
Portugal	10 487 289	7	1 498 184	4.25	3.39
Romania	20 020 074	7	2 860 011	2.64	6.66
Slovakia	5 410 836	4	1 352 709	3.39	5.81
Spain	46 559 731	17	2 738 808	3.81	2.96
Turkey	75 627 384	26	2 908 746	1.77	2.67
Unweighted Average	27 751 042	12	1 952 685	3.49	5.32

Source: Author based on [2]

The calculated values of the Robin Hood Index for each country are presented in Table 2. In 10 of 13 countries, the differences in regional distribution are higher for doctors than for hospital beds. That could mean that ensure equal distribution of beds is easier than is the case with labour. Three highest regional inequalities in case of doctors were found in Slovakia, Hungary, and Turkey. One can expect that regional inequalities are higher in Turkey (large, geographically heterogeneous country), but not in relatively small countries as Slovakia and Hungary. The problem can be hidden in the relation between the capital and the surrounding region. At least in case of Slovakia. After joining NUTS 2 regions of Bratislava and Západné Slovensko (Western Slovakia), the Robin Hood Index have decreased from 11.71% to 3.66% for doctors and from 6.31% to 2.32% for hospital beds. However, it is quite problematic to evaluate such result as the number of Slovak regions is quite low (4 regions). In case of hospital beds, the highest inequalities were identified in Portugal, Spain, and Poland.

In the fourth column of Table 2, we sum up both RHI values to create a simple indicator of the countries with highest inequalities. The sum of RHI is greater than 15 for Portugal, Slovakia,

Turkey and Spain. On the other hand, the relatively low inequalities (Sum of RHI<10) were found in Bulgaria, the Czech Republic, and France.

**Table 2. The values of Robin Hood Index**

Country	Robin Hood Index Doctors	Robin Hood Index Hospital beds	Sum
Austria	6.46	4.32	10.78
Bulgaria	4.16	4.07	8.22
Czech Republic	6.38	2.45	8.83
France	5.99	3.45	9.44
Hungary	10.89	2.97	13.86
Italy	4.91	5.31	10.23
Norway	6.11	4.55	10.66
Poland	5.45	8.16	13.61
Portugal	9.31	9.16	18.48
Romania	8.61	3.47	12.08
Slovakia	11.71	6.31	18.02
Spain	8.46	8.68	17.14
Turkey	9.55	7.71	17.27
Minimum	4.16	2.45	6.61
Maximum	11.71	9.16	20.87
Unweighted Average	7.54	5.43	12.97

Source: Author

We analysed correlations between values of Robin Hood Index and total population of the country, number of regions, average size of region, number of doctors per 1000, and number of hospital beds per 1000. The Robin Hood Index for doctors is not correlated with any other variable, nor with the Robin Hood Index for hospital beds. The Robin Hood Index for hospital beds is significantly correlated at 5% level with the number of hospital beds per 1000. As it is negative correlation, the high number of hospital beds is associated with lower levels of inequality.

As an experiment, we assumed that all 155 studied regions form a single country. In such hypothetical case, it would be necessary to re-allocate 322 594 (RHI = 14.37%) doctors and 628 279 (RHI = 18.86%) hospital beds among regions. So the inequality between the countries would need larger re-allocation of health resources than inequalities within the countries. This is not so surprising.

In some inequality studies (e.g. [3]), the crude death rate (CDR) was used as a measure of health need by adjusting the number of population. It is assumed that the crude death rate (and the health need) will be higher in older populations than in younger populations. We calculated the CDR-adjusted population proportion  $p_i^{CDR}$  by formula:

$$p_i^{CDR} = p_i \frac{CDR_i}{CDR_{EU28}}, \quad (2)$$

where  $CDR_i$  is the crude death rate by the region of residence, which is normalized by  $CDR_{EU28}$  – the crude death rate for EU 28 countries in 2013. The CDR-adjusted values of the Robin Hood Index were higher than the unadjusted RHI values from Table 2 for all 13 countries. The unweighted averages of the Robin Hood Index were 9.84% for distribution of doctors and 7.08% for hospital beds. Such results can have two different explanations. First, the crude death rate is not a good estimator of health need, at least in this case. Second, it means that the geographic inequality in European countries is even higher than presented in Table 2 if the CDR-adjusted health need is taken into account.

## 4 Conclusion

The Robin Hood Index was calculated for 13 European countries to measure regional inequalities in the distribution of doctors and hospital beds. One key finding is that inequalities in the geographic distribution of health resources are still a policy issue even in developed European countries. In 10 of 13 countries, the differences in regional distribution are higher for doctors than those for hospital beds. It is evident that the value of the Robin Hood Index will never be zero in the practice, however the RHI values reaching 10% or more surely need the attention of the both central and regional governments. The crucial methodological issue is the measurement of inequality in cases of metropolitan regions surrounded by other regions. The health system of the Czech Republic is performing relatively well in this international comparison.

## Acknowledgements

The research was supported by the Czech Science Foundation, project no. 16-01821S.

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# Social Entrepreneurship: A Way of Developing Social Innovation in Regions

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## Abstract

Social innovation results in social changes and develops a potential to create new sources of sustainable growth and jobs. It can be approached as the key factor of regional development. It is especially significant upon reintegration of the unemployed on the labour market. The paper points to the regional dimension of social innovation, especially to one of its instruments - social businesses. Based on the analysis of theoretical approaches to examining the concept of social innovation and its possible positive impact from the viewpoint of territorial development, the objective of the paper is to present the current status of social businesses at European level and characterise their importance and position in Slovakia in terms of support of regional development.

*Keywords: social innovation; social business; regional development; local development; area*

JEL Classification: L31, O35

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## 1 Introduction

Social innovation can be considered a strategic social investment and can also be supported by social policy through developing social economy by creating a suitable legal environment and providing sufficient financial support.

Social innovation develops in three mutually complementing axes - area, living conditions and work and employment. [5] These three axes are intersecting, if particular forms of social innovation in a particular region are analysed, also with a special regard to social entrepreneurship.

The paper concerns the issue of social innovation development. Particular attention was paid to the regional dimension of social innovation, especially to one of its instruments - social businesses. Based on the analysis of theoretical approaches to examining the concept of social innovation and its possible positive impact from the viewpoint of territorial development, our objective was to present the current status of social businesses at European level and characterise their importance and position in Slovakia in terms of support of regional development.

## 2 Material and Methods

We were working with a number of information sources. The basic source of the obtained information and knowledge were research works, publications, national and strategic documents, legislative standards, annual reports as well as statistical databases. Our survey was based on a secondary analysis of source materials and data, especially the documents of the European Commission, European Parliament and annual report of "Social Economy Europe" organisation. Due to a lack of comparable European statistical data on individual entities of social economy and social businesses, we also relied on partial results of a questionnaire survey of the International Centre of Research and Information on the Public, Social and Cooperative Economy (CIRIEC). The survey [3] was conducted in February, March and April 2012. The questionnaire survey comprised 52 respondents - academics, experts working in the fields representing social economy and high-ranking state officials representing the government level in social economy from the given countries - Table 1. In addition to the aforementioned external sources of secondary data, we were also working with national statistical data obtained from the database of the Central

Office of Labour, Social Affairs and Family (data on national and regional unemployment rates, data on the number of social businesses from the register of social businesses) and the Government Office of the Slovak Republic (data from development action plans elaborated for the least developed regions).

### 3 Results and Discussion

Social innovation can represent an instrument of participation, encouraging permanent changes of individuals, developing them in order to acquire abilities for their development throughout their lives. This approach began to develop in the 1970s and to gradually affect the formation of social policy and understanding of the significance of social work in Europe. The following authors are among those who made a significant contribution in this area. According to Taylor [24], social innovation represents new ways of doing things with an explicit purpose to respond to social needs such as poverty and crime. According to Chombart de Lauwe [10], social innovation is an influence on the creation of new social structures, new social relations and new methods of making decisions. This influence is based on realising changes they are to bring in society. According to Lallemand [14], a practice supporting participation of excluded population in social systems is considered a social innovation. Auclair and Lampron [2] underlined an integrated approach in social work, resulting in innovation upon providing social services. The integrated approach recognises the autonomy of people and their potential to solve their problems. According to Sabel [21], local partnerships (or groups of local development) are manifested as social innovations especially due to the ways of their organisation and their structures, enabling innovative solutions to economic and social problems. In his view, such specific approach is focused on reintegrating the unemployed on the labour market. It is an approach to local development in which a business, employment, education and training, community development of municipalities, environmental issues and infrastructure are considered components of a single unit.

Social innovation in businesses is a part of structural development of production, especially pointing to new forms of organisation of work. Schumpeter [22] is considered a founder and reference of the analysis of innovation in economic sciences. He was the first to emphasise the need of social innovation in order to ensure at least partial effectiveness of technological innovation. The social nature of innovation, implemented by businesses, has recently been paid particular attention [16]. According to Kanter [13], social innovation ensures business opportunities such as a partnership between private businesses and public interests, generating sustainable changes beneficial for both sides. The concept of social innovation, which has been dealt with by the Stanford Social Innovation Review (since 2003), concerns individual approach, compassion and altruism in relation to the most disadvantaged and endangered groups of society. This approach began dealing more with the issues of socio-economic actors and linking the public, private and third sectors in order to ensure dialogue between the participants, aiming at understanding and generating permanent changes [11]. According to Phills Jr., Deiglmeier and Miller [17], social innovation is defined as a new solution to a social problem, which is many times more effective, efficient, sustainable and fair than provisional solutions and which brings benefits for society. This definition introduces the notion of general interest. The common good is actually a dimension denoting the greatest specificity of social innovation compared to other forms of innovation [15]. Social innovation also includes [19] new processes, new working procedures in cooperation and implementation of new social practice. Creative entrepreneurs intervene in the system of social relations and work on their changes. Individual initiative has a significant role upon common changes. The basis is people standing outside the system who are unsatisfied with some aspects of its performance [12].

Under the current conditions, social businesses are perceived as the key factor in the European area from the perspective of fulfilling the main priorities of the Europe 2020 Strategy. They contribute to intelligent growth by responding to unsatisfied social needs, thus ensuring their satisfaction. They can have a significant impact on environment, e.g. they are able to develop

efficient methods leading to waste reduction, thus contributing to stimulation of sustainable growth [7]. At the same time, they contribute to the reinforcement of social cohesion or job creation, thus also leading to support of inclusive growth. As understood by the European Commission, social businesses can be defined as businesses pursuing a social objective, which is also a motive of their activities. The activities of social businesses are frequently linked to a high level of social innovation. Their objective is not to maximise profits. On the contrary, profits are reinvested especially in carrying out business activities [6]. Social businesses are relevant actors in social economy. There are two million social businesses and social economy organisations in the EU, representing approximately 10 % of all businesses of the Union. Social economy provides employment to more than 14.5 million people, representing approximately 6.5 % of employees in the EU. [23]. The sectoral consideration can be a basis of identifying the aim of the activities of social businesses in individual member states. From this perspective, a broad spectrum of the activities of social businesses can be specified, including: *social and economic integration of disadvantaged* (e.g. long-term unemployed persons) *and excluded persons* (work integration and sheltered employment); *social services of general interest*, including services such as long-term care of the elderly and persons with disabilities, education, employment, health care, etc.; *other public services* (e.g. maintenance of public spaces); *strengthening of democracy, civil rights and digital participation*; *environmental activities* (focused on e.g. reduction of waste and emissions, on renewable energy sources); *cultural, sport and leisure activities*; as well as *development of solidarity with developing countries* (e.g. support of fair trade). [8]

At European level, social entrepreneurship has a central role upon supporting a highly competitive social market economy, which is also reflected in the perception of social entrepreneurship as one of the instruments encouraging social innovation not only in the given strategy but also in its main initiatives. In order to support growth and development of social entrepreneurship, a number of measures or activities has been adopted over the last years, aiming at the financial support of social entrepreneurship by means of the EU Programme for Employment and Social Innovation, financial support from the European Social Fund, as well as development of instruments designed to promote it or exchange well-established procedures (e.g. the launch of Social Innovation Europe portal). The aforementioned measures are among the key measures defined in the action plan for promoting social entrepreneurship of the Social Business Initiative, launched in 2011. The given activities and measures aim at supporting social economy and, in its framework, at improving the position of social businesses in individual member states and their development. The levels of their acceptance as well as the existing financial, legal and administrative environments for such businesses differ in individual countries. The following table provides an overview of the level of national acceptance of the “social business” concept in individual member states. Since there are no comparable European statistical data on social economy, which is especially due to a lack of a single and accepted definition of social economy and difficulties in obtaining precise statistical data on individual players of social economy, including social businesses from the viewpoint of their statistical classification [9], we build upon the data obtained from a questionnaire survey on the present state of social economy in individual European countries, conducted by CIRIEC in 2012.

**Table 1. The level of acceptance of the “social business” concept in the country**

<b>Level</b>	<b>Country</b>
Low or absent level	Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Romania, Slovenia, Spain, Croatia
Moderate level	Austria, Belgium, Bulgaria, Cyprus, Denmark, France, Germany, Greece, Ireland, Italy, Malta, Portugal, Slovakia, United Kingdom
High level	Finland, Netherlands, Poland, Sweden

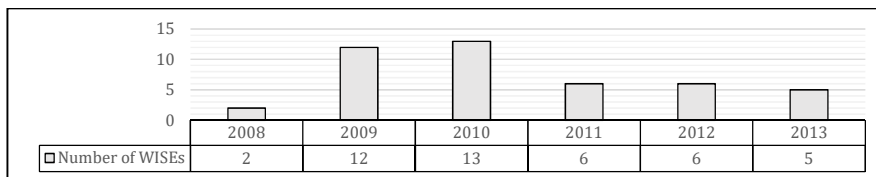
Source: Authors based on [3]

One of the key purposes of social businesses is their ability to link a business idea with a social objective. Their benefits in supporting employment of disadvantaged applicants for a job (long-term unemployed, graduates, persons with disabilities) can be highlighted from this

perspective. The countries developing the concept of work integration social enterprises (WISEs) include the Slovak Republic. The legal status of social businesses was enshrined in Slovak law in an amendment of Act 5/2004 Coll. on employment services and on change and amendment of some laws with effect from 1<sup>st</sup> September 2008. Social businesses became one of the instruments of active measures on the labour market. Financial support from public sources was provided to the regions with persistent high levels of long-term unemployed persons. Government grants including financial support from the EU were allocated to eight pilot social businesses in the regions of Banská Bystrica, Prešov and Košice. However, the creation and implementation of pilot social businesses resulted in a failure and subsequent mistrust in them due to misused public funds. Consequently, they were gradually cancelled. The amendment to law enabled building social entrepreneurship also at the level of self-governments, as municipalities are entitled to establish social businesses. In municipalities with high long-term unemployment rates, their business activities are frequently the only possibility of improving employment in the given municipality. In this regard, instances of good practice are appearing, which are related to the creation of jobs by social businesses established and exclusively owned by the given municipality (e.g. the municipality of Spišský Hrhov).

According to the Act on Employment Services [26], a work integration social enterprise can be established by a natural or legal person which hires at least 30 % of the employees from among disadvantaged job applicants (disadvantaged job applicants are specified in the Act on Employment Services) and which keeps at least 30 % of the financial resources representing income from its business activities remaining after paying all expenses related to its business activities in order to create new jobs or improve working conditions every year. Work integration social enterprises have to be registered in the register of work integration social enterprises kept by the Central Office of Labour, Social Issues and Family. 44 social businesses are incorporated in the register (as of 31<sup>st</sup> March 2014). [20] Figure 1 provides information on the development of the number of social businesses in the monitored period 2008 - 2013, whose operation had not been suspended or cancelled since their establishment. Year 2008 appears the most critical, which might also be related to the establishment of the first of the aforementioned bigger social businesses with a significant support from the public funds. Work integration social enterprises are at the same time obliged to provide their employees help upon finding employment on the labour market through their cooperation with the labour office, legal or physical persons encouraging or achieving integration of the disadvantaged persons on the labour market. The given obligation of work integration social enterprises is also related to the fact that they only represent a certain intermediary before further (potentially long-term) employment of such persons.

**Figure 1. The number of registered WISEs in the given year, whose operation had not been suspended or cancelled**



Source: Authors based on [20]

The formation of social businesses in Slovakia has currently experienced a renewal as a result of their identification as one of development instruments of twelve districts with the highest long-term unemployment rates in Slovakia. While the overall unemployment rate in Slovakia was approximately 10.6 % at the end of 2015 [4], it reached considerably higher levels in the aforementioned least developed districts (Table 2). Support of the least developed districts, which will be provided on the grounds of development action plans for the given districts over the period of five years, is to contribute to reducing the disparities compared to the national average. Their



gradual approvals in individual districts were carried out from February to September. However, what should be highlighted is the fact that each action plan reflects the specificities of the given district (also from the perspective of the cause of its economic straggling). Searching for solutions is thus approached on the basis of this perspective. They also include support of local development of the disadvantaged regions in Slovakia through establishing social businesses focused on regions, reflecting their specificities, and their purpose should be to contribute to supporting both regional and local economies, lead to unemployment reduction and improvement of the quality of life in the given region. Establishing social businesses in the twelve least developed districts of the regions of Banská Bystrica, Prešov and Košice will be supported from both the state budget in the form of a regional contribution [27] (Table 2.) and European funds.

**Table 2. Planned establishment of social economy players in the least developed districts**

<b>LDD</b>	<b>LU [%]</b>	<b>The number of planned projects aimed at creating social economy players and their focus</b>	<b>EERC</b>
Lučenec	17.53	minimum 6, focused on community services in building and agriculture, social work and care services, repairs of local roads, agricultural activities, etc.	EUR 1,025,000
Poltár	20.87	minimum 10, creation of social businesses in municipalities aimed at building activities, fruit processing, building an extensive sewerage treatment system, etc.	EUR 1,380,000
Revúca	19.97	minimum 6 social businesses focused on community services e.g. in the following areas: building, auxiliary and maintenance works, locksmithing and plumbing, carpentry, maintenance of local roads, care of forest funds	EUR 685,000
Rimavská Sobota	27.42	minimum 7, focused on community services and services in selected towns and municipalities, aimed at reducing poverty of marginalised groups	EUR 1,300,000
Veľký Krtíš	18.45	minimum 6, focused on community services in the following areas: reconstruction and building works, provision of social and cultural services to citizens, etc.	EUR 800,000
Kežmarok	23.44	minimum 4, focused on community services in the following areas: environmental projects, public spaces, green infrastructure, affordable social housing, etc.	EUR 570,000
Sabinov	18.69	minimum 10 social businesses focused on community services in the following areas: minor works in building, social services and care services, production of packaging, manufacturing of products, etc.	EUR 705,000
Svidník	19.38	minimum 6, focused on community services in the following areas: services, manufacturing of paving blocks, wooden products, implementation of flood prevention measures, etc.	EUR 650,000
Vranov nad Topľou	17.8	minimum 11, focused on community services in the following areas: community services, day care centre and care services, building works, training centre for special forestry machines, engineering works, etc.	EUR 1,200,000
Rožňava	21.58	minimum 8, focused on pilot examination of social innovation, work book of a job applicant dealing with solutions to the issue of employment of long-term unemployed by a system of voluntary interest of the unemployed themselves in a certain activity, etc.	EUR 1,278,000
Sobrance	18.4	minimum 7, focused on community services, improvement of housing capacities and service provision, etc.	EUR 715,000
Trebišov	18.42	minimum 6, focused on community services in the following areas: gardening, vegetable growing, development of bee-keeping, establishment of a tailor workshop, pavement reconstruction, building activities, etc.	EUR 1,850,000

*Note: LU - level of unemployment, LDD - the least developed districts, EERC - expected expenditure of the regional Contribution*

*Source: Authors based on [25], [4]*

## 4 Conclusion

Social businesses can be considered one of the key instruments of social innovation in the process of creating new sources of sustainable growth and jobs. Tendency towards the development of social economy is growing in the EU, along with the tendency towards activities and measures leading to successful establishment, strengthening and development of social entrepreneurship. Such activities and measures especially aim at creating a comprehensive financial support of social entrepreneurship as well as instruments of its promotion or exchange of well-established procedures. The potential and capacity of social innovation and social businesses to bring solutions to the current challenges in society are highlighted. Public policy has an important role from this perspective, as it should facilitate the creation of social innovation corresponding to national priorities, development and social needs. It is important to frame public policies in favour of social innovation. It requires development of a national innovation strategy, also supporting social innovation. In addition, accompanying and innovative instruments of funding need to be developed and adapted to the specificities of social innovation. Public policies should support initiatives of the third sector (social entrepreneurs). Basic support systems for social innovation should be created in the given regions. In this context, regions should become participants and supporters of social innovation. The analysis implied that different levels of acceptance of the national concept of social business and related different levels of the existing financial, legal and administrative environments for such businesses and perception of the concept itself - a broader or a narrower concept - have continued in individual member states. An instance of narrower perception of the social business concept is the Slovak Republic, which is among the countries developing the concept of work integration social enterprises (WISEs). From this perspective, their operation is focused on the area of supporting employment of disadvantaged job applicants. Social businesses can be of particular significance in supporting regional development. After negative experience in establishing social businesses, Slovak social businesses have been experiencing a revival. Their regional dimension in eliminating differences between Slovak regions has strengthened. Social businesses establishment plan is a part of the latest measures to support the least developed districts. It is important to point out that the focus of newly established social businesses reflects specificities of the given region, their purpose should thus be to contribute to supporting both regional and local economies and lead to unemployment reduction in the given region. Gradual steps to the planned focused support with precisely defined conditions in contrast to the previous fragmented initiatives leading to their establishment can be considered positive. However, the undisputed cornerstone in the development of social businesses is completion of a legislative framework for social entrepreneurship, resulting from the lack of a special legal standard for social businesses, and creation of an umbrella organisation operating as a support mechanism and mentor for social businesses, e.g. in the area of providing advisory services and knowledge, in the support in building partnerships and cooperation at both national and international levels, in organising educational activities or exchanging experience and well-established procedures. In this relation, experience from the existing successful social businesses at the level of self-governments, which has been well-established in practice, can be beneficial.

## Acknowledgements

The paper has been supported by research project VEGA No. 1/0266/16 Public Policy as a Way of Fulfilling the Social Dimension of EU.

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# Impact of Demographic Trends on Sustainability of Healthcare Financing in the Czech Republic

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## Abstract

The paper deals with the revenues and expenditures of Czech health system related to selected groups of state insured persons (pensioners and children) and maps the trends in healthcare system solidarity (i.e. in the transfer of expenditures on working people). The solidarity grew continuously in the monitored period (with the exception of some years, when the assessment base increased). The difference between revenues and expenditures grew during the years 2000 and 2017 in an annual average of 6.7%. It was found out (based on calculations with different annual growth rates of assessment base in the period 2018 to 2029), that for the same annual growth of difference (6.7%) while maintaining demographic conditions and predicted expenditure growth, it is necessary to increase the assessment base about the value from the interval between 6 % and 7.5 % (exactly 6.5 %) yearly.

*Keywords: ageing; healthcare; public expenditures; sustainability*

JEL Classification: H51, I14

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## 1 Introduction

Public expenditures allocated into healthcare systems grow in all developed countries. The scope of services is highly influenced by political and social development in the territory. Governments must deal with ever increasing spending on ensuring and maintaining access to health services with appropriate quality and safety of their provision. Public budgets significantly contribute to financing of healthcare in many countries. It is mainly due to the obligation of healthcare availability also for people unable to pay the health insurance because of various reasons (age, health status, specific social situations). There is no direct link between the payments of contributions to cover health service and its drawing, which means that in this respect the system is very solidary.

Healthcare financing can be realized through "special health insurance" or directly from the state budget through a dedicated percentage of collected taxes.

There are attempts to implement excise taxes on chosen "unhealthy" products (e.g. sugar, high caloric diet etc.), whose revenues would be allocated directly to the healthcare system. The tax collection efficiency should not be omitted, so it is necessary to compare theoretical revenues with administrative costs. The question is how to determine harmful products. Moreover, it is questionable whether the imposition of such taxes will force the taxpayer for reduction of harmful activities. The problem is also that health status is affected by many factors. Impacts have lifestyle (50 %), environment (20 %), genetic predispositions (15 %) and healthcare system (15 %) [4] [8]. Social determinants (education, income, employment, quality and location of living, etc.) have important role too [7]. It is apparent that the implementation of such taxes is a complex issue and it is very doubtful whether their applications will achieve desired goals.

The last healthcare financing option is private health insurance. It is associated with uninsurability risk for many people because of their health status or their low income.

The state budget in the Czech Republic contributes to healthcare financing through payment for "state insured persons". The payment for state insured persons is uniform. Funds paid for them are mainly redistributed among health insurance companies based on the age and sex. The revenues and expenditures of the public health insurance system associated with state insured persons are significantly different [9].

The impact of population ageing on the sustainability of public finance (especially on pension system) is frequently discussed now. The healthcare system should not be neglected, since ageing has an impact on health expenditures due to increasing life expectancy [6] [10]. The setting of payment is regularly discussed at meetings of the Ministry of Health and the Ministry of Finance. The decision on changes in the amount of payment for state insured persons is mainly political.

The aim of this paper is to quantify the pace of annual growth of payment for maintaining the same level of solidarity between working and nonworking people. Working people are the ones between the age of 15 and 65 years. For more detailed analysis were chosen from all state insured persons just pensioners and children under 15 years of age, because of their share on the total number of state insured persons. In the year 2015 seniors accounted for 47 % and children up to 15 years 28 % of all [11].

## 2 Material and Methods

Data from the Czech Statistical Office (CSU) were used for expenditure modelling, namely data on average healthcare spending per one insured person by age and sex (in CZK) from publications Medical accounts of the Czech Republic (Zdravotnické účty ČR) for years 2000 to 2014 [3]. In this time period annual changes of expenditures were calculated and then their geometric means for groups divided due to sex and age. Geometric means were used for expenditures prediction in the coming years. The validity of this procedure has been verified. The spent expenditures on health services of all health insurance companies were compared with the values obtained on the basis of relevant population data in the distribution by age and sex multiplied by expenditures for that group. Both values were for the reference period (years 2000-2015) almost the same, so it can be assumed that this technique is suitable for predicting in the future. On the revenue side of the system, there were calculated options with annual rise of the assessment base for one insured person of 1 %, 2.5 %, 4 %, 5 %, 6 %, 7.5 % and 10 %. The last approved amount, i.e. 920 CZK for the year 2017 was taken as a zero value. The values have been selected to be higher and lower than the average annual growth of the assessment base in the period 2000 to 2017 (5 %).

Expenditures and revenues were predicted to the year 2029 due to the length of available time series (period from the year 2000 to 2014), so the analysis was made for the same time interval. Data about the number of people in each group were obtained for the years 2000-2015 from the CSU statistics on the actual number of inhabitants of the Czech Republic on the last day of chosen year [2]. These data are not available for the period 2016 to 2029, so it was taken from the medium variant of The population projection of the Czech Republic by 2100 [1]. Total numbers of children and pensioners were calculated due to the structure of published data by summing up of relevant age groups of men and women in age groups 0-14 years, 15-64 years and over 65 years.

Total revenues in chosen year (i) were determined according to the formula no. 1:

$$R_H = N_i * P_i \quad (1)$$

where:  $R_H$  = total revenues,  
 $N_i$  = number of persons for the monitored group (pensioners or children),  
 $P_i$  = year payment per one state insured person.

Total expenditures in chosen year (i) were determined according to the formula no. 2:

$$E_H = N_i * AE_i \quad (2)$$

where:  $E_H$  = total expenditures,  
 $N_i$  = number of persons for the monitored group (pensioners or children),  
 $AE_i$  = average expenditures on healthcare per one insured person (due to sex and age).

The differences between the revenues and expenditures for the groups of 0-14 years and 65 years and over represent the amount that must be redistributed from income-earning population

groups. Relevant annual growth for achieving a constant value (or annual increases of 6.7 %) of these differences was then established.

The paper thematically links to the research article which deals with redistribution effects of public health insurance in the Czech Republic in the year 2011 [5].

### 3 Results and Discussion

The first chapter focuses on healthcare system solidarity in the years 2000 to 2016. The year 2017 is monitored separately, because it is the last year, when the amount of payment is legislatively provided. It is assumed that politicians (and other civil servants) are specialists, so they professionally determined the assessment base and they want in the future a similar degree of redistribution as it is formed by this channel now. Situation in the year 2017 is considered to be zero (wanted) one. The required annual growth of payment for offsetting the negative trend caused by demographic changes while respecting a similar impact on workers as in the year 2017 (respectively this difference grew at the pace as in previous years, i.e. 6.7 % per year) is being discussed in the last chapter.

#### 3.1 Period 2000 to 2016

The tendencies of differences between the revenues and expenses for a group of seniors and children in a time period between 2000 and 2016 are followed as the first step in this analysis. The reason for it is to verify whether the values in the year 2017 are consistent with long-term trends and are not just a random situation.

**Table 1. Differences between revenues and expenditures with chosen state insured persons in CZK**

Year	Children		Pensioners		Both	
	All in bn.	Per one	All in bn.	Per one	All in bn.	Per one
2000	-3.5	-2 074	-28.7	-20 138	-32.1	-10 400
2001	-3.3	-2 060	-32.1	-22 708	-35.5	-11 679
2002	-3.6	-2 278	-36.7	-25 913	-40.4	-13 421
2003	-3.9	-2 538	-39.5	-27 727	-43.4	-14 578
2004	-4.0	-2 613	-39.8	-27 733	-43.8	-14 781
2005	-5.5	-3 638	-49.0	-33 677	-54.5	-18 429
2006	-3.6	-2 402	-49.0	-33 109	-52.6	-17 771
2007	-3.0	-2 009	-51.3	-33 892	-54.2	-18 142
2008	-4.2	-2 843	-57.2	-36 744	-61.4	-20 219
2009	-5.8	-3 912	-69.3	-43 367	-75.2	-24 306
2010	-3.3	-2 185	-63.8	-38 986	-67.0	-21 272
2011	-5.8	-3 750	-70.4	-41 388	-76.2	-23 499
2012	-5.3	-3 393	-72.3	-40 902	-77.6	-23 316
2013	-6.0	-3 831	-72.9	-39 947	-79.0	-23 206
2014	-3.8	-2 348	-74.4	-39 560	-78.1	-22 447
2015	-3.9	-2 405	-80.6	-41 692	-84.5	-23 754
2016	-4.1	-2 538	-85.5	-44 087	-89.6	-25 264

Source: Author

Table no. 1 shows a significant increase in the difference between revenues and expenditures. The gap was smaller in the years 2006, 2010 and 2014 than in previous years. This was due to the increase in the assessment base for state insured persons in a given year.

### 3.2 Year 2017

The situation in the year 2017 was analysed in more detail. Concrete numbers of revenues, expenditures and differences were calculated and are presented in the following table. It will be necessary to reallocate from workers in the year 2017 approximately about 96 billion CZK. That means per one pensioner (child) 26 710 CZK. In comparison with the year 2016, although there will be a revenue increase of 2.8 billion CZK, but on the other hand expenditures will increase by 9.8 billion CZK. So the difference will increase annually by 7.7 %. There is no doubt about the continuation of negative trends in terms of increasing burden on workers.

**Table 2. Differences between revenues and expenditures in the year 2017 in CZK**

	Children		Pensioners		Both	
	All in bn.	Per one	All in bn.	Per one	All in bn.	Per one
<b>Revenues</b>	17.8	11 040	22.0	11 040	39.9	11 040
<b>Expenditures</b>	21.7	13 433	114.7	57 422	136.4	37 750
<b>Difference</b>	-3.9	-2 393	-92.6	-46 382	-96.5	-26 710

Source: Author

### 3.3 Prediction for the Years 2018 to 2029

The prediction for the years 2018 to 2029 is made as the comparison of revenues and expenditures of healthcare system with different inter-annual changes of assessment base by 1%, 2.5 %, 4 %, 5 %, 6 %, 7.5 % and 10 %.

**Table 3. Differences between revenues and expenditures with chosen state insured persons**

Year	1 %		2.5 %		4 %		5 %		6 %		7.5 %		10 %	
	All in bn. CZK	Y/Y in %	All in bn. CZK	Y/Y in %	All in bn. CZK	Y/Y in %	All in bn. CZK	Y/Y in %	All in bn. CZK	Y/Y in %	All in bn. CZK	Y/Y in %	All in bn. CZK	Y/Y in %
<b>2018</b>	-105.8	9.7	-105.2	9.0	-104.6	8.4	-104.2	8.0	-103.8	7.6	-103.2	6.9	-102.2	5.9
<b>2019</b>	-115.8	9.4	-114.5	8.8	-113.2	8.2	-112.4	7.8	-111.5	7.4	-110.2	6.8	-107.9	5.6
<b>2020</b>	-126.3	9.1	-124.4	8.6	-122.4	8.1	-121.0	7.7	-119.6	7.3	-117.5	6.6	-113.8	5.4
<b>2021</b>	-137.5	8.9	-134.9	8.4	-132.1	7.9	-130.1	7.6	-128.2	7.2	-125.1	6.5	-119.7	5.2
<b>2022</b>	-149.6	8.8	-146.2	8.4	-142.6	8.0	-140.0	7.6	-137.4	7.2	-133.3	6.5	-125.9	5.2
<b>2023</b>	-162.3	8.5	-158.1	8.2	-153.6	7.7	-150.4	7.4	-147.1	7.0	-141.8	6.4	-132.1	4.9
<b>2024</b>	-175.3	8.0	-170.3	7.7	-164.9	7.3	-161.0	7.0	-156.9	6.7	-150.3	6.0	-138.0	4.5
<b>2025</b>	-188.5	7.6	-182.8	7.3	-176.4	7.0	-171.8	6.7	-166.9	6.3	-158.8	5.7	-143.6	4.1
<b>2026</b>	-202.8	7.6	-196.2	7.3	-188.9	7.0	-183.5	6.8	-177.6	6.4	-168.0	5.8	-149.4	4.0
<b>2027</b>	-218.2	7.6	-210.8	7.4	-202.4	7.1	-196.1	6.9	-189.3	6.6	-177.9	5.9	-155.4	4.0
<b>2028</b>	-234.7	7.6	-226.5	7.4	-216.9	7.2	-209.7	6.9	-201.8	6.6	-188.4	5.9	-161.5	3.9
<b>2029</b>	-253.2	7.9	-244.0	7.7	-233.2	7.5	-224.9	7.3	-215.8	7.0	-200.2	6.3	-168.2	4.1
<b>Av. change</b>		<b>8.4</b>		<b>8.0</b>		<b>7.6</b>		<b>7.3</b>		<b>6.9</b>		<b>6.3</b>		<b>4.7</b>

Source: Author

Table no. 3 shows that if the annual growth of the assessment base will be less than 5 %, the difference between, what the public health insurance system collects and pays in relation with the group of pensioners and children, will significantly increase. The results are not better in the case of remaining variants of growth. The annual growth of payment cannot be too high, because it is a significant expense of the state budget. A faster growth can affect negatively the sustainability of Czech public finances.



It is completely unrealistic to maintain a degree of redistribution as it is at this time (in the years 2016 or 2017) due to the adjusted range of services and assumed demographic changes. The differential indicator grew annually in recent years (2000 – 2017) by an average of 6.7 %. In order to maintain the annual average growth of difference at 6.7 % it will be necessary to increase the assessment base of 6 – 7.5 % each year (exactly 6.5 %). Monthly payments for one state insured person after application of 6 %, 6.5 % and 7.5 % annual growth rate are calculated in the table no. 4.

**Table 4. Changes of monthly pay for one state insured person (2017 = 920 CZK)**

Growth	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
6 %	975	1 034	1 096	1 161	1 231	1 305	1 383	1 466	1 554	1 648	1 746	1 851
6.5 %	980	1 043	1 111	1 184	1 260	1 342	1 430	1 523	1 622	1 727	1 839	1 959
7.5 %	989	1 063	1 143	1 229	1 321	1 420	1 526	1 641	1 764	1 896	2 038	2 191

Source: Author

Table no. 5 summarizes the related impacts on the state budget (no changes in legal conditions and determining of the public health insurance are assumed). Here should be noted that the revenues (expenditures of the state budget) are analysed with just only a certain group of state insured persons. For a better notion may be also stated that the revenues for children and pensioners (while using the same methodology) are estimated of 36 billion CZK in the year 2015, 37 billion CZK in the year 2016 and 39.9 billion CZK in the year 2017. Using of all growth rates will cause the increase of the state budget expenditures. There are many factors that should not be omitted - the scope of health services provided within the public health insurance system, the possibilities of the state budget and also the Czech government priorities.

**Table 5. Revenues of the health insurance system with chosen state insured persons (in bn. CZK)**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
6 %	43.0	46.3	49.7	53.2	56.8	60.4	64.0	67.6	71.3	75.5	80.0	85.0
6.5 %	43.2	46.7	50.4	56.3	58.2	62.2	66.1	70.1	74.4	79.2	84.2	89.9
7.5 %	43.6	47.6	51.8	56.3	61.0	65.7	70.6	75.6	81.0	87.0	93.3	100.6

Source: Author

## 4 Conclusion

Demographic changes, especially ageing of the population, have an impact in many areas of the public sector. In healthcare, first of all there is a need for systemic changes (for example in the structure of the bed fund of inpatient healthcare facilities). People gain at this time ever-improving medical procedures, live longer and spend more healthcare.

The pressures on the revenue side of the system should not be neglected, because the state insured persons are the majority of all insured persons in the Czech healthcare system. Among them pensioners and children are the largest groups. Healthcare system is already a strong redistributive channel from working people in favour to state insured persons. So the question is, how much due to population ageing this trend will deepen in the future. Solidarity grew continuously in the monitored period (with the exception in some years, when the assessment base increased). It was determined (based on the model) that in the time period 2000-2017 grew the difference between revenues and expenditures in an annual average of 6.7 %. The year 2017 is the last year, when the amount of payment is legislatively provided and according to this year assessment base changes were modelled for remaining the same degree of solidarity.

It is completely unrealistic to maintain a degree of redistribution as it is at this time (in the years 2016 or 2017) due to the adjusted range of services and assumed demographic changes. These requirements are beyond the financial capacity of the Czech state budget.

A research question was furthermore modified on how the assessment base should rise annually in the years 2018 to 2029 to maintain an annual growth of the difference between revenues and expenditures in amount of 6.7 % (the average annual growth of difference in time period 2000 – 2017). Based on the variant calculation was found out that the annual growth of the assessment base should be from a range between 6 and 7.5 % (precisely 6.5 %). Further specification of values can be misleading because of many factors that must be taken into account when deciding. It would be interesting in the future research to further examine accurate quantification of redistributive impacts of healthcare system on different population groups.

The determination of automatically optimizing mechanism for the assessment base associated with the development of selected macroeconomic variables is a very current topic now in the Czech Republic. Firstly, it is not clear, what is the best macroeconomic aggregate for these purposes. The risk is, as it is always a political decision, that mechanism can be changed with next elections. It is quite problematic for ensuring the sustainability and financial stability of healthcare financing in a long term period, so it is important to reach the agreement across all political parties on such a fundamental change.

## Acknowledgements

This article has been elaborated as one of the outcomes of the research project "Public Finance in the Czech Republic and the EU" registered by the Internal Grant Agency of University of Economics, Prague under the registration number F1/1/2016.

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# Health Care Public Investment Subsidies: Case study of Palliative Care in the Czech Republic

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## Abstract

When designing a public investment programme it is necessary to pay attention to how the goal indicators of the programme are set. If the goals chosen are not suitable there is a risk of ineffective use of public resources. This paper presents a case study of a public investment programme supporting palliative care in the Czech Republic. It focuses on a comparison of good practice, OECD recommendations for performance management and the current investment subsidies programme proposed by the Ministry of Healthcare. The authors recommend changes to the proposal in order to enhance the effectiveness of its state financing.

*Keywords: public investment; health care; performance budgeting*

JEL Classification: H51, I14, I18

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## 1 Introduction

Palliative care in the Czech Republic is not one of the most popular topics in healthcare, either from the point of view of public finance, nor in terms of the attention given to it by experts on the economics of healthcare. The final moments of human life are also not particularly popular among politicians or the electorate.

However, the Ministry of Healthcare (MoH) has recently decided to enhance its support for palliative care by means of a new investment subsidies programme. This programme is currently under discussion with the Ministry of Finance, whose agenda it is to approve investment programmes for all ministries, because these programmes make use of state finances. If the programme is approved, state budget resources can be allocated to it.

The main objective of this paper is to evaluate the proposed programme for supporting palliative care in the Czech Republic and establish whether it meets the recommended principles of performance budgeting. The paper focuses on the programme's goals, which are crucial elements for the effective allocation of public resources.

The paper is divided into four parts. The first part describes the respected principles of performance budgeting, in particular as regards setting the goals. The second chapter introduces MoH's intentions and the main features of its proposed programme. We then confront this with good practice in performance budgeting. The last chapter concludes our findings and recommends changes to the programme design.

## 2 Material and Methods

### 2.1 *The Performance Management of Programmes: Selected Methods*

In this part of the paper we introduce some of the approaches to performance measurement. Some of them are applied in the private sector but can be also translated into the public sector for programme management. This is important because programme objectives ought always to specify milestones to be attained within certain time periods, but in practice, statements of objectives are often overly general, vague and open-ended in terms of their timescale. [8]

These approaches are used as benchmark methods a provide criteria for evaluation of proposed subsidy programme of the MoH. The first one, SMART strategy is commonly used for setting the goals properly. The second, OECD Performance Management manual, is recommended

by this international respected organisation when designing public finance programmes. Finally, the result chain of performance concept enables to point out on the basic misconception of the proposed programme.

One widely used method is known as the *S.M.A.R.T strategy* (a mnemonic acronym) and was first mentioned by George T. Doran in the November 1981 issue of Management Review. According to this strategy, objectives should be *Specific* – they should target a specific area for improvement; *Measurable* – they should quantify or at least suggest an indicator of progress; *Assignable* – they should specify who will do it; *Realistic* – they should state what results can realistically be achieved, given the resources available; and *Time-related* – they should specify when the result(s) can be achieved [4].

Even though the original characteristic of the third smart objective was Assignable, for the purposes of our paper we would choose another option mentioned by other authors - Achievable. This implies a necessity to set objectives at the right level, so that they are not only ambitious but also achievable. According to OECD it is vital to ask key performance management questions in the following areas when setting objectives for various public tasks:

- Management and Improvement: is the internal use of performance management, to support management and continuous improvement, a major objective?
- Accountability and Control: is the external use of performance management, to increase accountability to responsible ministers or to the public, a major objective?
- Savings: are direct savings on the budget a major objective? [7]

As every public programme should be evaluated, the following questions must also be asked for performance management as presented by the OECD:

- Indicators: are simple and transparent indicators used as performance measures?
- Measurement Systems: are specialised systems used to measure performance?
- Qualitative Measures: are qualitative, indirect measures used along with quantitative measures?
- Processes (Activities): are measures of processes, activities or new initiatives important in performance measurement?
- Efficiency (Outputs): are measures of outputs important in performance measurement?
- Effectiveness (Outcomes): are measures of outcomes important in performance measurement?
- Service (Delivery) Quality: are service quality measures important in performance measurement?
- Financial Performance (Economy): are financial measures (cost of inputs, etc.) important in performance measurement? [7]

As a result, well-defined programmes need to be anchored in a strategic plan incorporating the aspects listed below.

- General or strategic goals and objectives for the organization's main functions and operations.
- A description of the guidelines to be followed to attain the goals and objectives.
- Identification of external factors crucial to the organization which are beyond its control and which could have a significant impact on the attainment of general goals and objectives.
- The plan is used to define or revise general goals and objectives. [3]

OECD recommends that the strategic plan's term of duration should not only exceed five years, but should be consistent with a medium-term budget framework, which is periodically updated. On the base of the strategic plan, annual implementation plans or operating plans are made. This should all be prepared with direct links between the long-term goals of the strategic plan and those identified in the budgets, to provide a point of reference for annual progress evaluations.

Other authors emphasize the importance of the result chain of the performance concept: "In the results chain framework, outputs are produced using inputs (resources) via activities and processes, and outputs generate outcomes for the community... effectiveness is about the extent

to which programs achieve their intended outcomes...(and) the extent to which a service delivers the benefits which it is supposed to deliver to society "[9] In all stages of the chain, there has to be clear identification of goals that are intended to achieve, especially at the outputs and outcomes stage.

Figure 1. The result chain of performance concept



Source: [9]

To the chain performance concept also refers a term ‘span of performance’ introduced by Bouckaert & Halligan, where the whole chain from input to outcome can be covered by performance management. This means that the reality is more complex, especially in the public sector unlike in a machine-based, routine-featured production function with a direct link between input, activities and outputs. As a result of a broad ‘span of performance’ there is a need to distinguish within a variety of emphasises on a performing public sector. The emphasis could be narrow, focusing on economy (input/input), on efficiency or productivity (input/output), or broader, focusing on effectiveness (input-effect/outcome), or broadest focusing on linking trust to input, or output, or effect/outcome. Thus there is a need for different spans of performance for different purposes in the public sector [2].

Another point is that the most important chain of the measurement process is neither measurement itself nor the resulting data but finding a purpose of measurement. Performance measures can be used for multiple purposes. Moreover, different people have different purposes. Legislators have different purposes than journalists. Stakeholders have different purposes than public managers [1].

**3 Results and Discussion**

*3.1 The Proposed Investment Programme*

In August 2016, the MoH proposed a new investment programme “Support for Hospice Palliative Care in the Czech Republic” (the Programme) [6]. The support would be provided by subsidies that would be released during the six-year period 2017 – 2022, as shown in Table 1:

Table 1. Planned resources for the Programme in mil. CZK

Year	2017	2018	2019	2020	2021	2022	Total
State budget resources	10,500	12,500	12,500	15,000	15,000	15,000	80,500
Other resources	4,500	5,360	5,360	6,435	6,435	6,435	34,525
Total	15,000	17,860	17,860	21,435	21,435	21,435	115,025

Source: [6]

These subsidies would be given to non-state non-profit organizations that provide palliative and hospice care. The recipients of the subsidies would also include municipal and regional organizations. The Programme’s main goal is to make sure 5 hospice beds are available per 100,000 inhabitants in the Czech Republic by 2022. The current overall number in the Czech Republic is 476 beds, therefore the desirable number is 516 beds when the Programme finishes in 2022.

- The Programme is divided into two sub-programmes:
  - 1) The Renovation and Purchase of Movable Assets
  - 2) The Development of Immovable Infrastructure

The first sub-programme is dedicated to the renewal of existing mobile hospice (home care) capacity by purchasing necessary equipment. The quantitative indicators for this sub-programme are defined as follows:

**Table 2. The Quantitative Indicators for the first sub-programme, numbers of devices purchased**

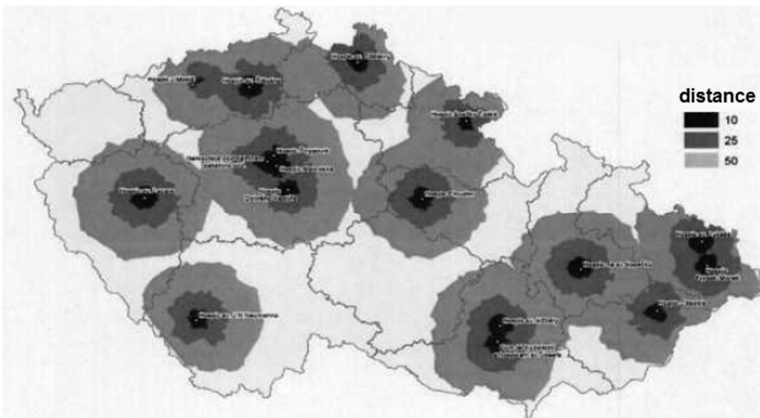
Adjustable beds	40
Anti-bedsore mattress	40
Lifter for immobile patients	16
Infusion pump	20

Source: [6]

The second sub-programme is intended to broaden the capacity of immobile hospices. This may include establishing new hospices as well as reconstructing existing hospices to make way for new rooms and beds. Its goal is to create 40 new hospice beds and thus raise the number of available hospice beds per 100,000 inhabitants from 4.6 to 5.0 to fulfil a requirement of European Association for Palliative Care - 50 palliative care beds per 1,000,000 inhabitants [5].

The MoH also pointed out that the net of hospices in the Czech Republic is geographically unbalanced as there are two out of 14 regions where no hospice exists – Karlovarský and Vysočina region. However, programme does not consist any priorities to solve that inequality. Regional inequality is clearly seen on the Figure 2:

**Figure 2. Distance coverage of hospice in the Czech Republic in km**



Source: [6]

### 3.2 Comparison and Recommendation

In this chapter, we test the suitability of various quantitative goal indicators. Three of these are indicators proposed by the MoH (money spent from the state budget, number of beds in hospices per 100,000 inhabitants and number of devices purchased), and we further suggest four more:

- *% of population within a given distance of a hospice* – the ideal value for this indicator is 100 %; this indicator is designed to deal with the problem of regional inequality
- *% of population within a given travelling time to the nearest hospice* – the ideal value for this indicator is 100 %; the purpose is the same as in the case of the previous indicator but this indicator takes into account different transport service provision in different regions

- *waiting time* – the ideal value is 0 months; this indicator measures to what extent care is provided as soon as it is needed
- *number of patients waiting*– the ideal value is 0 patients; this is connected with the previous indicator but is focused more on whether palliative care is provided to all patients who need it

In addition to the ideal values given, real goal values for the indicators must be set after discussion with experts and politicians. We do not set out to suggest the exact values here; the objective of this paper is to discuss the possible goal indicators for the programme in question.

Firstly, we use the result chain of performance concept in order to assess which stages are covered by each evaluated goal indicator. As Table 3 shows, the three indicators proposed by the MoH are only connected with inputs or activities that are used for providing public services. On the contrary, the four indicators we propose are connected with outputs and outcomes. Two of these can be considered to fulfil both output and outcome criteria, because in the field of palliative care there is no “classic” outcome indicator such as life-expectancy.

**Table 3. Goal indicators and result chain**

<b>Indicator</b>	<b>Input</b>	<b>Activity</b>	<b>Output</b>	<b>Outcome</b>
State budget finance	X			
Number of beds in hospices per 100,000 inhabitants		X		
Number of equipment purchased		X		
% population – distance			X	
% population – travelling time			X	
Waiting time			X	X
Number of waiting patients			X	X

Source: Authors

The question, why the MoH proposes objectives of its programme in the way it does not include output or outcomes based goals, could be answered simply. The MoH has not adopted principles of the performance budgeting and historically has not follow trends of good performance management. It still relies on incremental budgeting and the prioritisation of the expenditures is performed in the “black box”.

In the following text, we focus on the non-financial indicators. Table 4 shows which S.M.A.R.T. criteria are accomplished (X) by the indicators. However, the achievement of some indicators is under discussion (D) and depends on other factors.

**Table 4. Accomplishment of S.M.A.R.T. criteria by the quality of health care indicators**

<b>Indicators</b>	<b>S</b>	<b>M</b>	<b>A</b>	<b>R</b>	<b>T</b>
<b>Current:</b>					
Number of beds in hospices per 100 000 inhabitants	D <sup>1</sup>	X	X	X	D <sup>2</sup>
Number of the equipment purchased	X	X	X	X	D <sup>3</sup>
<b>Proposed:</b>					
% population – distance	X	X	D <sup>4</sup>	X	X
% population – travelling time	X	X	D <sup>5</sup>	X	X
Waiting time	X	X	D <sup>6</sup>	X	X
Number of waiting patients	X	X	D <sup>7</sup>	X	X

Source: Authors

D<sup>1</sup> – Although this criterion is quite specific at first sight, it assesses an average value and does not deal with the diversity of regions in terms of number of inhabitants and distribution of

hospices. This is why we propose indicators such as % of population within a certain distance, measured both in km and in terms of travelling time to the nearest hospice.

D<sup>2</sup>, D<sup>3</sup> – Despite the fact that the beginning and end of the programme are stated, there is no step by step guidance for its implementation.

D<sup>4</sup>, D<sup>5</sup> – As these indicators are only our proposal, the % level of the population that would be acceptable has not yet been set, nor has the specified catchment area in terms of distance (km) and travel time. It would be essential to achieve a political and professional consensus on these values. For the distance measured in km we preliminarily take into consideration 50km.

D<sup>6</sup>, D<sup>7</sup> – Due to the nature of palliative care, which is usually provided in pre-death situations, it is necessary that it be provided instantly with no waiting time. Even though this criterion might not be achievable all the time, the ambition should remain such, therefore it is desirable to set the goal at zero.

Table 5 shows the fulfilment (X) of performance management questions defined by OECD. At first sight there is an obvious deficiency in terms of the absence of any measurement system or qualitative measures for the programme. The same situation is true for service quality, where no standards of quality for new hospices are set. Financial measures are also missing.

**Table 5. Performance management questions by OECD applied to the programme**

Questions	Fulfilment
<b>Indicators:</b> are simple and transparent indicators used as performance measures?	X
<b>Measurement Systems:</b> are specialised systems used to measure performance?	
<b>Qualitative Measures:</b> are qualitative, indirect measures used along with quantitative measures?	
<b>Processes (Activities):</b> are measures of processes, activities or new initiatives important in performance measurement?	X
<b>Efficiency (Outputs):</b> are measures of outputs important in performance measurement?	D <sup>1</sup>
<b>Effectiveness (Outcomes):</b> are measures of outcomes important in performance measurement?	D <sup>2</sup>
<b>Service (Delivery) Quality:</b> are service quality measures important in performance measurement?	
<b>Financial Performance (Economy):</b> are financial measures (cost of inputs, etc.) important in performance measurement?	

Source: Authors

D<sup>1</sup> D<sup>2</sup> – Initially, measures for outputs and outcomes were omitted in the programme. However, we have proposed measures for both outputs and outcomes.

Outcome-oriented goal indicators are the most desirable because they are closely connected with quality of life and with the satisfaction of taxpayers/patients' needs. Indicators "Waiting time" and "Number of waiting patients" also fulfil S.M.A.R.T. criteria and help to comply with the OECD principles for performance management of public programmes.

However, the availability of relevant statistics also matters. Neither of the two indicators mentioned above are monitored nowadays. According to the MoH (in correspondence with us, there is no evidence that any patient has to wait at all before being accepted by a hospice in the Czech Republic. But this may change very quickly as the population ages. Thus, we recommend that a systematic system be developed to monitor of these indicators, which should include obligatory reporting to the MoH for all hospices.

Regional inequality could deepen if the only goal-oriented indicator was the overall number of beds in hospices in the country. Therefore, we strongly recommended using indicators that enable the problem of inequality to be monitored and improved. Put simply, state finance should be sent to the regions in which patients have to travel the longest distance or have longest travelling time to their nearest hospice. This is important both for serving patients and for their relatives who want to visit them. Visits from relatives play a very important role for palliative patients and are a crucial part of palliative care [5].



## 4 Conclusion

It is important to determine target indicators correctly to ensure effective use of public expenses. These indicators should be based on verified methods and connected to a suitable evaluation system. Firstly, the target indicators and their values must be agreed upon. The resources should be distributed on this basis only, not the other way round as is common practice at the MoH of the Czech Republic.

We have shown that in the case of a proposed programme to support palliative care, geographical differences were entirely omitted in the indicators proposed by the MoH, which could result in unequal access to palliative care. The target indicators proposed had no informative value as regards improvement of services and quality of life. Further there was no detailed schedule provided to describe how the targets would be met; this would help to reduce the risk of schedule non-compliance.

To overcome the above mentioned problems, we suggest that the target indicators should be extended and complemented by specific output and outcome indicators. These would enable the allocation of public funds in such a way as to eliminate unequal access to care not only for patients but also for their relatives. Furthermore, it would be better to monitor whether the patients' needs are actually fulfilled by the service provided. It is also essential to implement a phased approach to meeting individual targets, ideally with an annual timescale.

The possibility of using the optimal target indicators is limited at present by an insufficient data base. Nevertheless, this does not mean that we should not strive to obtain robust statistics.

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# Housing for the Elderly – Are Older Adults a New Vulnerable Group?

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## Abstract

Growing housing costs have been recorded in the Czech Republic over the last decade. The fact would not present a problem if household incomes grew in the same rate. However, as our outcomes show, the number of households where the share of expenditures on housing exceeds 30% or even 40% of their disposable incomes has grown. We can also interpret this fact from the increases of expenditures on social benefits provided to these households in the Czech Republic with the aim to support them in covering excessive housing expenditure (CZK 12 billion in 2014). The paper focuses on a specific group of elderly households. We would like to find an answer to the question what the extent to which these households have become a new vulnerable group is. On the basis of the EU-SILC data we have identified that the housing expenditures of 31% of these households (2014) exceed 30% of their disposable incomes; their number grew by more than 50% in the studied period 2005-2014. The non-take-up analysis also showed that up to 90% of the households entitled to the housing allowance did not apply for this benefit in 2013.

*Keywords: senior housing; simulation; non-take-up; social benefits; EU-SILC*

JEL Classification: C63, H24, H53, I38

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## 1 Introduction

Housing is one of the basic human needs. The elderly are no exception. More so, it is even more important for them to have permanent housing available [20]. Transition from the economically active stage of life to the non-economically stage is often connected with a drop in a household's incomes. This can have a negative impact on affordability of housing. If an elderly household has not prepared for this situation in advance, it gets into a life situation that is difficult to be solved [8, 15]. Generally, housing mobility is not too high in the Czech Republic and furthermore an individual's living space grows smaller with age which increases the barriers for moving. The elderly then reduce consumption of other assets or find another source of their incomes (an extra income, support from their family, utilization of social benefits, etc.) rather than moving their house.

According to international statistics (see [6]), the Czech Republic belongs, over a long period of time, among the countries where the elderly population has been affected by income poverty only to a minimum extent. The functional pension scheme positively contributes to this result as it provides a retirement pension to most pensioners that exceeds the income poverty limit defined by Eurostat. This is in particular true for the internationally applied indicator AROP(60). However, if we used the AROP(70) indicator, the scope of income poverty will increase from 9% to 22% for the elderly population (EU-SILC 2014 data). In decomposing elderly households, we identify one-person households, mostly single-female households, as the most vulnerable group.

We also obtained another view of the issues related to the financial situation of the elderly by directly interviewing households on their ability to cover their common expenditure or the minimum income that would enable them to do so. These and other subjective assessments of the position held by elderly households, for example their material and housing deprivation, have been monitored as part of the EU-SILC sample survey and were a subject of an extensive analysis conducted at a workplace of RILSA (see [19]). And finally, the housing-related social situations of the elderly can also be evaluated by comparing their housing costs and their incomes. This approach is also applied by the Czech social policy makers in their assessments of the burdening of households by reasonable costs and the subsequent compensating of selected households

through social benefits provided from the state welfare system and the follow-up system of assistance benefits in material need.

In general, the Czech social policy strives to focus non-insurance social benefits on a narrower range of population groups, mostly low-income groups (see for example the [7]). This enhanced precision in social benefits targeting is then quite frequently accompanied by fiscal restrictions in this area. However, this trend is not reproduced in the field of social benefits provided towards housing costs. Housing Allowance is provided from the State Social Support system [21], which is subsequently complemented by the Additional Housing Allowance from the Assistance in Material Need system [22]. In the case of these benefits, we have seen a constant growth in expenditures on these benefits since 2007 (see Table 1).

**Table 1. Public expenditure on social benefits in the Czech Republic 2005-2014, in bl. CZK**

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>State Social Support</b>	33.0	34.1	48.6	42.0	41.2	40.9	36.1	35.6	37.9	38.1
<b>out of which Housing Allowance</b>	2.5	2.3	1.6	1.6	2.3	3.5	4.6	5.7	7.4	8.9
<b>Assistance in Material Need</b>	11.6	12.0	3.3	2.8	3.1	3.9	5.0	7.8	10.5	11.3
<b>out of which Additional Housing Allowance</b>			0.5	0.5	0.5	0.7	0.9	1.7	2.8	3.2

Source: Authors based on [12]

Several reasons can be identified behind this increase: (1) a change in the allowance system (2) the growth of housing costs and energy costs is faster than the growth of incomes (pension adjustments) and so more households become entitled to receive the allowances (3) improved awareness leading to a partial decrease in non-take-up. The last mentioned issue refers to a situation when an entitled household is entitled to a social allowance but does not apply for it for some reason ([2, 10, 13, 18] deal with these issues in detail).

Our research focuses on elderly households. We have stated some of the reasons why we selected them as the objective of our research, which stem from certain social vulnerability of this population group. However, the practical reasons predetermining this group for some types of analyses cannot be omitted either. Probably the most substantial reason is that these households are little variable in time and so any year-to-year change of a household structure or a change of a housing type and housing costs can be less expected in their case. Also the amount and composition of household incomes do not differ in time too much. The majority of incomes of elderly households is composed of old-age pensions, with their amount being more or less constant in time. At the same time, literature (see the above specified titles) often identifies these households as the households which are more prone to the issues related to non-take-up.

In our paper, we want to clarify the extent to which the *elderly have become a new vulnerable group* due to their increased housing costs, hence newly generated beneficiaries receiving housing allowances. At the same time, we would like to *estimate* in this context the *non-take-up rate* for main social benefit provided to assist housing– the Housing Allowance.

## 2 Material and Methods

So that we could assess the accessibility of housing and analyse the existing housing situation of the elderly in a comprehensive manner, we use the data from the Living Conditions survey (hereinafter only EU-SILC) dealing with the economic and social conditions in respective countries [3]. The Czech branch of the SILC survey annually includes approximately 9 thousand households in the Czech Republic, out of which approximately 40 % of elderly households. It is essential for the analysis to correctly define the elderly household. Because such a definition is not unified across Europe, we use the age of the head of household (65+) as the classification criterion in the international comparison. In more detailed national analyses, we nevertheless define the elderly household on the basis of the actual fact of the drawing of the old-age pension.

It is apparent from what was mentioned herein above that the definition used by us covers a wider range of households.

We focus more on the non-take-up phenomenon (hereinafter only NTU). For the needs of modelling the NTU of the Housing Allowance, we base our research on the two neighbouring samples of the SILC survey (specifically, we use SILC 2013 and 2014). The merged sample comprises 2,748 households that can be considered to be elderly households in both years. For the needs of our analysis, 128 households showing at least one of the following characteristics were excluded from this sample: (1) interannually, the number of persons changed in these households, (2) either they changed their permanent address or the tenure status of their household changed, or (3) more than one housekeeping household reside in the respective apartment. These 128 households were excluded so that the above specified facts could not influence the calculation of the eligibility to and the amount of the Housing Allowance. In presenting the results and their recalculating for the whole population of the Czech Republic, the conversion factor is applied on the remaining 2,620 households for the merged sample of the SILC 2013 and 2014 survey. By its application, 2,620 households are extrapolated to 1,649 thousand elderly households in the Czech Republic. The authors are aware that by applying this approach, they lose the segment of the elderly population with respect to which the changes could have led to a change in their eligibility to and the amount of the Housing Allowance. However, because the objective is not to simulate the aggregate eligibility of the elderly population but to assess the NTU rate for the selected group, this data adjustment does not have any influence on the presented results.

The calculation of the eligibility to and the amount of the Housing Allowance is based on the legal regulations governing this allowance in 2013. A substantial diversion from the reality is the calculation of the eligibility to and the amount of the Housing Allowance for different stipulated periods. While the Czech social policy uses the average housing costs and reference income for the last quarter of the year, the data from the SILC survey do not contain such information. Therefore, the housing costs for the survey month and the reference income in the past year were assessed for the needs of the calculation. However, the advantage of the survey focusing on the elderly households for which we can expect the housing costs and incomes to be equally distributed in time can be seen here.

Table 2 herein under contains an overview of the major variables that enter the calculation of the eligibility to and the amount of the Housing Allowance. We calculate these for the households with respect to 2013, using either the legal regulations effective in 2013 or the values recorded in the SILC 2013 survey as the basis. Because the household incomes (reference income and Housing Allowance) for 2013 have already been recorded in the SILC 2014 survey, we use the survey of this year in the case of these two variables.

**Table 2. The variables used in calculating the eligibility to the Housing Allowance**

<b>Variable name</b>	<b>Variable description</b>	<b>Source of the values</b>
<b>RCH</b>	Actual housing costs of a household	EU-SILC 2013
<b>NCH</b>	Normative housing costs	Legal regulations 2013
<b>DCH</b>	Comparable cost of housing (rents, heating)	Legal regulations 2013
<b>k</b>	The basic regional coefficient (k=0.35 in Prague, otherwise k=0.3)	EU-SILC 2013
<b>RI</b>	The reference household income for the calculation of the eligibility to and the amount of the housing allowance	EU-SILC 2014
<b>LM</b>	The minimum level of subsistence	EU-SILC 2013
<b>RHA</b>	The value of the registered Housing Allowance	EU-SILC 2014
<b>SHA</b>	The value of the simulated Housing Allowance	MSM

*Source: Authors*

Equation 1 herein under shows which of the expenditure items are taken into account when ascertaining the real housing costs of a household for the needs of calculation of the Housing Allowance. As regards the rent for owner-occupied apartments, the substitute value of the rent as

stipulated by law is used. The item of energies costs, that may not exceed the standardized value determined by the State, is approached accordingly.

$$RCH = SUM(\text{rent, electric, gas, heating, water, other services, fuel}) \quad (1)$$

The Housing Allowance calculation is based on the value of the real costs of housing (RCH) that are compared with the reference income (RI) (see Equation 2). At the same time, the real costs are taken into account in the calculation up to the maximum amount of normative housing costs (NCH) and the value of the reference income may not be lower than the life minimum of a household (LM).

$$SHA = \min(RCH; NCH) - k * \max(RI; LM) \quad (2)$$

If the resulting monthly amount of the Housing Allowance is lower than CZK 50, the entitlement to the allowance does not arise. By comparing the simulated value of the Housing Allowance with the real value, we also find out whether a household entitled to the allowance really draws it (the take-up indicator) or not (the non-take-up indicator). If a household is not entitled to the allowance according to the calculations, yet withdraws it, the false-take-up value shows the extent of the problem of the false allocation of the allowance (or the false setting of the microsimulation model).

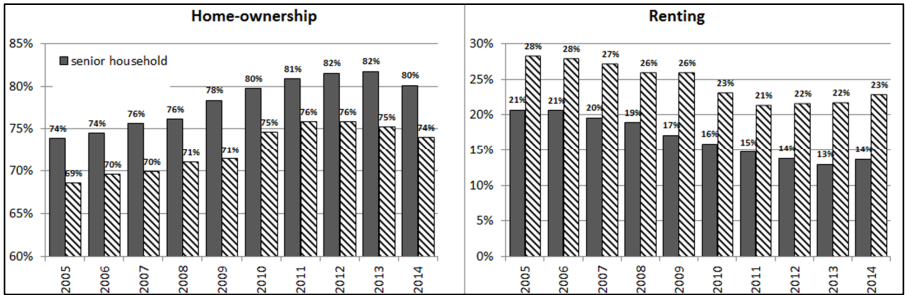
However, we keep under review in the paper how the scope of the entitlement to the Housing Allowance changes in the sample of elderly households if the hypothetical reference income acquired a value in the range from 80% to 120% of the reference income. Keeping this indicator under review (and ideally also comparing the results in time) will enable us to assess how sensitive the sample of elderly households is to a change in incomes within the range of 20%. The second assessed area is the scope of the take-up, non-take-up and false-take-up indicator depending on the proportion between the simulated Housing Allowance and the reference income. We divide the households with the entitlement to three equally large groups, taking into account how significant the share of the simulated SHA in the available income of a household is. We concurrently assume that the NTU rate will differ depending on the contribution of SHA to a family's budget.

### 3 Results and Discussion

The EU-SILC data show that elderly households reside mostly in the *owner-occupied type of homes* (see Figure 1), with the importance of home-ownership growing in time. The following three main processes played a significant role in the housing area: restitution of the property confiscated after 1948, privatization of the municipal housing stock (mostly in the form of purchases of apartments by their tenants for prices lower than the respective market prices), and the process of deregulation of rental housing that was to rectify the environment of the housing market [9]. Further contributing to the bigger share of the owner-occupied type of homes in elderly households is the effort of households to make provisions for their old age in the form of lower housing expenditure, however, the influence of the Czech society growing richer cannot be excluded. This fact is confirmed by studies of tenure choice. They show that tenure choice is particularly influenced by household income, education of its members, and marital status of the household head (married, single or divorced), residence in Prague or elsewhere [16].

Furthermore, the SILC data show that the flooring per one elderly household has grown from 41.9 m<sup>2</sup> to 46.3 m<sup>2</sup>. This is furthermore accompanied with the trend of decreasing scope of problematic areas of the condition of owner-occupied apartments (humidity, noise, dirt, etc.). Another positive fact is that elderly households are generally more satisfied with their housing than the rest of the society. The improving indicators of the housing quality and the ability to cover the costs related to housing are further confirmed by non-aggravating indicators of material deprivation and deprivation in the housing of elderly households (when in 2014, 89% of elderly households do not feel any deprivation).

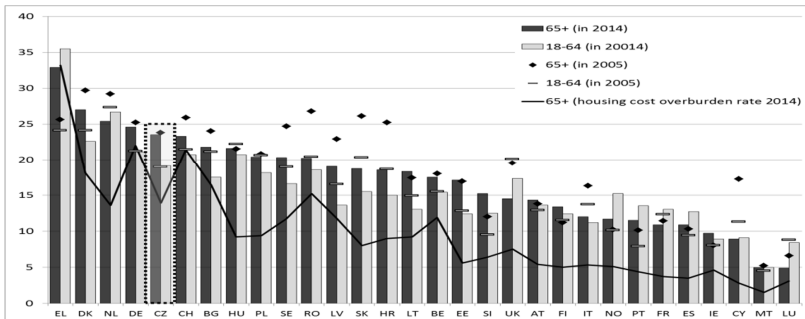
**Figure 1. Development of the owner-occupied and rental housing in the Czech Republic**



Source: Authors based on the EU - SILC data for 2005 - 2014

Nevertheless, 27% of elderly households feel housing costs as a big burden (in 2014). As it was mentioned in the introductory part, the elderly rather maintain their existing housing and social relations than change their housing. Figure 2 herein under shows that the Czech Republic belongs among the countries where households with 65+ year old persons are more burdened by covering their housing costs than non-elderly households (23.5 % vs. 19.1% in 2014).

**Figure 2. Median of the housing cost burden distribution, housing cost overburden rate by age group, in % of disposable income**



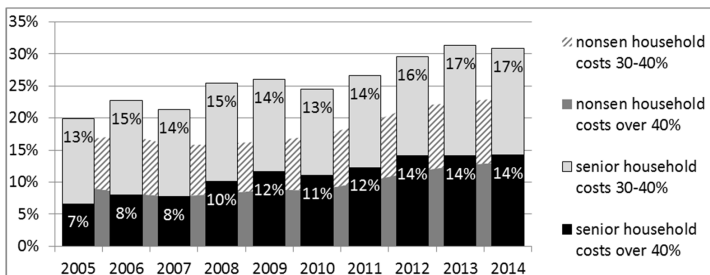
Source: Authors based on [4,5]

On the other hand, it is apparent that the studied burden value did not change too much in the Czech Republic from 2005 to 2014. The households with the head older than 65 spend approximately one quarter of their incomes on housing (even after having gone through the social system that covers part of their expenses). Figure 3 herein under implies that it is elderly households that became the group significantly more endangered by increased housing costs. In 2014, the costs for 14% of households are higher than 40% of their available incomes (7% in 2005) and the housing costs for 17% of households are between 30 and 40% available incomes (13% in 2005). In the studied period, the number of the households with costs exceeding 30% of their income thus grew by more than 50%.

Despite the high burden of housing costs, only 2.7% of elderly households receive the Housing Allowance (EU-SILC 2014). This very low percentage can be explained by several characteristics of elderly households: (1) the level of awareness of this allowance (allowances) among the elderly and the administrative process that an elderly person is not always able to manage (2) the effect of stigmatization of a household connected with application for the

allowance that an elderly household does not want to undergo because they consider it to be their personal failure, and (3) the character of the housing when elderly households do not adjust their housing (its size) according to their existing income situation, the number of persons in a household (for details see the study by [17]).

**Figure 3. Development of the percentage of the households for which housing costs account for more than 30% (or 40% respectively) of their available income in the Czech Republic**



Source: Authors based on data EU- SILC 2005 -2014

A certain distortion of the ratio of the households receiving the Housing Allowance also stems from the character of the data themselves, when the sample survey does not have to cover the very group that receives the allowances. At the moment, no detailed data are available from the system of the MLSA. Nevertheless, it is obvious that the ratio of elderly households in the group of receivers of Housing Allowance in the studied period has been growing (from 15% in 2005 to 24% in 2014). The trends mentioned herein above together with the growing percentage of elderly households can mean a higher burden on social systems in the upcoming years (as [1] also point out).

The entitlement to the Housing Allowance is under the situation when an elderly household has the reference income in the amount of 80 – 120 % of its reference income. It is noteworthy that our modelling shows that in the case of the elderly households selected by us in 2013, approximately 34% of households are entitled to the Housing Allowance. In actual fact, this allowance was received only by 2.3% of households.

It seems that the issue of receiving SHA strongly depends on the amount of household incomes. In Table 3 herein under, we divided the households entitled to SHA into 3 groups of the same size by the percentage of the possible amount of the allowance and their reference income (Entitlement 1-3 group). While the ratio of the households that did not claim their entitlement is the lowest (NTU 86.1%) in the first group, there are still 0.4% of the households that receive the allowance in the biggest group without entitlement to SHA. Our results of NTU in the senior group are higher than earlier conducted research [11, 14].

**Table 3. The entitlement to HA and its real withdrawing with respect to the proportion between the simulated HA and the reference income**

		Group				Total
		Entitlement 1	Entitlement 2	Entitlement 3	No entitlement	
Has the household in SILC 2014 (incomes 2013) obtained the Housing Allowance?	no	158,042	176,722	181,434	1,095,003	1,611,200
	yes	86.1%	96.8%	98.9%	99.6%	97.7%
		25,505	5,880	2,043	4,463	37,891
		13.9%	3.2%	1.1%	0.4%	2.3%
	Total	183,547	182,602	183,476	1,099,466	1,649,091
		100.0%	100.0%	100.0%	100.0%	100.0%

Source: Authors based on data EU- SILC 2013, 2014

## 4 Conclusion

Our research showed positive results in terms of the quality of elderly housing such as the growing size of a living area, decreased indicators of problems with homes and low values of housing deprivation. Because in the international statistics, the Czech Republic belongs among the countries with the lowest income poverty of elderly households - AROP(60) achieves 9%, the change of the indicator to AROP(70) itself shows us that a number of elderly households is situated between these two arbitrarily determined limits. Our results also show that elderly groups have been becoming a new group threatened by increased housing costs. In the studied period of 2005-2014, the number of the elderly households where the costs exceed 30% of their available incomes has increased by more than 50% (they are 540 thousand elderly households in 2014). More often this overburden affects single-member elderly households, and mostly they are female households.

In the Czech Republic, the social systems assists households with the covering of these excessive costs, specifically they are the allowances towards housing (the Housing Allowance and Additional Housing Allowance). The public expenditure on these allowances has been constantly growing since 2007, amounting to more than CZK 12 billion in 2014. The EU-SILC data also show us the growth of the recorded ratio of elderly households to the households receiving the Housing Allowance, from 15% in 2005 to 24% in 2014. Despite this assistance, the median elderly household however spent approximately one quarter of its income to cover the costs related to housing (even after having gone through the social system) in 2014.

The financial situation of the elderly could improve by decreasing the non-take up phenomenon that our simulation estimates to be more than 90% for elderly households, with the NTU rate depending on the amount of the share of the allowance in a household's incomes. The NTU phenomenon occurs in the case of the elderly in a higher rate due to (1) the lower level of awareness of this allowance (allowances) and the administrative process complexity (2) the effect of stigmatization of a household connected with application for the allowance and (3) the character of the housing (the issues related to low mobility). According to the EU-SILC data, only 2.7% of elderly households receive the Housing Allowance in 2014. A certain distortion of the ratio of the households receiving the Housing Allowance can also stem from the character of the data themselves, when the data do not have to cover the very group that receives the allowances.

## Acknowledgements

The authors are thankful to the Grant Agency of Masaryk University for the grant No MUNI/A/1047/2015.

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# Healthcare Systems in the States of Central and Eastern Europe: From Whom Should We Take Lessons?

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## Abstract

There are many reasons why we should investigate how the different healthcare systems perform. As health is the fullness of physical, mental and social wellbeing, it should necessarily be treated not only as an absence of a disease, but as a positive value of economic importance in the context of socioeconomic development of the country. All these factors make healthcare delivery one of the most intensively explored issues in order to identify the best solutions. The objective of this study is to identify the best performing healthcare system among the states of Central and Eastern Europe (CEE). For this purpose, the public health status has been assessed on the basis of three health indicators expressed as a composite health index. Next, the relative efficiency of CEE states has been evaluated using a Data Envelopment Analysis. The study clearly indicated the Czech Republic as the state consistently achieving excellent results both in health status of its population as well as in terms of efficiency. The Czech healthcare system should be considered as the reference solution by other post-communist countries which are willing to improve their national health delivery systems.

*Keywords: healthcare system; CEE states; health status; DEA efficiency*

JEL Classification: H21, H51, I11, I18

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## 1 Introduction

The literature is rich in publications concerning healthcare systems in the countries of Central and Eastern Europe (CEE), which in the 1990s have entered a path of transforming their planned economies into market ones. This transition was accompanied by significant changes in their national healthcare systems. The passage of time has shown that matters have proved to be extremely difficult, and after 25 years, the issue of satisfactory healthcare delivery still seems to be open in many countries. Examples of studies on healthcare reforms can be identified in several works [10], [15], [18], [19], [21], [24].

In CEE dominates the Social Insurance Healthcare system, also termed as a Bismarck model, expressing an idea of health coverage as a right of labour (contrary to the Beveridgean concept which reflects the philosophy of healthcare as a human right) [8], [16]. The Bismarckian insurance-based system is appreciated for its plurality of healthcare providers and abundance of choice [19]. The arguments typically cited in favour of the Bismarckian model emphasise that the social insurance institution does not have to compete against any of the other spending priorities for government resources as it has clearly identified funds coming from occupation-based premiums. But then, the major challenge this system faces is cost containment [6], [22], [23], [25].

The increasing needs of care for a growing elderly population, the development of new technologies, and the improvement of care in general, give rise to the question of how to improve the existing healthcare arrangement to meet the needs and expectations of its citizens in the presence of growing economic constraints. Therefore, it is not surprising that the main attention of healthcare policymakers and practitioners has been focused on the issue of efficiency; the relationship between healthcare efforts (inputs) and effects (outputs) parameters describing the performance of health systems with respect to the population's health, responsiveness and availability. There are many interesting studies which evaluate the performance of healthcare systems at country level [1], [2], [4], [11], [12], [13], [14]. Despite this, there is a shortage of studies investigating the efficiency of healthcare systems in post-communist European Union (EU) member states.

This study aims to identify which healthcare system existing in countries of Central and Eastern Europe performs best. For this purpose, 10 CEE members of the EU will be examined in a two-step approach: (1) assessing public health status (estimated on the basis of health indicators expressed as a composite health index (CHI); (2) evaluating the relative efficiency (in the sense of technical efficiency estimated using a Data Envelopment Analysis).

## 2 Material and Methods

This paper investigates which post-communist healthcare system operating in the EU member states can be treated as a benchmark solution. The study includes 10 CEE countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia (Croatia has been omitted since it joined the EU only in 2013). The research covers a 10-year period, 2005–2014.

In order to evaluate 10 national healthcare systems, a two-step approach will be applied. Initially, the composite health index (CHI) will be calculated on the basis of commonly used sub-indicators that reflect health potential on the national level. This will allow to rank analysed states according to their health status. Additionally, regression analysis will be used to identify states which show inferior health status than their economic wealth would suggest, and those who are positive outliers. In the next step, the examined healthcare systems will be evaluated according to their efficiency. This approach corresponds to the concept of technical efficiency introduced by Farrell [8], and it could be narrowed down to the statement that the state (the given national healthcare system) is technically efficient if it is able to produce the maximum possible health outputs from a given amount of health inputs. The study will be based on three output and two input variables, which are described in Table 1.

**Table 1. The set of input–output indicators (characteristics, data source and scope)**

Indicator	Notation	Data scope and source
<b>Infant mortality rate</b>		
Reveals the number of infant deaths (i.e., children aged 0–1 year) compared with 1000 live births. Perinatal care is an important part of healthcare for the whole population, and its quality is a sensitive measure of the health policy of the state. Any limitations in this area are revealed clearly by the infant mortality rate (IMR). As IMR is a destimulant, its conversion into a positive indicator is necessary. Infant survival rate measured as $IMR^* = 1000 - IMR$ is considered a good synthetic indicator of a society's health and the level of healthcare services.	IMR*	Average of 2005–2014 Eurostat
<b>Healthy life years at birth</b>		
This indicator shows, on average, the number of years that a person can expect to live in 'full health' by taking into account the number of years lived in less than full health due to disease and/or injury. Substantial resources are devoted to reducing the incidence, duration and severity of the major diseases that can cause morbidity but not mortality, as well as reducing their impact on the individual's life. In 2005, this indicator was included as a Lisbon Structural Indicator to underline that the population's life expectancy in good health—not just length of life—is a key factor for economic growth.	HLY	Average of 2005–2014 Eurostat
<b>Unmet healthcare needs</b>		
This variable refers to the percentage of the respondent's own assessment of whether he or she needed the respective type of examination or treatment, but could not enjoy it because of any one of three reasons: too expensive, too far to travel or too long a waiting list. This indicator expresses the capacity and accessibility of the healthcare system from the patient's perspective. This indicator is available as the only negative measure, so it needs to be converted into a stimulant. The coverage of medical needs measured as $UHN^* = 100 - UHN$ can be treated as the indicator of the capability of the healthcare system.	UHN*	Average of 2005–2014 Eurostat

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**Health expenditure per capita** (PPP, constant 2011 international USD)

This is an essential indicator of the health financing systems which provides information on the level of resources channelled to health, expressed as the money spent per inhabitant in the standard of purchasing parity power (PPP). Total expenditure on health is measured as the total amount of expenditure of all the financing agents managing funds to purchase health goods and services.

HEpc

Average of  
2005–2014  
World Bank

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**Number of medical doctors per 1000 inhabitants**

This indicator reveals the number of medical doctors (physicians), including generalist and specialist medical practitioners, per 1000 population. Preparing the health workforce to work towards achieving the health objectives of a country represents one of the most important challenges for its health system. This indicator can be treated as the measure of the country's professional medical knowledge included in the healthcare system to meet patients' needs.

MDpi

Average of  
2005–2014  
Eurostat, OECD

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*Source: Author based on notes and explanations delivered by Eurostat, OECD and World Bank.*

The CHI will be calculated as the unweighted average of the normalised scores of three sub-indicators (IMR\*, HLY, UHN\*) mentioned above. Data are normalised using the minimum-maximum procedure (the transformed score is first subtracted by the minimum score observed for all countries and then divided by the difference between the maximum and minimum scores). The normalised score varies in the numerical range from 0 to 1. The CHI will allow to rank 10 post-communism EU member states according to their health potential.

Next, the Healthcare System Efficiency score will be calculated by applying Data Envelopment Analysis (DEA). DEA was introduced in 1978 by Charnes, Cooper and Rhodes [5], who on the work of Farrell [9], proposed a basic DEA model—the radial CCR model (named after its founders: Charnes, Cooper and Rhodes), with assumption of constant returns to scale. The CCR model was extended to account for technologies that show variable returns to scale by Banker, Charnes and Cooper in 1984 [3]. DEA benchmarks analysed units only against the best ones which form the frontier of efficiency (productivity frontier). An object is recognized as 100% efficient (DEA score = 1) when comparisons with other units in a sample do not provide evidence of inefficiency in the use of any input or output. If any object is not at the frontier, that means it is inefficient. Its distance from the frontier determines the level of inefficiency and DEA score < 1. Over the years, the simple DEA models have been enriched by a number of modifications which enable users for a better fit of the appropriate DEA variant to research specific needs. In this study, the super-efficiency (SE) and non-oriented (NO) slacks-based DEA model (SBM) under the assumption of variable returns to scale (V) will be applied (in short labelled as DEA SE-NO-SBM-V). For mathematical foundations of the DEA see [7].

The super-efficient DEA variant allows ranking of efficient units (then SE-DEA score ≥ 1). The DEA SE-NO-SBM-V model will allow evaluating multiple systems, namely 10 EU states, at consuming multiple inputs, i.e., health expenditure (HEpc) and number of medical doctors (MDpi) in order to produce an output expressed by the composite health index (CHI).

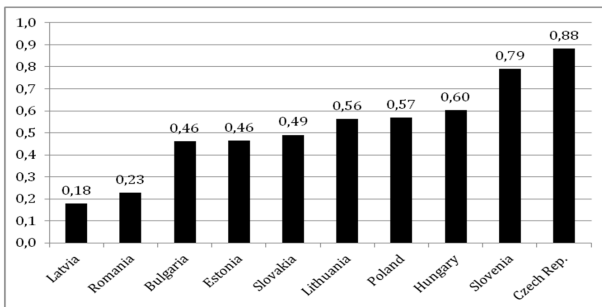
### 3 Results and Discussion

#### 3.1 The Ranking of Cee States according to the Composite Health Index

Figure 1 shows the ranking of 10 post-communist EU states according to the composite health index (CHI). CHI scores range from 0.18 up to 0.88, which means a medium variability (coefficient of variation equals 39%). The average value equals 0.52 and it is almost equal to the median (0.53). Czech Republic and Slovenia are recognised as states which reached the highest CHI (0.88 and 0.79, respectively). The health status of the inhabitants of these two countries can be considered as very satisfying in comparison with other countries in the sample. By contrast, Latvia and Romania show dramatically low levels of health status expressed by CHI indicator. CHI for Latvia equals 0.18 which means a score three times lower than it is in neighbouring Lithuania

(0.56), and more than double worse score compared to Estonia (0.46). Similarly Romania, which shows the CHI (0.23) double lower than the next ranked country, Bulgaria, Hungary.

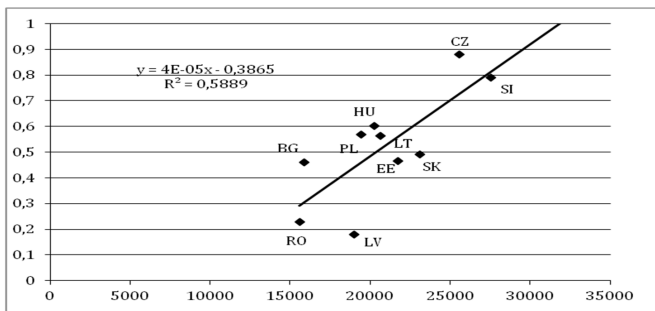
**Figure 1. Composite Health Index**



Source: Author based on data from Table A1

It is commonly known that peoples' health status is strongly influenced by their lifestyle, including food patterns (balanced diet, quality of food), physical activity, recreation, etc. Care for their health increases with an increase in peoples' economic wealth. Therefore, it is not surprising that in this study the Pearson correlation coefficient between CHI score and gross national income per capita (GNIpc) equals to 77%. Hence, it is worth examining the regression function for these two variables in order to identify the positive and negative outliers.

**Figure 2. Relationship between the composite health index (CHI) and gross national income per capita (GNIpc) in 10 CEE EU members**



Source: Author based on data from Table A1

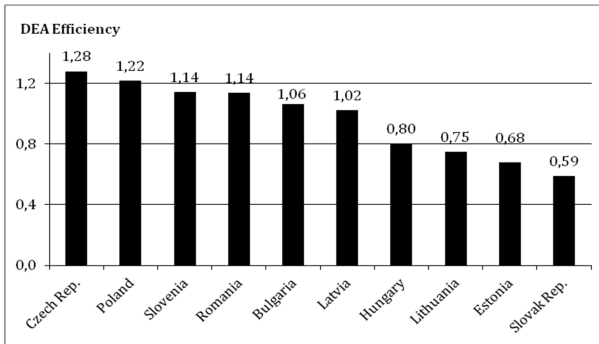
Figure 2 presents the relationship between the CHI and GNIpc. Outliers matter most in this case. Countries above the regression line have higher CHI scores than what the level of their economic wealth would suggest. Among 10 CEE members of the EU, Bulgaria and the Czech Republic are the strongest positive outliers. The health status in Poland and Hungary is also better than what their economic wealth would allow. In turn, Latvia demonstrates the highest negative deviation from the mean value. Its CHI score is significantly lower than what their economic wealth would suggest. Slovakia, Estonia and Romania are the other countries which show too low health status in comparison with their economic capabilities.

### 3.2 The Ranking of CEE States According to DEA Efficiency Scores

The next step in this research aims to evaluate success of CEE states in transforming healthcare inputs expressed by health expenditure (HEpc) and the work of medical doctors (MDpi) into healthcare output embodied in the composite health index (CHI). This approach delivers a new look at analysed states, and the results are somewhat surprising.

Figure 3 shows the ranking of 10 CEE members of the EU according to their DEA scores. In the language of DEA interpretations, DEA scores show the relative technical efficiency of each state in the sample. DEA efficiency scores range from 1.28 to 0.59, and the coefficient of variation equals 24%.

Figure 3. DEA efficiency stores of 10 EU member states



Source: Author based on data from Table A1 (using DEA Solver LV 8.0)

DEA computations recognized six states as efficient (DEA score  $\geq 1$ ). These are: Czech Republic, Poland, Slovenia, Romania, Bulgaria and Latvia. Czech Republic and Slovenia maintained their position as leaders, which they had reached in the previous step, but other states assessed as efficient may cause some surprise. This applies especially to Latvia and Romania which revealed the lowest health status indicators CHI, far below the level that would be suggested by their economic wealth, but they use their low health inputs efficiently. DEA score for inefficient states range from 0.8 to 0.59. Slovakia dropped in this ranking to the lowest position, 'producing health' about 40% more costly than it could if it were efficient.

In 2015, Bloomberg published its second ranking of most efficient countries for healthcare [17]. This report included 51 states, but only six of them are CEE countries (Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia). This incomplete list makes it impossible to compare results achieved in this study to Bloomberg's ranking. However, it is worth emphasising the unanimity of both rankings, recognising the Czech Republic and Poland (Bloomberg's ranking, respectively: 18 and 22) as the most efficient healthcare systems among CEE countries.

## 4 Conclusion

This study clearly indicates the Czech Republic as the state with the best healthcare system among other CEE countries, achieving the best results both in health status of the population as well as in terms of the efficiency. The Czech Republic also appears as the state where the health status of the population is much higher than what the level of its economic wealth would suggest. The best rank of the Czech healthcare system among CEE states according to the efficiency assessment agrees with results delivered by 2015 Bloomberg report.

The Czech healthcare system should be considered as the reference solution by other post-communist countries which are willing to improve their national health delivery arrangement.

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## Appendix

Table A1.

State	IMR	HLY	UHN	HEpc	MDpi	GNIpc
Average of 2005-2014						
Bulgaria	8.75	65.44	11.78	1029.26	3.77	15860
Czech Rep.	2.84	62.15	0.90	1876.94	3.60	25553
Estonia	3.76	54.50	7.41	1315.77	3.26	21717
Hungary	5.31	57.42	2.62	1628.96	3.02	20269
Latvia	6.45	53.70	13.55	820.38	3.07	18994
Lithuania	5.30	57.68	4.51	1366.54	3.91	20626
Poland	5.27	61.02	8.12	1304.87	2.20	19413
Romania	10.78	59.15	10.59	859.64	2.36	15580
Slovakia	5.92	53.82	2.03	1841.13	3.29	23104
Slovenia	2.68	58.04	0.16	2426.47	2.48	27554

Note: IMR - infant mortality rate; HLY - healthy life-years; UHN - unmet healthcare needs; HEpc - health expenditure per capita, PPP (constant 2011 international US\$); MDpi - medical doctors per 1000 inhabitants; GNIpc - gross national income per capita, PPP (constant 2011 international \$).

Source: Eurostat (IMR, HLY, UHN); World Bank (HEpc, MDpi, GNIpc); OECD (MDpi).

# Impact Assessment of Environmental Investment (2013-2015) in the Moravian-Silesian Region on the National Economy

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## Abstract

The growing demand for clean air has led at the European Union level to stricter legislation, implementation of emission ceilings, best available technology (BAT) and integrated permits (IPPC). With respect to preservation of industry, these restrictive instruments are accompanied by an opportunity to obtain subsidies from operational programmes in the case of implementation of measures beyond the mandatory requirements. The Moravian-Silesian Region is one of the regions worst affected by high air pollution; a significant part of the OP ENV funds was allocated there as environmental investment. Besides a reduction in the air pollutant emissions, the implementation of the supported measures also has economic impacts. The objective of the paper is an assessment of the economic and social impacts of the environmental investment using input-output modelling. Among other things, it follows from the paper that the implementation of environmental measures worth CZK 5.1 billion in the Moravian-Silesian Region induced an additional production in the Czech Republic in 2013-2015 of CZK 9.7 billion. The impact of the investment was assessed also based on gross added value, generated profits of contractors, and additional demand for workforce in 2014-2015 in form of full-time contracts. The investment was burdened by a high degree of imports because the technologies used are not manufactured in the Czech Republic.

*Keywords: environmental investment; investment multiplication; input-output model; Moravian-Silesian Region; Operational Programme Environment*

JEL Classification: H54, E22, C67

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## 1 Introduction

The increasing demand for clean air has been reflected in recent years in a number of legislative changes at both the national and supranational (European) level. Besides European Union directives, the most important current factors in the area of air economy are national emission limits, best available technology (BAT), and integrated permits (IPPC). The meeting of requirements has a great impact on the economic and social policy and on operators of industrial facilities. For example, achievement of emission limits according to the draft Directive of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants would require, according to [9], given a conservative estimate, annual costs of CZK 1.7 billion for implementation of required measures. The Operational Programme Environment was established in order to improve environmental quality and retention of competitiveness; it provides subsidies for environmental investment. Between 2007 and 2015, applicants could draw support up to 90% of the investment in case it was investment beyond the legislative requirements. The total allocation of support was more than EUR 5.3 billion.

The Moravian-Silesian Region ranks in the long run among the areas with the worst air quality in the Czech Republic. The pollution originates from both large industrial facilities and, to a great extent, from households and local heating and, to a lesser extent, from transport. The most problematic are the high concentrations of benzo[a]pyrene, fine particulate matter (PM<sub>2.5</sub>) as well as nitrogen oxides (NO<sub>x</sub>) and sulphur dioxide (SO<sub>2</sub>). In addition to the primary function of improving the environment, environmental investment may have indirect economic and social impacts. Investment can thus significantly contribute to development of economy and employment at the local or national level.

The objective of the paper is to assess the economic impacts of selected environmental investment implemented in the Moravian-Silesian Region. An emphasis is placed on investment

by the largest metallurgical and mechanical engineering facilities that have been supported from the Operational Programme Environment. The impacts are assessed using a static input-output model at the level of the Czech Republic, which assesses impacts on the following macroeconomic aggregates: production, gross added value, tax collection, profits, employment, wages and salaries. In light of the results, we formulate recommendations for setting of support from the new Operational Programme Environment for the period 2014-2020.

The paper consists of three chapters. The first chapter summarises the existing knowledge and application of input-output models and the basic steps for carrying it out. Besides, it briefly describes the investment implemented and designs the input-output model. The second chapter presents the results of the input-output analysis. Potential limitations arising from the model and data availability are discussed in the Conclusion.

## **2 Material and Methods**

### *2.1 Input-Output Models and Their Existing Applications*

For several centuries, economists have tried to describe connections between different sectors of the economy that could be used to assess impacts of investment on macroeconomic indicators. The current approach using input-output modelling, created by Leontief [7], is based on Petty [12], who dealt with relationships and dependencies between production, distribution and availability, on Quesnay [13], who originated the first rudiment of the multiplication effect on an example of a farmer and a craftsman and the money transfer between them, and on Walras [21], who created a model of the general equilibrium with production coefficients corresponding to the required amount of production factors for a certain level of total production of a selected good. Based on the general equilibrium models and other sources of inspiration, Leontief completely reorganised Quesnay's original table. At first, input-output models were applied at the macroeconomic level; later on, the use of microeconomic input-output analysis also started.

Input-output models rank among structural economic models, because they are most commonly applied to analysis of economy, its structure and relationships among its sectors. Leontief's [8] modelling is based on a set of linear equations describing flows of production among the different sectors (producers and consumers) and affected by the exogenous demand factor. As stated by, e.g., Oosterhaven [11] and Miller et Blair [10], there is a wide range of different types of models. Their basic division is into demand-based and supply-based. Furthermore, we can distinguish three types of models depending on the units in which they are constructed. These are a price model based on monetary units (Monetary Input-Output Model), a quantitative model based on physical units (Physical Input-Output Model), or a model combining the two aforesaid, typically denoted as a price model based on physical units (Physical-Input Monetary-Output Model). The choice of the model depends on the input (initial) data and the research question. As further stated by Duchin et Steenge [6], all three types of models may be either static or dynamic. A static model is a basic model based on production coefficients that do not change over time and so describe an invariable condition between inputs and production, i.e., an invariable ratio of inputs. Information on the structure of the economy (national or regional) are described in symmetrical input-output tables (SIOT), which are the basis for creating input-output models. Besides, they also contain the basic dependencies and relationships between demand and supply. The basic symmetrical table drawn according to Leontief [8] consists of three matrices (intersectoral flow matrix (sector x sector), final use/final demand matrix, and added value matrix (production of sectors and inputs to sectors). Statistical data and reports are used for compiling the tables. In the Czech Republic, the basic supply and use tables are compiled annually by the Czech Statistical Office.

Changes in demands in the different sectors induce numerous direct and indirect impacts. They are often of the nature of a multiplication effect, where demand in one sector induces an increase in demand in a number of other sectors, resulting in a multiplication of the total effects across the entire economy. As stated by, e.g., [14], Leontief's input-output model enables

assessment of the change in exogenous factors, including direct and indirect effects on final consumption. The calculation of the multiplication effect is based on Leontief's inverse matrix.

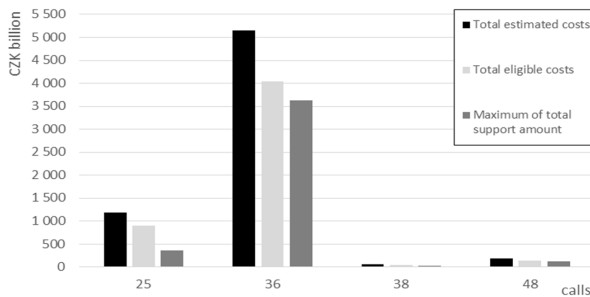
According to an extensive analysis of applications of input-output models, the model has been used in countless cases around the world in recent years. Besides the United States of America, where the model application has been traditional, it is also applied on a large scale in Europe and is very popular in Asia, especially in assessment of impacts on Chinese economy. The heavy and processing industries have been a traditional area of application of input-output models since the very beginning. Impacts and intersectoral connections are assessed for planned investment or in cases where changes in sectors and induced by external factors. A typical example of present-day use is the study by Beylot et Villeneuve [2], assessing the economic significance of metals in France in relation to vulnerability. It applies an input-output model to an assessment of the importance of copper. In Germany, on the other hand, Bösch et al. [3] examined the flows of wood and paper and their connections to other sectors. Among other things, the analysis results brought a surprising finding about a linear organisation of wood production, which was unexpected given the variety of uses of wood.

In the Czech context, input-output models have been applied several times in recent years in the area of assessment of economic impacts of changes in environmental legislation and implementation of measures. An example is the extensive study commissioned by [15], aimed at quantification of financial and economic impacts on industry caused by changes in environmental and energy legislation. Unlike the previous cases, it chose the approach of a comprehensive assessment of impacts, evaluating sectors as a whole, including intersectoral connections. For these reasons, it applied an input-output model and assessed impacts on competitiveness, profitability, employment, price levels, gross added value, and production. The assessment was made complete with the inclusion of emission permit trading. In connection to the previous one, the study for [16], focusing on a regional assessment of impacts of environmental legislation in selected regions (Ústí, Plzeň and Moravian-Silesian), reflecting the distribution of industries and thus distribution of impacts on regions, primarily at the macro level.

## *2.2 Introduction of Environmental Investment*

The assessment of impacts of environmental investment focused on the largest metallurgical and mechanical engineering facilities in the Moravian-Silesian Region. Detailed information about environmental investment implemented was obtained from the companies ArcelorMittal [1], Vítkovice Machinery Group [18], Vítkovice Steel [19], and Třinecké železářny [17]. The data below are valid, unless specified otherwise, as of 1 January 2015. The analysis assessed 31 investments supported from the Operational Programme Environment (OP ENV) under calls 25 (1 project), 36 (20 projects), 38 (5 projects) and 48 (5 projects) with total estimated costs of CZK 6.153 billion, eligible costs of CZK 5.158 billion, and maximum support amount of CZK 4.149 billion. Chart 1 shows a detailed breakdown of costs according to the OP ENV.

**Figure 1. Total amount of costs of selected environmental investment as per approved OP ENV subsidies and calls**



Source: Author [1], [17], [18], [19]

The implementation of all the 31 projects was between 2013 and 2015. The total estimated amount of the investment is CZK 5.1 billion. We obtained detailed data breakdowns by the year of implementation and cost category for all the projects. The investment in 2013 was CZK 78 million; the majority of the investment assessed was in the preparatory phase at that time (contractor selection, etc.). The investment of CZK 2.321 billion was implemented in 2014. The data for the years 2013 and 2014 are based on the real costs provided sorted by category based on the CZ-CPA structure. The estimated costs for 2015 are CZK 2.708 billion based on the preliminary project budgets and information from the operators.

For the purposes of presentation of the paper results, the investment is regressively aggregated into three main cost categories: Process and machinery equipment including associated works, Construction work, and Design and other services.

### 2.3 Model Structure and Creation

The input-output model was made in order to assess impacts of implementation of environmental investment on the following macroeconomic aggregates: gross added value, taxation, production, profits, employment, wages and salaries. The model is based on structure of the economy divided into 82 products (CZ-CPA). It is thus a model with a very fine and detailed product classification.

The input-output analysis is based on a series of assumptions. Conventional input-output models are based on the assumption of linearity and stability of inputs into sector productions. The assumption is manifested by each production of a specific sector has firm and stable ratios of inputs for its own production. The model does not assume the possibility of replacing inputs. Along with the impossibility to replace inputs, the model is based on an unlimited production capacity of each sector. According to that assumption, the sectors are capable of producing both extremely high and very low production, under which the sector would cease to exist in a real-world economy. The model also does not distinguish company size and assumes smooth production processes.

Moreover, the modelling of the investment impacts is done under otherwise invariable circumstances (*ceteris paribus*). Regardless of any other circumstances, it works with data that are set in the properties of the model input data (e.g., firm GDP trend, unchanged state tax or other policies affecting the sectors; the model never assumes impacts of other tax or regulatory measures or changes to the structure of the economy that are not defined in the input data). The assessment of the effect of investment on employment uses its structure for the production of different products for 2010. The last assumption concerns imports and exports. The model assumes a fixed ratio of imports and exports in the production functions of the different products for 2010.

With respect to the limited degree of detail of information about the origin of technology used and data on suppliers, the impact is modelled at the level of the whole Czech Republic, including imports of necessary technology as per data on current importation in each sector.

The basic component of the model is a matrix of technical coefficients  $A$  with the elements  $a_{ij}$  as per equation (1) in [8], derived from the SIO for 2010, adjusted with data on importation of each product for 2010 [5]. These coefficients represent the relationships among the sectors and are the results of the ratio of inputs of sector  $i$  to sector  $j$  and the total production of sector  $j$  for the specified time period.

$$A = (a_{ij})_{n \times n} ; a_{ij} = \frac{x_{ij}}{x_j} \quad (1)$$

where:  $0 \leq a_{ij} \leq 1 ; i, j = 1, 2, \dots, n$

The calculation of the production multipliers is made using an approximation of the so-called Leontief inverse matrix of technical coefficients. It is used for calculating the sector production multiplier. After that, we determined the value of multiplication of investment in the various sectors (productions) and the effect on other macroeconomic aggregates: gross added value, taxation, company profits, employment, wages and salaries.

The assessment of the job multiplication requires establishing the number of employees per unit of value of total inputs/outputs of the different sectors in the economy. This necessary information is provided by the [4].

### 3 Results and Discussion

The impact assessment of environmental investment was made for the following macroeconomic aggregates: gross added value, production, tax collection, profits, employment, wages and salaries. The quantity of impacts is dependent on the total amount of funds invested. Thus, there are large differences between the impacts over the period 2013-2015. The very low funds invested in 2013 had a near-zero impact on the aggregate quantities. Conversely, the funds invested in 2014 and 2015 had noticeable impacts at the Czech Republic level in most of the indicators. The data shown for 2015 are estimates, and the indicator values for the Czech Republic used for the comparison are based in 2014. Imports of technology used, which made up a significant part of the investment, had a major effect on the amount of impacts.

An increase in the funds invested resulted in a noticeable increase in the production induced by the investment. In absolute values, as shown in Table 1, the investment of CZK 5.1 billion induced production worth CZK 9.7 billion. In relative values, the production caused by investment contributed in 2014 to the total production of the Czech Republic by 0.04% of the total production and by 0.05% in 2015. The increase in the gross added value is proportionate to the increase in the funds invested in 2014 and 2015. On the whole, the investment in 2013-2015 generated a gross added value of CZK 2.45 billion in the Czech Republic. In 2014 and 2015, the share of generated gross added value to the total GDP was 0.031% and 0.033%.

**Table 1. Annual production induced by investment implemented (CZK)**

Year	2013	2014	2015
Value	176,422,211	4,392,357,110	5,174,555,573

Source: Author

Net taxes on products are tightly connected with the induced product. The induced product quantified in the previous point makes a significant contribution to taxation from the national point of view; in 2014 and 2015, it comprised 1 per mille of the total amount of taxes on products. On the whole, the implementation of investment by means of production induced an additional tax revenue of almost CZK 870 million in 2013-2015.

The effect of the investment on employment is of negligible significance on the national scale in each of the three years studied. In absolute terms, the investment had an effect on the annual demand for 2,295 employees (expressed as full-time contracts) in 2014 and 2,433 employees in 2015. The increase in the wages and salaries for the work done under employment relationships is noticeable in 2014 and 2015, when CZK 415 (0.024% of the total volume of wages in the Czech Republic) and CZK 453 million (0.027%), respectively, were paid in wages induced by the investment. The analysis of investment impacts on wages and salaries indicates the investment intensity for workforce costs. The insignificant increase in employment in the CR is connected with a noticeable amount of wages in the economy.

As for impact on profits, there is a noticeable link between the funds invested and a growth in profits. The investment implemented in 2014 and 2015 contributed to profits of almost CZK 0.5 billion (Table 2); in relative indicators, this is 0.04% of the profits generated in the Czech Republic in those years.

**Table 2. Total profits arising from the investment (CZK)**

Year	2013	2014	2015
Value	31,265,247	479,032,525	486,388,139

*Source: Author*

It follows from the above results that the environmental investment induced an increase in production worth CZK 9.7 billion in 2013-2015. However, the high proportion of technology imports resulted in an increase in the gross added value of only CZK 2.45 billion. In the assessment, we could not identify the country of origin of the goods (and services), meaning that the assessment worked with data on average importation for each sector involved in the environmental investment. All the investment was made in the mode of turnkey measure implementation by general contractors, selected in public tenders, and complete bids for implementation of measures including all construction work. The general contractors then hired subcontractors for component tasks. This fact made it impossible to trace the origins of the goods and services. Therefore, we had to create an input-output model at the Czech Republic level, not only at the level of the Moravian-Silesian Region, to which all the investment studied were aimed. In this respect, a certain degree of distortion must be regarded.

The impacts could be determined more accurately for the regional level if more detailed data on the origin of component parts of the investment (budgetary items). Since the construction work was the second largest item after the technology, the impacts on the economic situation in the region can be expected to be significant, and the demand for workforce would be largely bound to the Moravian-Silesian Region and could be traced in the unemployment rates.

The investment in environmental measures in the Moravian-Silesian Region significantly exceeds the gross added value generated. In order to increase the economic impacts of environmental investment, it would therefore be advisable to support primarily technology manufactured in the Czech Republic, which would not require significant imports, resulting to a higher production multiplication in the CR, an increase in the gross added value, tax collection, employment and profitability. On the other hand, it must be considered that the primary purpose of the implementation of the measures was to reduce emissions of air pollutants, particularly particulate matter. The economic impacts are thus only a secondary effect.

The maximum amount of support to the projects assessed was CZK 4.1 billion. As part of the production multiplication and its taxation, the state got back CZK 870 million in taxes. The additional tax revenues from the implementation of the environmental investment resulted in a return of 21% on the subsidy provided. Additional financial impacts can be expected in employment, as a possible decrease in unemployment.

The above presented results are influenced by the used method of static input-output model, respectively by the available information about investment which don't include information about the place of origin. It was not possible to apply the dynamic model due to the high volume of investment and big amount of items and due the lacking knowledge of production

technologies. It was also not possible to gain the detailed data from the contractors and subcontractors. Used static model does not take into account possible development of influences determining results. The largest uncertainties are associated with the assumed fixed ratio of imports and exports in the production functions. Within the projects, the biggest part the total budget consists of technological facilities and technologies. Used average ratio can deviate significantly results on both sides. The ignorance of the technology suppliers can lead to overestimation or underestimation of impacts. For accurate determination would be necessary to know the product's cycle of each technological facility and technology. In today's globalized world the production of specific product is often decentralized.

The results don't include the crowd out effect of investments and subsidies, which is necessary to keep in the mind in the public policy. The effectiveness of investment is also omitted in this paper. Based on the [20], there are big differences in costs effectiveness of different measures of air pollution reduction, which can be realised in the Moravian-Silesian Region.

#### 4 Conclusion

The purpose of the paper was to evaluate the economic impact of the environmental investments in the Moravian-Silesian Region. The primary purpose of the investment was to reduce the particulate matter and thus to improve air quality. The investment influenced the economy due to the production multiplication process. An input-output model was used for the assessment. Due to limited data, we applied a static model at the national level. The investment induced additional production worth CZK 9.7 billion, which also had an effect on added value, taxation, profits, employment and wages. More than 21% of the subsidies provided then returned to the state in the form of taxes collected on the additional production induced.

In general, we can conclude that support to investment in technology renovation is ineffective from a purely economic point of view due to the high proportion of importation of the technology. The invested funds of CZK 5.1 billion induced a gross added value of only CZK 2.45 billion. In the event of an effort to support both the environment and the economic growth, it would be necessary to support only technology manufactured in the Czech Republic, thus preventing increasing importation, which comprised a significant portion of the investment assessed. Despite the high technology importation, the investment implementation period (in 2014-2015) gave jobs to 2.5 thousand people on average either on the implementation as such or in sectors where the impacts were multiplied. The question is, nevertheless, whether the investment would take place without the subsidy provision, only taking longer to implement if no subsidies were granted. Thus, it might only be shifted in time. This hypothesis could be verified using counterfactual impact evaluation.

The economic impact assessment showed that input-output analysis is an appropriate tool but requires a large quantity of highly detailed information about the investment made. Besides the exact identification of the sector that produces the component, it also demands information about the origin of the component or where the technology was manufactured. In the case of investment amounting to billions of CZK, it is impossible to obtain exact data from contractors; it is necessary to use statistics on the imports and exports in the given segments. There is therefore a risk of distortion which was discussed above.

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# How Much Extra Will Households Pay for Environmental Improvement? Impacts of Water and Sewerage Legislation in Preparation on Incomes of the Poorest Households in the South Bohemian Region

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## Abstract

Growing demand for water quality improvement has led to stricter legislation at the European Union level. The Czech legislation is beginning to significantly reflect the effort to meet the commitments. Environmental impacts along with guarantee of sustainability and reliability of drinking water supplies are the key point of regulation in the water and sewerage sector. The amendment to the Waters Act in preparation, along with other amendments, will lead to increased prices of water and sewerage charges, thereby being reflected in household expenditures. The effect of the changes in preparation is examined in the article among the lowest-income households in the South Bohemian Region. Based on micro models, it turns out that the lowest decile of households in the South Bohemian Region would expend an additional 0.5-1% of its incomes on water after all the changes are adopted. The impacts on different cities in this region differ the most due to existing infrastructure and wastewater treatment technologies. The presented results thus bring a more accurate estimate of the impacts than those presented by the study of the Ministry of Labour and Social Affairs, based on average data for the entire country. They clearly indicate the necessity to analyse socially sensitive issues at the local level with respect to considerable regional differences across the Czech Republic, which may cause significant distortions.

*Keywords: price of water; proportionality of regulation; Regulatory Impact Assessment; water and sewerage charges; local impacts; Waters Act*

JEL Classification: D14, G18, Q53

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## 1 Introduction

Water is considered a fundamental and necessary good for human well-being, and is tightly connected to development of societies. Sustainability development studies pay considerable attention to it [5]. There is a global pressure on environmental and water quality improvement. In this connection, the EU has adopted the Water Framework Directive, setting clear goals and directions in the area of water management and environmental protection. As part of the efforts to meet the requirements of the Directive, overall regulation of the water utility sector has been in preparation in the recent months, and there has been a considerable increase in legislative requirements on water and sewerage utilities, primarily in the area of water quality improvement and assurance of reliable and sustainable water supplies. Achievement of the environmental goals is associated with significant economic and social impacts.

The legislative process includes an assessment of proportionality of the regulation using a regulatory impact assessment process. The legislative changes in preparation involve both an assessment of impacts of each amendment separately and an aggregate assessment of the conceptual design for regulation in the water utility sector; the Government has commissioned the Ministry of Labour and Social Affairs to assess the social acceptability of changes to water prices. According to the study and forecast, the expenditures should increase the most in low-income families with children, namely up to 2.76% of the total family expenditures in 2020 [6]. However, no comprehensive assessment of the legislative changes in progress; only separate changes in preparation are assessed.

The paper analyses the impacts on expenditures of the lowest-income households associated with increased fees for surface/groundwater consumption, restricted utilisation of WWTP sludge on farmland [9], and definition of emission limits in wastewater. The paper is based on a complete study [4], where the impacts were analysed using a regional principle built on micro models, compiled for selected municipalities of different regions in which the water and sewerage charges are the highest. For these municipalities, we then calculated additional costs associated with the meeting of legislative changes newly approved and currently in preparation. The social acceptability of water prices is mostly perceived from the perspective of a whole country, but this approach does not correctly document the actual impacts on household expenditures due to considerable regional and local disparities. This paper therefore applies the “bottom-up” approach, i.e., one that is based on a reflection of situations in different regions. The South Bohemian Region was selected as the case for the purposes of this paper, as the local impacts differ the most in it. The situation in four cities of this region was used to model the impact. The analysis is based primarily on existing and approved RIAs [7], [8], [9], which contain expected impacts on businesses and expected partial cost increases.

The following chapter deals with the issue of socially acceptable price, which is often recognised as one of the rules of proportionality. Moreover, it briefly introduces the legislative changes in preparation, including the data used in the models described in the final part of the chapter. The third chapter presents the model results and their discussion. A discussion of the significance of impact modelling at the local level is part of the conclusion.

## **2 Material and Methods**

### *2.1 Social Acceptability of Water Price as a Proportionality Indicator*

The proportionality of regulation is often discussed in the area of water policy and the water and sewerage sector. The concept of social acceptability of the water price is often used as one of the primary indicators [2]. Thus, social acceptability of the water price influences the water and sewerage charges calculations in many countries [1]. The indicator is also used in the study by the Ministry of Labour and Social Affairs, the first one to assess the impacts of the legislation in preparation. It concerns the share of water expenditures (water and sewerage charges) in the total household expenditures. However, the rate of this share is not uniform according to different sources. The World Bank defines the acceptable share of water expenditures in proportion to the household income as 3-5%; the UN assumes a 3% threshold, and the OECD uses 4% [5]. For OP ENV projects in the Czech Republic, the social acceptability threshold is defined as 2%, but it is respected generally. The proportion is most commonly bound to the average household incomes in the country. Absolute quantification can be done across instead of relative figures. According to the State Environmental Fund [11], the socially acceptable water and sewerage fee price for 2016 is set at CZK 144.40/m<sup>3</sup> (valid for Prague as the maximum in the CR); the minimum is valid for the Moravian-Silesian Region, being CZK 93.93/m<sup>3</sup>.

The social acceptability of the water price involves comparison of calculations from many countries (e.g., Chile [10]), but the different quality of water supplied is not taken into account. In the CR, water is regarded as very good quality, often achieving parameters of baby water, but the quality in some other countries matches that of utility water and is not intended for drinking purposes. Therefore, the social acceptability of the water price should not be compared only from a purely economic point of view; correct comparison should take into account additional parameters such as chemical composition of water, its origin, need for purification, etc.

Generally speaking, the terms proportionality/acceptability are used increasingly often in recent years, not only when determining water prices. The notion of acceptability occurs in many other areas too, such as photovoltaics [12], power industry and housing.

## *2.2 Data Sources - Legislation in Preparation*

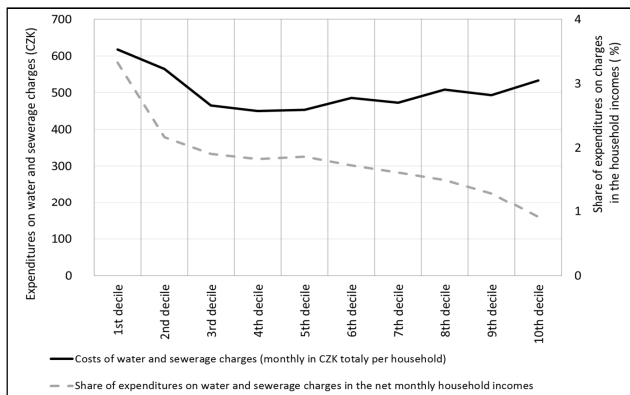
Nearly all newly emerging legislation is based on the Directive of the European Parliament and of the Council No. 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy. However, regulation in the water utility sector is connected with numerous other areas, such as the impact of changes in waste management and a number of other regulations indirectly associated with the issue. In accordance with the EU law, the CR has adopted a Government Regulation on indicators and values of permissible surface water and wastewater pollution, requirements of permits for wastewater discharge into surface water and sewerage, and on sensitive areas [7]. The Ministry of the Environment (MoE) has developed regulatory impact assessments (RIA) for the individual changes to the Water Act, on which this paper is based.

The proportion of household expenditures on water and sewerage charges is published by the Czech Statistical Office; water and sewerage charges are published by respective utilities on their websites, and the other data are collected by the Ministry of Agriculture as part of Selected Data on Property and Operating Records of Water and Sewerage Networks (VUME, VUPE). We made the micro models described below based on these publicly available data and own designs.

## *2.3 Model Structure and Creation*

As part of the determination of the current burden on the lowest-income households, we first made an analysis of the current situation based on data on household incomes and expenditures in 2015 [3]. For the purpose of processing of impacts with respect to the lowest decile in the distribution of household incomes, we calculated with incomes up to CZK 6000 and up to CZK 8000 (net income per person in the household); these are amounts falling within the first decile; the income up to CZK 8000 is often in the second decile, resulting in an assessment of impacts on the first and second deciles with incomes of CZK 6000 and CZK 8000. Chart 1 shows the absolute costs of water and sewerage charges per different household income deciles at the CR level, and the share of expenditures on water and sewerage charges in the net monthly household incomes. It is clear from the data that the poorest households have the absolutely highest expenditures on water per person. The absolutely lowest expenditures on water and sewerage charges are in the 4<sup>th</sup> decile. The amount of expenditures continues growing in the other deciles. The costs of water and sewerage charges represent the heaviest burden for the poorest households. In the first decile, the costs of water and sewerage charges in 2015 were more than 3% of the net monthly household incomes; these expenditures were more than 2% in the second decile and less than 2% in the other deciles. However, data at the local level are not available in the same classification as the national data. Notably, they lack a division of costs by more detailed characteristics such as income deciles. The expenditures on water in the lowest household decile in each region could be determined using expert estimates and an array of data at the regional level (e.g., average expenditures and water consumption in the selected region).

**Figure 1. Household costs of water and sewerage charges by income decile in the CR in 2015**



Source: Authors based on [3]

The analysis of impacts of new legislation is based on micro models, made by selecting 4-5 municipalities in each of the 13 regions in the Czech Republic with the highest water and sewerage charges and including Prague as a whole. The impacts are thus calculated based on reflection of local disparities. In the South Bohemian Region, the impacts were modelled for the cities of Český Krumlov, Prachatice, Strakonice and Tábor. In total, more than 206 thousand equivalent inhabitants of the South Bohemian Region are covered with regard to wastewater treatment. The comparison uses data on household expenditures and incomes in 2015 in the South Bohemian Region and water and sewerage charges in 2015. The household expenditures were derived from average expenditures in the region and from the distribution of the expenditures by the income decile in the Czech Republic due to the lack of detailed data, The forecast calculations only include the impact of the legislative changes, and exclude any other impacts (e.g., energy price trends), and disregard the population income trend due to highly uncertain forecasts, potential oscillations of the economic cycle, primarily with respect to the lowest household decile as per income, on which these oscillations do not have a marked effect in the long run.

The impacts are reflected in the 2015 prices as an increase in each year, depending on the expected year coming into effect. We assume a reflection of 10% margin in the costs of investment and increased charges and 15% VAT for water and sewerage charges. The impact models are made so that the municipality either uses groundwater sources or surface water sources. In this connection, we assume a loss in networks and process consumption in water purification of 25.8%, meaning that 1 m<sup>3</sup> of water invoiced requires a consumption of 1.35 m<sup>3</sup> of raw water. According to the current legislation plans, the increase in groundwater consumption charges can be expected gradually from 2017. Besides, the impact assessment assumes implementation of charges for wastewater discharge from 2017. The restricted use of WWTP sludge on farmland can be expected from 2019. The stricter emission limits for wastewater discharges is expected from 2021.

The impacts were analysed using micro models separately for each city. First of all, the impact of legislation on current water and sewerage charges was calculated. Stricter emission limits were reflected through the growth in operating and/or investment costs for individual WWTP according to the current state and emission. This increase in costs connected with WWTP together with other newly established or increased charges (e.g. charges for wastewater discharge) forms the overall increase in costs and thus in water and sewerage charges. In the next step, the total increase of water and sewerage charges was reflected in the expenditure of poorest households (first decile).

Due to the increasing charges for groundwater consumption, increased charges for surface water consumption have to be considered as well. Each River Basin organisation raises its prices on an annual basis. The study also has to consider increasing prices of surface water consumption. Based on the price growth so far, we made a forecast of price trends until 2023 using a sliding average of the amounts for four previous years. The estimated amounts of charges for Povodí Vltavy excluding VAT are shown in Table 1. Including losses in networks, process consumption, profit margin and VAT, the end price will increase by CZK 0.12-1.1/m<sup>3</sup> in the different years compared to the 2015 prices, assuming 100% use of surface water.

**Table 1. Forecast of surface water consumption price increase in 2017-2023 (CZK/m<sup>3</sup> excl. VAT)**

Year	2017	2018	2019	2020	2021	2022	2023
Value	3.77	3.85	3.93	4.01	4.09	4.18	4.27

Source: Authors

As concerns groundwater, the consumption charge should increase from CZK 2/m<sup>3</sup> up to the final CZK 6/m<sup>3</sup>, as of from 1 January 2022. This increase will be reflected in the end price of water as an increase by CZK 1.70 in 2017, CZK 3.41 in 2019, CZK 5.11 as of 2021, and CZK 6.82 as of 2022. In municipalities with predominant groundwater consumption, there will thus be a significantly greater price increase compared to those using primarily surface water.

The impacts of the increased charges for wastewater discharge to surface water and stricter emission limits on permissible pollution have been determined based on data on current emissions, technologies and extra costs distributed as depreciation of any investment associated with attainment of required concentrations. In the South Bohemian Region, the adoption of the emission limits proposed by the MoE [8] would require investment in reduction of total phosphorus emissions (Ptot) in all the four cities. Tábor would require the biggest investment; according to current concentrations, it would not meet emissions of total nitrogen (Ntot) and ammonia nitrogen (N-NH<sub>4</sub><sup>+</sup>) either. The calculation included depreciation of long-term tangible assets in depreciation class 5, i.e., depreciation over 30 years, the operator/owner's profit margin, and the VAT on sewerage charges. The increase in sewerage charges with average investment in light of various emission concentration proposals is shown in Table 2.

**Table 2. Impacts on sewerage charges from year of effect of decree (CZK/m<sup>3</sup>) compared to 2015**

City	Total expected average capital costs (CZK)	Cost in depreciation (CZK)	Cost of sewerage charge (CZK/m <sup>3</sup> ), incl. margin and VAT
Český Krumlov	33,000,750	1,100,025	1.02
Prachatice	14,152,050	471,735	2.08
Strakonice	15,220,350	507,345	0.42
Tábor	404,942,750	13,498,092	12.51

Source: Authors

### 3 Results and Discussion

The individual increases to charges should take place gradually and the changes, or impacts on prices, are therefore assumed in 2017, 2019, 2021 and 2023. These increases are compared against 2015, which is considered the initial year before the change. The four cities studied in the South Bohemian Region will see increases in the water and sewerage charges of CZK 3.63-5.82 in 2017, and CZK 10.06-22.15 in 2023. Table 3 shows the total increase in the water and sewerage charges in each city and year.

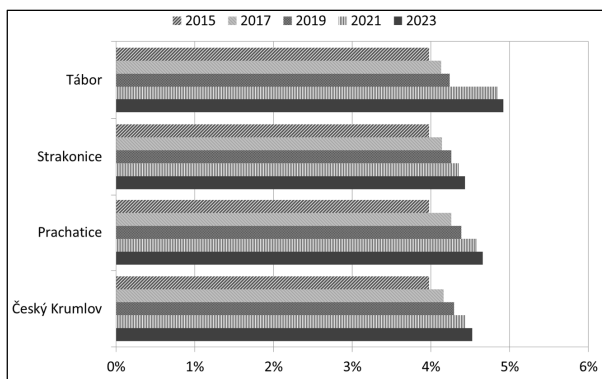
**Table 3. Water and sewerage charge increase (CZK/m<sup>3</sup>) in each year compared to 2015**

City/year	2017	2019	2021	2023
Český Krumlov	3.63	6.23	8.96	10.66
Prachatice	5.82	8.42	12.21	13.91
Strakonice	3.63	6.23	8.35	10.06
Tábor	3.63	6.23	20.45	22.15

Source: Authors

The increase in the water and sewerage charges due to the legislation changes can be further expressed as an increase in the share of expenditures on water in total household expenditures. The chart below shows the gradual increase in the share of costs of water and sewerage charges per household with incomes of CZK 6000 per person, i.e., households included in the first decile. Starting from 2017, we expect the implementation of a charge for groundwater consumption, a charge for surface water consumption, and a charge for wastewater discharge. Starting from 2019, we can expect an increase in the price associated with the restriction on use of wastewater treatment plant sludge on farmland. The stricter emission limits for wastewater discharges can be expected from 2021. Chart 2 shows the cost increases in the four cities of the South Bohemian Region – Tábor, Strakonice, Prachatice and Český Krumlov, selected as the cities with highest water prices in the Region. The most striking increase in the share in expenditures is seen in Tábor between 2019 and 2021; this area will thus be the most affected by the stricter emission limits, requiring an extensive adjustment to the wastewater treatment plant connected with massive capital investment costs. The impacts of the necessary adjustments will be perceptible for the following 30 years due to the depreciation period, i.e., at least for the depreciation duration. According to the analysis, the share of expenditures among the lowest-income households will not exceed 5% in any of the cities. Tábor is the closest to that threshold, with the expenditures being 4.92% of the incomes of households in the first decile. The share of expenditures on water is almost 0.5% lower in Český Krumlov and Strakonice.

**Figure 2. Share of costs per household with incomes of CZK 6000 per person (%) for selected cities**

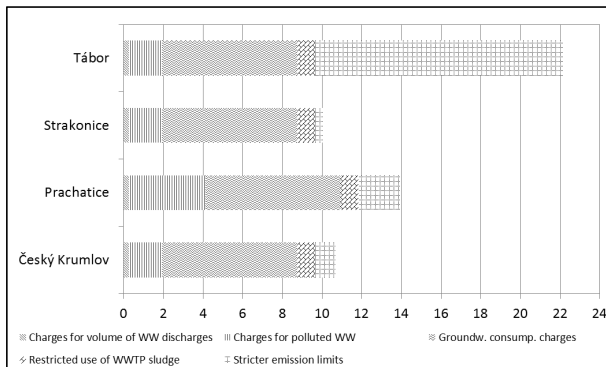


Source: Authors

The total increase in the water and sewerage charges should therefore be perceptible in 2023, after all the charges and legislative changes are implemented. Chart 3 below shows the individual items (charges) that will be reflected in the total water and sewerage charges in the four selected cities of the South Bohemian Region. In most of the cities, the increase in the water and sewerage charges will be associated mostly with the increase charge for groundwater consumption (from CZK 6.82/m<sup>3</sup>); in the case of Tábor, it will be the investment associated with meeting emission limits for the WWTP, amounting to CZK 12.51/m<sup>3</sup>. The component changes are

recorded in CZK per m<sup>3</sup>, including 15% VAT. On the whole, households in Tábor will pay CZK 22/m<sup>3</sup> more in 2023 compared to 2015. The other cities in the South Bohemian Region will not be affected much by the stricter limits on discharges, and the increase in the water and sewerage charges will not be as noticeable there.

**Figure 3. Expected increase in water and sewerage charges in 2023 (CZK per m<sup>3</sup>, incl. VAT)**



Source: Authors

The results presented above assume the maximum impact. Due to data availability, it was impossible to determine the exact amount of impact of the increase in the charges for surface/groundwater consumption. Municipalities using surface water as their source will not face such a high impact of the price increase. The decision on setting the emission limits will play a major role in the overall impact. If the stricter limits proposed by the Ministry of the Environment are implemented, the impact on the water and sewerage charges would be much more significant due to the failure to comply with the planned technical parameters in the majority of cases. The study assumed the average of the current proposals; the compliance is thus a question mark with a big influence on the final impacts.

#### 4 Conclusion

The objective of the paper was to assess the impacts of legislative changes in preparation on water and sewerage charges, or on the expenditures of the lowest household decile at the local level. The analysis of the local impacts showed that the poorest households have a noticeably higher relative share of household expenditures on water than maintained by the study of the Ministry of Labour and Social Affairs. Compared to the average expenditures of 2.8% of the total expenditures in 2020 among low-income families quoted by the Ministry, the above expenditures exceed in 4% of the total expenditures of the lowest-income households in the various cities of the South Bohemian Region in 2019. The difference is partly due to including different impacts on the water prices. Besides the increase in the charge for surface/groundwater consumption, the paper also assumes other impacts, including the need for investment in wastewater treatment plants due to stricter limits on quality of water discharged.

With respect to the decision-making process, the assessment of proportionality and acceptability has to evaluate all the impacts in aggregate, with an emphasis on the lowest-income households. Due to the significant differences, it is advisable in the event of significant legislative changes to carry out an assessment of impacts at not only the national level but also the local level on at least a sample of municipalities depending on data availability. Significant differences in the water management area can be observed even within the same Region due to the different infrastructures and technical equipment of treatment plants. On the example of the South



Bohemian Region, the impact on the expenditures on water differs by 0.5% of the total expenditures. Compared to the results from other municipalities, the impacts can be regarded as average with the exception of the city of Tábor. In the event of implementation of all the legislative changes, the study identified the highest increase in the water and sewerage charges in Prague, where the expenditures on water and sewerage charges would be up to 8% of the total expenditures in the lowest-income households in 2023. On the other hand, the comprehensive model identified the lowest share of expenditures on water in 2023 (3.5%) for Hradec Králové.

Based on the above results, it offers itself for discussion whether it is economically justifiable to increase the water and sewerage charges with respect to environmental impacts. Besides the direct financial effects, the assessment of the social benefits would require inclusion of additional non-financial and indirect utilities that the legislation in preparation and implementation of measures will entail. From a purely economic point of view, the price should always reflect the rarity of the good; only thus can responsible behaviour of consumers be achieved.

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# The Efficiency of the Higher Education in the Selected OECD Countries

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## Abstract

There are only a few studies about measuring the efficiency of higher education in international framework. In this paper we focus on this issue. We used DEA methodology and data from OECD database for 31 countries to measure the efficiency of their higher education. All data refer to the year 2011. We constructed two models with following variables: public expenditure on higher education as percentage of total public expenditure and public expenditure on higher education as a percentage of GDP as the inputs; percentage of the population that has attained higher education and employment rate with higher education as the outputs. We defined countries with efficient higher education (e.g. Canada, Israel, Japan, Sweden) and countries with inefficient higher education (e.g. Turkey, Korea) and calculated how much the countries with inefficient higher education should change the outputs to become efficient. Our results also showed that the proportion of public and private expenditure does not affect the efficiency score.

*Keywords: efficiency; DEA; higher education; OECD countries; public expenditure*

JEL Classification: C14, C67, I21

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## 1 Introduction

The higher education seems important for the economy. There are a lot of studies which analysed the impact of higher education on the economy. The higher education is traditionally financed by government in Europe. According to the OECD [15], the EU21 average applies the following ratio –78.6 % goes from the public sources and 21.4 % from the private sources. The OECD average applies a bit different ratio – 69.2 % goes from the public sources and 30.8 % from the private sources. The difference between these two ratios is caused by countries like e.g. Australia (where the ratio is 45.6 % public and 54.4 % private sources), Japan (34.5 % public and 65.5 % private sources), Korea (27.0 % public and 73.0 % private sources) or the United States (34.8 % public and 65.2 % private sources; see Figure 1).

There are studies which measure the efficiency of higher education in a country (see McMillan and Datta [13] – Canada, Avkiran [3] in Australia, Kempkes and Pohl [11] in Germany). On the other hand, there are only a few studies which measure the efficiency of higher education in international framework (see Afonso and Aubyn [1] or Clements [6]). Afonso and Aubyn [1] measured the efficiency in education (the whole education system, not only higher education) and health sectors for sample of OECD countries and applied two non-parametric methods – Free Disposal Hull (FDH) and Data Envelopment Analysis (DEA). According to their DEA analysis, the countries with efficient education are Finland, Japan, Korea and Sweden.

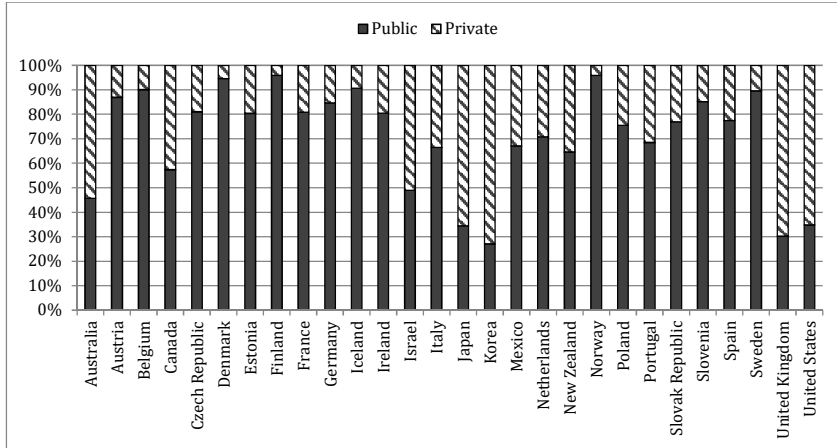
It is a pity that there is a lack of studies. They can help us to compare efficiency of our higher education with other countries. If there is a country which is similar to our country and is efficient and ours not, we can use the results of analysis and become efficient too. Of course, it is not so easy to change it, but it could give us the interesting information about what is our position in comparison with other countries.

There are a lot of methods how to measure the efficiency. In case of measuring the efficiency of higher education, parametric and non-parametric methods are often used. Parametric methods (e.g. Stochastic Frontier Analysis, SFA) are stochastic and set a concrete production function. Non-parametric methods (e.g. DEA, FDH) are deterministic and determine a ratio of weighted sum of inputs and weighted sum of outputs [16]. We used DEA methodology in our analysis.

The aim of this paper is to measure the efficiency of the higher (also known as “tertiary”) education in the selected OECD countries. We want to find out:

- The countries with efficient higher education,
- The countries with inefficient higher education and
- How much they should change to become efficient in higher education,
- If the proportion of public and private sources matters.

**Figure 1. Relative proportions of public and private expenditure on higher educational institutions**



Source: Author based on [15]

## 2 Material and Methods

In this chapter, we present the DEA methodology and data set we used in our analysis.

### 2.1 Data Envelopment Analysis

Data envelopment analysis is the optimization method of mathematical programming [5], [4]. DEA is used to evaluate the technical efficiency of homogenous production units (in our case, countries with higher education system). The technical efficiency can be defined as a ratio of the weighted sum of outputs to the weighted sum of inputs [8]. The aim of this methodology is to divide the production units into efficient and inefficient production units. Using multiple inputs and multiple outputs is one of the advantages of DEA. Another advantage is possibility to use the inputs and the outputs in monetary and non-monetary form.

We can construct input- or output-oriented model with constant or variable returns to scale. The choice of the orientation of the model depends on our aim – Do we want to minimize the inputs with the given level of outputs or do we want to maximize the outputs with the given level of inputs? In the first case, we use the input-oriented model and in the second one, we use the output-oriented model.

We used the output-oriented model with variable returns to scale and there is a formula, how to calculate this model:

$$\begin{aligned}
&\text{minimize} && g = \sum_j^m v_j x_{jq} + v && (1) \\
&\text{subject to} && \sum_i^r u_i y_{ik} \leq \sum_j^m v_j x_{jk} + v, \quad k = 1, 2, \dots, n \\
&&& \sum_i^r u_i y_{iq} = 1 \\
&&& u_i \geq \varepsilon, \quad i = 1, 2, \dots, r \\
&&& v_j \geq \varepsilon, \quad j = 1, 2, \dots, m \\
&&& v \in R
\end{aligned}$$

where  $v$  = dual variable matched with the convexity condition (see formula 2)

This formula is called the output-oriented BCC primal model. BCC model [4] uses variable returns to scale and is a modification of CCR model [5], which uses constant returns to scale. The variability is ensured by adding the convexity condition:

$$e^T \lambda = 1 \quad (2)$$

All linear programming models have the same “problem”. The large amount of conditions and restrictions has the negative impact on the solution of the problem. Therefore it is more suitable to construct the output-oriented BCC dual model. This dual model uses the same data but with less restrictions. From this point of view the dual model seems to be more practical (for the calculation procedure using the dual model see [10]).

## 2.2 Data Set and Model Specification

Data set is based on data from OECD database [13], [14]. All data are from the year 2011. Unfortunately, there are not all current data available; therefore we had to use older data. We use public expenditure on higher education as percentage of total public expenditure and public expenditure on higher education as a percentage of GDP as the inputs. We do not use total expenditure on higher education, because the European education system is financed especially by government and we want to know if the ratio of public and private sources matters. The outputs are represented by percentage of the population that has attained higher education (25-64 year-olds) and employment rate among 25-64 year-olds with higher education. According to the data availability, we selected 31 OECD countries.

We constructed two models (see Table 1) and used one input and two outputs for both models. The outputs are the same in both models, but the difference is in the input. Both models are output-oriented and used variable returns to scale. The DEA calculation was performed by using DEA-Excel Solver 2014 [9].

**Table 1. Model specification**

	<b>Model 1</b>	<b>Model 2</b>
Input	Public expenditure on higher education as a percentage of total public expenditure	Public expenditure on higher education as a percentage of GDP
Outputs	Percentage of the population that has attained higher education (25-64 year-olds)	Percentage of the population that has attained higher education (25-64 year-olds)
	Employment rates among 25-64 year-olds with higher education	Employment rates among 25-64 year-olds with higher education

Source: Author

Descriptive statistics of data set (minimum, maximum, mean, median and standard deviation) are presented in Table 2.

**Table 2. Descriptive statistics of data set**

<b>Variables</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Median</b>	<b>Std. dev.</b>
Public expenditure on higher education as a percentage of total public expenditure	1.666	5.467	3.151	3.016	0.897
Public expenditure on higher education as a percentage of GDP	0.766	2.596	1.397	1.334	0.463
Percentage of the population that has attained higher education (25-64 year-olds)	14.034	51.329	31.588	33.869	10.200
Employment rates among 25-64 year-olds with higher education	76.067	90.459	84.097	84.450	3.644

Source: Author

### 3 Results and Discussion

The results are presented in Table 3. According to the DEA methodology the countries with efficient higher education have the efficiency score equal to 1.

**Table 3. The efficiency score and the rank of the selected OECD countries**

<b>Country</b>	<b>Model 1</b>		<b>Model 2</b>	
	<b>Eff. score</b>	<b>Rank</b>	<b>Eff. score</b>	<b>Rank</b>
Australia	1.032	14	1.012	10
Austria	1.018	10	1.018	11
Belgium	1.027	12	1.034	15
Canada	<b>1.000</b>	1	<b>1.000</b>	1
Czech Republic	1.069	24	1.052	22
Denmark	1.044	20	1.045	19
Estonia	1.086	26	1.072	26
Finland	1.042	18	1.042	17
France	1.048	21	1.061	24
Germany	1.016	9	1.010	9
Hungary	1.090	28	1.097	30
Iceland	1.001	8	<b>1.000</b>	1
Ireland	1.048	22	1.047	20
Israel	<b>1.000</b>	1	<b>1.000</b>	1
Italy	<b>1.000</b>	1	1.072	25
Japan	<b>1.000</b>	1	<b>1.000</b>	1
Korea	1.093	29	1.082	28
Mexico	1.132	30	1.079	27
Netherlands	1.020	11	1.019	12
New Zealand	1.032	15	1.028	13
Norway	<b>1.000</b>	1	<b>1.000</b>	1
Poland	1.043	19	1.028	14
Portugal	1.030	13	1.037	16
Slovak Republic	1.075	25	1.051	21
Slovenia	<b>1.000</b>	1	<b>1.000</b>	1
Spain	1.087	27	1.085	29
Sweden	<b>1.000</b>	1	<b>1.000</b>	1
Switzerland	1.034	16	1.009	8
Turkey	1.187	31	1.173	31
United Kingdom	1.039	17	1.042	18
United States	1.061	23	1.060	23
Average	1.044		1.041	
Standard dev.	0.043		0.039	

Source: Author

Other countries with the efficiency score higher than 1 can be presented as the countries with inefficient higher education. On the other hand, it is not so easy to say that these countries are really inefficient. It is necessary to consider other aspects – for example: Does the country have more students in marketing programs than in chemistry programs? The chemistry programs need more expenditure per student than the marketing programs; How many public and private higher education institutions does the country have? Are private higher education institutions funded by the government?

When we stick to the results presented in Table 3, according to the Model 1 the efficient higher education is in Canada, Israel, Italy, Japan, Norway, Slovenia and Sweden. The Model 2 gives us the similar results. The countries, whose the higher education is efficient, also have efficiency score equal to 1 in Model 2 plus Iceland. On the other hand, the countries with the most inefficient higher education are Turkey, Mexico, Korea and Hungary. The results are similar in the both models (compare with [1]). The similar results are caused by the correlation between the inputs (the correlation coefficient is 76.1 %). We can discuss which one of these inputs is more suitable for measuring the efficiency of the higher education.

The input “Public expenditure on higher education as a percentage of GDP” shows that there is connection between the public expenditure and the development of economy. Growing economy can support government to spent more money. On the other hand, there is a theory about an optimal size for the government sector (see e.g. [12]). Afonso, Schuknecht and Tanzi [2] analysed the public sector efficiency and found out that the countries with lean public sector and public expenditure ratios not far from 30 % of GDP tend to be most efficient. In our analysis we deal only with public expenditure on higher education, but the point is the same – too much public expenditure on higher education does not mean that the higher education will be efficient (e.g. according to the Model 2 Japan and Norway have the higher education efficient, but their ratio the public expenditure on higher education/GDP represent the minimum and the maximum of data set – Japan 0.766 % and Norway 2.596 %; see Table 2).

We can use the input “Public expenditure on higher education as a percentage of total public expenditure” if we want to compare our ratio the public expenditure on higher education/total public expenditure with other countries without including GDP. We can find out that the high ratio does not necessary mean the high efficiency score (e.g. according to the Model 1 Canada, Italy, Japan and Norway have the higher education efficient, but their ratios the public expenditure on higher education/total public expenditure are very different – Canada 4.727 % and Norway 4.461 % vs. Italy 1.666 % and Japan 1.835 %).

Using output-oriented models help us to define how much the country should change the outputs (with the given level of input) to become efficient in the higher education. According to the Model 1, Korea, Mexico and Turkey are placed at the end of the rank. It means their higher education is the most inefficient. Turkey should increase the outputs by 18.65 % (it means that the employment rate of people with higher education should be increased from 76.067 % to 90.255 % and the percentage of the population with higher education from 14.034 % to 36.385 %), Mexico by 13.18 % (from 79.494 % to 89.968 % and from 17.323 % to 33.950 %) and Korea by 9.32 % (from 78.138 % to 85.420 % and from 40.409 % to 44.175 %).

According to the Model 2, Hungary, Spain and Turkey are placed at the end of the rank. Turkey should increase the outputs by 17.34 % (it means that the employment rate of people with higher education should be increased from 76.067 % to 89.259 % and the percentage of the population with higher education from 14.034 % to 27.752 %), Hungary by 9.71 % (from 79.246 % to 86.940 % and from 21.124 % to 34.619 %) and Spain by 8.47 % (from 80.286 % to 87.088 % and from 31.571 % to 34.246 %).

Increasing employment rate and percentage of people with higher education could sound easy when we describe results of our analysis, but there are aspects which have to be considered. We chose percentage of people with higher education as one of the outputs, because there could be the connection between public expenditure on higher education and people with higher education. In our analysis, the correlation coefficient between these two variables is 30.8 % in Model 1 and 27.1 % in Model 2. It means high public expenditure do not necessary mean more people with higher education (e.g. Japan where the public expenditure on higher education/total

public expenditure is equal to 1.835 % and the percentage people with higher education is 46.400 % vs. Norway 4.461 % and 38.054 % - according to the Model 1 both these countries have efficient the higher education; Canada where the public expenditure od higher education/GDP is equal to 1.979 % and the percentage of people with higher education is 51.329 % vs. Sweden 1.983 % and 35.174 – according to the Model 2 both these countries have efficient the higher education). In the case of percentage of people with higher education we should ask – Do we really need so many people with higher education? Does our economy need them? Maybe we need more people with secondary education. There is other “problem” about this output – we don’t know if these people with higher education studied in their country. They could study abroad and then they came back. Or they could study in their country and then they went to work abroad. Eurostat [7] presents data about the mobility of students (higher education) in Europe in 2011. We chose two countries with efficient higher education (Italy and Norway) and two countries with low efficiency score (Turkey and Spain) as the examples. 41.1 thousand students from Italy studied abroad and only 19.3 thousand students came to study in Italy. 12.8 thousand students from Norway studied abroad and 6.5 thousand students came to study in Norway. 21 thousand students from Turkey studied abroad and only 4.6 thousand students came to study in Turkey. 20.9 thousand students from Spain studied abroad and 30.9 thousand students came to study in Spain. The second input is represented by employment rate of people with higher education. It could be also influenced by the mobility of people. The choice of the inputs and the outputs is not easy because it is also influenced by data availability.

#### **4 Conclusion**

Measuring the efficiency is very popular and also useful. Using suitable methodology can give us the results, which can lead to increased the efficiency. In our case, we measured the efficiency of higher education in selected OECD countries. We used DEA methodology and constructed two models. Both models are output-oriented. The inputs are represented by public expenditure on higher education as a percentage of total public expenditure (Model 1) and public expenditure on higher education as a percentage of GDP (Model 2). The outputs are represented by percentage of the population that has attained higher education (25-64 year-olds) and employment rates among 25-64 year-olds with higher education (for both models). The data was obtained from the OECD publications Education at a Glance 2013 and 2014. The data set contains data from 2011.

According to the Model 1 the efficient higher education is in Canada, Israel, Italy, Japan, Norway, Slovenia and Sweden. The Model 2 gives us the similar results. The countries, whose the higher education is efficient, also have efficiency score equal to 1 in Model 2 plus Iceland. On the other hand, the countries with the most inefficient higher education are Turkey, Mexico, Korea and Hungary

We recommend dividing the selected countries into similar groups. Our results showed that it do not matter if the proportion of public and private expenditure is 90:10 (e.g. Sweden) or 35:65 (e.g. Japan – according to the Models, both these countries have efficient higher education), but it could be more helpful to compare the countries with similar economy (groups like northern countries in Europa, developing countries, America, Asia, etc.). We also recommend considering other inputs and outputs (e.g. graduation rates, ratio students/academic staff), but there could be a problem with data availability.

#### **Acknowledgements**

This article has been elaborated as one of the outcomes of the research project “Public finance in the Czech Republic and the EU” supported by the Internal Grant Agency of the University of Economics, Prague, No. F1/1/2016.

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# Risk Governance in Innovations in Mental Healthcare Services: Case Study Hronovce

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## Abstract

In this paper we focus on risk governance in innovation processes in providing healthcare services. We employed qualitative analysis to define and examine various approaches of relevant stakeholders to the risk definition and governance in public service innovation in mental healthcare. The objective of this paper is to present a case study prepared within the framework of an international research project on risk definition and risk governance in public services delivery. The paper is based on original survey data from our own research conducted within the research project LIPSE "Learning from Innovation in Public Sector Environments". The main findings point out that the studied case of mental healthcare provider is a successful hospital that grasped the concept of innovation but the risk management lags, both in theory and practice.

*Keywords: Risk Management; Healthcare Services; Innovation; Public Sector*

JEL Classification: H41, I18

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## 1 Introduction

Innovation is a risky business: outcomes, both foreseen and unforeseen, are uncertain, as is the process of innovation itself [8]. There are quite a lot of authors dealing with innovations in non-profit private sector [14, 17, 21] and also public sector [e.g. 3, 9, 11, 12, 13, 15, 16, 23] and many of them agree on risk averse culture in the public sector organisations. Organizational culture represents a significant antecedent; within public organizations, a consolidated culture of risk aversion is often a remarkable barrier to the adoption of innovations [1]. This is quite natural, Bhatta [4] Wolak-Tuzimek & Duda [24] and Michalski [10] also argue that success, unlike in the private sector, cannot be judged "on average": even if the majority of a public organization's service decisions turn out to be beneficial and successful, there is still little tolerance for any sort of even occasional 'failure'. Careful risk management could help to handle this obstacle, yet, the research on risk definition and risk management is rather scarce. This paper is based on the concept of Brown and Osborne [5], who propose the framework for risk governance and innovation in public services (Table 1) and connect the three risk management approaches with three types of innovation.

**Table 1. A typology of risk approaches**

Type of Risk Approach/Innovation	Technocratic Risk Management	Decisionistic Risk Management	Risk Governance
Evolutionary	X	X	X
Expansionary	---	X	X
Total	---	---	X

Source: [6]

Known risks can be assumed to drive innovation in cases when they provide the opportunity to find new ways of harnessing these known risks (e.g. new waste management techniques in environmental sustainability, new medication in mental health treatment, etc.). At the same time, these known risks may also be barriers to innovation. Uncertainty can spur innovation by ways of sudden shocks. Since uncertainty is unquantifiable and cannot be known

ex ante, the innovation it can potentially spur is likely to be of spontaneous nature and not planned [6].

Proactive risk management focuses on avoiding a risk from materialising in the first place, or, at least, minimising its occurrence or magnitude. Reactive risk management, on the other hand, addresses risks that have already materialised and whose effects need to be mitigated. Combination of the above mentioned framework and these two added dimensions is the base for constructing the final project framework for managing risk in social innovation (Table 2).

**Table 2. A framework for managing risk in social innovation**

Type of Risk Approach/Risk	Risk	Uncertainty
Hard	Evolutionary Innovation (Top-Down Management)	Stagnation (Risk Minimisation)
Soft	Expansionary Innovation (People-Driven Risk Governance)	Total Innovation (“Thriving on Chaos”)

Source: [6]

## 2 Material and Methods

This paper reports results from the Slovak part of the LIPSE research project that studied social innovations in the public sector ([www.lipse.org](http://www.lipse.org)). The project consisted of 7 work packages, we focus on one work package that deals with risk definition and risk governance. The goal of this Work Package (WP4) was to identify the current range of approaches to risk in innovation in public services across European countries (the empirical research of WP4 was based on a four country comparative study including Italy, the Netherlands, Slovakia and the UK) as well as to identify the key contingencies in two policy sectors and to empirically identify and evaluate current approaches for relevant stakeholders to engage in discussions about levels of risk for public service innovations. It also investigates how these discussions are translated into specific risk management and governance models [6]. Two fields were selected – mental health care (MHC) and environment. For the purpose of this paper we chose the mental healthcare field and a case of Psychiatric Hospital in Hronovce.

A multi-method research design was adopted. We identified 10 case studies in the mental healthcare policy field. We have followed a case study where all types of involved stakeholders were interviewed in following institutions:

- Two public MHC hospitals.
- Two non-profit organisations active in MHC.
- Two public mental departments at regional hospital.
- Four private specialist medical practitioners' surgeries as MHC establishments (in a private ownership with public financing via health insurance).

The methodology of study is fully consistent with the LIPSE research project methodology as set by the WP4 research leader, University of Edinburgh. In mental health, the risks involve vulnerable adults, and directly focus on people. It is also a field where risks and benefits are invariably contested among users, citizens and professional groupings. This makes risk management a vital aspect in any innovation. The research analysis aims to provide a representative sample of different types of risk and risk approaches across state systems and societies, in the paper we present only risk definition and approaches to its management and governance in the Psychiatric Hospital in Hronovce. This case was also selected by the WP4 leader for in-depth analysis. The criteria for selection of the field of mental healthcare were as follows:

- Risk Locus - mental health services address vulnerable user groups. There is thus a clear risk to service users, which, in many cases, extends to service staff. It also includes traits of financial, reputational, and political risks.

- Risk Timing - mental health services deal with the status quo of patients and evoke more immediate risks. This increases risk as uncertainty of outcomes and is likely to affect both reputational and financial risks for organisations.
- Organisational/Operational Differences - mental health services are mostly embedded into a network of statutory bodies. There is also an increasing commercialisation in operation that again translates into risk potential at the level of, amongst others, an organisation's reputation.

The main reason for choosing the case study was that it is the most progressive mental health hospital with full range of inpatient and outpatient services and an advanced system of quality management; expected to be innovation leader.

Stakeholders were interviewed using a semi-structured interview protocol containing both open (inductive) and closed (deductive) questions. We achieved 100 % response rate thanks to a direct approach, the final structure of respondents from Hronovce Hospital is in Table 3.

**Table 3. Overview of the interviewees**

<b>Interviewee</b>	<b>Role in Organisation</b>
1 Ladislav Belan	Quality manager
2 Martina Molnárová	Head of quality department
3 Milan Zelina	IT department
4 Danka Welterová	Chief doctor inpatient department
5 Jana Gyurkyova	Nurse
6 Daniela Takacsová	Vice director for nurses
7 Ajit Das	Vice director MHC
8 Dusan Duriancik	Vice director management

*Source: Authors*

### **3 Results and Discussion**

The hospital was established by the Ministry of Health of the Slovak Republic on 1<sup>st</sup> January 1991 as the state budgetary organisation, from 1<sup>st</sup> January 1992 as the public subsidised organisation. The hospital delivers inpatient and outpatient mental health care. The history of this hospital is longer – in 1951 the socialist state decided to transfer all mentally ill from families to “rehabilitation centres”. Already at the end of 1951 the centre in Hronovce served to 450 patients. In 1953 it had 29 employees (but no medical doctor). The quality of services started to improve during the history of the hospital. In 1960s, the main building was opened and first professional medical staff hired (in 1968 the hospital served to 240 patients with two psychiatrists and 29 nurses). In 1970s the number of qualified staff increased to 126, not too far from international standards. In 1980s the whole hospital underwent major reconstructions and was able to deliver relatively high quality care using modern international methods. Today the hospital has 310 beds, its area is 10 hectares and employs 245 employees. It runs its operation within the ISO 9001:2008 system.

First, we state the innovations that were identified by interviewees, then we focus on their definition of risk and in the end we analyse the risk management and risk governance models in the hospital.

It is obvious that the hospital is innovative, but the innovation process is more spontaneous that structurally organised. In the following table we provide most important examples of innovative practices and connected risks as mentioned by interviewees.

**Table 4. Innovations and associated risks**

<b>Innovation</b>	<b>Associated risks</b>
The hospital operates several working therapy places (workshops), like glass and ceramics production, bookbinding, joinery, weaving.	Two types of risks well known and managed (in standard templates):  A/ risks to patients when working in such workshop – for example by using of sharp tools or any kind of equipment with injury chance  B/ risks to staff and other persons present on spot
Special forms of therapy: socio-therapy, hypo-therapy	The same set of risks plus:  C/ risks of escape of patient from the hospital (one case during last year)
Physical culture activities (Pilates, yoga, volleyball, fitness)	Mainly B type of risks
Introducing new treatment methods and drugs	D/ financial risks (the hospital is financed from public health insurance system, insurance companies set maximum limits for spending and any costly treatment should be financed within the given limit)
Travel bureau, working outside, but also organising excursions for patients	All types of risks – A-D (economy of business activities should deliver profit).

*Source: Authors*

The risks involved with innovations are assessed in several ways. As indicated in Table 4, for A type of risk the hospital has standard templates for risk level assessment. The B and C types of risks are also assessed and prevented, main tool are standard procedures developed for most types of activities within the hospital. The D type risks are assessed by the financial manager, but there is no standard procedure to manage them.

The hospital has two specific formal bodies to deal with innovations and all their aspects, including risks assessment:

1. Quality Council (advisory initiative body)
2. Quality department and quality manager (hierarchical subjects in the hospital organisation system).

Quality Council meets regularly and its members are all relevant internal stakeholders (external stakeholders, like representative of the municipality are not invited, yet). The Council is very active.

Main innovations risks are assessed and discussed. This is done partly in invention phase (there is no regular mechanism to determine and assess innovation risks *ex ante*, so in this part informal factors, like experience of these involved are crucial) and dominantly in implementation phase – Quality Council, quality manager and other internal stakeholders work together to prepare standard procedures and templates). The dissemination phase is not any core focus of the hospital (so only informal channels are used to share good and bad experience).

However, currently, there is no formal risk management system operating within the hospital. Risk management is partly indirectly managed by the ISO system, but there are no clear explicit structures responsible for risk management.

Risk management has implicit character, but it is relatively functional – the hospital uses several standard forms/templates to assess and prevent risks *exit* and we can also stress that from the point of view of results, no emergency situation has occurred, yet.

The hospital is fully aware about the need to establish formal risk management system. This task will be connected with implementation of new ISO 2015 standards (the hospital waits for their publication, they do not want to change their ISO twice in short period). ISO 2015 will be implemented before next re-certification audit in 2017.

When questioned about challenges in terms of managing the risk of innovation, only following interviewees provided some inputs (Table 5).

**Table 5. Challenges in managing the risk of innovation**

<b>Interviewee</b>	<b>Associated risks</b>
1 Ladislav Belan	We know that this is important area, but for formalisation we already decided to wait for ISO 2015 norms. This updated quality management system is expected to include part on risk management.
3 Milan Zelina	We really need to utilise existing standards and templates, update them and to develop regularly new for new innovative procedures.
5 Jana Gyurkyova	We need to do bit more to protect the staff.

*Source: Authors*

It is clear that innovation risk management is rather a new term for the hospital. They have effective quality management system, but have not started with risk management as the regular and formal procedure yet. All employees in top management are supportive to innovations and they are also aware of risks, but the issue of risk governance where risks in innovations should be regularly and systematically assessed and managed is still very recent. Due to the research and interviews made, the awareness of management concerning this issue increased.

As we already mentioned, the research on risk definition and risk management in innovations in public sector is rather scarce. However, similar research findings have authors like Staroňová and Málíková [19], who researched the innovations of social services in retirement home (high focus on clients – improving services by innovations, yet low awareness of systematic implementation and risk management of innovations). Other authors deal with innovations at the regional level [7] or innovations at the central level using various economic tools for management of innovations, mentioning the risk averse of public organization in implementing of innovations [18, 22]. This points out that the risk management is not a strength of public organizations, with better risk governance the innovations should be more feasible.

#### **4 Conclusion**

To conclude the presented research, we can state that the most progressive psychiatric hospital in Slovakia has implemented ISO; however, it does not have a systematic risk management system, not even for general risks. They try to be innovative, implicitly try to assess and prevent innovation risks, but such process will be systematically established only in the future. There is no benchmark to learn from in the country and the area.

Interviewees in our research mostly struggled to define risk in their work context and sometimes even to identify specific examples of innovations, they mostly stated as an innovation a use new drugs and treatments. The management was more likely to be aware of risk and risk approaches, e.g. reputational risks to the organisation, financial risks, and bureaucratic risks (such as failure to report or a change in the existing regulatory environment).

Concerning the risk management, almost all interviewees confirmed the non-existence of systemic ex-ante risk management for general. There was only one concrete ex-ante risk management tool - use of standard templates to assess risks connected with work therapy and other progressive therapies for each patient involved. For all respondents, the biggest barrier to implement any system lies in the limited capacities, both financial and human, that disable adapting a systematic approach for risk management.

The Psychiatric Hospital in Hronovce is mostly stuck at the level of decisionistic risk governance: trying to involve various stake-holders and deliberate the risk management process, but at the moment it almost impossible to address uncertainty as opposed to risks that can be identified ex ante. Given the current state of risk perceptions and approaches, the hospital has problems addressing any risk as a strategic component.

The above mentioned results and conclusion also describe the situation of other organisations that were subject to our research. In total we interviewed 10 organisations working in the field of mental healthcare and we can conclude, the situation is very similar: general risk management is almost absent in MHC system in Slovakia, only Hronovce case as the most progressive MHC hospital plans to start to implement systemic risk management from 2016 as the part of adaptation to new ISO norm. In general, the public sector organisations are rather risk averse [6], which in our conditions is rather historically rooted [2] that public sector refuses innovations because of the omnipresence of risk and fear of political failure. The only risk controls are connected with the obligatory state controls and regulations [20].

Research projects like this increase the awareness of respondents of risk governance: the organisations are able to better define the risks and their management which make them more open to the innovations.

## Acknowledgements

This research is supported by LIPSE (Learning from Innovation in Public Sector Environments) project that studies the drivers and barriers of social innovation in the public sector. The research is co-financed on local level by APVV project DO7RP-0010-12.

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# The Influence of the Intensity of Competition on the Supply Side on the Expenditure on the Collection and Disposal of Municipal Waste

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## Abstract

Prerequisite for the success of using the external production in the case of collection and disposal of municipal waste is sufficient level of competition on the supply side which ensures a price squeeze on the cost level and prevents the abuse of monopoly power. The aim of this paper is to verify, by using data from the Czech Republic, whether the level of competition in tenders for public procurement affects the size of expenditure on the collection and disposal of municipal waste. The methodology is based on the regression analysis with the sample of 98 observations. The results of the econometric analysis confirmed that with a higher number of bids the competitive effect in the case of collection and disposal of municipal waste transfers into the lower level of expenditure per capita. However, far more significant effect has the change of suppliers or distributing contracts between several suppliers. In terms of economic efficiency, a market size also appears to be important. Results of the analysis showed that the lowest values were found in spending per capita for municipalities with about 25,000 inhabitants.

*Keywords: Czech Republic; municipalities; public procurement; waste management*

JEL Classification: H57, Q53

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## 1 Introduction

Collection and disposal of municipal waste belongs to the set of services that are provided by local governments in most developed countries. Providing this service requires a fairly significant investment in fixed assets, which is often not in the budgetary possibilities especially in small municipalities. It omits (especially in the case of small municipalities) the possibility to provide this service under the in-house production and it is necessary to hire external companies (use the institute of public procurement). Prerequisite for the success of this model is sufficient level of competition on the supply side which ensures a price squeeze on the cost level and prevents the abuse of monopoly power.

The aim of this paper is to verify, by using data from the Czech Republic, whether the level of competition in tenders for public procurement affects the size of expenditure on the collection and disposal of municipal waste. The article is divided into three main sections. Current state of knowledge is discussed in the first one. The second part presents the data used and the selected method of creating regression model. Finally, the third part presents the results of the model and discusses the theoretical and practical implications.

### 1.1 The Current State of Knowledge

Using an external output for providing services brings not only positive aspects, which is in particular price pressure, but also considerable risks [8]. Their importance increases substantially if the subject of the contract is difficult to quantify and there is a possibility of an abuse of monopoly power. Both of these factors are indicated by Brown and Potoski in their articles [2] and [3]. In the case of collection and disposal of municipal waste it is usually not a problem to quantify the output of contract. It is significantly worse in probability of monopoly dependence. Companies can have considerable advantage in situations when they own fundamental



infrastructure, such as a landfill. Moreover, it is also possible to identify the effect of economies of scale, which can lead to the formation of regional monopolies. It is possible to eliminate the risk through sufficient level of competition on the supply side. Its condition is sufficiently large contract, which is able to attract new suppliers.

Especially the second condition is not fulfilled in the Czech Republic since the municipal system is highly fragmented. Out of more than 6,250 municipalities, there are up to 80% of municipalities with fewer than 1,000 inhabitants, which is the size that is definitely not attractive enough for new companies and thus it does not guarantee sufficient range of competitors. Additionally, you can also successfully doubt about the ability of these municipalities due to the limited administrative capacity to organize a tender for public procurement sufficiently open to wide range of candidates.

The influence of the intensity of competition to the expense of the municipalities for collection and disposal of municipal waste was a subject of numerous specialized studies abroad. Indirectly, this problem is solved by studies that deal with the problems of transition from internal to external production. In this case, it is possible to mention, for example McDavid [5], who analysed collection and disposal of municipal waste on a sample of 126 Canadian municipalities using econometrics and estimated costs drop by 50%. Smaller cost reduction was identified in [4] on a sample of 305 municipalities in Wales and England namely around 22%. In contrast, in Sweden Ohlsson [7] identified lower internal cost of production by 6%.

However, in terms of the scope of this article, they are more relevant studies which analysed the impact of the intensity of competition on expenditure. However, there are not so many such studies. One of the older ones, [13], analyses the impact of the implementation of CCT (compulsory competitive tendering) on expenditure (net and gross) incurred to ensure the collection and disposal of municipal waste in 315 British towns, is worth mentioning. The study found out that in regions where larger number of companies entered the competition, there is greater decrease in costs. The positive impact of increased competition on the cost of public services, including the collection and disposal of municipal waste, is also mentioned in several publications, although this conclusion is not always supported by empirical analysis. As an example let us mention [1], [6] or [11]. Most of these papers also highlight a decrease in effectiveness of external production with monopoly supplier, which is consistent with the conclusions of [3].

The logic behind the number of bids submitted on the expense of municipalities for the collection and disposal of municipal waste rises from the theory of competitive effect. It is an indirectly-proportional relationship between the number of submitted bids and the tendered price of public procurement. In the Czech Republic, in the case of the collection and disposal of municipal waste industry, there was confirmed an existence of this namely in the article [9]. This relationship is also confirmed by the results presented in [10], where a diversity of unit costs in several size groups of municipalities in the South Moravian region was analysed. It turns out that municipalities with higher number of competitors actually report lower expenses.

## **2 Material and Methods**

The used data set combines two basic sources. The first one is information systems containing information about municipal expenditure in 2007-2015. Specifically, the publicly available systems MF ARIS (<http://wwwinfo.mfcr.cz/aris/>), MF UFIS (<http://wwwinfo.mfcr.cz/ufis/>) and Monitor (<http://monitor.statnipokladna.cz/>), which contain information about the expenditure of all municipalities in the Czech Republic in the budgetary structure, making it possible to determine the exact amount of expenditure on collection and disposal of municipal waste, as well as their functional structure (wages, payments for services etc.). Based on these data, average annual expenditures per capita in the period were calculated for each municipality. Here it should be noted that this is expenditure, not costs because the statement used to report on implementation of the budget is not based on accrual basis. This leads to the fact that the data used are not suitable for comparison of costs between internal and external productions, as in the case of internal production costs for the purchase of capital goods,

they appear only in the purchase year and in subsequent years are not taken into account. This restriction, however, is not relevant for the analysis below, because in the case of payments to external supplier there are not usually significant time shifts and expenditure for the purchase of services may be identified as the costs.

The second data source used is Information System on Public Contracts (ISVZ; <http://www.isvz.cz/>), where information about the tenders for public procurement is stored. There were selected all contracts for the collection and disposal of municipal waste in the Czech Republic in the monitored period from this database. For each municipality, which during the period has awarded more than one contract, there were calculated the average number of the submitted bids.

After combining these two data sources (ISVZ about public procurement and MF ARIS, MF UFIS, Monitor about budgets), for further analysis, there were selected only those municipalities where all the variables were filled by comprehensive data and where the share of expenditure on external production of the overall costs of the collection and disposal of municipal waste exceeds 50%. It left only 98 municipalities sized between 1,200 and 377,000 inhabitants for the analysis. The main reasons for significant reduction of the group result from two factors. The first is that in small municipalities that use external production, a size of public procurement does not exceed the limits of small-scale contracts (CZK 2 mil.), which means that they are not tendered under the Public Procurement Act and therefore data showing their results are not published in ISVZ. Secondly, in contrast, in number of large municipalities an internal security dominates, which removes them from the sample because of the low proportion of external production.

The following variables were used for the analysis. In the case of the dependent variable it is an average annual expenditure per capita for the period 2007-2015 (AEPC). As the explanatory variables were used the following ones, while for each of them the anticipated direction of dependence is given:

- population (POP) – there is assumed negative relationship due to the existence of economies of scale,
- the average number of submitted bids to tenders for public procurement (BIDS) - in accordance with the existence of the competitive effect negative relationship is assumed,
- the number of suppliers who were contracted during the examined period (SUP)- assuming negative relationship, because the change of a supplier or involvement of more of them at the same time (dividing the procurement into parts), reduces the probability of monopoly position abuse,
- four binary dummy variables – attaining value 1 if a procurement in the municipality received one out of four companies that hold significant market share in the Czech Republic,
- the share of external production (EXP) - control variable to cope with the distortion arising from working with nonaccrual data; the variable is calculated as a proportion of payments for services to the municipality's total expenditure on the collection and disposal of municipal waste.

**Table 1. Descriptive Statistics of Main Non-Binary Variables**

Variable	Mean	Median	Min	Max	Standard deviation
AEPC	929.203	864.431	325.304	2345.04	296.443
POP	21165.0	6017.50	1254.00	377028.	51801.3
EXP	0.9605	0.9830	0.5567	0.9998	0.0692
BIDS	3.0774	3.0000	1.0000	8.5000	1.5821
SUP	1.1429	1.0000	1.0000	4.0000	0.4308

Source: Author

### 3 Results and Discussion

The structure of the model is displayed in the formula (1) and has logarithmic form. The transformation enabled to achieve better explanatory power of the model. Moreover, in the case of two variables, population and number of bids non-linear relationship was identified and variable occurs in square form. There were kept only those variables which have statistically significant regression coefficients in the model, which was the case of three of the four binary variables.

$$\ln(AEPC)=\beta_0+\beta_1\ln(EXP)+\beta_2\ln(SUP)+\beta_3\ln(POP)+\beta_4(\ln(POP))^2+\beta_5\ln(BID)+\beta_6(\ln(BID))^2+\beta_7ZKS+u \quad (1)$$

The OLS method in Gretl software has been used for estimation of the model. They were also carried out standard procedures for testing the heteroscedasticity and normal distribution of residuals. Values of regression coefficients are presented in Table 2.

**Table 2. Regression Model, Dependent Variable is ln(AEPC)**

Variables	Coefficient	Standard deviation	p-value	
Const.	10.988	1.3028	<0.0001	***
ln(EXP)	-0.9075	0.2955	0.0028	***
ln(SUP)	-0.4626	0.1228	0.0003	***
ln(POP)	-0.8995	0.2754	0.0015	***
(ln(POP)) <sup>2</sup>	0.0454	0.0144	0.0023	***
ln(BIDS)	0.4518	0.1464	0.0027	***
(ln(BIDS)) <sup>2</sup>	-0.2417	0.0748	0.0017	***
ZKS (binary)	0.3923	0.1266	0.0026	***
F test (p-value)	2.97e-06			
Adj R2	0.2860			

Source: Author

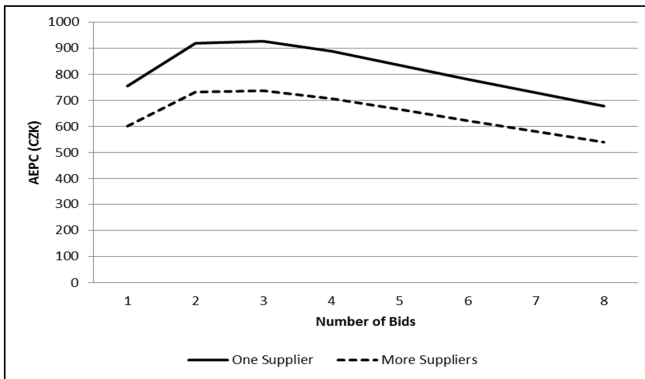
The presented model identified the statistical significance of the variables ln(POP) and ln(POP)<sup>2</sup> which confirms the existence of economies of scale. However, it is not for the entire range of the file. The population growth leads to a decrease of expenditure per capita, but only up to around 25,000 inhabitants. Subsequently, there occurs gradual increase.

In terms of the degree of competition it is interesting to note that the actual number of bids significantly reduces the up from obtaining more than 3 bids. Only then there is relatively sharp decline, while each additional bid, on average, reduces expenditures per capita by 6%.

The model shows surprisingly low expenditures per capita for municipalities with just one bid. It is very interesting and surprising finding. It may be the result of a specific bargaining method or specific situation on the regional market and it will be the subject of further research.

Much stronger effect than the number of bids in the procurement process, however, brings a change of supplier, or distributing contracts between several suppliers. Resolute effect stands out from the graphic analysis presented in Figure 1. It shows two model relations between the number of bids received and expenditures per capita in the municipality with 6,000 inhabitants (the value corresponds with the median). The first relationship (bold line) shows the situation when, during the reporting period the supplier was not changed, and the second (dotted line) the situation when the change occurred. It is obvious that in the second case, expenditure per capita was on average lower by 165 CZK, which for the whole municipality represents an annual savings of nearly 1 mil. CZK. If in the examined period the average budget of a municipality of this size is around 100 mil. CZK, then it covers 1%.

**Figure 1. Model relationships between the number of bids received and expenditures per capita in the municipality with 6,000 inhabitants**



Source: Author

The last statistically significant variable is binary variable ZKS and its regression coefficient reached positive value. Municipalities, whose supplier is “Západočeské komunální služby”, have higher average spending per capita than others and they are considered as statistically significant. It is a company wholly controlled by “Marius Pedersen”, which is another key company in the Czech market. In order to determine whether it is the result of market imperfections, or different design of contract outputs it will be necessary to analyse the contracts. For other major suppliers regression analysis did not identify any statistical significance of the coefficients.

#### 4 Conclusion

The results of the econometric analysis, which were presented in the Section 3, confirmed that with higher number of bids the competitive effect in the case of collection and disposal of municipal waste transfers into the lower level of expenditure per capita. However, far more significant effect has the change of suppliers or distributing contracts between several suppliers. Both lead to uncertainty of existing suppliers, prevent them from abusing monopoly position, and ultimately reduce expenditures of municipalities for this type of public service.

The impact of the competition on the cost of waste collection, which was identified in the model, is fully in line with the findings of most studies that have been discussed in Section 1.1 (e.g. [6], [11] and [13]). A new finding, that the presented model shows, is significant effect of breaking the monopoly supplier of either the exchange after certain time or split the contract into several parts.

Based on these conclusions, regular over-competing suppliers can be recommended, the objective should be to get at least four bids. The duration of the contract, however, should take into account the economic life of fixed assets, which must be bought by external suppliers. During too short period these suppliers would be forced to transfer the “unspent” value of fixed assets into the price. Too short period of the contract would also favoured large companies, because these unused fixed assets could be transferred into other contracts.

In terms of economic efficiency, market size also appears to be important. Results of the analysis showed that the lowest values were found in spending per capita for municipalities with about 25,000 inhabitants. Merge of small municipalities into higher units provided by one company could thus bring significant savings. This would also increase the administrative capacity, as well as the attractiveness of the procurement for another supplier.

In terms of further research, it seems desirable to examine the impact of other factors on the amount of public expenditure on the collection and disposal of municipal waste. These include the previously mentioned inter-municipal cooperation, but also an ownership of key infrastructure and introduction firm rewards (fixed versus linkage on volume).

## Acknowledgements

This paper was supported by GA ČR within the project No. 15-08032S "Unfair competition and other economic factors influencing the efficiency of the provision of public services".

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# Competition among Czech Health Insurance Companies from Patients' Point of View

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## Abstract

Czech health care system is based on Bismarck's model and involves a seven Health Insurance Companies. The system theoretically enables a managed competition among them as well as competition among providers but a space for such competition is highly regulated. There is an endless debate if the Czech system needs more than one Health Insurance Company (HIC). The paper examines theoretical and real space for managed competition among HICs from the patients' (insured) point of view. We also analyze if patients' fluctuation among HICs is affected by bonus programs (financed from companies of prevention) provided by HICs. We do not suggest an optimal solution, but we prove that current situation is sub-optimal for both supporters and opponents of a managed competition principles.

*Keywords: health insurance company; insured; competition; managed competition; Czech Republic*

JEL Classification: H75, I13

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## 1 Introduction

There are three basic models of providing health care services [3]: Bismarck's, Beveridge's (similar to Semashko) and liberal. The core difference among models depends on the level of allowed competition among actors and an extent of a solidarity principle among insured. Bismarck's model is the one based on solidarity principle but quite variable in an extent of competition.

As Arrow [2] showed, the health market is connected with a spectrum of market failures. Therefore, every time a government considers a pro-market health reform, it always has to respect limits of usage of market forces. The question is not if the better are a market or non-market principles in the health policy. The question is how through the market principles can be the quality of health service (i.e. the quality of population's health) improved. The solution to market failures is offered through [7] a "managed competition" where "The sponsor establishes rules of equity, selects participating plans, manages the enrollment process, creates price-elastic demand, and manages risk selection. Managed competition is based on comprehensive care organizations that integrate financing and delivery." To implement such principles into Bismarck's system means enabling a managed competition among Health Insurance Companies (HICs) but with compulsory health insurance system (no one can be excluded from insurance). "Managed competition should allow social health insurance organizations to become more consumer-oriented and more active in managing the provision of health care" [14].

A Bismarck's system may have one or more payer (HIC). Pros and con of having more than one payer are broadly discussed e.g. [10] "Single-payer systems are usually financed more progressively and rely on existing taxation systems; they effectively distribute risks throughout one large risk pool, and they offer governments a high degree of control over the total expenditure on health. Multi-payer systems sacrifice this control for a greater ability to meet the diverse preferences of beneficiaries".

However, a multi-payer system (i.e. more than one HIC) brings no benefits if there are no differences among HICs. The study [14] shows that "In the absence of clear differences between insurance organizations, the advantages of managed competition may be too difficult to achieve". It says that if there is no difference among HICs or their health insurance plans then the competition among them is more formal than real. It was showed [15] that if the benefit programs

have a real impact on consumer's decision and proved that "new product designs with higher deductibles are likely to be more attractive to healthy purchasers, but the new benefit designs are likely to have only small effects on market participation". An absence of a managed competition the situation leads to reduction only to the price competition or (if the price competition is not allowed) creates only an illusion of a competition.

Agrawal, Veit [1] conclude that „Market-based reform would require that informed consumers be provided choices among market participants offering diverse delivery and finance options. These conditions did not exist at the beginning of the managed care movement, and to a significant degree they have failed to materialize nearly three decades later, hindering efforts at market-based reform.” According to the study, the result is that if the consumer is not able to perceive differences among offers, then he makes a decision only based on price or make no decision.

The Czech health care system is an example of Bismarck's model with a multi-payer system with limited space for a managed competition. Based on that case the paper examines theoretical and real space for a managed competition among HICs from the patients' (insured's) point of view. Current financing system is one of the contributory type, based on compulsory health insurance. Total expenditures for health is around 7,1% of GDP and about 90% of total expenditures come from public sources. The insurance cover provision most of the health care services (except treatment like cosmetic, acupuncture etc.).

There are seven not-for-profit Health insurance companies and the largest one, the General Insurance Company of the Czech Republic (VZP), covers 59% of a population (see table 1 for review of HICs). During past ten years, there was a reform attempt to enforce the role of competition but it failed. There is an endless debate about an optimal number of health insurance companies. Is it better to have more than one if competition space is highly restricted?

**Table 1. Health Insurance Companies**

<b>Name of HIC</b>	<b>Abbrev.</b>	<b>Insured in 2014</b>
Veřejná zdravotní pojišťovna / General Health Insurance Company	VZP	5 975 170
Vojenská zdravotní pojišťovna / Military Health Insurance Company	VoZP	695 592
Česká průmyslová zdravotní pojišťovna / Czech Industry Health Insurance Company	ČPZP	1 205 872
Oborová zdravotní pojišťovna zaměstnanců bank, pojišťoven a stavebnictví Branch Health insurance comp. of employees in bank, insurance sector and construction	OZP	728 722
Zaměstnanecká pojišťovna Škoda / Employees insurance company Škoda	ZPŠ	139 319
Zdravotní pojišťovna Ministerstva vnitra ČR / Health insurance company of Ministry of interior of Czech Republic	ZPMVČR	1 239 890
Revírní bratrská pokladna / Coalfield Brotherhood Cash Office, a health insurance comp.	RBP	428 627

*Source: Author based on [4]*

The aim of the paper is to analyze an extent of the managed competition among Czech HICs from the patients' point of view. To do that we gather theoretical conditions of the managed competition, we examine a space for the managed completion among HICs and analyze if the only remaining part of the managed competition (bonus programs) has some impact on market changes (expressed as the growth of insureds).

## **2 Material and Methods**

As the methodology, we use a literature review to identify conditions of managed completion and we use a secondary data analysis to gather an evidence of situation. A regression analysis is used for analysis of relationship between expenditures of HICs on bonuses and change of number of insureds.

### 3 Results and Discussion

#### 3.1 Managed Competition in Theory

The first step is to identify areas where a managed competition may be implemented and as the second we put a focus on competition among HICs from the insureds' point of view. We recognize three basic actors within the health care system: Patients (insured), HICs and providers.

The competition among HICs is theoretically possible through selection among different health insurance plans (combination price and risk). Such possibility was a part of reform attempt in 2006, but it failed. The second part of a managed competition among HICs is a solution to the problem with cream skimming and different share of health/sick insured. At the beginning of system implementation, it was less than 100% redistribution of gathered insurance payment but since 2005 it is 100%. Redistribution is based on age and health structure of insured taking account costs of treatment for each group. There is also a compensation for extremely expensive treatments. Redistribution is a prevention of the cream skimming, but 100% principle does not create a space for "reward" for HIC with the better ability to attract more insured. The competition among patients is strictly prohibited; each person has to be insured and if he/she does not make a choice, then they are automatically insured by General Health Insurance Company (VZP).

The competition among providers is enabled through contracting with HICs. Theoretically, providers want contracts with maximum payers (HICs) as they want to maximize revenues but HIC offers a contract only to "better" providers. The key role depends on HICs because they create a network of providers for its insured. The better network should lead to healthier insured and consequently to the better economy of HIC. The contracting system should eliminate the "worst" providers. It is assumed that HICs have better information than patient about the quality of care; therefore they can eliminate "the worst" providers. Providers with no contract may offer only directly paid services. In reality, all big and important providers (i.e. hospitals) have contracts with all HICs. The following table presents the number of contracts of each HICs. Annual report of HICs submitted in the Chamber of Deputies has been used as the source [4] in all cases, but in the case of VZP the number seemed to be "unrealistic", hence we use the website of VZP [9] to retrieve the different value.

**Table 2. Number of contracts of each HIC with providers in 2014**

Health Insurance Company	Number of contracted providers	Health Insurance Company	Number of contracted providers
VZP	40 349[4] or 23 531[9]	OZP	26 117
VoZP	24 878	ZPŠ	5 777
ČPZP	25 422	ZPMVČR	25 825
		RBP	10 339
<b>Total number of providers in 2013</b>			<b>29 218</b>

Source: Author based on [4], [9], [13]

The largest space for competition among HICs is the competition for insured. We recognize three main areas for a managed competition:

- The price of insurance - This factor is inducing a cream skimming in its pure form. As a part of a managed competition the price may differ according to a willingness to pay (level of co-payment in the case of treatment) or according to a "desired" behavior from the HIC's point of view (e.g. fulfilling obligatory prevention examination). Currently not allowed.
- Health insurance plans - it can be a combination of the price of insurance and risk of co-payments or a combination of price and extent of guaranteed services. Currently not allowed.
- Bonuses for insured - A bonus is reward or stimulus to "desired" behavior provided by HIC. These bonuses (benefits) are financed from "fund of prevention" in the case of the Czech



health care system. Each HIC has to have this fund. A spectrum of offered bonuses depends on of HIC choice. Currently allowed.

### 3.2 Analysis of Bonuses (Benefits) for Insured

As we find out, bonuses (benefits) are the only remaining area for the managed competition for insured among HICs. To analyze an extent of this managed competition we gather information about HICs expenditures and also we perform an analysis of their offer from the patients' point of view. Finally, we compare costs of gaining bonus offered by HIC with benefits (value) of this benefit.

If bonuses are the only allowed tool for competition among HICs; it is good to know how these bonuses enable a competition and affect patient's decision about changing his/her HIC. At the beginning, we count a share of expenditure on bonuses on total expenditures and we count an average value of bonuses per total number insured (see table 3).

**Table 3. Average spending on bonus programs**

<b>Average 2011-2014</b>	<b>VZP</b>	<b>VoZP</b>	<b>ČPZP</b>	<b>OZP</b>	<b>ZPŠ</b>	<b>ZPMVČR</b>	<b>RBP</b>
% of total expenditures spend on bonus programs	0,30	0,58	0,72	0,46	0,62	0,41	0,81
Amount of CZK spent on one insured per year (in CZK)	71	118	144	90	135	82	154

Source: Author based on [4]

### 3.3 Bonus Programs from the Patients' Point of View

The bonus is some financial incentive or non-financial service provided by HIC only for its insured and always based on insured's request. A typical bonus is financial allowances covering partial costs for prevention examination or costs spent on a healthy lifestyle. Each HIC offers different sets of bonus with different value and conditions of provision. However, all HICs have two conditions: recipient of bonus has not to be in debt against HIC and bonus will not be provided if insured is in the process of change of his/her HIC. Decision to change a HIC may be affected by these reasons:

- A desire to have an access to physician who actually has no contract with patient's HIC
- Motivation to get one specific bonus according to patient's needs
- Motivation to get more bonuses in comparison with the previous situation
- Negative motivation – knowing that changing HIC disable possibility to get bonuses from old HIC (at least half of the year)
- Follow family members to the same HIC (to get more bonuses)
- Spontaneity – how often and how easily may be HIC changed. Insured may make a change twice per year since 2016; previously (2011-2015) only once per year
- Follow employer wishes or incentives
- Other or irrational reason

Because there is no price competition and the strong majority of providers have contracts with the majority of HICs; we consider bonus programs as the most important variable for motivation to change. Bonus programs are different and it may be unclear what each HIC supplies for potential insured. We wanted to make a comparison of offers for a "model insured". However, we failed, we weren't able to count a net value of benefits because:

- We don't know maximum limits per year for all HICs – such information could be available through phone or personal contact.
- We don't know based on what mechanism it is possible to achieve a maximum amount per benefit – Is it covering a percentage of total costs till given limit or it covers full price till limit? (e.g. OZP declares a maximal and an average contribution).
- It is difficult to evaluate some non-financial benefits. For example, a service "physician on phone" offers advice for patients. We cannot evaluate quality (or value).

- A lot of benefits or offers requires additional website research. Especially offers of discounts offered by partners of HIC and offers of additional travel insurance (it requires another comparison).
- HICs differs in a possibility to submit request personally or via mail, some programs require more than one interaction with HIC. We also find out (or we estimate) that each HIC has a limit of bonuses per insured/year and each HIC requires 3 or more documents to provide a financial benefit.

We could estimate costs for analysis (time spend) as well as costs per request submission, but without comparison with benefit, it doesn't bring useful findings. To evaluate costs of HIC's change we also have to consider opportunity costs (e.g. loss of benefits provided by original HIC). Therefore, benefits provided by new HIC should be higher than costs for HICs analysis + costs for benefit request (new HIC) + expected loss of benefit provided by original HIC – costs for benefit request (original HIC). If we use our model person and expect that each HIC has some limit per insured/per year it is almost not possible to be in surplus during the first year after the change.

Rather than the analysis of total sum of benefits is more simple for insured to compare HICs based on single criteria according to his/her preferences. Example: insured prefers to be vaccinated against hepatitis, therefore he/she choose according to best offer of this benefit. However, all HICs have the rule that beneficent must not be in the process of change of HIC.

To seek more information, we found out that there is a website "programs of HICs" with the aim to make the comparison easier for insured. The website is supported by the National network of health (NGO). Authors [5] are declaring that they want to help insured but in section "comparison of benefits" we find information that the page is being prepared. So currently there is none helpful "comparison maker". Obviously, there are differences among HICs from the patients' point of view but nothing clear and easily understandable.

### 3.4 How Patients React on Bonus Programs?

To evaluate of bonus programs, we use a total and average sum of expenditures on bonus programs. Even though expenditures on prevention are affected by the pro-active behavior of insured we assume that level of interest is affected by the level of communication of prevention possibilities. In a management competition concept is considered the role of HIC as important for communication with insured and potential insured [10],[1]. There are four main reasons of why number of insured is changed:

- Death or birth (parents' choice).
- No choice – automatically insured in VZP (General health insurance company).
- Change – insured's choice. It is possible [8] twice per year (since 2016), previously only once per year (2012-2015) a before that quarterly (till 2011). Fewer opportunities to change decrease a space for competition. One slot per year makes fewer opportunities than currently valid two slots.

Review of changes from 2011 to 2014 is displayed in table 3. There was a possibility to change HIF only once per year in the examined period.

**Table 3. Review of changes in number of insured between 2011-2014 and average expenditures per capita and year**

	VZP	VoZP	ČPZP	OZB	ZPŠ	ZPMVČR	RBP
Change number of insured from 2011-2014 (* = without fusion)	-300 669 *-335 669	108 480	483 172 *53 172	33 189	3 916	94 430	13 753
Average expenditure on bonus per capita and per year in 2011-2014 in CZK	71	118	144	90	135	82	154

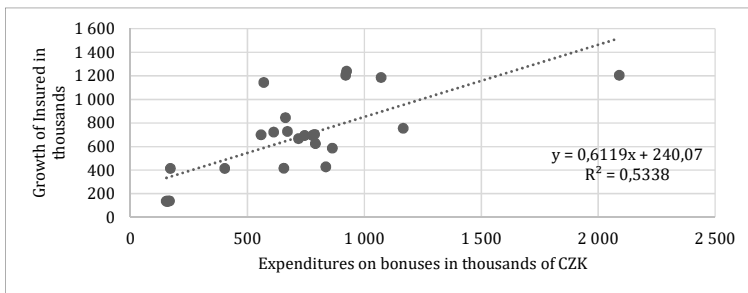
Source: Author based on [4], [6], [11]

Patient's involvement in bonus programs is affected by:

- His or her activities in effort to get the bonus
- Activity of HIC to inform patients
- Existence of an attractive offer
- Formal obstacles of receiving bonus (how many forms, how many visits in HIC office, hidden conditions)

But total sum of HIC expenditures on bonus program is a sum of these factors. We examine a hypothesis that a higher level of expenditures in one year may affect increasing of a number of insured in next year. In other words, we assume that HIC with most attractive “sold” bonuses attracts more insured. We used total expenditures on bonuses 2010-2013 and confront it with a number of insured 2011-2014 (we count with one-year delay and we deduct 430 thousands of insured in 2012 in the case of ČPZP. This number presents insured gained from fusion with other HIC and it is not a result of ČPZP expenditures). Results are shown in Picture 1. It seems that generosity of HIC (expressed as expenditures on bonuses) has a positive effect on the growth of a number of insured. We didn't count with the largest HIC (VZP) because of its specific situation (decreasing market share from 62% to 59% of insured), VZP involvement increases the coefficient of determination to unrealistic 0,77 (Because VZP is losing insureds and it has the lowest spending on bonuses).

**Figure 1. Relationship between expenditures of HIFs (excl. VZP) on bonuses in "t" and number of insured in "t+1" in thousands of CZK and insured**



Source: Author

Even though we find out that bonus programs are hardly comparable, we reveal the relationship between “generosity” of HICs and growth of a number of insureds. It means that HICs with “better” offers are able to gain more insureds and at least part of insured is able to do rational market decisions.

#### 4 Conclusion

A clear difference among HICs from insureds point of view was set as a condition of the managed competition. We found out that bonus programs are the only area where HICs may compete. Our analysis reveals an unclear environment on the “market” with bonus programs and it shows that rational choice measured by cost-benefit principle may be ignoring this “market”. However, HICs offer different bonuses, therefore, persons with specific needs of families using economies of scale principle may achieve a profit from bonuses. The analysis of the relationship between expenditures on bonuses and gaining new insured suggest that “market” is at least partly operating and some insured are participating. A 125 222 insured had changed a HIC to 1/1/2016 [12]; it is 1.2% of insured. We prove that current situation is a sub-optimal for both supporters and opponents of a managed competition principles. Current space for a managed competition is too limited if we want to get benefits from a competition (i.e. better service in better quality

provided by the more efficient way while we keep access and solidarity principle alive). It seems that obstacles of a managed competition are not only regulatory rules (i.e. 100% redistribution) but also a confusing system of bonus programs. The more transparent environment could stimulate an active participation of insured on the market and more successful HICs should profit from it. Activities like comparative websites should be supported or provided by Ministry of Health (to prevent advertising activities of HICs). It doesn't mean that bonus programs should be standardized or regulated. On the other side, if Ministry of Health doesn't support a managed competition principle, there is a time to re-open a debate of how many HIC is better to have. It is possible extent/reduce a space for a managed competition at that moment, but doing nothing is irrational from a long-term point of view.

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# Monetary Valuation of Odour from Agricultural Production

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## Abstract

Costs Benefit Analysis (CBA) is recommended to assess the projects for funding from Rural Development Programme of the Czech Republic for years 2014–2020. It should ensure that the Ministry of Agriculture of the Czech Republic selects the most efficient investment projects. CBA enables to compare all costs and benefits of each in monetary term and to determine the projects that are the most beneficial for the society. There is a need to establish the prices of externalities which will be used by the farmer preparing application for subsidy. The aim of the article is to monetary value the price of odour from livestock production (approximated by ammonium) as it is one of the annoying side-effects affecting local inhabitants. A preventive expenditures method was used. The price of odour was set as the costs for annual decrease of 1 kg of ammonium per one livestock unit (LU). The price is 146 CZK per one 1 kg of annual ammonium decrease in cattle, 61 CZK in pig, 0.3 CZK in poultry, and 69 CZK in other production. For the evaluation of the projects, the price is consequently multiplied by the change in the number of LU that the project brings.

*Keywords: externalities; monetary valuation; odour; preventive expenditures*

JEL Classification: D61, D62, Q18

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## 1 Introduction

CBA is recommended to assess the projects for funding from Rural Development Programme of the Czech Republic for years 2014–2020 (RDP). It should ensure that the Ministry of Agriculture of the Czech Republic selects the most efficient investment projects also from the point of view of the whole society. The finances come from public resources (from European Union and national budget) and therefore the projects financed from them should be selected knowing their social costs and benefits for the public (especially when large amounts of finances are in question as the projects from RDP can be in the value up to 130 million CZK). CBA is currently used by the Ministry of Regional Development of the Czech Republic in the selection process of the investment projects that should be supported from Structural funds. Therefore, the operational programmes (OP) such as OP Environment, OP Employment, OP Transport, OP Business and Innovations for competitiveness, Integrated regional OP etc. have their database of social-economic impact of their projects. The investment projects financed from RDP had not been selected based on CBA before and this database is lacking.

Some of the prices might be taken up from the current database of OPs. However, mostly the RDP investment projects have different impacts as they are of the different nature. They are related to agricultural production with its specifics and particularities. There is a need to evaluate the externalities related to the projects and establish their prices which will be used when the farmer prepares subsidy application. Unlike the externalities in agriculture in general (see e.g. [2] or [5]), the particular area of externalities generated by the investment projects has not been examined yet. Nevertheless, only having the prices of externalities a sum of net benefits is computed, i.e. benefits minus costs; a positive (negative) sum means that the alternative entails a positive (negative) social profitability [16].

The article deals with the valuation of the odour from agricultural production which has negative impact on the population living near the farm. The aim is to calculate the value of odour using method of preventive expenditures. The paper is structured as follows. Firstly, the concept of externalities and their valuation is introduced. Then the method the monetarisation of the price of odour is introduced. The prices are calculated in the next section. Discussion section compares our results to those of other authors. Last section concludes.

The term externality differs from the notion of public goods. Externalities are generated as side effects of an activity that negatively affect the production or consumption possibilities of other economic agents without permission or compensation. „Externalities are defined as benefits or costs, generated as by-products of an economic activity that do not accrue to the parties involved in the activity.” [1] Particularly for the case of agriculture, the negative and positive impacts from the agricultural sector on the environment, public health and rural communities are the “costs or benefits that occur when the activity of one entity directly affects the welfare of other parties in society than those directly involved” [5]. The externalities are “beyond the market” that tend to fail because producers do not take the negative side effects of their activities into account and make private decisions based on prevailing market prices. Not all the negative and positive impacts they generate are accounted for in economic decision making.

When market prices of externalities do not exist, they have to be monetary valued e.g. by using existing market as a proxy or by other methods. “Monetary valuation is the practice of converting measures of social and biophysical impacts into monetary units and is used to determine the economic value of non-market goods, i.e. goods for which no market exists.” [13]

For the purpose of the estimation of environmental externalities, different methodologies can be employed. Direct methods utilize the prices either from conventional or substitute markets. First category includes effect on production method, and replacement costs method. The second contains preventive expenditures method, travelling costs method, and hedonic pricing model. Direct methods utilize hypothetical markets as the contingent valuation method asks the inhabitants about their willingness-to-pay or willingness-to-accept the externality. Other direct methods are contingent ranking method and choice experiment method. A useful reference for environmental CBA can be found in [10].

The method of valuation depends on the requirements for the form of the prices and their usage. The valuation method should not be too costly and time consuming (secondary research is preferred when available). However, there is a problem that most of the studies are done only for specific investment projects or specific situation or location (site, country) and their generalization is complicated. Also, when particular types of agricultural projects are to be evaluated, there are certain requirements on the prices. They should be as objective and robust as possible, should be stated on particular measurable unit, and should be based on the latest available data. See Pechrová [11] for extended methodological discussion.

In agricultural projects supported from RDP we may distinguish between odour from the animal production and from biogas stations. The article focus on the first mentioned.

## **2 Material and Methods**

One of the reasons for the relatively small number of economic valuation studies for odour is probably the difficulty in measuring the intensity and discomfort caused by bad smell in an objective and scientific way. Its perception is subjective and difficult to specify. There are methods that can assess the odour in terms of nuisance of odour (odour annoyance) and express it in so-called odour units, which are unfortunately subjectively determined. However, the odour price (from livestock production) should be expressed in physical units. Objective measurement is difficult mainly because the smell includes several compounds. Odours caused by animal production arise from many gases emitted from excrements and manure, including alcohols, aldehydes, amines, carboxylic acids, esters, ketones, organic sulphides, terpenes, aromatics, hydrogen sulphide and ammonia. These gases can be measured by scattering studies which are costly and therefore unusable. If the project is assessed ex-ante, the applicant for a grant is not able to either estimate what amount of odour the project will produce or measure it as well. For this reason it is necessary use the parameter, which is known.

We propose that as a proxy variable for the odour can be used two important compounds - ammonia or hydrogen sulphide (as proposed by [4], who used them for odour approximation due to ease of measurement). However, this raises the problem of measuring the quantities. It is usually costly and time consuming (especially for farmers), because it requires the measurement

by technician. In addition, we must not forget that the expenditures for documentation for submission of grant are not eligible for funding. For this reason, there should be used more easily measured variables. In our article we consider the amount of NH<sub>3</sub> produced by the livestock recalculated per one animal, or in general on livestock unit (LU). Farmer than takes into account the number of animals in each category that changed as a result of the project (the number of livestock can increase or decrease due to the project implementation) and recalculate it on LU. In order to recalculate on LU it is possible to use the coefficients stated in Annex no. 3 of the Government Regulation no. 75/2007 Coll. [7].

**Table 1. Conversion of the of livestock categories on LU according to Government Regulation no. 75/2007 Coll**

Species and categories of livestock	Coefficient of recalculation on LU	Species and categories of livestock	Coefficient of recalculation on LU
Cattle aged over 24 months	1.0	Sows and boars	0.3
Cattle aged over 6 months to 24 months	0.6	Young breeding pigs and fattening pigs	0.12
Cattle aged over 1 month to 6 months	0.2	Sows with piglets	0.45
Sheep aged over 12 months	0.15	Horses aged over 6 months	1.0
Goats aged over 12 months	0.15	Horses aged until 6 months	0.4
Poultry	0.026		

Source: [7]

Model calculation of odour price in CZK/LU was made by the preventive expenditures method. There are examined the cost of measures to prevent the formation of odour to protect the social welfare of the residents. Preventive expenditures method is suitable as it is commonly used for valuation of water and air quality, emissions, noise and biodiversity conservation.

For calculation of odour price was used *Methodological guideline of the Ministry of environment, Department of air-protection on classifying livestock in accordance with Act no. 201/2012 Coll., On air protection, on calculation of emissions of these pollutants from stationary sources and on a list of technologies to reduce emissions of these stationary sources* [9] (further referred as *Methodological guideline*).

The concentration of ammonia in livestock production is influenced not only by the type of the animal, but also by used biotechnology. When the manure is stripped regularly, the emissions of NH<sub>3</sub> decrease by 15% or when the cattle is stabled on deep bedding with regular adding of 5 kg of straw per head per day, the emissions are reduced by 30%. In case of stabling for sows when the floor is fully slatted with a vacuum system the reduction of emission is 25% lower (Research Institute of Agricultural Technique – RIAT [14]). There are also biological preparations for treatment of manure and slurry or bedding and feed or water additives which decrease ammonia emissions (see [15]). Those were also examined by RIAT.

### 3 Results and Discussion

The odour is approximated by the emissions of ammonia (NH<sub>3</sub>) that is the main cause of it. First, the normative annual emissions are found out in the legislation and recalculated per 1 LU. There are certain differences regarding the type of the stable etc. Then the costs for reduction of the emissions are calculated. The reduction can be done by various methods. We selected the additives to the animals' feed that cause the decrease of the ammonia emissions in the excrements of the animals. The needed amount of the feed additives per year and their price is found out. Price of odour is approximated by the costs for annual decrease of 1 kg of NH<sub>3</sub> / 1 LU.

The produced amount of NH<sub>3</sub> is taken from the legislation that states the norms of the average amount of NH<sub>3</sub> produced by the particular animal per year and is recalculated to livestock unit LU. The emission calculator available at [www.vuzt.cz/svt/vuzt/emise.php](http://www.vuzt.cz/svt/vuzt/emise.php) [14] by RIAT calculates the annual emissions of ammonia at listed stationary sources of air pollution in

accordance with Annex no. 2 of Act no. 201/2012 Coll., on air protection, category 8 (breeding of livestock with total annual emissions of ammonia  $\geq 5$  tons). The on-line system enables the farmer to calculate the emissions for all stables in null and investment variants.

First, we need to determine how much emission is produced by an animal in a particular category. For this purpose, it is used the table of *partial emission factors*, which indicates the quantity of kg of  $\text{NH}_3$  produced by an animal per year (see table 2). In our case we took into account only “stable” kind of housing animals. Ammonia emissions also differ according to whether there is produced manure or slurry. The emissions for particular animal categories were calculated in the case of housing on bedding and in the case of housing with production of liquid manure or poultry droppings (see table 3). Incorporation of manure or slurry into the soil was not taken into account because it is not always done by the farmer.

**Table 2. Emission factors**

Livestock categories	Emission factors [kg $\text{NH}_3$ / animal / year]				
	Stable	Manure, bedding	Slurry, droppings	Incorporation into soil	Pasturage
Dairy cows	10	2.5	2.5	12	2.4
Young cattle, suckled cows	6	1.7	2.5	6	1.8
Sheep and goats	0.3	0.03		0.1	0.45
Piglets	2	2	2	2.5	0
Sows	4.3	2.8	2.8	4.8	0
Pregnant sows	7.6	4.1	4.1	8	0
Fattening and breeding pigs	3.2	2	2	3.1	0
Fattening rabbits	0.45	---	0.02	0.5	---
Female fattening rabbits	0.8	---	0.01	0.9	---
Pullets and laying hens	0.12	0	0.02	0.13	0
Broilers	0.1	0.01	0	0.1	0
Geese, ducks and turkeys	0.35	0.03	0	0.35	0
Horses	2.9	0.9		2.2	2.9

Source: [9]

As an odour reducing solution was selected the preparation from a list of verified biotechnological solutions for reducing the emission of ammonia and reduction of odour [15]. Amalgerol Classic additive was chosen as it reduces the emission of  $\text{NH}_3$  by 40%. We considered an application for slurry according to the recommended dosage: (1) cattle – 1 litre of concentrate to 5  $\text{m}^3$  of slurry, (2) pigs – 1 litre of concentrate to 3  $\text{m}^3$  of slurry, (3) poultry – 3-5% aqueous solution in week intervals (summer = 200 ml; winter = 400 ml) [15]. According to the price list of ZZN Polabí, a.s. for year 2015 ([www.zznpolabi.cz](http://www.zznpolabi.cz) [17]), preparation Amalgerol cost 195 CZK per 25 litres. Now we can calculate the needed amount of the additive – i.e. how much of the manure must be treated by it per year. Hence, there was calculated the annual production of manure of cattle, pigs and poultry. In Annex no. 1 to *Decree no. 377/2013 Coll., On the storage and use of fertilizers* [8] is given an average annual production of manure and process water, at an average consumption of bedding material per LU (= 500 kg live weight).

We calculated the case of housing with the production of manure or poultry droppings. When these data were not available, we took those for stabling with the production of manure without the liquid manure. Because the application of preparation is normalized on  $\text{m}^3$ , the amount of produced manure per year was recalculated. The density of manure 1060  $\text{kg}/\text{m}^3$  was taken from agro-normative ([www.agronormativy.cz](http://www.agronormativy.cz) [9]). Annual requirements were calculated according to the dose prescription. Price of additives per 1 LU/year was calculated by multiplying the annual needs and its price: e.g. for calves it was 699.06 CZK/LU/year, for milked cows 529.81 CZK, for fattening pigs 735.85 CZK/LU/year, etc.



**Table 3. Emissions of ammonia according to particular animal categories**

Livestock categories	Emissions of ammonia without incorporation into soil [kg NH <sub>3</sub> / animal / year]	
	Housing on bedding	Housing with production of liquid manure or poultry droppings
Dairy cows	12.50	16.00
Young cattle, suckled cows	7.70	8.50
Sheep and goats	7.70	8.50
Piglets	0.33	4.00
Sows	4.00	7.10
Pregnant sows	7.10	11.70
Fattening and breeding pigs	11.70	5.20
Fattening rabbits	5.20	0.47
Female fattening rabbits	0.12	0.81
Pullets and laying hens	0.11	0.14
Broilers	0.38	0.10
Geese, ducks and turkeys	3.80	0.35

Source: Author

Using Amalgerol Classic causes the decrease of ammonia emissions by 40%, i.e. dairy cows produce annually instead of 12.5 kg NH<sub>3</sub> only 7.5 kg NH<sub>3</sub>/year (5 kg less). As the expenditures for additives are expressed on LU; a recalculation from the number of animals on LU is done. Then the price for decrease of NH<sub>3</sub> emissions by 3.9 kg/LU/year is calculated (1 dairy cow is 1.3 LU). The expenditures per additive are 359 CZK/LU/year. The price for annual decrease of 1 kg NH<sub>3</sub> emissions is 138 CZK for the case of housing on bedding with manure production. In case of production of liquid manure the price for 1 kg NH<sub>3</sub> emissions decrease for dairy cows is 108 CZK.

Now the *Methodological guideline* and our proposed form allow the calculation of NH<sub>3</sub> emissions for particular animal categories and bedding technologies. Particular simplification is that the total saving of emissions is multiplied by unified price for decrease of emissions. It is suitable especially in cases when the farmers invest to more areas of livestock production and it would be complicated to distinguish the prices for NH<sub>3</sub> reduction according to particular categories of animals. Final price is set as average price for the reduction of 1 kg of NH<sub>3</sub> emissions according to the type of animal without distinguishing the type of bedding. The results are stated in table 4.

**Table 4. Average price for annual decrease of 1 kg NH<sub>3</sub> emissions per LU according to the animal type**

Type of animals	Calculated price [CZK]	Rounding [CZK]
Cattle	145.77	146
Pigs	61.07	61
Poultry	0.29	0.3
Average (other animals)	69.04	69

Source: Author

For cattle – the price is an average price for dairy cattle, young cattle and fattening cattle housed on bedding with production of manure and also with production of liquid manure. In pig production there is calculate the average for categories piglets, all sows, fattening and breeding pigs housed on bedding with production of manure and with production of liquid manure. Due to similar prices for NH<sub>3</sub> reduction in categories of hens, geese, goats and turkeys we recommend to use only one price for the poultry. It is an average of the categories. For other categories, it is suitable to use average price of others in height of 69 CZK per 1 kg of NH<sub>3</sub> per year. Price of odour differs due to the physical nature of the manure produced by different animal categories. Each

type of animal excrement (manure) has different amount of  $\text{NH}_3$  and hence the price for its decrease varies.

The price of odour from various sources was done by many authors. Mostly, particular places as sources of odour (such as landfills – see [3] or pig farms [6] that are the most relevant for our article) are examined. The most frequent methods are contingent valuation (willingness to pay) and hedonic method that is using the prices of properties in the locality. For example, a study of Garrod and Willis [3] found that the WTP for decrease the odour from landfill on 50 days per year in the north of Great Britain is WTP 21 USD / year / and that the prices of properties decrease by 5% up to 4 km (10 960 USD / km). Unlike in our study, the odour was measured by dispersion study. The setting of the price is more precious, but unusable for RDP as the farmer would have to pay for the study. Hedonic pricing method was used by Pechrová and Lohr [12]. They examined price of properties located near the biogas stations in the Czech Republic and found out that the influence of “the distance from biogas station on the flat prices is negative as its presence lowers the price by 0.15% according to linear regression model or by 0.40% based on log-linear form of the model”. Application in RDP would be difficult as price of the properties differ in the CR regions significantly and the price base would be different. In North Carolina, the price of the house in the value of 114 000 USD that is 1 mile far from the farm with 5 000 animals decreases when the size of the farm increases by 1 pig by 0.71 USD [6]. In our case the prices are calculated on different units, hence, not fully comparable. In the future, the prices of odour can be calculated by alternative methods (hedonic pricing, willingness to pay) and compared to the results of this study. However, for the usage in current RDP programme, we recommend to utilize prices per LU. For valuation of the odour that is changed by the influence of particular project in livestock production (i.e. project where the number of LU changes) shall be used as proxy variable the price for decrease per 1 kg of  $\text{NH}_3$  per year multiplied by the number of LU change per year. Challenge for future survey is to select and monetary evaluate other externalities related to RDP projects and to define their usage in the RDP.

#### 4 Conclusion

The aim of the paper was to evaluate the price of odour from agricultural production as it is one of the most important side effects of livestock production lowering the welfare of the society (particularly of local inhabitants). For pricing of odour from agricultural production, which would change due to the implementation of a project in livestock production financed from RDP, as a proxy variable was used the price for reductions of 1 kg  $\text{NH}_3$  per year multiplied by the change in the  $\text{NH}_3$  emissions. The price was gained by preventive expenditures method as the costs for the consumption of the additive which reduces the odour by 40% per year. In application for grant, the farmer shall calculate the emissions for all stables in null and investment variants (recalculation from the number of farm animals per year). Online calculator created by RIAT can be utilized for this purpose. The difference in emission was then multiplied by the price of 1 kg  $\text{NH}_3$  (considering the type of animal) and the price for odour stated. The price was set on 146 CZK per one 1 kg of annual ammonium decrease in cattle, 61 CZK in pig, 0.3 CZK in poultry, and 69 CZK in other production. In this form it can be included into CBA of the project. The research will continue with identifying and monetary valuation of other externalities related to RDP projects.

#### Acknowledgements

This article was supported by Thematic task number 4107/2016 of IAEL.

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# Comparison of Nonprofit Organizations and Profit Firms: Do We Compare Units or Their Environments?

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## Abstract

The contribution focuses on a comparative methodology of effectiveness of nonprofit organizations and profit firms. The comparison of effectiveness of these two organizational forms has been dealt with in several studies, however, their results have been vague. At the same time there are only a few research papers which have concentrated on a comparative methodology. The objective of the contribution is thus to introduce some partial conclusions of the author's dissertation connected with a comparative methodology of different legal forms by way of an example of a specific research project in the field of secondary general education in the Czech Republic. The possibility to compare effectiveness of profit firms and nonprofit organizations is very limited for two reasons. Nonprofit organizations represent a highly heterogeneous group thanks to which the comparison is made more difficult. Nonprofit organizations occur sporadically with other types of providers in mixed markets, the markets are usually separated. The main recommendation in case of comparison of two types of organizational forms is to, first of all, carry out a thorough analysis of environment and markets and define factors which are different for each type of an organization. Conclusions concerning nonprofit organizational effectiveness can only be drawn for a specific area of public services at a specific time.

*Keywords: nonprofit organizations; organizational effectiveness; public services; comparative research*

JEL Classification: L33

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## 1 Introduction

Since the establishment of a research programme dealing with nonprofit organizations there has been a basic motivation to prove that a legal form (or a nondistribution constraint) implies certain behaviour. If no strong evidence is found in this respect, it could be critical not only for a research programme, but also for nonprofit organizations whose representatives often like to shield themselves with sector perception. If nonprofit organizations have common specific, distinctive and positive qualities for society, it can represent certain privileges consisting in tax advantages for them and their donors and sponsors, easier access to subsidies or more positive perception by the public. As far as economics as a scientific discipline is concerned, for an economist, more useful is considered as more effective, therefore a basic criterion of rationality of organization of social phenomena is represented by a relationship in which inputs and outputs are found.

It is recognized that an ideal way of how to evaluate effectiveness of nonprofit organizations tends to be their comparison with a definitional opposite, i.e. profit firms. It has been testified by the fact that from the seventies to the nineties of the last century, results of several empirical studies were published. The majority of the studies contained an assertion that nonprofit organizations were less effective but many studies did not find any difference among different types of providers or a difference in the opposite direction [16].

When analyzing the results, Steinberg points out that nonprofit organizations, in contrast to profit firms, produce multiple outputs of which some are not contained in available data and other cannot be objectively measured due to their nature. Because nonprofit organizations produce more unmeasurable outputs, costs of measurable outputs will be overstated and nonprofit organizations will be considered less effective. Weisbrod [17] also emphasizes complicated nature of comparing effectiveness of different institutional forms. In his opinion, a variety of results of comparison of production costs arises from methodological uncertainty of how to measure outputs. He is also not sure whether it is possible to suppose production of the same outputs irrespective of an institutional form.

Methodological issues of measuring organizational effectiveness of nonprofit organizations represent a current topic which has been indicated by several articles published in recent years in prestigious journals. However, extended efforts are caused by an increasing demand for transparency and accountability of nonprofit organizations rather than vague results of published studies. Therefore, the majority of articles have focused more on conceptualization and operationalization of organizational effectiveness measuring [3] and [13], definition [10] and [11], measuring methods [15] or they have aimed at a particular determinant of organizational effectiveness such as effectiveness of management processes [9], [5], [1] and [4]. As far as the author is concerned, issues associated directly with the methodology of comparative surveys are dealt with only in three articles [7], [2] and [12].

On the one hand, there are thus vague results of several comparative studies of effectiveness of nonprofit organizations and profit firms, on the other hand, there are only a few research articles addressing the fact how such comparison should be carried out. The presented contribution picks up on the paper published at the conference in 2012. The previous contribution introduced the subject matter of the author's dissertation and discussed possible more detailed specification of the contribution. Illustrated by an example of a specific research project, the recent contribution contains some partial conclusions of the dissertation connected with a comparative methodology of different legal forms.

## **2 Material and Methods**

In 2015, the author of the paper conducted an independent research project the purpose of which was to compare effectiveness of providers of public services. In order to prove the effect of an organizational status as an internal factor on the behaviour of an organization it was necessary to eliminate the effect of other factors as much as possible. It was thus necessary to select such industry of public services in which organizations operated under comparable external conditions.

Further steps consisted in describing environment of a selected industry in order to determine key factors influencing management of public service providers, opting for a sampling frame of providers of a selected public service and choosing a sample comprising homogenous units. Collection and processing of equivalent and comparable data concerning economic results and performance of public service providers followed. Afterwards, indicators of inputs, outputs and outcomes for the purpose of carrying out a data envelopment analysis (DEA) were determined from the obtained data. Finally, a principal component analysis to determine factors which contributed to the result of the DEA analysis the most was to be carried out.

On the basis of three main criteria which were represented by a balanced ratio of all types of public service providers (i.e. at least 20% representation both for nonprofit organizations and profit firms and governmental institutions), a sufficient number of units for making the analysis (i.e. a minimum number of 50 units for each type of a provider) and existence of a homogenous set of units with the same focus and achieved outputs, the field of Czech secondary general education was selected for the analysis.

### *2.1 Period under Consideration*

With regard to the demographic curve when there was a significant decrease in children born in the Czech Republic at the beginning of the nineties of the last century as well as in view of the first published results of so-called state school-leaving exams in 2013 and 2014, the 2008 to 2010 period was chosen for the research purposes. In accordance with the method for evaluation of effectiveness, the data after the period under consideration were selected for indicators of results (indirect relationship between outputs and outcomes):

- For economic indicators: 2008 and 2010
- For performance indicators: 2007/2008 and 2009/2010
- For indicators of outcomes: 2012/2013

## 2.2 Sampling Frame and Sample

The sampling frame comprises all legal persons running secondary schools with general education in the Czech Republic defined according to:

- a type of school entered in the Register of schools as no. 34 – Secondary school
- a field of education as K – Secondary school with a school-leaving exam

According to information available from the Register of Schools as at 31 March 2015, the sampling frame amounted to 379 legal persons in total. From this frame a sample was chosen. Entities removed from the sampling frame comprised:

- entities which kept their final accounts according to a school year in the period under consideration;
- entities which operated other types of schools (mainly nursery, primary and higher professional schools);
- entities which in addition to a secondary school operated also other facilities, e.g. school canteen, school club or house of children and youth;
- entities which operated other fields of educations;
- entities which did not publish their annual report, therefore, it was impossible to obtain any data.

The sample includes 114 entities. The basic proportion of representation of individual types of organizations in the sampling frame and sample is provided in Table 1.

**Table 1. Comparison of sampling frame and sample**

Type	Set	Sampling frame		Sample		
	Type Czech	Abbreviation	Number	%	Number	%
Municipality	obecní	OBE	9	2.37 %	4	3.51 %
Region	krajské	KRA	272	71.77 %	92	80.70 %
Profit companies	ziskové	SRO	78	20.58 %	11	9.65 %
Nonprofit companies	neziskové	OPS	4	1.05 %	4	3.51 %
Church	církevní	CIR	20	5.28 %	3	2.63 %
Total			379	100.00 %	114	100.00 %

Source: Author

From the comparison of the sampling frame and sample it is evident that the number of units of the sample reaches exactly 30% of the sampling frame. At the same time, however, proportions of individual types of schools according to their founders were not maintained while proportions of general secondary schools founded by private entities (SRO, OPS, CIR) decreased, and, on the contrary, with regard to public sector, they increased. The decrease in the number of units with private and church schools mainly due to data availability (final accounts) also means their low representation in the sample and it makes it virtually impossible to draw general conclusions about nonprofit organizational effectiveness (in case of the OPS type, 4 units remained in the sample and in case of church entities, only 3 units remained).

## 2.3 Data Sources

As far as data collection is concerned, it was relatively demanding mainly due to the number of diverse sources which was also partially caused by a change in evidence of economic data for public institutions. Full overview of the data sources is provided in Table 2.

**Table 2. Data sources**

Data source	Indicators	Extent	Type of organization
Register of schools	Basic data	114	all
ARIS (Automated Budget Information System)	Final accounts 2008	96	KRA, OBE
The Treasury	Final accounts 2010	96	KRA, OBE
Commercial register	Final accounts	15	OPS, SRO
Annual reports	Final accounts	3	CIR
CEDR (Central Record of Subsidies from the State Budget)	Subsidies	114	all
Statistical yearbook	Performance indicators	114	all
CERMAT (Center for Evaluation of Educational Achievement)	Results of final exam	114	all

Source: Author

### 2.4 Characteristics of the Sample

An average number of students per one general secondary school is greater in larger municipalities, the smallest number of students is logically found in general secondary schools in smaller municipalities, there is thus a direct relationship between the type of a unit (organizational status), size of a unit according to the number of students, municipality size and a method of financing of a unit.

Table 3 suggests that units established by public administration gain revenues only from received subsidies. With respect to private entities, the participation of a subsidy in profits ranges from 55 to 80 percent. It also applies, both with private and public institutions, that the more developed region, the smaller participation of a subsidy in profits is.

**Table 3. Participation of subsidy in total profits in 2008 according to size of municipality**

Size of municipality	KRA	OBE	CIR	OPS	SRO	TOTAL
The Capital City	93,67%			61,12%	55,48%	83,29%
Large (100 - 999 K)	97,65%		92,50%	69,34%	66,14%	86,55%
Medium (50- 99 K)	97,46%			80,13%	69,17%	90,16%
Small (10-49 K)	97,46%	95,16%	85,32%		64,46%	96,65%
Total	96.85%	95.16%	90.10%	67.93%	62.94%	92.33%

Source: Author

### 2.5 Indicators of Input, Output and Outcome

On the basis of the obtained data and so-called intervention logic, indicators of input, output and outcome were determined for conducting the DEA analysis. Revenues in total, received subsidies and costs in total were defined as the basic three input indicators. After that, relative indicators of an average amount of a subsidy per one student and average costs per one student were added to the above-mentioned indicators. Indicators of output are represented by the number of students, number of classes, number of graduates and number of enrolled students. A relative indicator of output is considered to be the number of students per class. Indicators of outcome are numbers and proportions of successful students when passing the school-leaving exam from Czech language and a compulsory optional subject. Table 4 contains an example of indicators of input and output for case models 1 and 2.

**Table 4. Example of input and output indicators**

Indicator	Abbreviation	Kind	Type
Subsidies in total	SUByear	absolute	Input
Costs in total	COSTyear	absolute	Input
Number of students	STUDyear	absolute	Output
Number of classes	CLASSyear	absolute	Output
Number of graduates	GRADyear	absolute	Output

Source: Author

## 2.6 Models

In order to evaluate the effectiveness, five models in total were determined from various stakeholders' point of view: a subsidy provider, a school manager, the public, a school owner and an expert. The first two models engaged in comparison of financial inputs and outputs of educational activity in the form of the number of students, they thus evaluated technical efficiency. Other three models focused on effectiveness because at the output, they evaluated achieved results of educational activity in the form of a school-leaving exam. Inputs changed with these three models: model 3 measured a granted subsidy per student, model 4 measured revenues and model 5 measured the number of students in class.

The first model was based on the subsidy provider's point of view. The main task of the provider was to monitor what the subsidies from public sources were granted for. The objective of the model was to maximize outputs of educational activity per volume of a provided subsidy. The input of the model was thus evident; it was represented by the received subsidies in total. The output was both total numbers of students in a given year and the number of enrolled students and the number of graduates, because in case of schools, there are other important activities in addition to education itself. The model was based on monitoring technical efficiency, it neither monitored quality nor targets of educational activity which in the case of a general secondary school was preparation for a higher level education.

$$\text{EFE1} = \frac{\text{STUDyear, GRADyear, CLASSyear}}{\text{SUByear}} \quad (1)$$

The second model was based on the school manager's point of view. The main task of a school manager is to achieve maximum outputs by means of minimum costs. The objective of the model was to maximize outputs of educational activity per volume of costs. The input of the model was evident; it was represented by the costs in total. The output corresponded to the model 1 output and it also monitored only technical efficiency.

$$\text{EFE2} = \frac{\text{STUDyear, GRADyear, CLASSyear}}{\text{COSTyear}} \quad (2)$$

Since the data on inputs in school years 2007/8 and 2009/10 and outputs in calendar years 2008 and 2010 were available, the data analysis was conducted in case of model 1 and 2 in two variations (1A and 1B, 2A and 2B) per individual years.

## 3 Results and Discussion

### 3.1 Results

The box plot in Figure 1 shows that with respect to model 1 the units of the SRO and OPS type which had the greatest achieved outputs within the granted subsidy belonged to the most effective ones in both years under consideration. On the other hand, the least effective ones were church entities which also had a great scatter of efficiency in both variations. Regional and municipal general secondary schools were placed at approximately the same level. Lower efficiency values in the majority of the cases in 2010 are caused by lower subsidies granted to a few private entities which thus influence the efficiency results of the entire set.





representation of some organizational types, mainly the private ones (OPS and churches) is very low in the selective set, so the results cannot be transmitted to the entire basic set and no conclusions can be drawn from the obtained analyses. Nevertheless, with respect to the fact that the research project was conducted mainly for the methodological reasons, several interesting findings can be found.

The first one involves homogeneity of the selective set. The decrease in number of private entities within the entire set was partly given by lower data availability and partly by their high heterogeneity. On the grounds of the use of legitimization tactics [9], private entities are able to produce a larger range of products (they offer more fields of study) and thanks to the diversification strategy within one entity, they also offer more types of schools (basic, secondary, higher professional). Even if the difficulties with data availability from private entities are overcome, when comparing profit firms and nonprofit organizations there will always be a problem with a high level of heterogeneity of nonprofit organizations which is one of their basic characteristics.

### *3.3 Mixed Markets*

The second finding is that in the field of secondary general education, there are three independent groups in total: the largest one is the group of general secondary schools founded by public administration which is equally distributed in the entire Czech Republic with a relatively higher number of students and dependent on received subsidies; it is followed by private general secondary schools of the SRO and OPS type with a small number of students situated in larger settlements and receiving means from school fees and finally, there is a small number of church schools whose management resembles a public type.

This fact corresponds to a stratified market as described in the article by [14]. In the Czech Republic, in the field of secondary general education there are basically two independent markets, the first one is represented by schools founded by public administration and the second one are private schools with legal forms of a limited liability company and a generally beneficial association. Church schools have established an independent niche for themselves in this environment in which they have operated over a long period.

Separated markets in the case of the Czech secondary general education have not emerged spontaneously, however, they have been supported by public policy implemented through the state. The state has created entirely different conditions for different types of entities by means of granted subsidies. A relatively absurd situation is thus emerging when private entities are able to use granted subsidies the best, but at the same time, they are the smallest as well as the least stable economic units.

### *3.4 Range of Organizational Types*

The third finding is that on the basis of an example of a very similar management of limited liability companies and generally beneficial associations, it is possible to agree with the Baruch and Ramalho's [2] assertion that nonprofit organizations and profit firms are only extremes on a continuum ranging from "privately-held for-profit" to "non-revenue generating NPO" passing through "publicly-traded for-profit," "regulated for-profit" and "revenue-generating NPO."

### *3.5 Application of Sophisticated Methods*

The last finding is that the research project results were actually evident already from the detailed description of the environment itself and from simple analyses of characteristics of the sampling frame and sample comparing the type of an entity with the size of a unit, geographic distribution and a method of financing. As a matter of fact, the use of the data analysis method as a multi-criterion analysis was unnecessary, all important features of different organizational types were revealed already before the analysis.

The principal component analysis, such as a secondary data analysis, the objective of which was supposed to be comparison of achieved effectiveness with organizational status as one of the factors was even impossible to use due to a low representation of some types of units in the sample and a strong dependence of the majority of the factors.

Description of the environment in which compared units are situated as well as description of their qualities are as important as the analysis.

#### 4 Conclusion

In conclusion it can be stated that possibility to compare effectiveness of profit firms and nonprofit organizations is significantly limited for two reasons: heterogeneity of nonprofit organizations and limited occurrence of nonprofit organizations with other types of providers in mixed markets. In practice there are actually two extreme cases of occurrence of profit firms and nonprofit organizations.

First, different organizational forms operate in different areas or at least in niches with different conditions. According to [6], there are only a few cases in which nonprofit and profit entities are in the same form and function in order that statistical comparison was meaningful. How could anyone compare a local centre of culture which manages several theatre performances a year, two or three jazz concerts or a dance performance which provides services for local schools with a Broadway production company the only task of which is to produce one show as best as possible until the last profitable performance?

The second extreme case is a situation when both organizational forms have the same conditions, they thus occur in a mixed market. Under the same conditions, production behaviour of nonprofit organizations and profit firms does not differ. However, if behaviour of various types of organizations does not differ, the comparison between the two lacks purpose.

Fundamental recommendation for the case of comparison of two types of organizational forms is, first of all, to carry out a thorough analysis of the environment and markets and define factors which differ for each type of an organization. At the same time, any generalizing conclusions must be avoided. Conclusions concerning nonprofit organizational effectiveness may only be drawn for statements valid for a specific area of public services at a specific time.

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# Towards Health Technology Assessment in the Czech Republic

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## Abstract

Health Technology Assessment (HTA) is considered to be one of the tools how to improve health systems imbalances and problems through systematic evaluation of properties, effects, and impacts of health technology. The role of HTA is discussed in the context of increasing expenditures on health care caused especially by improving and using new technologies in the health care sector. The paper analyzes reasons for the growth of costs of health care and describes one of the methods for regulation of this growth - use of HTA. The Analysis deals with the development and use of HTA in the Czech Republic. The conflict of available resources and innovative technologies in healthcare is performed and methods of HTA are discussed in general introduction. The goal of this article is to reflect the Czech situation in HTA. The main issues of HTA assessment in relation to health policy are introduced. The progress of HTA in the Czech Republic is evaluated separately as a process towards to applied pharmacoeconomics and as a process towards HTA. Both the comparative analyses are performed to show the gap in implementing HTA in the Czech Republic. It was found that HTA in the sense of pharmacoeconomics was implemented (even if Czech Republic does not have a formal HTA body in the sense of an independent agency), however, such a selective use of HTA principles so far has not resulted in the implementation of HTA.

*Keywords: health technology assessment; pharmacoeconomics; czech health policy; economics of public health*

JEL Classification: I180

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## 1 Introduction

The rapid growth of the health care cost over the decades is the main feature of current health care trends funding. The Czech Republic is not an exception [13]. Economists try to reach an agreement on what the main determinants of this development are. Policy related to improvement of health care funding problems and imbalances should be implemented.

Health policy was examined in relation to need an insurance reform and also in the context of health reform of the Czech health care system [16]. Some authors performed comparison of health policy related to HTA in which they compared several countries and analyzed their efforts towards to HTA [6]. This paper deals with substantial issues of HTA and health policy related to implementation HTA in the Czech Republic.

The aim of this article is to reflect the Czech situation in the area of HTA and the main issues of HTA are discussed in relation to health policy. To achieve that goal, the first part of the paper introduces the main theoretical findings concerning the topic, especially the relation between technological improvement and health care expenditures. The final part of the paper discusses the results obtained from performed comparative analyses and formulates conclusions.

Relevance of the paper can be proved from theoretical as well as empirical point of view. Literature review [e. g. 1, 4, 6] demonstrates that HTA plays an important role in the area of public finance of health care in relation to cost savings. Although HTA is a frequent topic of international studies, there are only a few studies in the Czech Republic that study and seek solutions for such a phenomenon [e. g. 6]. We try to fulfill this research gap and to show the progress of HTA in the Czech Republic for pharmacoeconomics (when HTA methods are applied for drugs). In the next step the progress in the field of pharmacoeconomics is related (and compared) to HTA development in general. Together with the main issues of HTA methods we point out main acts of health policy related to HTA in the Czech Republic.

## 1.1 Background

Before we can start evaluating the development of HTA in Czech Republic, we need to characterize the general trend in health care which leads to the need of HTA. In order to understand properly changes that have occurred in health care, it is important to understand a general demographic trend as well as dynamic technological changes in the health sector.

Such a trend as longer life expectancies and declining fertility rates of the population in the Czech Republic can be described as progressive aging. According to Population projections in The Czech Republic up to year 2065 (made by Czech statistical office) it is obvious that significant growth in the number and proportion of persons aged 65 years will rapidly continue. On average, in the Czech republic, the share of population aged over 65 years would increase from 15% in 2009 to 31% in 2050 [18].

The technological innovation is considered to be the second (but not less substantial) factor of high and rising health care expenditures. Improved health care technologies generally increase care expenditures. Greater availability of such technologies is associated with greater per capita use and higher spending on health care services [3]. The new technologies in healthcare allow a cure for more patients, improve patient's quality of life and shorten duration of treatment. However, we are facing a conflict between available sources and technological improvement.

Trend of enormously increasing costs of health care has led to the need for more accurate evaluation of benefits and the price of medical technology. Economic evaluations compare and evaluate costs and benefits of different medical interventions have been hailed as a possible solution to this dilemma. Economic evaluations enable decision maker to maximize the benefits (health effect) of a given quantity of resources, to decide on the correct mix of different treatments [2]. The next table shows expenditure on health care as percentage of GDP in the Czech Republic in recent years. From this table it is clear that the trend is increasing.

**Table 1. Expenditures on health care in the Czech Republic as percentage of GDP**

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
5.9	6.2	6.6	6.4	6.4	6.2	6	6.4	7.3	6.9	7	7.1	7.8	7

Source: Author based on OESC statistics

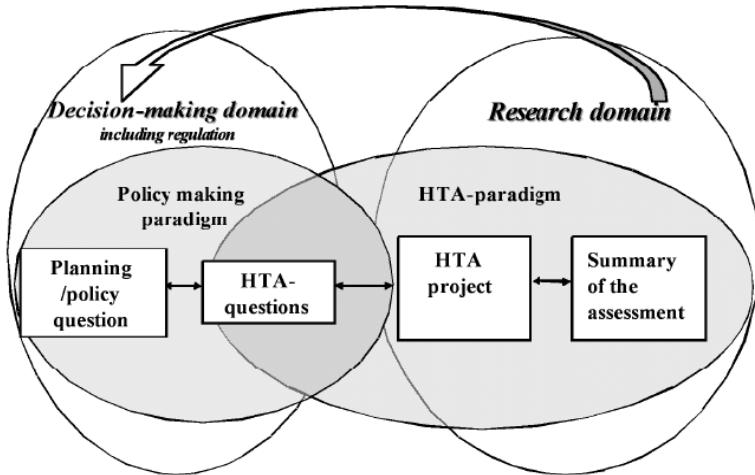
Economist's effort to find the value of technological innovation, measure gained output and compare these two have resulted in the concept of HTA. Issues of HTA can be understood as a response to the search of an evaluation and analysis of the benefits of new technologies in health care. The most important mission of HTA is to inform public policy makers of the healthcare sector. The word "technology" in context of HTA is used in a very broad sense and the medical technology is an intervention that can be used to promote health, prevention, diagnosis and treatment of acute or chronic disease, or in rehabilitation. These include particularly drugs, medical devices, diagnostic and therapeutic methods and measures in the field of clinical practice, public health and health care organizations.

Use of HTA is a target mainly in areas where policy-making is used in a broad sense and includes decisions made at the patient level, health care provider or institution level [6].

## 1.2 From Evaluation to Policy

There is a clear distinction between assessment (a scientific process) and appraisal (the role of policy-makers). The role of HTA has been described as a bridge between research and decision-making. The close relation between HTA and policy-making depicts the interdependence and separation between research-based assessment and decision-making process. The majority of EU Member States have public sector HTA agencies that provide information for decision and policy making at regional or national levels [5]. The following figure illustrates the relation between HTA and policy-making.

Figure 1. Seminar in colon surgery



Source: [12]

The field of HTA was developed in a systematic way in the United States, where the Office of Technology Assessment published its first report on this subject in 1976. The first country in which HTA was formalized and mandatory guidelines for health economic evaluations were issued, was Australia in 1992. There were similar mandatory guidelines in Canada, Finland, the Netherlands, Portugal, in the USA Regence Blue Shield and Nice – national Institute for Clinical Excellence issued its guidelines [11].

HTA began to spread to the rest of the world in the late 1980s, with the formation of the Swedish Council on Technology Assessment in Health Care. During twenty years HTA has spread to nearly all European countries and then to some of countries in Central Europe [2].

The majority of EU Member States have public sector HTA agencies that provide information for policy decision. The primary aim of HTA agencies is to produce HTA reports.

## 2 Material and Methods

The article starts with describing of the context of HTA implementation in general. Next situation in European countries is briefly performed. This is given to contrast to the development in the Czech Republic in the next part. The main part of the analysis is more focused on the Czech Republic. Situation in the country as institutionalization and professionalization of HTA is performed and finally assessment of current issues in HTA in Czech Republic is presented.

Paper is based on document analysis and comparative analysis of the development of pharmacoeconomics and HTA in the Czech Republic.

The comparative analysis is based on academic publications, Ministry of health's materials, books from conferences and panel discussion from conferences about HTA in the Czech Republic. We analyse separately development of HTA considering pharmacoeconomics and development of HTA considering general aspect (e.g. medical devices) in conditions of the country. Finally, the comparative analysis of the development is performed to reach the research goal. Two aspects of HTA in the Czech Republic are separately examined – development of pharmacoeconomics is examined and policy related to Pharmacogenomics is introduced in the first part of the analyses. In the next step development of HTA is examined and policy related to HTA is performed.

### 3 Results and Discussion

On the contrary to the development of HTA in European countries, the information about HTA came to the Czech Republic with delay. During communism the decisions about investments in medical technology was made mainly on the political basis in Czechoslovakia. Situation changed with the end of communist regimes. When western countries began to use HTA to evaluate spending in health technologies the markets in Middle and East Europe including Czech Republic became vulnerable to companies delivering medical devices [19].

First information about HTA in the Czech Republic appeared relatively late. Probably two articles in the journal *Praktický lékař*, which were issued in 2002 and in 2003, were the first information about HTA. In 2004 the whole supplement of the journal *Klinická onkologie* brought conference papers dealing with HTA in oncology.

A very important point in the development of HTA in the Czech Republic was the establishment of Czech Pharmacoeconomic society (ČFES) in 2005. ČFES organized educational seminars and training meetings about pharmacoeconomics during the first years of its existence. A short script about pharmacoeconomics was issued in 2007 and since its inception the magazine *Pharmacoeconomics* started to be issued regularly. Working group of ČFES issued in 2009 document called „The Best Practices for pharmacoeconomic analysis in the Czech Republic“. Despite the fact that the document was not legal obligatory it became a guideline for pharmacoeconomic analyses made in the Czech Republic and later it became a material for obligatory document.

Although the Czech Republic does not have a formal HTA agency, the formal initiative came from State Institute for Drug (SÚKL) which issued an obligatory document “The procedure for evaluating the cost-effectiveness” in February 2013. The institute focused on developing and formalizing the use of pharmacoeconomics and previous optional document from ČFES became a basis for this guideline. The decision scheme is an important part of the document see Figure no. 2. The decisions are made by SÚKL in a joint procedure. The application must include a pharmacoeconomic analysis of cost-effectiveness and budget impact analysis in addition to clinical information. If the drug passes through this process then it can be covered by the public insurance.

The main critical argument to Czech model of HTA for drugs is that there is no separation of the appraisal and decision stages within SÚKL. Moreover, the Czech model for pharmacoeconomics lacks organizational, social and other issues of HTA. [6]

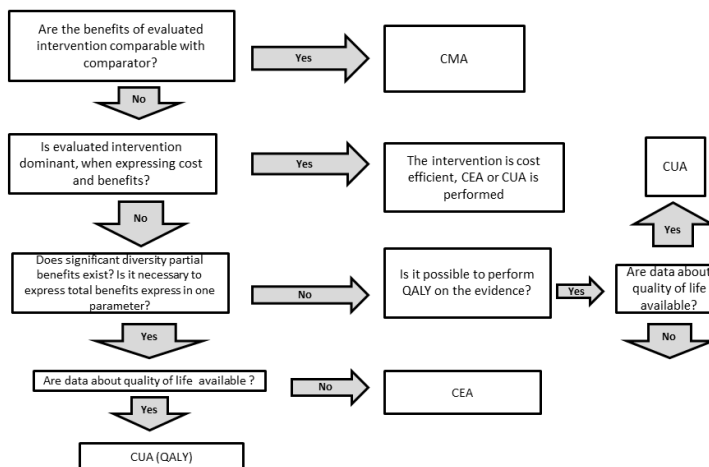
A very different situation in HTA utilization is in general use of HTA (for evaluating new technologies as medical devices, diagnostic and therapeutic methods or preventive program). The lack of interest in HTA studies results from health care providers and decision makers. Formal methodological guidance does not exist and the Czech Republic is not a member of international networks for HTA. Currently the legislation which would concern HTA is missing.

Some effort has been developed during Heger’s function. The tender for HTA methodology managed by Ministry of Health and it was won by Academy of Healthcare Management with a bid price 240, 000 CZK (about 8, 900 EUR). The methodology consists of three main parts: a general introduction describing general HTA, Manual for Applicants (evaluators) and the Manual for the opponent. The most essential for the process are considered the two manuals which define the formalities of HTA analysis.

Pilot testing of the methodology was made in the second phase of the tender with the aim of pilot testing and verification of the practical applicability of the methodology. Four selected technologies for pilot testing were chosen (one representative technology was chosen from each group of technologies), those where the input data was well available (drug, medical device, exercise, prevention). The aim was not actual evaluation of selected technologies, but the verification of procedural and substantive applicability of these methods.



**Figure 2. Mandatory pharmacoeconomic guideline**



Source: Author based on [22]

With no relation to policy activities of previous Minister of Health the new minister of health (in office since January 2014) established a “Device Commission”. The precise name of the Commission is “Commission for evaluating and allocation of medical devices” and the Commission discusses proposals for the allocation and operation of medical devices which should be reimbursed from health insurance (only devices whose costs exceeds 5 million CZK). When concerning methodology of the commission the multicriterial evaluation is used but the methods of HTA are not implemented in its decision. New minister of health has only mentioned that HTA is one of possible ways to evaluate new medical devices and and probably HTA methods will be implemented in commission’s methodology later.

On the other hand, ČFES (no matter on political will) has recently developed an interest in HTA methodology and in April 2016 the document „Best practices of ČFES for medical – economic evaluations in the Czech Republic“ was issued. The document contains a nonobligatory general recommendation which defines basic standard of HTA with declaration that “recommendation of ČFES should be understood and interpreted in the context of the laws of the Czech Republic.”

As we have mentioned in the introduction, the main objective of HTA methods from the public finance’s point of view is the sustainability development of the health care costs. To reach that goal, a policy related to HTA plays an important role. From these reasons we examined and described the development of HTA activities in the Czech Republic in context of the health care policy. In the Czech Republic some activities in the field of HTA have been developed. When concerning Pharmacoeconomics, these activities become internalized in the decision-making process. As unsatisfactory appears to be an interest in HTA as a general issue especially the influence of politics. Even if some efforts was expended during period of minister Heger, new minister of Health has not so far mentioned HTA as a policy priority. Table 2 summarizes the main issues of Czech HTA from 2006 to the present. The main characteristic of the development of the HTA in the Czech Republic is quite a significant difference between the development of the HTA in Pharmacoeconomics and in HTA as general practice.

Some efforts have been made when ČFES issued nonobligatory guideline for HTA. However what is currently being missed is the demand for this type of guideline from the perspective of health policy. Czech current minister of health does not mention HTA as a policy priority [18] even if HTA evaluation in relation to cost savings in health care could be a tool how to improve public

finance when considering health care costs. The new Device commission was established with no respect to HTA methodology and only informal minister's claim could promise implementation of HTA methods to decisions of this commission.

**Table 2. Development of pharmacoeconomics and HTA in the Czech Republic**

<b>Pharmacoeconomics</b>	<b>HTA</b>
<b>2006-2009 Minister of Health Julinek</b>	
Professional information about Pharmacoeconomics came to Czech Republic (ČFES)	Basic information about HTA
<b>Januar 2009 - May 2009 Minister of Health Filipiova</b>	
ČFES - optional guideline for pharmacoeconomics analyses	HTA is not mentioned as a policy priority
<b>May 2009 - June 2010 Minister of Health Juraskova</b>	
	HTA is not mentioned as a policy priority
<b>June 2010 - July 2013 Minister of Health Heger</b>	
2012 - methodology for Pharmacoeconomics is prepared	Conduct of the Minister no. 6/2012 - "HTA in the system of public health insurance"
February 2013 - SÚKL issued mandatory methodology for Pharmacoeconomics	Council HTA was established
	Tender for HTA methodology
	Pilot tests of suggested methodology
	Issuance of document "implementation of HTA in CR"
<b>2013 - 2014 Minister of Health Holcát</b>	
	period of stagnation
<b>from 2014 Minister of Health Nemecek</b>	
	HTA is not mentioned as a policy priority
	Devices Commission was established ( HTA methodology is not implemented in its decision)
	ČFES - optional guideline for HTA

*Source: Author based on document analysis*

## 4 Conclusion

As most of the European and world's health care system Czech health system deals with two major problems. First, the increasing cost of health care, second, continuous advances in technology. HTA is one of the tools how to maintain the sustainability of public finance when concerning health care costs. The article presents results of document analysis concerning HTA development in the Czech Republic and policy related to HTA. The Czech Republic is one of the latest countries, where HTA has not been fully implemented. A typical feature for HTA in Czech Republic is that no comprehensive HTA study has been probably produced but efforts to a larger utilization of HTA methods can be seen in pharmacoeconomics. As it was performed, we can observe in the Czech Republic a very hybrid situation: on the one hand we can see an active SÚKL which appraisals of cost effectiveness analyses are translated into decisions, on the other hand the situation is very different when considering other HTA (medical device, diagnostic and therapeutic methods and preventive program). Such a methodology is currently in stage of the creation, discussion and pilot studies.

The Czech Republic for many years lacks sufficient systemized HTA and its implementation into the decision-making process and what is currently being missed is the demand for this type

of guideline from the perspective of health policy. Even if the elements of HTA in assessing the efficacy, safety, effectiveness and relative cost-effectiveness and its impact on the budget is standard used in drugs (pharmacoeconomics) this selective use such principles so far has not resulted in the implementation of HTA for other technologies.

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# Does Spatial Dimension Matter in Waste Generation? Case Study of Czech Municipalities

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## Abstract

Municipal waste generation has been already studied in broad range of studies but most of the studies neglect the spatial aspect of analyzed datasets. This paper's aim is to explore spatial distribution of municipal solid waste, municipal mixed waste, glass and plastic generation in the Czech Republic. Data on municipal level for the year 2011 were analyzed using global and local indicators of spatial autocorrelation. We detected significant positive spatial autocorrelation for municipal solid waste and municipal mixed waste production, there are no spatial patterns in the case of recyclable waste streams (glass and plastic). With map visualization we could detect particular clusters of high or low amount of produced municipal solid waste and mixed municipal waste. Even though the majority of municipalities does not show any spatial distribution, we identified clusters of high waste production in Central Bohemia, Ústí nad Labem and Moravia-Silesia region and clusters with low waste production in Central Bohemia, Hradec Kralove, Pardubice, South Bohemia and Vysocina regions. To explain detected spatial distribution further research using geographically weighted regression will be carried out.

*Keywords: waste management; municipal solid waste; separated waste streams; spatial autocorrelation*

JEL Classification: C210, Q530

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## 1 Introduction

There is already broad range of studies dealing with waste management and waste production on individual, municipal, regional or state level. The results of these studies show that there is significant variability in waste management characteristics (e.g. waste generation or organization of waste management) between used units. The studies vary in ways they are trying to explain what are the causes of this variability. Selection of concrete factors or variables depends on local conditions, in particular country, availability of data needed and also consideration of researchers. In general, factors influencing municipal waste production can be divided in two broad groups – individual and situational characteristics [13]. Impact of individual characteristics such as socioeconomic and demographic factors on production of municipal waste have been shown in many studies, e.g. [5], [8] or [15]. On the other hand, waste management organization and charging policy as situational characteristics were analyzed in other studies ([6], [12] and [3]). Most of these studies neglect the spatial dimension of analyzed data, although the impact of these characteristics may differ at various geographical locations (countries, regions or municipalities) [11].

However, spatial data have several specific characteristics that make the analysis using classical statistical methods difficult. One of the most prevalent attribute of spatial data is spatial dependence or spatial autocorrelation. The variable at one point in space could be related to the values of this variable at some or all other locations in the system [1]. Existence of such trend in the data opposes the basic assumption of linear models and standard parametric statistical tests [14]. To better understand the spatial dimension of data it is necessary to use special statistical methods that consider the geographical proximity of units.

The issue of spatial autocorrelation (SAR) in research is not a new topic, Cruikshank referred to spatial patterns of cancer mortality in England and Wales in 1940s [7]. Since then large spatially referenced data sets and increasing capabilities for visualization have led to distinctive development of spatial data analysis [2]. SAR has been already used in wide range of research in the field of environmental studies but the application in waste management studies is so far

limited. SAR has been so far applied in published studies on municipal level in Greece [9], province level in Turkey [11] and state level in Nigeria [10]. All three studies use global as well as local measures of SAR, eventually more advanced spatial statistics as well (e.g. geographically weighted regression). Global coefficients are valid for the whole region of concern. Local statistics are able to identify particular clusters of units or look up spatial outliers [14]. All three studies supported the hypothesis that there is spatial dimension in waste management data. Keser et al. [11] detected a significant positive spatial autocorrelation for the municipal solid waste (MSW) generation rates, that implies that provinces closer to each other have similar MSW production patterns. Ioannou et al. [9] came to similar conclusion for Greek municipalities, only in this case authors analyzed recycling rates and also came to significant positive spatial autocorrelation. The Nigerian model does not give results of SAR for MSW but also states that there are spatial patterns in MSW generation.

The main goal of this paper is to evaluate if there are any spatial patterns in municipal solid waste, mixed municipal waste, glass and plastic production among Czech municipalities using global and local spatial indicators. Better understanding of local specifics can help municipalities or local authorities to better plan waste management activities and to adapt waste management policy on local level.

The paper consists of four chapters and is structured as follows. In the introduction, we described the current state of knowledge in the research dealing with spatial analysis of waste production. In the second chapter, the method and data used for the purpose of the research in the Czech Republic are presented. The third chapter introduces the main results of the research. Last chapter resumes the research results presented in this paper and shows possible directions of future work.

## **2 Material and Methods**

In this study we analyze quantitative spatial data regarding municipal waste generation in Czech municipalities. We acquired data about municipal solid waste production from waste management information system (ISOH). ISOH is a statewide database collecting data about waste production and treatment since 2001. This dataset covers all municipalities that produce more than 100 tons of 'other waste' (incl. municipal waste), or 100 kg of 'hazardous waste' in a year [16]. That means there are also municipalities that do not surpass the given limit and do not have to report their waste production. That does not mean that these municipalities do not produce any waste but the amount is rather low. This category of municipalities that do not report its waste generation involves mostly small municipalities with few inhabitants. For example, in the year 2011 96% of all Czech municipalities reported their waste production, 99% of state population were living in these municipalities. From this database we got data about production of MSW, mixed municipal waste (MMW), glass and plastic for the year 2011. We did not use data for other separated waste streams because there are different possible ways how to dispose of these streams (such as direct sale to waste paper or scrap metal buyers) that can bias the data. In order to avoid differences in amount of produced waste caused by different population size of Czech municipalities we computed per capita values.

After exclusion of municipalities with no reported data about waste generation or with extreme values the sample consisted of 5,887 municipalities from all regions (from 6,251 municipalities in 2011). We excluded all municipalities with reported average per capita waste generation further than 3 standard deviations from the mean. The average MSW generation in 2011 was 262 kg per capita, thereof it was in average 204 kg MMW per capita, 14 kg glass per capita and 12 kg plastic per capita and year (see Table 1).

**Table 1. Values of descriptive statistics for MSW, glass and plastic production (in kg per capita), CR, 2011**

Variable	Mean	Minimum	Maximum	Std. deviation
MSW	262.60	1.04	772.93	141.02
MMW	204.36	0.02	772.93	124.03
Glass	13.76	0.02	379.76	9.88
Plastic	11.51	0.01	172.23	7.27

Source: Authors

To identify spatial distribution and find areas with high or low values of MSW we used Exploratory Spatial Data Analysis (ESDA). There are several different global and local statistics measuring spatial correlation in data. One of the most widely used global indicators for quantitative continuous data is Moran's I [14], defined with following formula:

$$I = \frac{\sum_i \sum_j w_{ij} c_{ij}}{s^2 \sum_i \sum_j w_{ij}} \quad (1)$$

where  $c_{ij} = (z_i - \bar{z})(z_j - \bar{z})$

$$s^2 = \frac{\sum_i (z_i - \bar{z})^2}{n}$$

$c_{ij}$  representing the similarity of point  $i$ 's and point  $j$ 's attributes,

$w_{ij}$  representing the proximity of point  $i$ 's and point  $j$ 's location, with  $w_{ii} = 0$  for all points,

$z_i$  representing the value of analyzed attribute for point  $i$ ,

$n$  representing the number of measured spatial units.

To define spatial relationship between units in our study we used inverse distance option and Euclidian distance.

Local indicators of spatial association (LISA) enable decomposition of global indicators into the contribution of each observation [2] that means that the sum of all local indicators is equal to the global indicator. LISA enables to identify clusters of units with similar values of analyzed characteristics; the values in the clusters can be all low ("cold spots") or high ("hot spots"). LISA is also able to find the spatial outliers - unit with high or low value surrounded with values of units with opposite sign [14]. We computed LISA using Anselin Local Moran's I statistic. According to [2] Anselin Local Moran's I for an observation  $i$  is defined as:

$$I_i = z_i \sum_j w_{ij} z_j \quad (2)$$

where  $z_i, z_j$  are deviations from the mean,

$w_{ij}$  representing the proximity of point  $i$ 's and point  $j$ 's location, with  $w_{ii} = 0$  for all points,

summation over  $j$  is such that only neighboring values  $j \in J_i$  are included.

All computations and visualisations were made using ArcGIS 10.3.1.

### 3 Results and Discussion

As first step, we computed global Moran's I for MSW, MMW, glass and plastic. The results of this analysis are shown in Table 2. The Moran's I signifies that the spatial distribution of values in not a result of random spatial processes if the p-value is significant. In our case we found two p-values that are statistically significant at 99 % confidence level - for MSW and MMW. In both cases Moran's I are positive which means that the spatial distribution of high and low values are to some extent spatially clustered. The highest autocorrelation was observed in case of MMW. The autocorrelation in case of MSW is slightly lower. We can assume that the significant Moran's I for MSW is mainly caused by MMW because we did not find any spatial correlation for separated waste streams (glass and plastic). In case of glass and plastic it is possible to assume that all

features of spatial distribution are resulting from random spatial processes. This result contradicts the conclusion of Ioannou et al. [9] who found relatively strong spatial autocorrelation for recycling rates in Greece. Clusters with high generation of recyclables were detected mostly in urban areas probably because recycling programs were first developed there. In the Czech Republic the success rate of recycling programs is also dependent on “age” of the system in municipality [4] but it does not show any correlation to spatial distribution of municipalities.

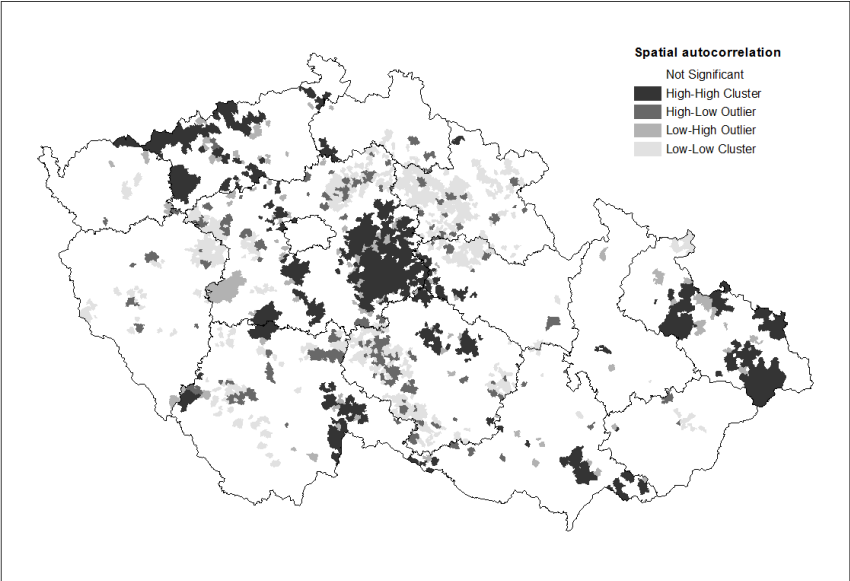
**Table 2. Global Moran's I and determination of spatial pattern**

Variable	Global Moran's I	z-score	p-value	Spatial distribution
MSW	0.160	39.906	0.000	Cluster
MMW	0.182	45.464	0.000	Cluster
Glass	0.001	2.719	0.007	Random
Plastic	0.001	1.554	0.120	Random

Source: Authors

As global indicator Moran's I does not indicate where the clusters and outliers located are. To better understand the local distribution, we computed Anselin Local Moran's I for MSW and MMW. We did not pursue the spatial analysis of glass and plastic because of the results of global analysis.

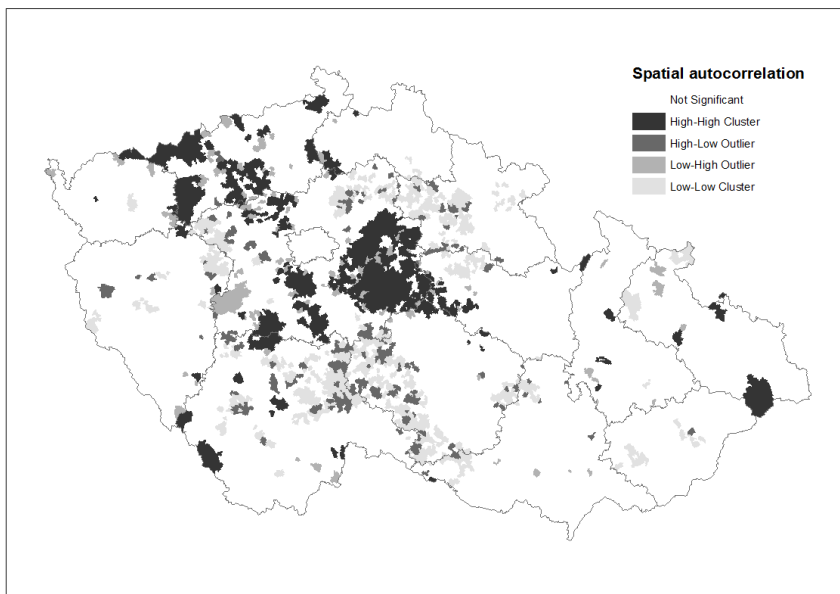
**Figure 1. Results of the Anselin Local Moran's I for MSW, Czech Republic, 2011**



Source: Authors



**Figure 2. Results of the Anselin Local Moran's I for MMW, Czech Republic, 2011**



Source: Authors

The results of Anselin Local Moran's I for MSW and MMW show that even though the majority of municipalities does not show any spatial pattern of MSW (80% of all municipalities) and MMW (78% of municipalities) generation there are still many clusters with similar features and also several outliers (Figure 1 and Figure 2). It is obvious that our hypothesis that the spatial autocorrelation in MSW can be explained through spatial distribution of MMW can be confirmed only partially. There are still clusters of similar MSW production that do not correspond to the clusters of MMW and vice versa which means there must be various reasons for similar generation of MSW and MMW. But it is hard to explain this difference without further research of particular factors that are causing the origination of geographical clusters.

The clusters are not distributed equally throughout the territory of the Czech Republic. Biggest cluster of high production of MSW as well as MMW is situated in the western part of Central Bohemia region. Smaller clusters of high amounts of municipal waste are also in Usti nad Labem region and in case of MSW also in Moravia-Silesia region. Biggest group of low waste production lies in a belt leading from northwestern part of Central Bohemia region through Hradec Kralove region to northeastern part of Pardubice region, this cluster is more pronounced in the case of MSW than MMW. Low amounts of MMW form a distinctive cluster at the border between regions South Bohemia and Vysocina. In general, there are more clusters in the Bohemian than Moravian part of the Czech Republic.

SAR enables us to identify clusters of units that embodies specific level of analyzed characteristics in comparison with its geographical surrounding. Only with SAR analysis we are not able to tell what is causing the spatial distribution of municipal waste generation. It is possible that underlying factors such as socio-economic or socio-demographic variables are also non-randomly distributed. Origination of clusters may also be caused by potential similarities in MSW management systems in neighboring units [11]. The results of SAR can help us to find particular clusters of units that should be analyzed further. Thanks to detection of factors influencing lower

or higher MSW or MMW generation, it would be possible to formulate recommendation for municipal waste management.

#### 4 Conclusion

The purpose of this paper was to evaluate the spatial distribution of generation of four different waste streams (MS, MMW, glass and plastic) in municipalities in the Czech Republic. We used one indicator, Moran's I, as global and one indicator, Anselin Local Moran's I, as local statistic of spatial autocorrelation. With the aid of these two statistics we detected spatial patterns in the generation of MSW and MMW, spatial distribution of glass and plastic is in our case random. The result for MSW is in agreement with study for Turkey [11]. In contradiction to our findings, Ioannou et al. [9] detected spatial autocorrelation also for generation of recyclable waste. The absence of nonrandom spatial distribution in our sample can be a consequence of the fact that achievements of recycling programs in the Czech Republic are not dependent on settlement structure.

Earlier studies for various European countries detected influence of different individual and situational characteristics on waste generation and recycling behavior but it is possible that impact of these factors is not constant throughout the country and is different from region to region. Some factors significant in one region may be insignificant in another. The analysis of these factors and their relationship to municipal waste generation was beyond the scope of this paper and forms the core of further, currently undergoing research. To quantify the impact of different variables a use of more complex methods (e.g. geographically weighted regression) is needed.

#### Acknowledgements

We thank for the financial support of the project „Demographic development and behavioral aspects (e.g. crowding-out effect) and their impact on the municipal waste charging policy“ (Czech Science Foundation – Project Nr. 16-14409S).

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# The Costs of Municipal Waste and Separate Collection. Efficient Measures How to Cut Them Down

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## Abstract

Most analyses dealing with the costs of the municipal waste management system focus on competition, ownership, quality of the service, economies of scale and density, or intermunicipal cooperation. Only a few of them consider system parameters that are under direct control of municipal representatives on a daily basis – e.g. pick-up frequency, number of collection points and their density, distance to collection points, curbside collection versus collection points (drop-off recycling), volume of bins/containers installed in the system. Our research aimed to fill this gap implementing dynamic factors that influence the total costs of the system – performance of the container-based collection, efficiency of the container-based collection network, or charging system. In contradiction to our assumptions these factors explain the intermunicipal variability in total costs per capita only marginally. The highest importance has residual waste production per capita, residual waste cost per ton and number of inhabitants per collection site (or economies of density). The dynamic factors influence the separate collection costs that depend on the efficiency of the container-based collection network of plastics, or on glass and plastics production, but also on number of containers for glass per km<sup>2</sup>, volume of installed glass containers (liter per capita), and type of charge. These results should be reflected by the implementation of the relevant measures aimed to decrease municipal waste management costs.

*Keywords: municipal waste management costs; separate collection costs; municipal waste charges; efficiency*

JEL Classification: H42, Q53

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## 1 Introduction

Factors influencing the municipal waste management costs and efficiency, especially competition ([12], [5] or [30]), ownership ([4], [14] or [29]), quality of service ([8]), economies of density and scale ([12], [6] or [29]), or intermunicipal cooperation ([3], [7], [31]) are usually at the center of attention. However, relatively little is known about how each component of the municipal waste management system (incl. separate collection) influence the municipal waste management costs – e.g. pick-up frequency, number of collection points and their density, distance to collection points, curbside collection versus collection points (drop-off recycling), volume of bins/containers installed in the system, performance of the container-based collection, efficiency of the container-based collection network, or charging system. These components belong to those parameters of the municipal waste management system that are under direct control of municipal representatives.

Although the previous research dealt with the frequency of collection ([22], [11] or [2]), distance ([22]), number of pick-up points, and number of inhabitants per pick-up point ([23], [11]), the current research should take into account also dynamic factors influencing the municipal waste management costs. These factors result from the intention of municipal representatives to guarantee not only a high quality of the system in the long-term (when the system is perceived as convenient, the people have a higher motivation to use it regularly) ([17], [26] or [10]), but also the efficiency of the system.

Actually, the municipal waste management system is based on an unstable balance between system costs and benefits, where the costs should be outweighed by the satisfaction of citizens. Despite the fact that the municipal waste management system aims to fulfill legal duties in the first place, their fulfillment is dependent on the citizen's acceptance of the system parameters. That is why the system needs to be convenient. However, the budgetary limitations call for the system efficiency as well – to get the convenience, but not for any price.

To intensify the ongoing research of factors influencing municipal waste management costs and to emphasize the long-term efficiency factors we work with new variables in our analysis as:

- 4.1.1 Volume of bins/containers installed in the system,
- 4.1.2 Performance of the container-based separate collection,
- 4.1.3 Efficiency of the container-based separate collection network,
- 4.1.4 Charging system.

Volume of bins/containers installed in the system represents the information about the total volume of bins for mixed municipal waste, or containers for separate collection that is available for citizens in the municipal system. The higher volume of bins/containers pro person installed in the system, the higher convenience of the system for citizens is achieved (higher volumes of containers prevent their congestion), but the higher costs of the system operation arise. Higher installed volumes indicate that the number of bins/containers in the system is too high, or that volumes of bins/containers don't reflect the real needs of citizens and are too high.

Performance of the container based separate collection (paper and cardboard, plastics, glass) evaluates the amount of separate collection through 1 m<sup>3</sup> of the installed containers during a year and represents the utility value. The lower amount of separately collected waste 1 m<sup>3</sup> of the installed containers generates, the lower utility value the containers in the system have. In this case the system seems to be equipped by unnecessary containers and the efficiency of the system is distorted.

Efficiency of the container-based separate collection network evaluates the amount of separately collected waste in 1 m<sup>3</sup> of the container at the moment, when the waste is picked up. This variable assesses the usual settings of the collection in the municipality (e.g. frequency of the collection) and the optimal filling of containers by the explicit wastes (e.g. paper and cardboard, plastics, and glass). The lower the efficiency of the container-based separate collection network is, the higher discrepancies between the current system settings and real needs (the amount of containers in the system is too high, or volumes of containers are high).

The research of how the charging system influences the costs of the municipal waste management system is not new (see [19] or [9]). This variable reflects the differences between variable (unit-based) and fixed fees and their influence on municipal waste management costs. Variable fees are implemented especially to increase system savings, when the waste producer is motivated to decrease the amount of waste deposited on landfills, and to increase the separate collection. Slavík and Pavel [28] confirmed the environmental effectiveness of variable fees in comparison with fixed fees in the Czech Republic, so we linked to this research and tested the influence of the charging system on municipal waste management costs.

Based on previous research and using new variables measuring the efficiency, the goal of this paper is to identify key factors that influence the municipal waste management costs in the Czech Republic. Our research is focused on two municipal waste streams – residual waste and separate collection. We test usual variables that influence the convenience of the municipal waste management system (e.g. frequency of the collection, accessibility of the pick-up points), but we extend the research using new variables (volume of bins/containers installed in the system, performance of the container based separate collection, and efficiency of the container based separate collection network).

## 2 Material and Methods

For our study we conducted a questionnaire survey among municipalities in the Ustecký and Liberecký region in the northeast part of the Czech Republic. All the municipalities in the region were addressed with a letter and after some time contacted via phone. The survey was carried on in the autumn of 2015. From the 569 municipalities in these two regions we received 77 filled-in questionnaires, which is a 13 % rate of return. Unfortunately, not all the forms were filled in correctly or completely, so it is not always possible to use all the cases depending on the aim of the analysis. In this article we are aiming on the issue of total annual costs per capita and separate collection costs per capita. In the first case, our sample consists of 57 municipalities with

average total costs of 927 CZK per capita, in the second case, of 74 municipalities with average separate collection costs of 193 CZK per capita (table 1). Nevertheless, municipalities in our sample have a similar size structure as municipalities in the whole region with the majority of smaller municipalities.

**Table 1. Annual waste treatment costs per capita (CZK), 2014**

	Sample	Minimum	Maximum	Mean	Std. deviation
Total cost	57	288.9	1640.0	927.2	283.8
Separate collection cost	74	13.3	895.7	193.1	138.7

*Source: Authors*

Because of varying population sizes of municipalities in our sample we did not use absolute values obtained directly from the survey but indicators computed per capita, per square kilometer or per ton of waste. As a result we have the following set of indicators:

- Number of inhabitants per collection site,
- Number of collection sites per square kilometer,
- Number of glass/paper/plastic containers per square kilometer,
- Volume of installed glass/paper/plastic bins/containers (liter per capita),
- Annual performance of container-based collection for glass, paper, plastic and total (kg/m<sup>3</sup>),
- Efficiency of the container-based collection network for glass, paper, plastic and total (kg/m<sup>3</sup>),
- Residual waste, or glass, paper, plastics production (kg per capita),
- Residual waste costs per ton (CZK/ton),
- Charges as dummy variable – we have two types of charges that we coded as 1 ('local fee for operation of a system of accumulation, collection, shipment, sorting, recovery and disposal of municipal waste' that represents the fixed type of fee) and 2 ('fee for municipal waste' or 'fee for the accumulation, collection, transportation, sorting, recovery and disposal of municipal waste from natural persons on the basis of an agreement' that represents variable fees), for the use of charges as dummy variable we used local fee (code 1) as reference category,
- Collection of plastic through bags as dummy, for the use of this variable as dummy we labeled 'no collection of plastic through bags' as reference category.

We wanted to understand which factors influence the amount of costs, total or separate collection, and if there are differences in costs between municipalities with various types of fees. For this purpose we used two statistical methods – regression analysis, specifically ordinary least squares (OLS), and independent-samples T-test. The assumptions for using OLS (linear relationship between dependent and independent variables, homoscedasticity, multicollinearity and normality of the error distribution) were tested and verified. To exclude extreme values we tested which values lie within 3 standard deviations from mean, in our sample there were not any observation beyond this interval. To estimate which variables are significantly increasing the explained variability we used the Stepwise computing method. Also for the subsamples used in the t-test it was possible to verify the assumption of a normal distribution of dependent variables and homogeneity of variances. Applying IBM SPSS Statistics 20 all computations were made.

### 3 Results and Discussion

First we present the results of OLS for total per capita cost (Table 2). The final model consists of three independent variables (residual waste cost per ton, residual waste production per capita, and number of inhabitants per collection site) that are explaining 44% of intermunicipal variability in total costs per capita.

**Table 2. Regression coefficients for total costs per capita (CZK), 2014**

	<b>Beta</b>	<b>Std. error</b>
Constant	622.813***	128.777
Residual waste cost per ton	0.072***	0.022
Residual waste production per capita	1.295***	0.300
Number of inhabitants per collection site	-0.979***	0.359
n	57	
r <sup>2</sup>	0.472	
Adj. r <sup>2</sup>	0.440	

\*\*\* stand for statistical significance at 1%

Source: Authors

The results indicate a significant relationship between residual waste production per capita, or residual waste cost per ton and total costs. Increasing production of residual waste per capita leads to the increase of total costs. This result is obvious when the increasing amount of residual waste requires additional services (as higher frequency of the collection of residual waste, higher volumes of bins etc.). However, variables reflecting the frequency of the collection (e.g. residual waste volumes collected per week) are not significant when explaining the total costs. This result is in contradiction to Dijkgraaf and Gradus ([11], [13]) who consider the number of pick-up points, inhabitants per pick-up point, surface per pick-up point and collection frequency as important factors influencing total cost function. Dijkgraaf and Gradus [11] concluded that the 1% increase of the number of inhabitants per pick-up point will raise the total cost about the same percentage and higher pick-up frequency will increase the total costs about 19-22%. Dijkgraaf and Gradus [11] confirmed the relevance of economies of scale when analyzing pick-up points and their influence on total costs. However, in comparison to Dijkgraaf and Gradus [11], Domberger et al. [16], or Stevens [33] our results don't indicate economies of scale in the Czech municipal waste management system in the case of residual waste collection.

The influence of residual waste costs per ton on total costs of the system per capita reflects the way how the Czech municipal waste management system is financed. Because of the fact that the residual costs represent almost 60% of total costs of the system ([18]) and the calculation of charges (especially 'local fee') is based on residual waste management costs, the municipalities transfer the residual waste management costs onto households.

The significant influence of number of inhabitants per collection site on total costs indicates economies of density in the separate collection of paper, glass, and plastics. Abrate et al. [1] also found economies of density as important factor influencing the total costs, but economies of density were observed in the case of refuse collection. For the further discussion about the influence of population density on the efficiency in the Czech Republic see [30], [31].

Although we did not detect any significant difference in total costs between the two types of charges, we wanted to use other method to analyze the relationship. To do that, we computed several t-tests that compared means in the group of municipalities with a local fee against a group with other fees. Table 3 presents the average cost and waste production in the two groups. Even though the types of charges do not contribute significantly to explaining the intermunicipal variability in total costs, we found some significant results using t-tests. There are significant differences not only in total costs, but also in the case of average residual waste production per capita and average residual waste costs.

**Table 3. Characteristics of municipalities according to waste collection fee, 2014**

	Municipalities with a local fee	Municipalities with a different type of fee	Sig.
N	35	22	
Average total cost	1004.0	805.0	***
Average residual waste cost	618.7	470.2	**
Average separate collection cost	186.3	181.1	
Average residual waste production	225.9	156.0	**
Average glass production	12.2	15.4	
Average paper production	10.6	12.0	
Average plastic production	9.7	10.7	

*Average residual waste /glass / paper /plastic production per capita and year*

*\*, \*\*, \*\*\* stand for statistical significance at 10%, 5%, 1%*

*Source: Authors*

These results confirmed that variable fees decrease the municipal waste management costs (also in [19] or [9]). The motivational power of variable fees leads to the decrease of residual waste production and simultaneously to the increase of the separate collection of paper, glass and plastics (although the differences in the production are insignificant), which is the key assumption for the implementation for recycling programs based on separate collection ([25]).

In comparison to our expectations volume of bins/containers installed in the system, performance of the container based separate collection, and efficiency of the container based separate collection network are not significant when explaining the total costs in Czech municipalities. To understand this result the overall cost structure should be reflected. According to Vrbová [34] the separate collection costs represent approximately 17% of the total cost, the predominant part are residual waste costs (58%). Increasing efficiency of container based separate collection would tell only limited information about the total costs and their development.

Therefore, we computed also a regression model only for the separate collection costs per capita (Table 4). The model is also statistically significant and with following independent variables: glass and plastic production per capita, efficiency of the container based separate collection network for plastic, number of containers for glass per km<sup>2</sup>, volume of installed glass containers and charge. The model explains 59 % of variability among municipalities.

**Table 4. Regression coefficients for separate collection costs per capita, 2014**

	Beta	Std. error
Constant	152.885***	41.490
Plastic per capita	7.626***	2.085
Glass per capita	5.398***	1.583
Efficiency plastics	-0.590**	0.289
Number of containers for glass per km <sup>2</sup>	-1.172***	0.310
Volume of installed glass containers (liter per capita)	3.691***	1.212
Charge	-49.175**	24.263
n	74	
r <sup>2</sup>	0.623	
Adj. r <sup>2</sup>	0.585	

*\*, \*\*, \*\*\* stand for statistical significance at 10%, 5%, 1%*

*Source: Authors*

Because of the fact that the separate collection of glass, paper and cardboard and plastics depends highly on the recycling behavior of households (see [20] or [21]), mainly the



effectiveness of a container based separate collection network (based on our result especially for plastics, and glass) is under direct control of the municipality. Adapting the frequency of the collection and the volume of containers on spatial conditions the municipality is able to decrease the separate collection costs per capita. The reason lies in the routing optimization and possible reduction of the number of collection vehicle trips ([27]), and in the density of collected waste ([15]). Using the web-GIS oriented systems enables the further increase of the system efficiency ([24]). The high significance of the number of containers for glass and volume of installed glass containers on total costs indicates the increasing pressure on efficient use of the infrastructure for the separate collection of glass. Because of the economies of density, the denser is the municipality equipped with the collection sites, the higher efficiency of the system (and the higher convenience for households). On the other hand, the higher volumes are installed in the system, the higher costs for separate collection. These results confirm the importance to adapt the volume of containers for glass to real needs of households (higher volumes than real need causes that those containers are emptied that are not filled up). To explain, why variables for paper, and plastics are not significant, further (especially qualitative) research is needed. In the case of charges our results indicate that municipalities with other than local fee have lower separation collection costs than municipalities with local fees.

#### **4 Conclusion**

Most analyses dealing with the costs of the municipal waste management system focus on competition, ownership, quality of the service, economies of scale and density, or intermunicipal cooperation. Only a few of them concentrate on system parameters that are under direct control of municipal representatives on a daily basis – e.g. pick-up frequency, number of collection points and their density, distance to collection points, curbside collection versus collection points (drop-off recycling), volume of bins/containers installed in the system. Our research aimed to fill this gap implementing dynamic factors we assumed to influence the total costs of the system per capita - performance of the container-based collection, efficiency of the container-based collection network, or charging system.

In comparison to our assumptions these factors are not explaining the intermunicipal variability in total costs per capita. The highest importance has residual waste production per capita, residual waste cost per ton, and number of inhabitants per collection site. To decrease the municipal waste management costs, especially measures focused on residual waste production, residual waste treatment costs and on how to exploit economies of density should be implemented. Furthermore, our research confirmed that unit-based fees decrease the municipal waste management costs. The pressure on a lower landfilling rate and on separate collection decrease the total costs of the municipal waste management system per capita.

Considering the reduction of separate collection costs, the measures aimed to increase efficiency of the container-based collection network of plastics, and to manage glass and plastics production should be highlighted. Especially the adaptation of the collection frequency, density of installed containers (number of containers in the system) and the volume of containers on spatial conditions should be prioritized.

Regarding our results, further research should focus on more subtle analysis of dynamic factors as performance of the container-based collection, efficiency of the container-based collection network, or the charging system. Especially the analysis of measures aimed to increase the system efficiency should stay at the center of attention. The extension of the research to other regions is also advisable.

#### **Acknowledgements**

This article was supported by the Czech Science Foundation (Project Nr. 15-08032S “Unfair competition and other economic factors influencing the efficiency of the provision of public services”).

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# Institutional and Managerial Aspects of Intermunicipal Cooperation

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## Abstract

The objective of this study is to evaluate which attributes of intermunicipal cooperation (IMC) are important in relation to the cost efficiency of municipal waste management, examining a sample of 658 municipalities (205 cooperating) in the South Moravian Region during the three-year period from 2012 to 2014. Most foreign studies have confirmed the influence of IMC on cost efficiency in terms of cost savings, both in the Czech Republic and abroad. This paper is a follow-up to a previous study of Soukopová and Klimovský [27] that confirmed the influence of IMC and showed that the institutional aspects of IMC are important in relation to cost efficiency. The paper addresses the issues in a more complex manner. We investigate other aspects of IMC (managerial, etc.) using the OLS regression model. The results show that institutionalization and ownership share are undoubtedly significant factors of cost efficiency, although there is a significant synergy effect of other factors related to IMC. In contrast, the results of the OLS model show that city size (populations over 20,000 inhabitants) and waste collection company profits increase municipal waste management expenses per capita.

*Keywords: intermunicipal cooperation; cost effectiveness; institutionalization; waste management*

JEL Classification: H70, H77, R50

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## 1 Introduction

Intermunicipal cooperation (IMC) and its influence on increasing the efficiency of municipal expenses are currently significant research issues in the Czech Republic and other countries. The authors who study these issues usually point out that IMC enables the decrease of expenses and the saving of costs for municipalities and the improvement of the quality and accessibility of local services [5], [17-18], [22], [29], etc. These authors have emphasized that cooperation between municipalities improves both the cost efficiency and the cost effectiveness of local government [9] in relation to cost savings, especially for small municipalities [2-4].

Because the costs expended by municipalities on waste management have been exponentially growing recently in the Czech Republic [25-26], the demand of municipalities for efficient and effective solutions has been increasing. The increasing costs of waste management and waste disposal as well as increased wage levels, require measures that will enable the decrease of total expenses. Thus a space is created for making use of IMC that will enable the decrease of expenses, for example by utilizing the positive effects of the economies of scale or the economies of density. In addition, municipalities themselves can influence this if they collaborate in the given area.

What does the term intermunicipal cooperation really mean? As Bel and Warner [5] state, IMC in Europe takes the form of mutual collaboration of municipalities or administrative organizations when various municipalities get involved in joint ownership and common production of public utility services, as is the case for example in Norway [23], Spain [1-4], and the Netherlands [8], [12]. According to Warner [29], IMC in the USA has a long tradition and is the third most frequent form of providing public utility services, after internal ensuring and contracting out.

From a theoretical point of view, grounds for IMC are provided in particular by the economic theory that deals with economies of scale or density effects [18]. According to Bel and Warner [5], other theoretical issues connected with IMC are the structure and organization of local government.

Many public utility services succumb to problems related to the insufficient size of their administrative area, which prevents them from making full use of the economies of scale [16]. Collaboration among municipalities theoretically represents a way to solve such problems. IMC can be an option when seeking the optimal scope of production for public services provided at the local level, hence also for achieving economies of scale with lower transaction costs. An intermunicipal approach can be an alternative to traditional modes of production (public/private/mix).

As Bel and Warner [5] show, when efforts are made to decrease expenses, it is important to minimize production costs, but the sum of production and transaction costs is also quite important. Transaction costs have been widely applied in analyses of IMC (cf. [13], [17], [22]). According to various research studies, IMC can decrease transaction costs more than privatization can, because collaborating municipalities have similar goals [6], [14]. As Bel and Warner [5] observe, low transaction costs are a precondition for the efficiency of IMC in providing services. Collaborating municipalities are able to share their coordination and transaction costs [4].

The foreign economic literature investigating IMC in the area of public utilities, especially waste management services (e.g. [1-2], [5], [8], [12]), frequently focuses on the impact of IMC on cost savings. Some authors [5], [13] have pointed out that although most research study results (cf. [1-5], [8-9], [12-14], [26-27], [29-30]) show that IMC has a significant impact on cost savings in waste management, it is important to examine the internal aspects of IMC (such as management, institutionalization, and share of municipalities in cooperation). However, this research is still in the early stages.

This paper investigates internal aspects of IMC in the Czech Republic, specifically in the South Moravian Region. Our research questions were:

1. How are municipal waste management expenses affected by selected aspects of IMC?
2. Do these IMC aspects/factors significantly influence waste management expenditure?

The aim of the paper is to determine which internal aspects of IMC influence the cost efficiency of municipal waste management services.

The paper is structured to present the answers to our research questions. The first part of the paper provides data about IMC in the South Moravian Region. The second part presents the results of the research. The final part discusses the results and formulates conclusions.

The relevance of this paper can be proved from both a theoretical and an empirical point of view. A literature review (cf. [1-5], [8-9], [12-15], [24-30]) shows that IMC plays an important role in the area of municipal waste management, especially in relation to cost savings. Although IMC is a frequent topic of international studies, there are few studies in the Czech Republic that study and seek solutions for this phenomenon. This research proceeds from other research papers ([11], [18-27]), extending them with an institutional approach and dealing with the issues in a more complex manner.

## **2 Material and Methods**

The research was performed in relation to data collected for the three-year period from 2012 to 2014. The basic analysis was conducted for 671 municipalities in the South Moravian Region and subsequently only for the 219 municipalities that mutually cooperate. The South Moravian Region was selected because its municipalities, out of all the regions of the Czech Republic, have been cooperating in the waste management area the most and for the longest period of time.

The linked open data on municipal populations from the Czech Statistical Office (CZSO) and the linked open data on municipal solid waste expenditures (MSWE) from MONITOR, the specialized information portal of the Ministry of Finance of the Czech Republic, were used for the analysis. The data relating to waste collection companies, internal aspects of IMC, management, etc., were obtained via a questionnaire-based survey. The survey was carried out from September 2015 to the end of January 2016.

To achieve the standard data distribution, it was necessary to clean the data. The standard distribution was achieved after the data had been cleaned by 2% (1% at each side). The data set after the sample cleaning contained 658 municipalities and 205 cooperating municipalities.

A statistical analysis of the data (using basic descriptive statistics in relation to the studied factors) was performed. Subsequently, in order for it to be possible to compare the results of the research with foreign parametric (econometric) studies (for example [1-2], [8]), the regression analysis (OLS model) was used, as it had been used in those studies. The basic function of municipal waste management expenditure, in relation to the manner of ensuring and the form of providing waste management services and other factors, takes the following form:

$$MSWEpc = f(Inst, Share, Imp_{10}, Imp_{20}, Man, Prof, Profit) \quad (1)$$

The dependent variable, *MSWEpc*, is the total municipal waste management expenditure per capita in the municipalities of the South Moravian Region in the Czech Republic. It includes collection, transportation, disposal or treatment, and other waste management services. The total costs incurred by the municipality are determined by the population of the municipality (therefore we study the expenses per population) and the variables influencing the expenses, which are as follows:

- *Inst* is the dummy variable representing the institutional form of IMC. It acquires a value of 1 when it is a voluntary union of municipalities cooperating in the area of waste management, and a value of 0 when the municipalities cooperate without an institutional background. The hypothesis about this variable is that there is a negative correlation. We proceed from the assumption presented by Feiock [10] that was also confirmed by Bel and Warner [5] in their research.
- *Share* is the variable representing the ownership share of an intermunicipal waste collection company. It acquires values from 10% to 40%. The hypothesis about this variable is that there is a negative correlation. We suppose that a larger ownership share allows influence over the aims and direction of an intermunicipal waste collection company.
- *Imp<sub>10</sub>* (*Imp<sub>20</sub>*) is the dummy variable that acquires a value of 1 when the management of a company is significantly influenced by a city or town with a population larger than 10,000 (20,000) inhabitants; otherwise it acquires a value of 0. The hypothesis about this variable is that there is an ambiguous correlation. It is reasonable to expect a negative correlation, as in the standard "Dahl-Tufte dilemma" that asserts that larger municipalities tend to be more efficient providers of various local services, while smaller municipalities tend to be more democratic [7], but the questionnaire survey indicated a positive correlation. The municipalities indicated that the effect of a large municipality engaged with a waste collection company is negative (as it influences a company's operations to its advantage).
- *Man* is the dummy variable that acquires a value of 1 when representatives of municipalities participate in the management of a waste collection company; otherwise, it acquires a value of 0. The hypothesis for this variable is that there is a negative correlation. We proceed from a study of best practices for municipalities in the area of waste management [25], in which the factor of municipalities' representatives in the management of a waste collection company was unequivocally a positive factor in terms of savings of municipality expenses.
- *Prof* is the dummy variable representing the professional management of the intermunicipal waste collection company. This variable acquires a value of 1 with professional management of the waste collection company, and a value of 0 otherwise. The hypothesis for this variable is that there is a positive correlation. We suppose that professional managers try to increase their benefits. They receive a share of the profit of the company. Therefore, their interests may not reflect the interests of municipalities (owners) on transforming the economies of scale to lower prices for the owners (municipalities).
- *Profit* is the dummy variable that acquires a value of 1 when the intermunicipal waste collection company generated a profit in the examined year, and 0 otherwise. The hypothesis for this variable is that there is a positive correlation (see above).

The analysis, which involved both exploratory data analysis and multiple regression analysis, was conducted at the municipality level and used data for the three-year period from 2012 to 2014. We used the software packages Microsoft Excel 2011 and STATISTICA for the analyses. Table 1 shows the descriptive statistics of individual variables.

**Table 1. Descriptive statistics of variables used in the model**

Variables	Mean	Min	Max	Standard deviation
<i>MSWEpc</i>	532.21	333.03	921.21	112.12
<i>Inst</i>	0.30	0.00	1.00	0.46
<i>Share</i>	0.26	0.10	0.40	0.14
<i>Imp<sub>10</sub></i>	0.86	0.00	1.00	0.35
<i>Imp<sub>20</sub></i>	0.46	0.00	1.00	0.50
<i>Man</i>	0.22	0.00	1.00	0.41
<i>Prof</i>	0.79	0.00	1.00	0.41
<i>Profit</i>	0.85	0.00	1.00	0.36

Source: Authors

### 3 Results and Discussion

IMC is extensively used in the South Moravian Region. More than 30% of municipalities (194) are served by a supplier under one of the forms of IMC (an agreement concluded among municipalities, VAM). Six waste collection companies that were established by multiple municipalities and represent some of the aforementioned forms of IMC, see Table 2, have been operating in the South Moravian Region in the long term. All of the waste collection companies are 100% publicly owned (they are owned by municipalities or towns or by unions of municipalities).

**Table 2. The intermunicipal waste collection companies in the South Moravian Region for 2014**

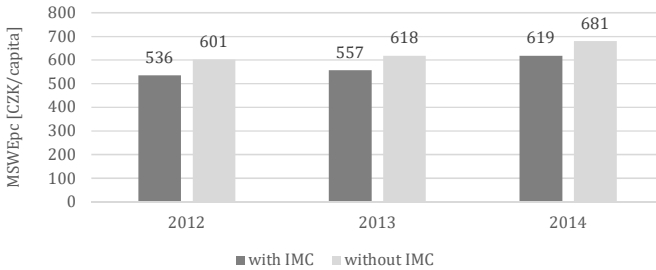
Waste collection company	The number of served municipalities	The number of owners	The character of ownership	Collection area (number of inhabitants)	Collection area (km <sup>2</sup> )
RESPONO.	79	96	Public	91,031	72,553
EKOR.	49	42	Public	78,184	57,201
HANTÁLY.	33	35	Public	57,339	60,629
KTS EKOLOGIE	16	27	Public	26,164	14,453
STKO	13	17	Public	17,640	22,436
ESKO-T	4	166	Public	2,981	6,893

Note: The last of the waste collection companies listed in Table 2 is ESKO-T, which operates only four municipalities in the South Moravian Region and has its seat in Třebíč. Most of their co-owners (162 municipalities) are from the Vysočina Region.

Source: Authors

The expenses of cooperating municipalities are lower than those of municipalities without IMC. Figure 1 shows the relation between average municipal waste management expenditure per capita exerted by cooperating and non-cooperating municipalities. The difference is noticeable in all three years and the municipalities with IMC show lower expenses per capita. The municipalities without IMC show on average 11% higher expenses than cooperating municipalities in 2012 to 2014. Specifically, the municipalities with IMC showed 10% lower expenses than the municipalities without IMC in 2014; they showed 11% lower expenses in 2013 and 12% in 2012.

**Figure 1. Average municipal waste management expenditure per capita in the South Moravian Region**



Source: Authors

In terms of the influence of IMC, the results were expected and correspond to the results from foreign and domestic studies (for example [1-5], [5], [12-15], [24-30]).

We now use a more complex approach, ordinary least-squares (OLS) regression. This research proceeds from previous research papers, e. g. [12], [19], [22-24], [26-27], [29-30] extending them using an institutional approach. The paper deals with the issues in a more complex manner.

Table 3 shows the results of the regression analysis (OLS model).

**Table 3. Results of the regression analysis (n = 205, R<sup>2</sup> = 0.4336, adjR<sup>2</sup> = 0.3931)**

Variable	Coefficient	Standard error	t-share	p-value	Hypothesis	Fact
<i>Const</i>	627.855	41.37779	15.17371	0.000000		
<i>Inst</i>	-108.908	25.66663	-4.24316	0.000036	negative	negative
<i>Share</i>	-483.485	63.20871	-7.64902	0.000000	negative	negative
<i>Imp<sub>10</sub></i>	11.782	32.00435	0.36813	0.713229	ambiguous	stat. insignificant
<i>Imp<sub>20</sub></i>	98.319	20.06537	4.89993	0.000002	ambiguous	positive
<i>Man</i>	0.332	17.87281	0.01859	0.985192	negative	stat. insignificant
<i>Prof</i>	-69.197	36.38428	-1.90183	0.058864	positive	stat. insignificant
<i>Profit</i>	100.222	41.39284	2.42123	0.016508	positive	positive

Source: Authors

The results show that the cost efficiency of municipal waste management expenditure is significantly influenced by the following variables: institutionalization of IMC, the ownership share, the influence of large municipalities (larger than 20,000 inhabitants) on management of the intermunicipal waste collection companies, and the earned profit of the waste collection company. The results for other variables are not statistically significant. The results concerning the variable expressing the institutionalization of IMC as a cost efficiency factor in decreasing municipal waste management expenses are very interesting.

These results corroborate the conclusions reached by Feiock [10], according to whom stability among local agreements is impeded by the requirement of heterogeneity among local government partners, and by the fact that if their IMC is to address the issues concerning economies of scale, it is necessary to develop the forms of governance that help to overcome differences among partners. Feiock's theory of institutionalized collective action builds on the foundations of the work by 1990 Nobel Prize holder Elinor Ostrom, who deals with political institutions and the structure of political networks. Common interests, needs, and resources, just



like institutional homogeneity in budgetary rules or in the requirements for a given service [5], make collaboration easier. Bel and Warner [5] identify several key differences in the main characteristics of individual types of cooperation regimes. For example, in terms of the degree of institutionalization, individual forms of cooperation range from informal to formal institutionalized arrangements, and they have differing impacts on the efficiency of the provided public utility services and their costs.

These results closely related to the results of the variable municipal ownership share of intermunicipal waste collection company. The results show that increasing the ownership share allows significant cost savings for municipalities.

In contrast, the influence of big cities (with population over 20,000 inhabitants) and of the emphasis on gained profit are variables that increase municipal expenses. The result of the variable of the influence of a large municipality on the management of a waste collecting company was unexpected. This result does not confirm the operation of the “Dahl-Tufte dilemma” that says that larger municipalities tend to be more efficient providers of various local services, while smaller municipalities tend to be more democratic [7]; it is in accordance with the results of a questionnaire survey conducted in the municipalities which showed the opposite dependence. The results associated with the variable of professional managers were very interesting. This variable does not have sufficient statistical significance. However, its results are contrary to expectations, as they indicate that professional managers try to ensure lower prices for cooperating municipalities.

The result of the factor of municipality representatives’ influence on the management of a waste collection company was surprising in relation to the findings of Soukopová et al. [25]. However, this result can be justified by the fact that Soukopová et al. [25] studied only the twenty best municipalities in terms of the municipal waste management expenditure efficiency (“best practices”), while the current research analysed all the municipalities of the South Moravian Region participating in IMC in the area of waste management. In addition, the research confirms a number of management theories and some of the conclusions of the New Public Management, showing that an independent professional (manager) is more efficient in managing public corporations.

## 4 Conclusion

The Czech Republic and other European countries such as Spain, Italy, and France must face the fragmented structure of local government characterized by a large number of small municipalities. For these countries, IMC can represent a beneficial change that will enable them to cope with the challenges related to the non-optimal sizes of their municipalities [5].

In this case study, we tried to answer the questions of how municipal waste management expenses are affected by selected aspects of IMC and whether these aspects/factors of IMC have a significant influence on waste management expenditure.

The research results show that IMC is undoubtedly a significant factor of cost efficiency, although there is a significant synergy effect of the other factors related to IMC. The significant factors affecting costs are: the institutionalization of IMC, municipal ownership share, influence of a big city (with population over 20,000 inhabitants), and emphasis on the profit of the waste collection company. The first two variables have an impact on cost savings; the other variables increase municipal waste collection expenditures. The variable of the influence of a large municipality is very interesting: it increases municipal waste management expenses. This conclusion was unexpected in terms of the set hypothesis, and will be the subject of further research aimed at determining whether the “Dahl-Tufte dilemma” is really a dilemma in terms of cost efficiency. This could be related to another variable that proved to be significant, which is the institutionalization of IMC. This variable will also be studied in the follow-up research, in particular in connection with the assumptions and conclusions of Elinor Ostrom, who concluded that a functional institution with common interests, needs, and resources operates better.

We are aware of the limitations of the research presented in this article. In spite of a research sample size similar to that of foreign studies, we conducted research in only one Czech region. In terms of IMC, our data refer only to the field of waste management, and therefore further research activities aimed at delivery of other local services should be conducted in order to address the impact of internal factors of IMC in more detail. We did not compare our Czech data with data from other countries, and since our conclusions are rather country-based, it is necessary to understand them in a broader context of existing as well as forthcoming research.

## Acknowledgements

The research leading to the production of this paper was supported by the Czech Science Foundation under project No. GA15-08032S "Unfair competition and other economic factors influencing the efficiency of the provision of public services".

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# Possible Structure Development of Job Seekers by the Highest Level of Education Attained

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## Abstract

The aim of this paper is to assess how operate the educational system in terms of “producing” the graduates which are able to find a job after their studies. We point out the number of job seekers by the gender and the highest level of education attained up to the year 2030 according to Czech Statistical Office classification (incomplete and without education, primary, apprentice, secondary without high school diploma (HSD), apprentice with HSD, secondary common with HSD, secondary vocational with HSD, higher, and university) by the models with constant linear trend and with 95% confidence intervals (as the optimist and pessimist scenario) for each category of job seekers. We came to the conclusion that there are disproportions between the labour market needs and the structure of job seekers, especially by gender. If the current trend does not change, there will be e.g. still more job seekers males than females – with vocational education, and more females than males - with higher and university degree.

*Keywords: level of education; job seeker; efficiency of educational system; disproportions by gender*

JEL Classification: C20, J11, J45

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## 1 Introduction

Unemployment of new graduates is a long discussed problem among policy makers as young people belong to sensitive category of persons with difficulties to find a job. Especially graduates lacking skills and practise are endangered by unemployment. The level of highest education attained by the school graduates has increased recently in the Czech Republic. Similarly with this development, the number of university graduates grew too (see e.g. paper by Potužáková [18] or Kubanová, Linda [13]). These processes (besides macroeconomic situation) lead to the increase of the number of unemployed people as these graduates were not able to find the job appropriate to their level of education. “The mismatch between supply and demand in the labour market has been constantly increasing in the sense of the decreasing number of vacancies for the increasing number of job applicants” (Sobotková, Dohnalová [19]). “The quantity leads to a decline in quality” concludes Pavelka [15] in his analysis of the trends in higher education in the Czech Republic since 1989. Czech Republic belongs among countries with high-quality and effective educational system. It is unfortunate that there are large gaps even in these countries graduates with a certain educational attainment end up at the Labour Offices. The situation may be tolerable if it is the case of a seasonal fluctuation. However, if the development of registered job seekers is represented by long-term system that could be improved it should be.

The problem of readiness of the graduates to the job market is not present only in the Czech Republic. For example Stanciu, Banciu [20] examined this issue in Romania and Bédoué, Giret [1] in France. Hudáková, Lusková [7] analysed the needs and requirements of the labour market in Slovakia in order to improve the study programme at their university so its graduates can find a job easier. The education of the graduates should match their jobs. Otherwise there are “penalties” in terms of lower salary or job satisfaction as found out by McGuinness, Sloane [14] for the case of United Kingdom. “There are large wage penalties for being in a job for which one is currently overeducated and a substantial, but smaller, wage penalty for being overskilled. However, only males suffer a significant wage loss as a consequence of current overskilling” (McGuinness, Sloane [14]). Surprisingly, in Hungary, the number of university graduates has decreased recently (see

study of Kómvés, Dajnoki [11]), which might bring better perspective for the students to be employed.

To describe the situation and possible development in the Czech Republic is the aim of the paper and the main goal is to assess how operate the educational system in terms of “producing” the graduates which are able to find a job after their studies. The paper is structured as follows: first section describes used data and assumptions of the projection. Next section presents the results. Last section discusses and concludes.

## 2 Material and Methods

The input datasets for the analysis are obtained from the public database of the CZSO “The structure of job seekers registered by Labour Offices – by education, age and duration of unemployment (actual on 31st December of the particular year)” (CZSO [5]). There are available the time series from 2004 to 2014 and the classification by the highest level of education attained has the following structure: (A): incomplete and without education, (B): primary, (C): apprentice, (D): secondary without high school diploma (HSD), (E): apprentice with HSD, (F): secondary common with HSD, (G): secondary vocational with HSD, (H): higher, (I): university (at least bachelor degree or higher). From the demographic point of view the person is economically productive in the age group 19–65 completed years. Of course, a certain number of people in each population works before the age of 19 (indicated as -19). On the other hand, there are persons able to work later than at 65 (indicated as 65+). For this reason, we introduce a certain simplification within the data matrix compatibility – for mutual comparison with other data structures within the CZSO’s surveys and results we will consider the age group -19 as comparable to 15–19 and the age group 65+ as comparable to 65–69. As stated by Fiala, Langhamrová and Průša [6] “an error which resulting from this simplification is negligible in similar studies”. In addition to the aforementioned “Structure of job seekers registered by the Labour Offices” we use the results from the “Population projection of the Czech Republic up to the year 2100”, according to CZSO in low, medium and high variant (CZSO [4]), but for the years 2015–2030 only. These results serve as a support for our calculations.

Because the time series about the development of registered job seekers is short (only from 2004 to 2014), it is not possible to use ARIMA models (Box, Jenkins [3]) to predict the future trend (see e.g. study by Pflaumer [17], who had several decades of observation). On the basis of expert expectations, which are applied e.g. in demographic models of aggregate statistics, we use extrapolation with constant trend and calculate both side 95% confidence intervals as an upper and lower limit, that will be affected by variability of the past development. (These expectations are used e.g. in papers by Bogue, Anderton, and Arriaga [2] or Stauffer [21] and in the condition of the Czech Republic e.g. by Hulík [8] or Fiala, Langhamrová and Průša [6]). In our analysis, it is not appropriate to use the classical linear regression model in the form

$$y_t^{M/F} = \text{const}_t^{M/F} + \beta \cdot \text{trend}_t^{M/F} + \varepsilon_t^{M/F} \quad (1)$$

where  $y_t^{M/F}$  is analysed time series of particular statistic specific by gender,  $\text{const}_t^{M/F}$  is a constant,  $\text{trend}_t^{M/F}$  is a linear deterministic trend and finally  $\varepsilon_t^{M/F}$  is a residual term. This model would provide an estimate of the (increasing or decreasing) slope of a trend that would not be appropriate to extrapolate into the future. More realistic is the use of a constant trend where

$$\left(\text{const}_t^{M/F} + \beta \cdot \text{trend}_t^{M/F}\right) = \hat{c}_t^{M/F} \quad (2)$$

creates the medium variant of the future development. The upper (as the pessimist scenario) and lower (as the optimist scenario) bound of this development can be calculated as

$$y_{t+h}^{M/F} [\text{high, low}] = \hat{c}_t^{M/F} \pm 1.96 \cdot \sigma^{M/F} \quad (3)$$

where  $1.96 = u_{0.975}$  is a 97.5% quantile of normal distribution and  $\sigma^{M/F}$  is a standard deviation specific for particular gender and category of job seekers. For each group of job seekers by the

highest level of education attained (marked with the letters A–I) we perform an extrapolation within the optimistic (low), medium and pessimistic (high) scenario up to the year 2030.

Using the “Population projection of the Czech Republic up to the year 2100” (CZSO [4]), particularly the results for the years from 2015 to 2030 in low, medium and high variant the analyses are merged to provide an expert expectation about the potential future development of age-and-sex-specific demographic structures of job seekers in optimistic (low), medium and pessimistic (high) scenario. Followed by matrix operator approach of Keyfitz [9], or Bogue, Anderton, Arriaga [2], and in the case of small specific population modelling according to Šimpach, Langhamrová [23] or Šimpach, Pechrová [24] we perform an estimation as

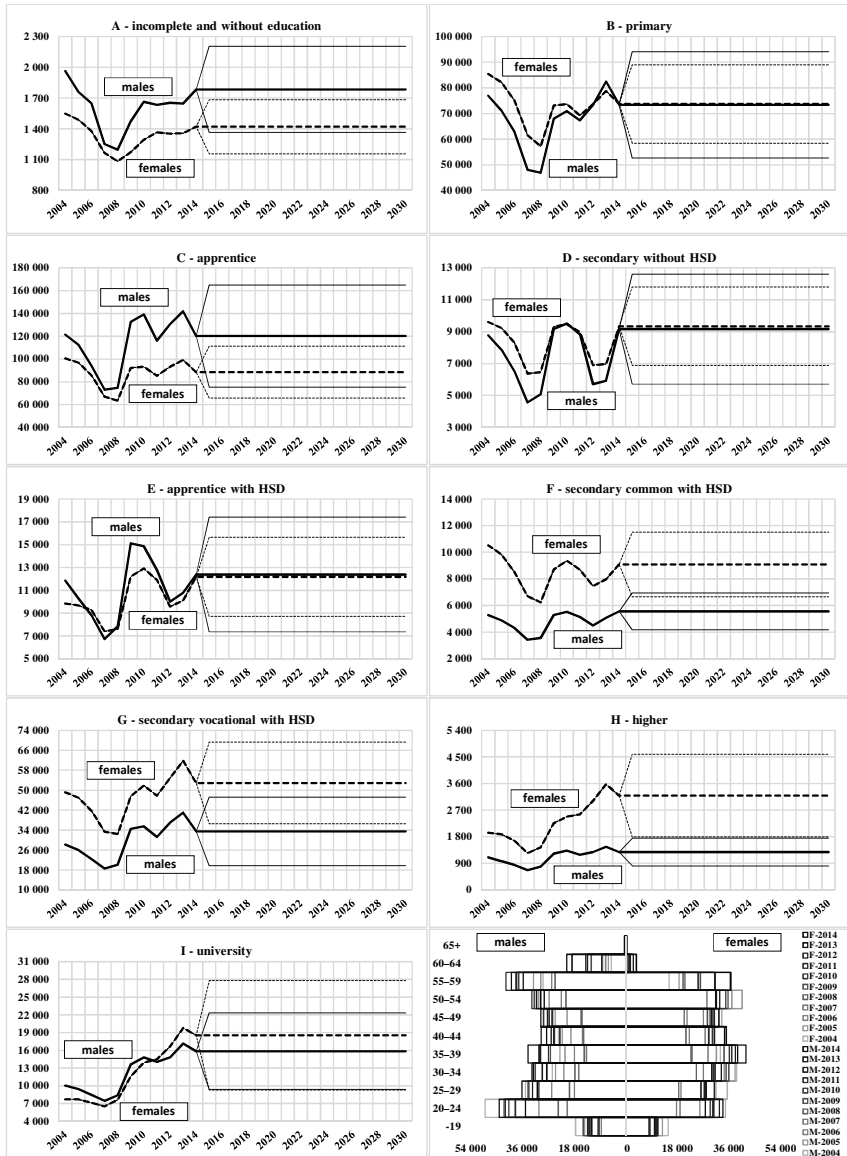
$$j_{t,x}^{M/F} [\text{high; medium; low}] = \sum_{ED} y_{t+h}^{M/F} [\text{high; medium; low}] \times \frac{j_{t=2004,x}^{M/F}}{S_{t-1,x}^{M/F} [\text{high; medium, low}]} \quad (4)$$

where  $j_{t,x}^{M/F}$  is age-and-sex specific number of job seekers according to particular scenario in time  $t = 2015\text{--}2030$ , the sum of  $y_{t+h}^{M/F}$  is the total number of predicted job seekers without distinction of education (groups A–I in total),  $j_{t=2014,x}^{M/F}$  is the last known number of  $x$ -year old job seekers by gender and  $S_{t-1,x}^{M/F}$  is the age-and-sex specific number of living persons in the Czech Republic according to Czech Statistical Office’s Population projection in particular scenario. On the basis of these assumptions we construct three population pyramids of the potential future development of job seekers specific by age and sex. The most likely scenario is the medium variant. Optimistic and pessimistic scenario creates a lower and upper limit, where the estimates will be located with 95% confidence. Although it seems that the intervals are relatively wide they still can be applied in many other necessary studies e.g. for planning of study programs, reaccreditation of study plans in another directions and trends, marketing of high schools and universities or social and employment policy (see e.g. paper by Kincl, Novák, and Štrach [10] or Krebs, Průša [12]).

### 3 Results and Discussion

In the first part we calculate an estimate of the constant deterministic trend for individual groups of job seekers by gender and educational attainment. Based on the data variability we also estimate 95% both side confidence intervals. The results are shown in the Figure 1, where plots A–I represent the individual educational groups according to the classification of the Czech Statistical Office. The lower and upper bounds represent the optimistic and pessimistic border, which would not be exceeded in future. (Charts A–I also include the empirical data of analysed time series in years 2004–2014 by sex). Variability in all groups of educational attainment is usually higher in the case of male population. This is caused by significant male fluctuation between the working positions. Male positions are also more affected by seasonality, which increases the probability of registration at the Labour Office. (This effect is more concerned with males with lower level of education – primary, apprentice and secondary without HSD (jobs of seasonal workers). Unpleasant findings are that the growing trend in the analysed numbers of registered job seekers is observed in both males and females in the group of higher education and university education. This is an issue as the complications with finding a job in higher educational groups is mainly caused by high number of graduates from certain study fields (especially in humanistic character). Low educational costs, particularly at the humanities study field, and the “relative convenience” contributes to the popularity of studying the university (see e.g. paper by Pavelka [15]).

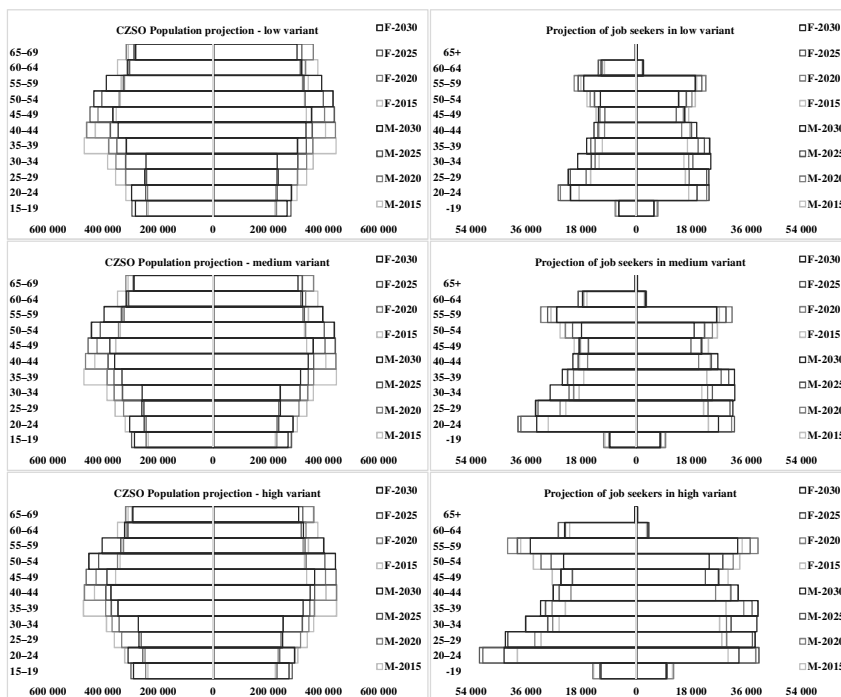
Figure 1. Development of job seekers registered at the Labour Offices (males – full line, females – dotted line) by the highest level of education attained together with extrapolation up to the year 2030 and 95% intervals of confidence (A – incomplete and without education, B – primary, C – apprentice, D – secondary without HSD, E – apprentice with HSD, F – secondary common with HSD, G – secondary vocational with HSD, H – higher, I – university. In the last chart is presented the development of age-and-sex specific structure of job seekers in the period of 2004–2014.



Source: Author and [5]

However, the vision of a potential future problem to succeed in the labour market is hidden or overlooked (see e.g. paper by Pechrová [16] about responsibility and support from teachers at the secondary schools). (In the Figure 1 is also shown the age-and-sex-specific structure of registered job seekers in the years of 2004–2014 without distinction of education attainment. Darker stripes on the outer edge of the population pyramid mean that the number of registered job seekers grew over time.) In the second part we firstly predict the development of age-and-sex-specific demographic structure of job seekers in 2015, 2020, 2025 and 2030 based on the results of expert expectations of the potential future development of job seekers by the highest level of education attained. Secondly we present the results of Population projections of the Czech Republic according to CZSO. Both results are presented in Figure 2. It is evident that the highest probability of failure in the labour market is in the case of new young graduates and then in the case of persons in higher ages. The employers are afraid to employ older people because they expect them to work less efficiently (see e.g. Krebs, Průša [12]). This distribution is across the particular age groups more uniform in the case of female population, especially in the range of 20–24 years to 40–44 years. This is due to maternity and parental leave, which can cause the obstacles in returning back to work for females who stay home with their children (see paper by Potužáková [18] or Šimpach, Dotlačilová and Langhamrová [22]). Therefore, the employment policy should give greater attention to this issue – to help to females’ easier find a job after maternity and parental leave compared to stay at the labour offices.

**Figure 2. Population projection of the Czech Republic in low, medium and high variant (males are in chart on the left side, females on the right side) according to Czech Statistical Office in selected age-groups from 15–19 to 65–69 years (left charts) and Projection of job seekers in optimistic, medium and pessimistic variant in selected age-groups from -19 ≈ (15–19) to 65+ ≈ (65–69) years (right charts) according to expert expectations.**



Source: Author and [4]



## 4 Conclusion

The aim of this paper was to evaluate the situation in the Czech Republic based on the latest available data about registered job seekers at the labour offices by the highest level of education attained and to point out the possibilities of improving efficiency in the placement of applicants. We presented the possible development of the number of unemployed graduates according to highest level of education attained and possible development of age-and-sex population structures of these persons. The reasons for unfavourable development might be various. The determinants which influence the number of unemployed graduates in the Czech Republic were examined by Sobotková, Dohnalová [19]. They focused not only macroeconomic situation of the country, but also subjective matters of the graduates. They found out that the most of the respondents have unrealistic ideas about the actual needs of the Czech labour market and that the profession selected by the graduates is often independent of their study field (Sobotková, Dohnalová [19]).

There is also an important issue from the point of view of the employers. Despite that they value the degree of their possible employees, the main problem is that graduates have better theoretical knowledge than practical training in the field (Stanciu, Banciu [20]). Béduwé, Giret [1] found out that in France the situations of vertical (qualification) mismatch and skill mismatch had strong negative effects on wages, while situations of horizontal (field) mismatch did not. Similarly for UK, there are large wage penalties for being in a job for which the graduate is overeducated or overskilled (McGuinness, Sloane [14]). "However, horizontal mismatch increases both job dissatisfaction and the desire to find another job, even if their job is qualified, permanent and reasonably well paid" (Béduwé, Giret [1]).

The results of our analysis suggest that problems occur in the case of male and female population immediately after graduation, and specifically in the case of females (probably) after returning from maternity and parental leave. Those are the issues where the system of placing applicants into the employment should be improved. The predicted numbers of registered job seekers by the highest level of education attained in three scenarios should serve as a guideline for employment policy.

## Acknowledgements

The author gratefully acknowledges to the Czech Science Foundation project no. P402/12/G097 DYME – "Dynamic Models in Economics" for supporting this paper.

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# Why Do Elderly Households Decide to Move?

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## Abstract

Demographic trends in the developed countries lead to a larger proportion of elderly households in the society. When shaping the appropriate public policy, both decision makers and academics in the field realise, that our knowledge of the behaviour of this type of households is limited. The paper tries to address the topic and evaluates the motives for the housing mobility of elderly households. Using sample set of the Czech households in the period 2009-2012, we analyse the motivations for deciding whether to move house or age in place. Our results show that elderly households prefer homeownership to rental housing and do move even less frequently than other Czech households. Primary motives for moving the house are family reasons. During the analysed period, however, financial reasons for moving come into the discussion. On the other hand, the quality of housing or (un)availability of services seems not to be an incentive for moving.

*Keywords: housing; elderly; choice; factors; logistic regression*

JEL Classification: D12, P36, R21

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## 1 Introduction

Population ageing has become one of the most discussed and challenging public policy issues in many European countries. One issue might be linked to household mobility. Will it become more common to move house at retirement? What will be the reasoning behind these decisions – housing finance affordability or social or family reasons? There is quite well-structured evidence about tenure choice determinants and responses to social policy changes for households in general. But what do we know about the behaviour of elderly households in the Czech Republic? We are, therefore, interested in the housing tenure choice models for seniors, i.e. persons who are over 60 years old. Particularly we analyse the behaviour of senior households concerning their decision to move the house. The motivation for our analysis is straightforward. The population in developed countries is becoming older and besides other, it brings about the necessity to solve the issue of the housing of senior households. While shaping the appropriate policy, the policy makers should be aware of factors which influence the decision of senior households to move their house or to stay.

The tenure choice modelling is based on the basic model of the demand for housing [3, 4]. The assumption underlying these models is the life-cycle hypothesis [15], according to which households consume a major part (if not the whole) of their wealth during their life. On the basis of this theory, it can be expected that the elderly will adjust their housing tenure according to the tendency to use up their wealth, and as a result will sell their assets (including homes in ownership) and opt for rental housing more often as they grow older. The tendency towards moving elderly households could also be enhanced by other factors related to the conditions in the respective households and to the changes resulting from a higher age of the household head [12, 13]. These factors include, in particular, changes in health status, the loss or death of a partner, and changes in the current situation with children [6].

Some studies (for example [5, 7] showed that these assumptions are not fulfilled in reality in many countries and the home-ownership ratio among seniors does not significantly decrease in proportion to increasing age. This may be because households emphasize aspects other than just lifetime equity. Older people differentiate between housing-related wealth and other types of wealth, tending to use home-ownership as the main source of a potential bequest for their children. Other studies showed that the house moving ratio for seniors and the related tendency to leave the home-ownership sector at an older age is closely connected with the conditions in a

particular country. Tatsiramos [11] used the risk hazard model to show that the tendency to leave the home-ownership sector manifested itself in most of the countries in a monitored sample of 13 European states. In the Central and North European countries, however, a significant proportion of households remained in the home-ownership sector and only moved to a smaller flat or house. This was also proved to a certain extent in a study by Angelini et al. [2], who used a sample of 13 European countries to show that the life-cycle hypothesis is true for seniors over 65 years old rather than for people 50 to 65 years old, who tend to choose the opposite strategy, i.e. transitioning from home-renting to homeownership or increasing the size of the owned home. Angelini et al. [2] confirmed that one of the main motivations for moving home is a change in the household set up: usually a divorce, loss of a partner, or children moving out. Similar conclusions can be found in Andersson and Abramsson [1], who conclude, that the probability of moving is higher for persons in every other tenure form than home ownership. However, economic factors also play an important role: households with lower incomes but a relatively high ratio of wealth (house-rich) and households with a poor cash flow sell their homes far more often at a higher age than other households.

The Angelini et al. [2] study provided the basic framework for our research. The topic is also studied in the Czech context [8]. Large portion of the studies are oriented on the tenure choice aspect of the housing mobility. Lux, Sunega [6] assessed the influence of the form of ownership on mobility (in general) and Špalková, Špalek [10] derived the factors influencing the tenure choice decision in respect to the rent deregulation process in the Czech Republic. In our analysis below, we focus on the potential influence of two areas on the housing mobility of the senior households. We assess (i) the variables describing the financial situation of households and the costs related to the current housing tenure type expressed objectively and subjectively; (ii) the traditional demographic variables.

We hypothesize that senior household when deciding to move or stay in place put a higher emphasis on their financial situation (income and housing costs) compared to other households (H1).

The first part of the paper summarises the characteristics of housing for elderly people in comparison to other households. We present descriptive statistics based on Czech sample data (the panel data based on an investigation of EU-SILC, European Union-Statistics on Income and Living Conditions). Housing tenure, regional, socio-demographic, and financial aspects are discussed. The second part of the analysis deals with the motivations for deciding whether to move house or age in place (the loading of a household with housing costs, the household financial situation – indebtedness). We used an econometric model to compare the expressed motivations to move or stay, as identified by the survey, with actual decisions. The decision determinants are derived.

## 2 Material and Methods

The research presented in the paper takes form of quantitative analysis of sampled data. As the decision to move or stay in place can be characterized by dichotomous variable, we employ a probit regression (e.g. [14]). This approach allows calculating the conditional probability of the decision to move depending on a given factor, provided that the values of other factors are constant (for more info see e.g. [10]).

The values of the coefficients  $\beta_k$  express the effect of each factor on the decision to move or stay in place and at the same time show its direction. We refer to decision to move as the default choice, because the values of the coefficients  $\beta_k$  are related to this option. Positive values of the coefficient  $\beta_k$  therefore indicate that higher values of factor  $x_k$  increase the likelihood of moving the house. On the other hand, negative values indicate that there is a greater likelihood of the decision to stay in place in case of high values of factor  $x_k$ . Then for those factors with a dichotomous nature (Yes = 1/No = 0), lower values of the factor mean 'No' and its higher values 'Yes'.

The analyses included in this paper are based on the data pertaining to Czech households collected by the CSO (The Czech Statistical Office). The data were collected under sample surveys of income and living conditions of households between 2005 and 2013, under the European Union-Statistics on Income and Living Conditions (called hereinafter the EU-SILC). This data set contains information on the social structure of households, their incomes and expenditures. The household investigated by EU-SILC survey usually stays four years in the panel and up to one third of the panel is annually renewed. This enabled us to analyze changes of households' characteristics between two (or more) years. As the timespan between the two analysed years is longer than four years, we are not able to use panel data.

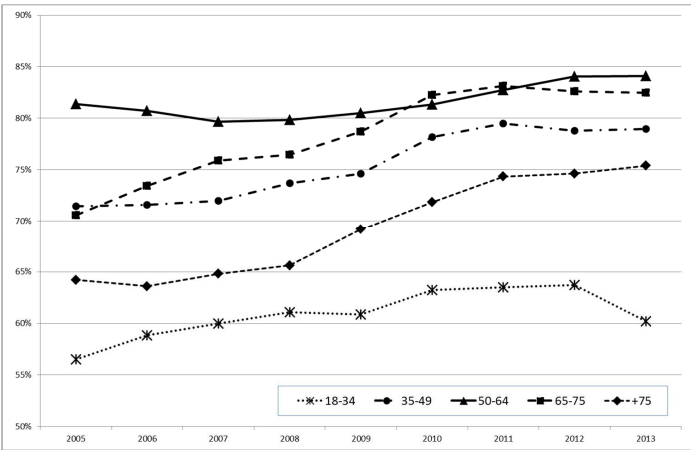
### 3 Results and Discussion

We classified the households of seniors by age, which is the most commonly used criterion. Termination of employment and retirement are usually perceived as marking the beginning of the senior age. This generates a category of people who are considered to be dependent and in need of economic and social support, and who at the same time may be undergoing physical or psychological changes. The retirement age both in the Czech Republic and abroad is between 60 and 65 years, with an increasing trend towards 65 years. Because the average retirement age in the Czech Republic has not yet reached 65 years, we have set a defining limit of 60 years for seniors [9]. Such defined senior households constitute more than one-third of all Czech households (1.5 million out of 4.2 million in 2012). For the period studied in our analysis, this ratio increased from 32.2 per cent in 2007 to 36.5 per cent in 2012.

#### 3.1 Tenure Choice

All Czech households significantly prefer homeownership to home renting. The percentage of homeownership in 2013 was 77.9 per cent. The percentage of homeownership in the studied period increased due to the concurrence of several factors. In addition to the ongoing privatization of the municipal housing stock, the process of rent deregulation was gradually completed. It is also impossible to ignore the orientation of the housing policy in the Czech Republic towards supporting homeownership (see [10]). Senior households favour homeownership even more than other households, in correspondence with the situation in other countries (see Figure 1).

Figure 1. The percentage of homeownership in 2005-2013 by selected age groups



Source: Authors based on SILC-EU

Although the percentage of homeownership increased in all age categories over the course of time, some interesting trends can be tracked. It is quite obvious that homeownership has been losing its attractiveness for the youngest households (18 to 34 years old). This is probably due to the economic crisis. The opposite development can be seen in the oldest households (+75 years old). It is apparent that the growth concerns in particular households between 75 and 79 years old (by 15.7 percentage points between 2005 and 2013). For the other age groups of households, a gradual slowing of the growth in homeownership is apparent after 2009, which is probably also related to both the economic crisis and rent deregulation.

### 3.2 Financial Aspects of Housing

Another aspect that potentially influences household decisions about home moving as well as about housing tenure is the financial aspects of housing. These aspects include particularly the indicators related to housing affordability, which is usually characterized on the basis of a set of indicators connected with housing costs and their share in the total income or expenditure of the household. In addition to the objectively expressed indicators that we use in the last part in the probit model, we also focused on subjective perceptions of the importance of selected financial aspects by individual households. These include whether a household considers housing-related expenditures to be a burden, whether it has difficulty paying off loans or mortgages, and whether it has debts. The results are summarized in Table 1.

**Table 1. Financial aspects of housing (%)**

	2007			2009			2012		
	elderly	others	total	elderly	others	total	elderly	others	total
<b>Financial burden of the total housing cost</b>									
Heavy	18.8	20.1	19.7	22.3	23.8	23.3	29.2	28.1	28.5
Slight	69.8	67.3	68.1	68.6	66.5	67.2	62.5	63.9	63.4
Not at all	11.4	12.6	12.2	9.1	9.7	9.5	8.3	8.0	8.1
<b>Financial burden of the repayment of debts from hire purchases or loans</b>									
N/A (no housing costs)	93.7	72.6	79.4	94.9	73.5	80.8	94.6	77.4	83.7
Heavy	1.4	7.2	5.3	1.5	8.5	6.1	2.2	7.8	5.8
Somewhat	4.2	18.0	13.6	3.2	16.4	11.8	2.8	13.5	9.6
Not at all	0.7	2.2	1.7	0.4	1.7	1.3	0.4	1.3	1.0
<b>Ability to make ends meet</b>									
with great difficulty	5.0	8.6	7.5	5.6	9.0	7.8	8.5	10.0	9.5
with difficulty	19.2	19.3	19.3	19.9	20.2	20.1	22.5	21.6	21.9
with some difficulty	39.6	35.1	36.5	38.7	35.2	36.4	36.6	34.6	35.3
fairly easily	25.5	25.5	25.5	25.0	24.3	24.6	23.1	24.3	23.9
easily	9.8	9.8	9.8	10.2	9.9	10.0	8.5	8.4	8.4
very easily	0.9	1.7	1.4	0.6	1.3	1.1	0.8	1.0	1.0
<b>Arrears on rent payments</b>									
Yes	0.9	3.9	2.9	0.8	3.7	2.7	1.3	3.6	2.7
No	51.0	54.0	53.1	51.4	54.7	53.6	54.6	55.1	54.9
N/A	48.1	42.1	44.0	47.7	41.6	43.7	44.1	41.3	42.4
<b>Arrears on utility bills</b>									
Yes	0.9	4.7	3.5	1.2	4.7	3.5	1.8	4.7	3.7
No	98.5	94.1	95.5	98.1	94.3	95.6	97.8	94.6	95.8
N/A	0.6	1.2	1.0	0.7	1.1	0.9	0.4	0.6	0.6
<b>Arrears on hire purchase instalments or other loan payments</b>									
Yes	0.3	1.8	1.3	0.3	2.1	1.5	0.6	2.1	1.5
No	6.0	25.6	19.3	4.2	23.9	17.1	4.8	20.5	14.8
N/A	93.7	72.6	79.4	95.6	74.0	81.4	94.6	77.4	83.7

Source: Authors based on SILC-EU

The data imply that Czech households do not have any significant debts related to housing, or do not consider their housing-related debts to be significant. The situation of senior households is very similar to the situation of other households with one exception. In contrast to other

households, only a small number of senior households have a mortgage, which many seniors would be unable to obtain in any case due to their age, and those who do have mortgages do not have outstanding payments.

We registered differences in the household perceptions of the financial burden. In the studied period, the number of households that stated they had difficulties or significant difficulties having enough money to cover their expenses increased; nevertheless, senior households had comparatively fewer problems.

### 3.3 Motives for the Decision to Move

As stated above, we used probit regression in order to assess the potential influence of the studied variables. To capture the dynamics of the influence of these factors, especially as regards the impact of the economic crisis, we present the models separately for 2009 and 2012. The models capture the gradual influence of individual groups of potential factors and at the same time show the changes in influence of these factors during the studied periods. Two individual models (M1-M2) have been derived. Particular models differ in the amount of information (number of potential factors) that is used to explain household's decision to move. Models are stated separately for seniors (+60) and for households with a head of household younger than 60 (other 18-59). The variables used in each model are either dichotomous or are calculated using logarithmic tables. Summary of the variables employed shows Table 2

M1- financial indicators (income per capita, floor area per capita, market price of the real estate, share of housing costs in the total costs, rent and utility bills in arrears, subjective perception of whether the household had enough money to cover expenses or felt excessively burdened with housing expenses or loan repayments)

M2 – supplemented with demographic indicators (education, family or single-person male/female households) and location factors (a household from Prague, rural or urban area)

**Table 2. Variables used in models M1-M2**

M1	Income (disposable)	Net disposable income of the household (logarithm)
	Total area per person	Total area per capita (logarithm)
	Market price	Market price of the housing (logarithm)
	Household cost ratio	Total Housing cost on total household net income (logarithm)
	Arrears rent	Arrears on Mortgage or Rent Payments (yes=1)
	Arrears utility	Arrears on utility bills (yes=1)
	Arrears loans	Arrears on Hire purchase instalments or other loan payments (yes=1)
	Make ends meet	Ability to make ends meet (yes=1)
	Housing cost burden	Financial burden of the total housing cost (yes=1)
	Loans burden	Financial burden of the repayment of debts from purchases or loans (yes=1)
M2	Family	Two adult household (yes=1)
	Single/male	One person household – male (yes=1)
	Single/female	One person household – female (yes=1)
	Education	Low education (both primary=1)
	Prague	Municipality type – Prague (yes=1)
	Town	Municipality type – town (yes=1)
	Countryside	Municipality type – countryside (yes=1)

Source: Authors

In both studied years (2009, 2012) and in all the models, the variables related to the residential location of the household have an impact. As can be seen from Tables 3 and 4, the impact is the same for both household types, although its intensity differs. Nevertheless, the probability that senior households will move is higher for Prague and urban households and is very low for rural households ( $\beta_{2012}=-0.148$ ).

**Table 3. Probit models for 2009**

Senior +60					Other 18-59			
M1		M2			M1		M2	
coeff	SE	coeff	SE		coeff	SE	coeff	SE
0.148	3.303	-1.306	3.790	[move_yes = .00]	-0.928	1.392	-1.295	1.469
-0.041	0.262	0.095	0.310	Income (disposable)	0.267	0.119	0.329	0.127
0.142	0.210	0.062	0.209	Total area per capita	0.026	0.071	-0.127	0.089
-0.142	0.070	-0.198	0.072	Market price	-0.229	0.042	-0.238	0.045
0.236	0.180	0.060	0.158	Household cost ratio	0.435	0.109	0.361	0.112
-0.016	0.639	-0.020	0.630	Arrears rent	0.410	0.176	0.382	0.175
0.545	0.537	0.472	0.527	Arrears utility	0.083	0.164	0.101	0.165
				Arrears loans	0.200	0.207	0.191	0.209
0.058	0.122	0.113	0.124	Make ends meet	-0.001	0.081	0.036	0.082
-0.058	0.208	0.032	0.210	Housing cost burden	-0.304	0.124	-0.219	0.127
0.542	0.244	0.635	0.246	Loans burden	0.117	0.077	0.142	0.077
		0.162	0.407	Family			-0.147	0.095
		0.808	0.441	Single/male			0.393	0.128
		0.492	0.438	Single/female			0.246	0.146
		-0.063	0.131	Education			0.027	0.130
		0.559	0.209	Prague			0.239	0.130
		0.044	0.182	Town			0.002	0.101
		0.030	0.187	Countryside			-0.154	0.110

Note: All coefficients significant at 99% level except for those marked by \*  
Source: Authors

**Table 4. Probit models for 2012**

Senior +60					Other 18-59			
M1		M2			M1		M2	
coeff	SE	coeff	SE		coeff	SE	coeff	SE
-8.692	2.421	-11.963	2.607	[move_yes = .00]	-1.733	1.532	-1.012	1.604
0.567	0.184	0.859	0.208	Income (disposable)	0.485	0.134	0.488	0.138
0.138	0.147	-0.098	0.180	Total area per capita	0.098	0.081	0.015	0.106
-0.037	0.080	-0.039	0.083	Market price	-0.394	0.053	-0.447	0.059
0.739	0.145	0.676	0.144	Household cost ratio	0.470	0.119	0.372	0.117
0.097	0.308	0.120	0.317	Arrears rent	0.518	0.215	0.369	0.211
0.599	0.255	0.642	0.279	Arrears utility	-0.004	0.207	0.098	0.207
				Arrears loans	0.421	0.207	0.407	0.213
0.187	0.150	0.157	0.149	Make ends meet	-0.214	0.081	-0.198	0.083
0.466	0.372	0.587	0.386	Housing cost burden	-0.009	0.145	0.065	0.146
-0.026	0.233	0.048	0.225	Loans burden	-0.039	0.096	0.000	0.096
		0.117	0.295	Family			-0.092	0.098
		0.488	0.371	Single/male			0.194	0.155
		0.852	0.347	Single/female			0.149	0.162
		-0.152	0.160	Education			-0.014	0.153
		0.105	0.183	Prague			0.407	0.138
		-0.028	0.145	Town			0.000	0.107
		-0.148	0.158	Countryside			-0.107	0.117

Note: All coefficients significant at 99% level except for those marked by \*  
Source: Authors

However, the biggest differences between the factors that increase the probability of moving for individual types of households are in the group of financial indicators. Here, it is interesting to monitor not only the differences between the two groups of households, but also the dynamics of this development. Generally, it can be said that seniors were significantly more sensitive to changes in housing costs or disposable incomes in 2012. Increases in these two variables significantly contributed to the willingness to move, with the influence of the housing costs as a percentage of the total costs ( $\beta_{2012}=0.676$ ) playing a dominant role. The willingness to move was also significantly influenced by subjective perception of (in)ability to cope with these high costs or other financial liabilities of a household. The households with debts related to utility bills were significantly more willing to move ( $\beta_{2012}=0.642$ ). In comparison with 2009, seniors became significantly more sensitive to the (objective or perceived) deterioration of their financial situation during this period.

The other households assessed the influence of their financial situation on their willingness to move significantly differently. In 2012, the main motive for a household to move was rent or



loan arrears. The households that subjectively perceived their financial situation as not very good (the household did not have enough money to cover expenses) were less willing to move ( $\beta_{2012} = -0.198$ ). Data for 2009 show that in the other households there were no significant shifts in the intensity or direction of the influence of financial factors, as was the case for the senior households. This may be related to the fact that rent deregulation had a much more significant influence on senior households. It is possible to suppose that the significantly higher influence of the financial situation in 2012 could be related to the fact that senior households in fact left flats with regulated rents, considerably increasing their housing costs.

#### 4 Conclusion

As in most European countries, the number of senior households in the Czech Republic has been gradually increasing. It is clear that issues related to the housing of this age group will increasingly become a focus of national housing policies. Any good policy must be based on an outline of the current state of the housing sector and various aspects related to the subjective perception of housing by individual households.

In the analyzed period between 2007 and 2012 (or 2002-2012, because the data always include a five year retrospective), considerable reluctance of Czech households to move persisted. If they moved at all, it was usually for family or housing reasons. These reasons prevailed for senior households as well as for the other households. The probit analysis confirmed these trends to a considerable extent. The results showed that seniors moved more in cities than in rural areas. From the studied trends, the sensitivity of senior households to (perceived or objective) deterioration of their financial situation considerably increased. We were able to confirm the hypothesis H1 only for the year 2012. After abolishment of the rent control in the Czech Republic (2010-2012), the elderly households take more attention to their financial situation when deciding whether to move or stay in place. The households with financial problems (mainly lower income) more likely move their house.

It can be concluded that Czech senior households acted in a very rational manner when deciding about their potential moving. In particular, home moving was considered mostly by the households that perceived the financial situation of their household as deteriorating, especially in connection with a growing burden of the housing costs. It was not proved that the quality of housing or (un)availability of services would be an incentive for moving.

Overall, also, in the Czech Republic gradient increase of senior households' proportion can be found. More and more senior households perceive high burden of housing costs and consequent bad financial situation. Although the rate of moving among the senior households is still quite small, there is a moderate increase through their financial problems. Motivation to move will though be more and more confronted with the lack of appropriate possibilities where to move. Senior households, as a result, might be trapped in the large, expensive housing with high housing costs. To prevent the potential fall under the poverty line of a significant number of senior households, public policy measures should be discussed.

The lower willingness of elderly households to move might be, of course, also influenced by other factors. One which should be mentioned is the relative large lack of small rental flats in urban areas, together with the absence of social housing and housing with assistance for seniors.

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# Urban Green Space – Beneficial but Costly. New Approaches to Financing

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## Abstract

Public green space provision is one of the public services provided by municipalities. Municipalities face a lack of finances to provide public services in a sufficient amount. The question of searching for new ways of public green space provision is up to date. The paper discusses different approaches to urban green space provision. We used the desk research method and an in-depth analysis of Prague 8 District for identifying and analysing different approaches. Besides broadly discussed approaches, we found other opportunities for public green space financing and thereby we extended the variety of the identified possible approaches to alternative urban green space financing applied at the municipal level. The new ways of financing have a potential to bring cost cuts to municipal budgets as well as benefits to local inhabitants.

*Keywords: public green space; public services; financing; benefits*

JEL Classification: H41; Q26

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## 1 Introduction

Urban green space provision is one of the public services provided by municipalities and it is very beneficial in terms of well-being of local inhabitants as well as cost cuts in other sectors. Due to the increasing manifestations of consequences of climate change in the urban environment (e.g., in the form of higher numbers of hot days and nights, drought and water shortage in cities, or conversely extreme torrential rain and floods in cities), green spaces may make a substantial contribution to adaptation of cities to climate change. Depending on the particular type of vegetation and weather conditions, green spaces contribute to local climate control thanks to evapotranspiration, i.e., water evaporation by the leaf parts of the plants, and provision of shade (resulting in prevention of overheating of paved surfaces and buildings, so typical of cities). According to a meta-analysis of Bowler et al. [2], a park reduces the temperature by approximately 1 degree Celsius compared to adjacent built-up areas.

These urban green space services bring society benefits in the form of reduced need for building air-conditioning, and reduced need for heating in winter (as a result of the fact that trees prevent cold air flows that cool buildings). However, this partial benefit is dependent on the tree species, its orientation in respect of the building and cardinal points, the building height, etc. From a global point of view, there is a significant contribution to global climate control due to the ability of green spaces to absorb CO<sub>2</sub>.

Increased green spaces contribute to better evaluation of quality of life and medical self-assessment [17]. The direct medical effects include regulation of stress and mental disorders [26], [12]. An indirect medical effect is the positive influence on health due to air quality improvement. On the other hand, Vos et al. [29] show potential negative effects of trees on air quality under special circumstances if trees hinder sufficient air flow on streets with heavy traffic.

Other benefits of trees include reduced wastewater treatment costs. According to McPherson et al. [18], the monetary benefit from reduced rain runoff can be expressed through reduced costs of water treatment in wastewater treatment plants based on the sewage fee rate and the annual total precipitation. Table 1 summarises benefits from trees in the city in monetary terms.

Studies of cost-benefit analyses of urban green spaces can be helpful for showing the public value of urban green spaces [28] and for deciding about investments into green infrastructure in

the cities by local policy makers and as well as for other stakeholders who are deciding about public or participatory projects supporting urban green space provision. Macháč et al. [16] undertook a cost-benefit analysis for the “Pod Plachtami” park in the city of Brno, Czech Republic, with the result of annualised benefits ten times higher than annualised costs of this park (benefit/cost ratio  $\cong$  10).

Municipal budgets need to cover costs of many different public services and struggle with a lack of money (e.g. [6]). According to Jones [13], focusing on the UK case, local budgetary cutbacks are among the main reasons for decreasing quality of urban parks. New approaches to financing have to be searched for.

**Table 1. Economic benefits from city tree planting and maintenance – converted to 1 tree**

Type of benefits	Medium tree (tree height x treetop width: 12,2 m x 8,2 m)	
	Min	Max
	Reduced costs of wastewater treatment	140.8 per annum <sup>[18], [10], [5]</sup>
Decrease in NO <sub>2</sub> , SO <sub>2</sub> , O <sub>3</sub> , PM <sub>x</sub> emissions	7.0 CZK per annum <sup>[18], [22]</sup>	18.8 CZK per annum <sup>[18], [10]</sup>
Decrease in greenhouse emissions (CO <sub>2</sub> )	146.1 CZK per annum <sup>[18], [27]</sup>	943.6 CZK per annum <sup>[18], [19]</sup>
Decrease in costs of heating and cooling	0-8% of costs of heating and cooling <sup>[18]</sup>	
Aesthetic, recreational and other production values	5-15% of the total real estate value* <sup>[31], [14]</sup>	

*Note: The values of benefits are based on studies abroad. The resulting amount is the product of the biophysical benefits (mostly shown in [18]) with the monetary valuation of the biophysical units ([5], [10], [19], [22], [27]). Afterwards, the values are converted to the nominal 2014 CZK value reflecting inflation, exchange rate and purchase power parity. The resulting value is then the mean of two values obtained by conversion using purchase price parity and using the exchange rate. All the values represent annual benefits, except the aesthetic, recreation and other production benefits, expressed in aggregate using hedonic pricing ([14], [31]). The hedonic price represents an one-off benefit in the form of increased value of real estate near green spaces.*

*\*The value transfer based on the hedonic price is burdened with a great deal of uncertainty. With respect to specific local conditions, the percentage values should only be regarded as approximate.*

*Source: Authors based on [5], [10], [14], [18], [19], [22], [27], [31]*

The paper brings an overview of approaches in the area of involving diverse entities in management of urban green spaces, which municipalities can apply to increase the efficiency of provision of high-quality urban green spaces, from both a financial and a qualitative point of view. Thus, it does not deal with conventional financing methods, such as grant schemes of public or private institutions. The added value of the paper consists not only in discussing alternative financing schemes of urban green spaces in one place, but also in an extension of commonly discussed approaches by identifying other schemes.

Section 2 of the paper discusses methods used and demarcates the research area of interest. Section 3 brings an overview of alternative participatory approaches to urban green space provision of, followed by a discussion of benefits and limitations of these approaches in Section 4.

## 2 Material and Methods

In this paper, we build on the definition of urban green spaces used in Dunnett et al. [7]. Urban green spaces are areas consisting predominantly of unsealed surfaces without regard to ownership or accessibility for the public. With respect to new approaches of municipalities to financing urban green spaces, we will be highly interested solely in areas which are in municipal ownership. We will not include privately owned urban green spaces in our analysis, such as private gardens.

Alternative models of urban green space provision include a certain level of public participation. In a narrow context, public participation usually refers to procedures which work with affected groups of local inhabitants during the decision-making phase of public projects to

allow them to influence the final decision of the public authority (e.g. [24]). Arnstein's ladder of citizen participation [1] evaluates the degree of local community involvement and comprises not only an opportunity to take part in the final decision, but her citizen participation of a higher level includes delegation of certain powers to citizens and citizen control over the implementation phase of public projects. On the highest rung of the ladder, the ultimate empowerment of local initiatives is achieved. Local community and citizen involvement can assume the forms of cooperation between the municipality and voluntary community groups, local business and the general public.

Participation of local initiatives can be embraced under the umbrella term urban governance. Governance is a process of regulation, coordination and control where government – urban or national – plays only a certain limited role [23] and the visible boundary between the public and private sectors fades away. We witness a certain form of partnership between the public and private sectors.

In this place, we would like to stress the difference between the definition of participation approaches and the narrow definition of public private partnerships used, e.g., in the European Commission's Green paper on public private partnership COM(2004) 327. In this narrow approach, a public private partnership is based on the typical entrepreneurial model: a private partner, not necessarily local, expects profit from the partnership; the public sector expects better results by getting expertise of the private sector and helping distribute costs over time.

We used the desk research method for identifying discussed approaches to public green space provision and an in-depth analysis of Prague 8 District for identifying other specific approaches at the municipal level typical of the Czech Republic. The in-depth analysis in Prague 8 from the point of view of alternative financing schemes included the exploration of all the decisions made by the municipal council and the municipal cabinet, materials discussed on the Environment Committee, being an advisory body to the municipal cabinet, and all the information published on the municipal web pages, including all the municipality's press releases. The analysis was undertaken for the period November 2014 – July 2016.

Prague 8 District is one of the biggest districts in Prague in terms of the number of inhabitants as well as the area. It has 103 thousand inhabitants, total area is 21 km<sup>2</sup> and the area of green spaces in administration of Prague 8 District is 210 ha excluding spaces administered by the city of Prague as well as excluding private green spaces (Appendix n. 9, Usn ZHMP 12/1 dated 17.12.2015). Prague 8 District spends around 40 mil. CZK annually on operating costs for the provision of green spaces under its administration. The height of investment costs depends highly on projects realized in particular years.

### **3 Results**

#### *3.1 Different Forms of Participatory Approaches to Urban Green Space Provision*

In this section, we present an overview of different forms of participation of local communities in urban green space provision. The focus is on the municipal level. The approaches contain sharing management of publicly accessible open spaces with local community as well as yielding of certain open spaces to private initiatives and permitting restricted access to these areas.

##### *Friends of the Park Groups*

It is common practice in some European countries (e.g., the United Kingdom) and the USA that civic society participates in management of a certain public space, such as an urban park. The term "*friends of the park groups*" has become established for these initiative citizen groups. They are typically non-profit organisations associating volunteers involved in managing the park, and more or less also financing investment in the park and its maintenance [21]. Friends of the park accept financial donations for their work from local inhabitants and corporations, and public grants as the case may be. Depending on the degree of the groups' formal definition, Lehari [15]

divides friends of the park groups into (i) informal ad hoc groups that appear momentarily, e.g., in order to clean up a particular area; (ii) semi-formal groups, which are non-profit organisations managing a particular area but not having an agreement on cooperation with the public authority, the cooperation thus being purely informal; (iii) formal associations that have an agreement with the public sector defining both parties' rights and duties.

Perhaps the best-known example of formally defined cooperation between the public sector and local community is the relationship between New York City and the non-profit organisation Central Park Conservancy, which largely contributes to the management of New York City's Central Park. According to Walls [30], this park management success story has also led other cities to finance their parks with private money.

Within Prague 8 District, we identified two different schemes which can be defined as "friends of the parks" approaches. The local council cooperates with local environmental initiatives, e.g. Vědomý dotek, z.s. This volunteer organisation takes additional volunteer care of a local forest called "Čimický háj" above the level provided by the city. The local municipal council supports this organisation by informing about its activities, providing work aids, enabling the public donation campaign for new tourist components in the forest area. The second identified approach of Prague 8 District is the offer of the local council to the general public to take over management of certain publicly accessible areas. The municipal authority registers several requests of local inhabitants to take care of publicly accessible green spaces around the places where they live. The municipal authority has declared its interest in provision of these green spaces to local people for maintenance and in enabling legalisation of the current state of guerrilla gardening (i.e., wild gardening on land without legal rights to it) in these locations. The municipal authority expects wider interest in this new scheme.

#### *Grants in the Area of Public Space Management*

Another example of public participation (also identified in Prague 8 District) is grant schemes announced by municipalities in order to support local citizens and non-profit organisations in public space management. While in convention funding, municipalities cover the direct costs of the implementation (both operating and capital costs) of projects and the indirect costs of project administration (wages for authority employees, overheads of authority employees, project documentation, etc.), this type of grants usually cover costs of materials, which can be co-financed by the grant applicants. The local citizens invest the labour on public space improvement. Prague 8 District started to offer these grants in 2016 (Usn RMC 0225/2016).

#### *Partnerships with Expert Public and Expert Institutions*

When developing municipal plans, the city can use the expert potential of its own citizens and organisations, such as universities. For example, landscape architects may be willing to contribute, without claims for remuneration, their ideas to the conceptual design of the locations where they live. Likewise, cooperation with universities can be mutually beneficial: universities may participate in the self-government work by assigning seminar, bachelor or diploma theses. For Prague 8 District, we identified cooperation with universities within a student competition for the best architectural design of two selected urban public squares within the area. Students presented their architectural designs for these squares, which together with the conclusions of the jury, where members were volunteering experts from academia, was used for the definition of expectations for the final architectural design.

#### *Business Improvement Districts as a Form of Public Private Partnership*

Some countries – Canada, USA, the United Kingdom, Serbia and Albania [21], [8] – have developed so-called Business Improvement Districts (BID), relating to entire neighbourhoods. Morçol et Wolf [20] say that the creation of BID helps blur the formerly sharp divide between the public and private sectors, and provision of public services becomes partly managed by the private sector. The creation of BID is motivated by unsatisfactory standards of public service provision or decreasing opportunities of public sector to finance public services. Property owners may agree in a higher level of public service management standards, as long as they want to

contribute finance to the improved quality. A BID can be created if a certain percentage of property owners and the local self-government agree with it. Adequate conditions for public space management are achieved by increasing the property tax of instituting a specific fee levied from all property owners. The utilisation of these funds is then typically decided by a body elected by property owners and cooperating with the local self-government. The BID covers not only public space management but also social services, marketing promotion for the region, etc. [3]. BIDs are on a rise. London, for example, has 48 BIDs as of 2016. Similarly to friends of parks, BIDs too are criticised by some authors for crowding out public services paid from public budgets and for potential establishment of rich neighbourhoods with good public services and poor deprived ones.

There are no typical BIDs in the Czech Republic so far, and it is a question for lawyers whether current legislation would permit their creation. On the other hand, the example of Prague 8 shows that there are private initiatives analogous to BIDs in the Czech Republic. The association *Konsorcium pro Karlín o.p.s.*, uniting large business entities in the Karlín neighbourhood of Prague, takes part in urban green space provision above the level provided by the city.

#### *Open Space with Restricted Access – Community Gardens and Allotment Gardens*

Municipalities may also support urban green space by enabling activities which necessitate designation of a part of public open space for access to certain user groups only. Among these activities we count urban farming: community gardens and allotment gardens. The importance of urban farming grows with the degree of alienation of the modern urban human beings from nature and traditional agriculture. Guitart et al. [11] comment on the nature of ownership and form of community gardens, including benefits arising from them and certain limitations. As mentioned by Speak et al. [25], garden allotments are also important for the city from the point of view of the degree of ecosystem service provision. Moreover, Castro et al. [4] have proven a statistical relationship between the involvement of children in community gardening, their consumption of fruit and vegetables and a subsequent decrease in incidence of obesity among children. Gibas et al. [9] describe the history and possible future of garden allotments in the Czech Republic.

Prague 8 District politically supports allotment gardens within its area. The Environment Committee of Prague 8 declared its support to allotment gardens and cooperates with one of the allotment gardening associations on the opening of a new community garden which would be accessible to the public.

## **4 Discussion**

Friends of the park groups and BIDs are the most commonly discussed alternative urban green space financing models. This paper brings an extension of these approaches applied at the municipal level – we also found a model of supporting private initiatives in urban green spaces with municipal grants, partnerships with the expert public and expert institutions, and by restricting access to open spaces to enable additional urban farming projects in allotment gardens and community gardens.

Community involvement can reduce the need for public finances, increase the degree of utilisation of public spaces by local citizens, better react on local citizens' needs, involve citizens in the municipal functioning, and last but not least, increase citizens' identification with the places where they live. On the other hand, a higher level of community involvement necessitates an effort of municipal officers in terms of above-standard communication with the public. By leading a more intensive dialogue with the public, the municipality may come across conflicting interests of different groups, which it then has to tackle. Even volunteer groups interested in involvement in public space management have to cope with various problems: the most commonly quoted ones include too high share of responsibility, lack of volunteers, and necessity to make long-term commitments [7].

According to Jones [13], the major problem of effective community involvement lies not in the lack of local voluntary groups, but in good management of local councils to make them work well.

Some authors criticise the participatory approaches in which private money is spent on public space provision due to their crowding-out effect on public finance. According to critics, two types of parks are established as well: rich ones with successful friends of the park groups, on which the officials' attention is then focused, and rich ones without friends, from which attention is turned away. The criticism reflects concerns about privatisation of public services [21].

Walls [30] looks at all the participatory approaches with private money spending as an act of philanthropy and sees several other problems of external financial sources: free riding as a reason for underfunding due to non-excludability of public green spaces, uncertainty in funding levels throughout time, and costs of fundraising. The share of fundraising costs together with other non-programmatic activities can reach about 15-30% of the total costs spent [30].

Green areas in cities bring citizens an array of effect that positively influence their well-being. Thanks to their ability to control local climates and absorb precipitation, they help urban environments adapt to climate change. Green areas in cities influence the assessment of quality of life by citizens, self-assessment of health, as well as market value of property (near green spaces). Besides, they contribute to reducing concentrations of pollutants in the air. It has been calculated (on the example of a case study in Brno) that the social benefits of urban green spaces increase ten times the (capital and operating) costs of green spaces [16]. In spite of that, the quality of urban green spaces stagnates or even deteriorates, particularly due to lack of (public) funding for green space management ([6], [13]). Therefore, participatory approaches in the area of urban green space provision, in spite of some critical responses noted above ([21], [30]) may bring public budget savings on the one hand and contribute to retention or improvement of urban green space quality on the other hand. The added value of the participation approaches is involvement of local citizens (and businesses as the case may be) in the process of creating the character of an area, helping to identify with the area.

## 5 Conclusion

The paper discusses different approaches to urban green provision: an up-to-date topic in the situation of limited public finances. The added value of the paper consists not only in discussing alternative financing schemes for urban green spaces in one location, but also in an extension of commonly discussed approaches by identifying other schemes.

Our findings based on desk research and an in-depth case study of one of the Czech municipalities would need to be systematised in further work by in-depth analyses of other case studies to get a complex picture of alternative approaches to public green space provision currently applied in the Czech Republic.

## Acknowledgements

The paper was supported by a grant from Iceland, Liechtenstein and Norway "UrbanAdapt - Development of urban adaptation strategies using ecosystem-based approaches to adaptation" (EHP-CZ02-OV-1-036-2015) and by TA CR Omega grant "Support to development of adaptation measures and strategies in cities" (TA CR: TD03000106).

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# Relationship and Significance of Performance Indicators of Regional Public Libraries

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## Abstract

This article deals with the relationship and significance of 14 performance indicators of 15 regional public libraries from the Czech and from the Slovak Republic. These libraries are engaged in the Benchmarking of Libraries project. The aim of this article is to determine the intensity of mutual relationship and explanatory power of selected performance indicators under conditions of Czech and Slovak regional public libraries engaged in the Benchmarking of Libraries project. Methodology of research is based on correlation and regression analysis of performance indicators that are divided into input and output ones. Results of analysis show that (i.) there is dependence among the majority of selected performance indicators; (ii.) dynamism of selected indicators from the perspective of five-year period (2011 - 2015) is not significant; (iii.) it is possible to detect different changes of values of some indicators depending on the fact whether it is regarding Czech or Slovak regional libraries; (iv.) intensity of relationship between input (independent) and output (dependent) types of indicators shows priorities, on which regional libraries should focus to improve their performance level.

*Keywords: performance indicators; public libraries; inputs; outputs; benchmarking*

JEL Classification: H4, C8

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## 1 Introduction

Public libraries fulfil their mission in the field of library and information services, and they are characterised by unlimited users' access and universal library collection. Public libraries in the Czech and also in the Slovak Republic provide their services at state, regional and municipal level, and that generally for free on certain terms. Public libraries belong to those organizations providing public services that obligatorily (by law) and also voluntarily (managerial and professional concerns) monitor a set of performance indicators. These indicators are revealing details of demand, supply, quality, efficiency and other activities pertaining to these libraries to an extent corresponding with their mission and functions [17]. Performance indicators provide important information for grants and management of public libraries, and reveal the frugality, efficiency and effectiveness of public funds used on their provision.

The topic of performance of public services is connected to a number of issues, according to Ochrana et al. [8], to most important ones belongs the issue of optimal amount of provided public service. Also discussed [2, 14], in connection with the performance of public services, are justified or real demand of citizens including the issue of so called black passenger, limited public resources at all budget levels, and also changing needs of society, e.g. related to the progressive development of information technologies.

The topic of performance of public and other types of libraries (university, special) stimulates many professional discussions and researches, e.g. about the influence of slowdown of services of public libraries on their efficiency, or about optimal accessibility and volume of provided services. In the field of library and information public services there was a research conducted, in above mentioned sense, by Mikušová, Meričková and Stejskal [7], who evaluated justifiability of public funding of production of public libraries. Economic value of public libraries' services was studied by Aabø [1], who was observing, based on survey and method of willingness to pay (WTP), willingness of clients of libraries to pay for services of public libraries in Norway. Comparable approach is represented by the Return of Investment methodology, which was used for the needs of analysis of value of Czech public libraries e.g. by Řehák [12] or Stejskal [13]. Other

possibilities of quantitative evaluation of efficiency of public libraries are represented e.g. by models of multi-criteria decision making, and especially models of Data Envelopment Analysis (DEA), as it is shown e.g. by Vitaliano [16] or Li and Yang [6].

Special and very significant category of observing and evaluation of performance with the aim to improve quality of activities and processes, especially in public services, is represented by benchmarking [3]. Under conditions of public and university libraries, benchmarking is very often and successfully applied in many countries. For example, strong tradition of monitoring of performance indicators and implementation of benchmarking since 1999 under conditions of public libraries in the UK has been recorded by Favret [4], and that in the form of Libraries Benchmarking Club. Benchmarking of public libraries is going on also under conditions of North American, Canadian and Ontario public libraries with the focus on city libraries (City Librarian), as it is shown in the last Annual Performance Measures and Benchmarking of Toronto Public Library (2016), [15]. An inspirational example can be found also in German benchmarking project BIX – Bibliotheksindex, which traces 18 indicators and aggregates them into 4 groups – supply, efficiency, utilization and development, [9].

Under conditions of the Czech and the Slovak Republic the Benchmarking of Libraries project (further BL) was started in 2005 from initiative of the National Library of the Czech Republic in cooperation with the National Information and Consulting Centre for Culture (NIPOS). The first reference year was the year of 2006. Since 2011, after an agreement with the Slovak National Library, also Slovak public libraries have been joining the BL. In terms of the BL, 32 types of statistical data (performance indicators) are being monitored regarding the activity of a library, of which indexes or performance indicators are calculated, [10, 11]. The number of public libraries involved in the BL has an increasing trend, in 2011 it was 257 (203 of those were from the Czech Republic), and in 2015 it was already 318 (244 from the Czech Republic). Public libraries within the BL are categorized into city (municipal) libraries and regional libraries (resp. regional scientific libraries).

The object of this research consists of 14 selected performance indicators and their values for years of 2011 – 2015, that are being traced within the above mention BL under conditions of Czech and Slovak regional public libraries.

The aim of this article is to determine intensity of mutual relationship and explanatory power of selected performance indicators under conditions of Czech and Slovak regional public libraries involved in the project of the Benchmarking of Libraries.

In order to meet the set aim, two questions are being tested: (1) Is there statistically significant (linear) dependence among selected indicators? (2) What is the dynamism of selected indicators from the perspective of five-year period? (3) Is it possible to explain the different behaviour of indicators according to the fact whether it is the case of Czech or Slovak regional public libraries? (4) What is the intensity of the relationship between input and output types of indicators?

Methodology of the research is based on the correlation and regression analysis, while these methods are described in a separate part of this article.

## 2 Material and Methods

Data for the research were obtained from the internal databases of the project of Benchmarking of Libraries (BL) with the approval of involved public libraries. For the needs of the research regional libraries were selected. There are 18 Czech and Slovak regional libraries engaged in the BL. Nevertheless, in order to get more accurate results, three regional libraries were not included in the analysis because in terms of values of some indicators (variables) they represent extremes of the researched set. It is the case of regional libraries located in Brno (CZ), Havlíčkův Brod (CZ) and in Pezinok (SK). Thereby the analysed set consists of 15 regional libraries ( $n=15$ ;  $n_{cz}=9$ ;  $n_{sk} = 6$ ) with seats in České Budějovice, Hradec Králové, Karlovy Vary, Liberec, Olomouc, Pardubice, Plzeň, Ústí nad Labem, Zlín, Nitra, Prešov, Trenčín, Trnava, Zvolen and Žilina.

## 2.1 Characterization of Variables

Basic characterization of analysed set from the perspective of 14 selected variables (indicators) for years of 2011 – 2015 is shown in Table 1. Variables  $X_1 - X_{10}$  represent inputs, and they are also independent variables for the needs of regression analysis. Variables  $Y_1 - Y_4$  represent outputs, and they are also dependent variables for the needs of regression analysis. Within analysis, each variable (indicator) was represented by a table, in which rows stood for individual regional libraries, and columns stood for years. After that, the data were transformed into a single data table using IBM SPSS Statistics program. Each variable represents a column in the table, as new columns there were added a number (time) variable Year (Y) and so called dummy alternative variable State (S) with values 0 = CR, 1 = SR. Rows of the data table (records) were created by individual combinations – library x year. The resulting data table has 75 rows (records) and 16 columns (variables).

**Table 1. Basic statistical characterization of performance indicators**

Input (X) and output variables (Y)		n=15, years 2011-2015			
		average	minimum	maximum	standard deviation
X <sub>1</sub>	Population served	84,878.33	41,683	170,800	27,201.87
X <sub>2</sub>	Number of library units	757,050.61	178,180	2,188,930	647,365.47
X <sub>3</sub>	Additions (number of new library units)	13,773.73	2,350	35,072	9,220.49
X <sub>4</sub>	Registered users	13,525.05	7,557	26,398	3,815.16
X <sub>5</sub>	Education and cultural events for the public (number of events)	521.52	106	1,249	229.72
X <sub>6</sub>	Number of places for studying	196.76	80	387	90.75
X <sub>7</sub>	Number of computers with Internet connection	36.83	9	98	23.25
X <sub>8</sub>	Area for users in m <sup>2</sup>	2,940.48	984	6,214	1,609.10
X <sub>9</sub>	Number of hours for the public weekly	58.8	43	65	4.39
X <sub>10</sub>	Number of employees (recalculated number)	57.90	26.7	91.5	21.59
Y <sub>1</sub>	Visitors of a library (physically)	206,603.85	104,384	400,619	68,692.90
Y <sub>2</sub>	Loans in total (number of pieces)	556,693.45	240,254	1,427,682	234,796.45
Y <sub>3</sub>	Visitors of a library (online)	228,342.85	27,907	1,137,155	169,121.48
Y <sub>4</sub>	Visitors using the Internet in the library	19,055.61	3,166	71,583	13,973.65

Source: Authors based on internal data of BL, the National Library of the Czech Republic, 2016

Table 1 shows that regional libraries differ significantly from the perspective of values of monitored performance parameters, which is demonstrated by variation range of values (difference between maximal and minimal value) and also by the standard deviation. Nevertheless, questions are raised by indicator –  $X_1$  Population served – which is in the BL represented by the number of inhabitants of a given regional capital. Here it is necessary to remind that regarding the specific character of library and other types of services of regional libraries, which go beyond boundaries of residential city, the number of population served cannot be limited only by the number of inhabitants of this city (residents). It is clear that services of regional libraries are used not only by residents, but also by non-residents, and that in a greater extent than in case of large city libraries. These are usually commuting employed people and studying people. Another argument is the fact, that regional libraries are established by regions, and so they are funded from regional budgets. Also the number of inhabitants of a given region is not an accurate indicator of the number of population served, and that when taking into account the area of the region, and thus the spatial accessibility. The issue of residents and non-residents of New York and of services in area of one of the biggest cities of the world was also pointed out by Vitaliano [16].

## 2.2 Methodology

To analyse relationships between individual variables the correlation and regression analyses were used. The calculation of correlation between individual attributes was carried out according to the classic linear Pearson's correlation coefficient  $r_{xy}(1)$ :

$$r_{xy} = \frac{\sum_{i=1}^n x_i y_i - n \cdot \bar{x} \cdot \bar{y}}{\sqrt{\sum_{i=1}^n x_i^2 - n \cdot \bar{x}^2} \sqrt{\sum_{i=1}^n y_i^2 - n \cdot \bar{y}^2}} \quad (1)$$

The same type of correlation coefficient was used also to find out relationships between individual variables and year (to find out what the trend is), resp. between variables and attribute State (to find out what the difference between the Czech Republic and Slovakia is).

For the needs of regression analysis the observed variables were divided into two groups –  $X_{1-10}$  and  $Y_{1-4}$  (see Table 1). To find the optimal linear model, that represents relationship between input variables and output variable, the Ordinary Least Squares method (OLS) was used together with the Stepwise elimination algorithm. This heuristic algorithm, programmed within IBM SPSS Statistics program, selects variables for the model that are statistically significant at alpha level of  $\alpha = 0.05$ , and on the contrary it eliminates variables that are not significant even at doubled alpha level of  $2\alpha = 0.1$ . Resulting model accordingly does not include all input variables that significantly correlate with the output variable, but only those enabling to explain the behaviour of output variable in an effective way.

Let  $X_i$  ( $i = 1, 2, \dots, k$ ) to be input variables gained by elimination, and  $Y$  to be output variable. Created linear regression model can then be represented by formula (2):

$$Y = b_0 + b_1 X_1 + b_2 X_2 + \dots + b_k X_k \quad (2)$$

where  $b_0$  is a constant of the model and  $b_i$  ( $i = 1, 2, \dots, k$ ) are regression coefficients representing the influence of individual input variables (regressors)  $X_i$  (3):

$$b_i = \frac{\partial Y}{\partial X_i} \quad (3)$$

Quality of regression model is represented by the coefficient of determination  $R^2$ . It determines what part of variability of  $Y$  variable can be explained by the behaviour (variability) of input variables  $X_i$ . It is calculated according to the formula (4):

$$R^2 = \frac{SSR}{SST} = \frac{\sum_{i=1}^n (Y_i - \bar{Y})^2}{\sum_{i=1}^n (Y_i - \bar{Y})^2} \quad (4)$$

where SSR is regression (explained) sum of squares, and SST is total sum of squares in regression model.

Optimization (elimination) algorithm maximizes adjusted coefficient of determination  $R^2_{adj}$  (5):

$$R^2_{adj} = 1 - \frac{n-1}{n-k-1} (1 - R^2) \quad (5)$$

The algorithm adds variables into the model (resp. takes them out of it) so that the value of  $R^2_{adj}$  increases the most. As soon as the adjusted determination coefficient reaches its local maximum, the found model is considered optimal.

### 3 Results

#### 3.1 Dependence between Variables, the Influence of Time and Locality (State)

In this part there are stated results of testing of three research questions: (1) Is there statistically significant (linear) dependence among selected indicators? (2) What is the dynamism of selected indicators from the perspective of five-year period? (3) Is it possible to explain the different behaviour of indicators according to the fact whether it is the case of Czech or Slovak regional public libraries?

Correlation matrix (see Table 2) represents the strength of relationship among all 14 traced attributes. Statistically significant dependences are tinged with grey colour. Very strong dependences (correlation coefficient higher than 0.7) are additionally displayed in bold.

**Table 2. Correlation matrix**

	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$	$X_9$	$X_{10}$	$Y_1$	$Y_2$	$Y_3$	$Y_4$
$X_1$														
$X_2$	<b>0.740</b>													
$X_3$	0.505	<b>0.852</b>												
$X_4$	0.206	0.402	0.513											
$X_5$	-0.253	-0.469	-0.294	0.229										
$X_6$	0.253	0.385	0.497	0.298	0.116									
$X_7$	0.109	0.403	0.618	0.350	-0.108	0.666								
$X_8$	0.297	0.372	0.415	0.330	0.066	<b>0.844</b>	0.635							
$X_9$	0.070	0.219	0.045	0.121	0.113	0.236	-0.076	0.010						
$X_{10}$	0.649	<b>0.848</b>	<b>0.867</b>	0.293	-0.402	0.605	0.594	0.521	0.083					
$Y_1$	0.318	0.401	0.606	<b>0.780</b>	0.319	0.563	0.502	0.540	0.037	0.497				
$Y_2$	0.122	0.101	0.318	0.376	0.274	0.462	0.597	0.435	-0.244	0.281	<b>0.674</b>			
$Y_3$	0.400	<b>0.777</b>	<b>0.763</b>	0.338	-0.459	0.296	0.505	0.314	0.019	<b>0.707</b>	0.336	0.138		
$Y_4$	0.596	0.690	0.528	0.336	-0.277	0.511	0.359	0.384	0.271	0.602	0.434	0.291	<b>0.437</b>	

Source: Authors

The above displayed correlation matrix shows that statistically significant and very strong dependences were found between these pairs of variables: number of library units – population served; number of library units – additions; number of library units – number of employees; number of library units – visitors (online); additions – number of employees; additions – visitors (online); registered users – visitors (physically); area for users in m<sup>2</sup> – number of places for studying; visitors (online) – number of employees. All mentioned correlations are positive. When increasing one attribute, the other one increases as well and vice versa.

Dynamism of variables in time (for the period of 2011 – 2015) was calculated using the correlation with time variable (year), as it is shown in Table 3. It is clear that all values of correlation coefficients are close to zero. None of them is statistically significant. It means that none of traced variables is developing in time; they are all static (there is no significant annual increase or decrease).

Correlation with the State variable represents significantly different behaviour of a given variable in the Czech and in the Slovak Republic. A positive correlation means that in Slovakia this indicator reaches higher values, a negative correlation represents higher values in Czech libraries (see Table 3). The majority of correlations in this table are statistically significant. Non-significant differences were recorded only by variable Number of hours for the public weekly and Loans in total. The majority of attributes show negative correlation, and that means that the variable reaches higher values in libraries in the Czech Republic. Slovak libraries dominate only in attribute Education and cultural events for the public.

Table 3. Correlation of variables in time while differentiating the state

Variables	Dynamism (year)	Dummy (state)
X <sub>1</sub> Population served	-0.028	-0.462
X <sub>2</sub> Number of library units	0.013	-0.665
X <sub>3</sub> Additions	-0.039	-0.813
X <sub>4</sub> Registered users	-0.105	-0.315
X <sub>5</sub> Education and cultural events for the public	0.143	0.363
X <sub>6</sub> Number of places for studying	0.094	-0.531
X <sub>7</sub> Number of computers with Internet connection	0.159	-0.666
X <sub>8</sub> Area for users in m <sup>2</sup>	0.061	-0.484
X <sub>9</sub> Number of hours for the public weekly	0.113	0.139
X <sub>10</sub> Number of employees (recalculated number)	0.000	-0.803
Y <sub>1</sub> Visitors (physically)	-0.085	-0.474
Y <sub>2</sub> Number of loans in total	0.125	-0.292
Y <sub>3</sub> Visitors (online)	0.059	-0.679
Y <sub>4</sub> Visitors using the Internet in the library	0.002	-0.524

Source: Authors

### 3.2 Intensity of Relationship between Dependent and Independent Variables

Using regression models the research followed testing of question (4) What is the intensity of the relationship between input and output types of indicators? In regression models below, independent variables (regressors) are represented by ten observed attributes  $X_1$  to  $X_{10}$  together with variables Year and State. Dependent variables are represented by  $Y_1 - Y_4$ ; individual regression models are named according to these dependent variables.

In case of Regression model  $Y_1$  *Visitors (physically)*, the Stepwise algorithm detected 5 significant regressors that explain the dependent variable Visitors (physically). They are the variables: Registered users -  $X_4$ ; Education and cultural events for the public -  $X_5$ ; Number of places for studying -  $X_6$ ; Number of hours for the public weekly -  $X_9$ ; Number of employees (recalculated number) -  $X_{10}$ . The equation of optimal linear regression model is:

$$Y_1 = 37575.6 + 10.01X_4 + 104.11X_5 + 113.85X_6 - 2152.08X_9 + 1256.34X_{10}$$

This model reaches coefficient of determination  $R^2 = 0.820$ , it means that the 5 selected regressors explain the given output variable of 82 %. Neither year nor state is a significant regressor in the given model.

In case of Regression model  $Y_2$  *Loans in total*, the Stepwise algorithm this time selected only 4 significant regressors that explain the dependent variable  $Y_2$  - Loans in total. They are the variables: Population served -  $X_1$ ; Education and cultural events for the public -  $X_5$ ; Number of computers with Internet connection -  $X_7$ ; Number of hours for the public weekly -  $X_9$ . The equation of regression model has this form:

$$Y_2 = 722308.5 + 1.55X_1 + 423.4X_5 + 6089.6X_7 - 13791X_9$$

Coefficient of determination is  $R^2 = 0.56$ , it means that the model represents the behaviour of the variable  $Y_2$  of 56 %.

For regression model  $Y_3$  *Visitors (online)*, 3 variables were selected by the Stepwise algorithm: Population served -  $X_1$ ; Number of library units -  $X_2$ ; State -  $S$ . The equation of regression model is:  $Y_3 = 289411.5 - 2.3 X_1 + 0.23X_2 - 93626.25S$

The coefficient of determination  $R^2 = 0.71$  stands for the fact that the regression model explains output variable  $Y_3$  of 71 %. This model is the first one where also the dummy variable State was selected. It means that in Czech libraries there is significantly higher number of online visitors and that on average by 93,600 visitors per one library and year.

For regression model  $Y_4$  *Visitors using the Internet in the library*, the Stepwise elimination algorithm selected 6 variables: Number of library units -  $X_2$ ; Additions -  $X_3$ ; Registered users -  $X_4$ ; Number of places for studying -  $X_6$ ; Area for users in m<sup>2</sup> -  $X_8$ ; State -  $S$ . There is also the  $S$  - State attribute acting as a significant regressor in this model. The equation of the created regression model has the form:

$$Y_4 = 5297.4 + 0.023X_2 - 1.459X_3 + 0.822X_4 + 108.6X_6 - 4.05X_8 - 10606.3S$$



The coefficient of determination representing the quality of the model is  $R^2 = 0.69$ .

However, the displayed models cannot be understood in the way that variables  $Y_1$  to  $Y_4$  depend statistically significantly only on regressors used in equations of these models. Regression models represent the minimal group of input variables that can statistically significantly describe the changes in behaviour of the output variable.

#### 4 Discussion and Conclusion

The right mix of performance indicators is a very important presumption of the correct evaluation and comparison of performance of public libraries, especially within benchmarking projects. Regional libraries are specific units in the network of public libraries in the Czech and in the Slovak republic, and that taking into account their functions and mission and also their total number and size diversity. The research carried out revealed that indicators that are being traced within the benchmarking project of Czech and Slovak public libraries show mutual linear dependency in many cases. It follows that within the regression analysis it is possible to explain dependency of output variables using one variable or a set of input variables. Accordingly, four models were calculated. In all of them the influence and the intensity of inputs (input indicators) on four outputs (output indicators) were studied, while outputs were the number of physical visitors of the library (model  $Y_1$ ), loans (model  $Y_2$ ), online visitors (model  $Y_3$ ) and utilization of the Internet in the library (model  $Y_4$ ).

In summary it can be stated that each of 10 traced statistical variables (regressors)  $X_1$  to  $X_{10}$  is present at least in one model. Some of variables are present in two models. In first two models that represent classic library services (physical visitors and loans) there is this pair of independent variables present:  $X_5$  – Education and cultural events for the public, and  $X_9$  – Number of hours for the public weekly. In other words, if a library wants to gain physical visitors and increase the number of loans, it should focus on events for the public and on the opening hours weekly. Other two models represent modern online services. Also in these models there are two independent variables present together:  $X_2$  – Number of library units, and  $S$  – State. The State variable, which is present in these models, shows that in the Czech Republic these services are being used more than in Slovakia.

Indicator of population served, under conditions of regional libraries, and its real explanatory power is evoking the discussion. The special attention is deserved by online services of regional libraries, and that both from the perspective of their increasing proportion in total attendance of libraries, and from the perspective of number of loans of library units. This trend is not surprising and it is noticeable also from the results of German and Canadian benchmarking project of public libraries [9, 15]. Classic services of public libraries (loans and also the provision of information) are moving into online space, paper form of documents is being replaced by the electronic one, and public libraries have to cope with this phenomenon, [5].

#### Acknowledgements

The article was created under SGS project (SP2016/60, The Technical Efficiency and Economic Stability of Allowance Organizations) Faculty of Economics, VŠB - Technical University of Ostrava and was supported within Operational Programme Education for Competitiveness – Project No. CZ.1.07/2.3.00/20.0296.

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# Barriers to the Development of the Operations of Social Enterprises in the Czech Republic

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## Abstract

Social entrepreneurship is characterised by a high degree of creativity and innovation, not only in technical terms but also in managerial and social terms. The contribution of social enterprises to national economy consists mainly in the combination three types of benefits - economic, social and environmental. Social enterprises are becoming a strong and effective instrument of public administration and local governments in fighting against social exclusion, and they help address unemployment in specific groups of people in the labour market. Social entrepreneurship is a relatively young sector. The Act on social entrepreneurship is undergoing a drafting process. One of the barriers for social entrepreneurship is the absence of this act, which is already applied in some other countries. This paper aims to identify the main barriers to the operations of social enterprises on the basis of a questionnaire survey conducted in social enterprises. The paper should thus contribute to the debate about social entrepreneurship and employment of disadvantaged people in the labour market in the Czech Republic.

*Keywords: social entrepreneurship; public administration; incubator; disadvantaged people*

JEL Classification: J79, L31, O35

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## 1 Introduction

The urgency of structural unemployment, social policy issues and the need for more active integration policies result in the question and need to establish suitable structures, that might, in certain areas, take over these socio-economic issues from the public administration. One of the possible alternatives is to address the issues related to social economy through social enterprises that provide alternative and complementary options to addressing these issues. The concept of social entrepreneurship has been adopted by some EU countries; nevertheless, this concept has not been socially recognised everywhere. It does not only concern recognition of the enterprise but also recognition in the form of support, regulation and legislation by public authorities.

Importance of the third sector and its differentiation from the private and public sectors has been highly topical recently. Its economic importance is associated primarily with productivity and employment and growth can also be observed in the services sector. The importance of the third sector in the countries of Central and Eastern Europe is underrated. In contrast, in developed countries, such as France, Belgium and Ireland, the social economy contributes to 10% of employment [6].

Social economy and social entrepreneurship do not bring innovation associated with ownership of companies. Social economy emphasises responsibility of the social enterprise owners related to changes in the society by introducing innovation in the field of new products and their quality, new methods of organisation and production, new production factors and relationships in the market and new forms of enterprises and entrepreneurship [5].

The values and starting points for social economy and social entrepreneurship are inspired by the ideas of solidarity and humanism advocated by Owen and King, Leon Walras and John Stuart Mill. [4] Contemporary economists include, for example, Jacques Defourny, Jean-Louis Laville and others who combine the ideas of social, solidarity, ethical or humane economy and thus emphasise the importance of local social enterprises and social entrepreneurship [7].

### *1.1 Social Enterprise – Current European Approach*

Danish Technological Institute (DTI), which is actively involved in social innovation, defines social business as "a business with primarily social objectives where economic profit is primarily reinvested in the business for the same purpose or in the development of the local community and therefore is not intended to maximise profits for owners and shareholders" [3]. Social enterprises try to meet the local needs using local sources, they enter into local partnership initiatives and contribute to local development. [10]

A key objective of social entrepreneurship is the inclusion of disadvantaged people in the labour market and resulting reduction in the dependence of people on state unemployment benefits. The state supports these social enterprises at the start of their activities, tries to facilitate their establishment and further development of the enterprises. The social enterprise means an enterprise where people are recruited from target groups: "It is built upon a partnership of public and private social sectors while providing public services and promoting public employment policy". [8]. Social enterprise is very exceptional since both these sectors work closely together here, and it can be understood as an executor of social policy. Social enterprise is supported by public (including EU) funding. Despite this funding, it remains an independent social enterprise and its decisions on business operations involve no-one from the outside.

Its weight and significant participation in the establishment of European social entrepreneurship is carried by international networks dedicated to research and promotion of this concept. These include the European network EMES which, based on the research into social economy and social entrepreneurship in fifteen European countries, defined the ideal type of social enterprise. EMES's approach has been adopted by other major international organisations such as CIRIEC [1] and Social Economy Europe [14]. Both these institutions - EMES and CIRIEC - cooperate with other countries; they carry out research work and issue studies. In the Czech Republic, the research in the field of social entrepreneurship is conducted by the organisations P3-People, Planet, Profit, Chamber of Social Enterprises and partial research is conducted at universities.

### *1.2 Legal Environment*

In the individual EU countries there is no uniform model of European social economy law. Social economy is legally recognised in selected EU countries [9].

Social enterprises are subject to regulations introduced by a number of laws; however, none of them defines the term social entrepreneurship. Social enterprises are mainly focused on creating jobs for disadvantaged people [16]. Once the Czech Republic was established, the law took over regulation concerning non-profit sector entities (civic associations, foundations, churches) and the conditions for doing business and manage assets underwent only partial changes. It can be stated that the law of the Czech Republic does not prevent from social enterprises but does not promote them either. There are no rules set for social entrepreneurship such as the rules of profit reinvestment [2].

**Table 1. Countries with social economy and social entrepreneurship legislation**

Country	Legislation adopted in	Name of law
Finland	2003	Act on social entrepreneurship
Lithuania	2004	Act on social entrepreneurship
Slovakia	2004	Definition of social enterprises under Act No. 5/2004 Sb, on services in employment
Italy	2005	Act on social entrepreneurship
Poland	2006	Act on social cooperatives
Belgium	2008	Regional decree on social economy
Spain	2011	Act on social economy
Greece	2011	Act on social economy and social enterprises
Slovenia	2011	Act on social entrepreneurship
Portugal	2013	Act on social economy
France	2014	Act on social and solidary economy

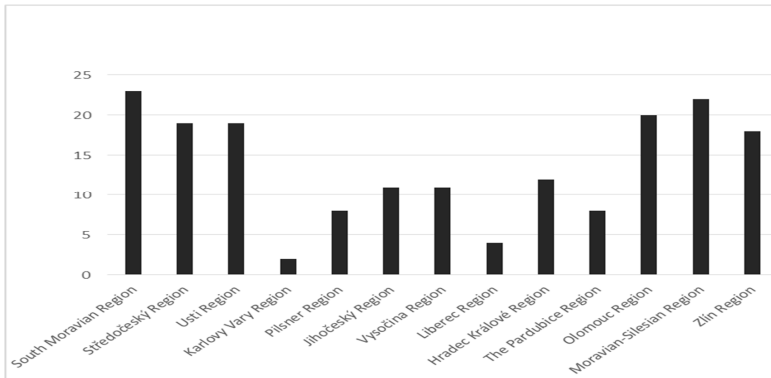
Source: [13]

Currently, the new version of the law [12] is being drafted in the Czech Republic. Along with the preparation of the Act on Social Entrepreneurship, the Development Strategy of Social Entrepreneurship in the Czech Republic is being prepared by the Ministry of Industry and Trade. The future Act on Social Entrepreneurship applies mainly to SMEs. The Act has impacts both on public budgets as well as the business environment. The Act on Social Entrepreneurship does not establish any new legal form, it only specifies characteristics to be met by natural persons or legal entities that wish to benefit from the status of a social enterprise, i.e. the integration of social enterprises and benefits arising from such a status.

### *1.3 Current Structure of Social Enterprises in the Market in the CR*

Graph no. 1 indicates that most social enterprises are located in the South Moravian Region (23 social enterprises), followed closely by the Moravian-Silesian Region (22) and the Region of Olomouc (20). The graph is based on the database of Czech social business administered by the organisation TESSEA and the company P3 – People, Planet, Profit. This website gives information about the indicators of selected social enterprises such as field of activities, destination, employed groups etc. Due to the fact that it is voluntary for social enterprises to get registered in the database, the data is not statistically relevant. Still, we can say that the number of social enterprises is growing, which is caused by the transformation of current businesses into social enterprises, the transformation of NGOs into social enterprises and the establishment of new social enterprises.

**Figure 1. Number of social entrepreneurship**



Source: Author

The most commonly employed target group is people with disabilities. The most employed group of disabled people are physically disabled people (over 50%), followed by people with intellectual and mental disabilities. The main activities of social enterprises are gardening services, vegetation management, maintenance and cleaning services. Furthermore, social enterprises are involved in accommodation and catering services and food processing.

## 2 Material and Methods

This paper aims to identify the main barriers in the activities of social enterprises on the basis of a questionnaire survey conducted in social enterprises. The paper should also contribute to the debate on social entrepreneurship and employment for disadvantaged people in the labour market in the Czech Republic. The paper answers mainly the following questions:

- What are the main barriers in conducting social entrepreneurship?
- What is the position of social enterprise in today's job market?
- Are social enterprises financially advantaged?

To identify the main barriers in the activities of social enterprises we used a survey in the form of a questionnaire. The form was distributed to 100 social enterprises, the selection was random and use was made of the Directory of Social Enterprises which is available on the website of České sociální podnikání.cz registering a total of 224 social enterprises (as of 31<sup>st</sup> March 2016). Registration in the Directory of Social Enterprises is voluntary and therefore we can not determine exactly how many social enterprises currently operate in the Czech Republic. The questionnaire survey was carried out in spring 2016, the response rate was 30%. The online questionnaire contained 10 questions and some of the questions were open. The questions concerned mainly the legal form of the enterprise, reasons for the selecting the legal form, strengths of social entrepreneurship, problems with doing business, funds used for business (various loans, operating subsidies, grants, donations etc.), opinions on the legislation, employment of disadvantaged groups and support from public administration and the state.

## 3 Results and Discussion

The conducted questionnaire survey indicates the following: in relation to employment the respondents clearly indicate that they employ disadvantaged groups (this response was provided by over 70% of respondents), especially persons with disabilities and the long-term unemployed. The respondents identify social dimension of their entrepreneurship as a strength.

As regards the social entrepreneurship funding, 45% of all respondents answered that they were receiving contributions for their employees which is one of the strong features of social entrepreneurship – employment of disadvantaged people (mainly those physically handicapped). Another major financial item was internal funds. Respondents often mention incompatibility between operating and capital subsidies. As the main source of funding they report EU funds (54%) and grants from other organisations (24% - in the same proportion they reported that they receive no subsidies).

The question of profit over the past year was responded to positively by 70% of all the enterprises. This indicates that social entrepreneurship is developing in a positive direction and it also proves the viability of this kind of business.

As regards the law, respondents most frequently apply the employment act, tax law, hygiene standards, trade licensing law, Civil Code, Business Corporations Act standards concerning the disabled. The question of what change or support from the state the respondents would appreciate was mostly answered as follows: clear definition of social entrepreneurship, better financial support, tax incentives, changes in public procurement and awareness raising and promotion of social entrepreneurship. Based on the survey, we can generate the following answers to the questions:

What are the main barriers in conducting social entrepreneurship: the unresolved issue in terms of social entrepreneurship is the very absence of the social entrepreneurship act. Most of the respondents in our survey confirmed the need for legal regulation of social entrepreneurship, which is associated with clearly defined criteria for social businesses and uniform rules.

What is the position of social enterprise in today's labour market? One of the main stakeholders influencing the operation of social enterprises is the public administration. The problem is on the part of the state as social economy is not defined and classification into a specific sector is missing. Currently, the social economy and social sector fall under the Ministry of Labour and Social Affairs - social benefits, under the Ministry of Industry and Trade - economic benefits and the Ministry for Regional Development - local benefits. Fragmentation of this sector puts great emphasis on the interactions between different ministries so as to set uniform rules and avoid problems in the operation of social enterprises. The problem of social enterprises in the labor market may be caused by a lack of innovation supply and, to a large extent, by weak innovation demand. The question to be addressed is also the inclusion of social entrepreneurship in the active employment policy. Public administration does not support social entrepreneurship. Cooperation between employment offices and municipalities or cities is obvious but, on the other hand, there is no coordination in terms of determining the amount of contributions for different groups of job seekers or the selection of appropriate tools and targeted programmes. Logically, cooperation is not possible here since the activities of employment offices are based on the concept of the MLSA and, methodically, the employment offices are controlled by the General Directorate of the Employment Offices of the CR.

Are social enterprises financially advantaged? Development of a legal environment and legislative basis for the character of social enterprises should also facilitate access to public funds and decision-making of financial institutions related to the provision of financial support, e.g. loans and credits, to the enterprises under certain favourable conditions. Another possibility offering financial support to the social enterprises is through tax reliefs. All this was provided by the respondents in their reactions.

The research results confirm the findings of other surveys conducted in the Czech Republic. For example, P3 confirms in its 2015 survey that the most often employed groups of people are those with disabilities and the long-term unemployed. This result comes from survey results concerning 151 social enterprises. A special phenomenon is the fact that the target groups change in terms of the operations of the businesses. One of the reasons may be the exhausted amounts disbursed from public funds, which may result in a headcount reduction. This is also confirmed by another survey from 2015 conducted by the Faculty of Economics and Administration [17]. The qualitative interviews indicate that the respondents (social enterprises) employ mainly disabled people. The new law will be essential for further surveys in the field of social entrepreneurship. This law will result in further major changes in the position of social

enterprises in the labour market, use of funds, highlighted social entrepreneurship at the local level – e.g. advantages provided in the procurement process, autonomy in decision making (with respect to social enterprises established by municipalities or cities), quality criteria as is the case of social services, accounting system. The main reasons for the necessity of legal regulation currently include:

- Absence of a uniform legal environment in the field of social entrepreneurship,
- System support not only in relation to employing people with disabilities, but also the long-term unemployed and socially excluded people,
- Support of citizen and community initiatives in addressing issues in municipalities and regions,
- Defining responsibilities of central government authorities in developing social entrepreneurship
- Absence of social economy development and support strategy, definition of benefits for social enterprises.

#### 4 Conclusion

This paper has identified main barriers to the operations of social enterprises. Answers to the survey questions are based primarily on the conducted survey. The survey results indicate that the main barriers to the development of social enterprises is the non-existence of social entrepreneurship law, inadequate definition of the social enterprise (what criteria are to be met by a social enterprise). Social enterprises do not receive support in public processes (socially responsible public procurement proceedings). What is also missing is a systematic setup of financial support for social enterprises (soft loans, credits) [16].

The objective of this paper is to contribute to the debate about social entrepreneurship. Currently, application deficit may be observed in the social entrepreneurship market. What is now being drafted is the social entrepreneurship act; however, the local governments are not ready to cooperate with social enterprises or give advice to the social enterprises. Another problem is a lack of social innovation capacity (insufficient innovation offer) and, to some extent, weak innovation demand (i.e. demand for effective solutions to social issues) [11]. Apparently, the only prospective way forward is to diversify the factual focus of support programmes and their capacity, to actively seek innovative capacities and opportunities, and to actively promote the innovation demand (public and private) for social impact.

It is therefore necessary to implement collaboration with local social enterprises into local strategies, bring this initiative to the level of cooperation with the public sector (e.g. by creating social incubators and platforms) and encourage this type of local business – e.g. by awarding socially responsible contracts.

#### Acknowledgements

This article was supported by the research project MUNI/A/1022/2015 "Výzkum neziskového sektoru: alternativní přístupy".

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# Analysis of University Activities in PCT Patent Application

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## Abstract

Universities contribute to economic growth not only through teaching and research, but through engagement and collaborations with industry and other off campus entities. One way of measuring the economic effects of these activities is to examine patent data. The aim of the study is to introduce analysis of university activities. If technology transfer office manager determines that an invention has sufficient internationally commercial potential, university will probably choose to file a Patent Cooperation Treaty (PCT) application on an invention. This study evaluates commercial potential of university patenting through participation of PCT application.

*Keywords: technology transfer office; university patenting; commercialization potential; patent cooperation treaty; patent*

JEL Classification: O3, I28, H4

## 1 Introduction

The most popular world university rankings are routinely taken at face value by media and social actors. While these rankings are politically influential, they are sensitive to both the conceptual framework (the set of indicators) and the modelling choices made in their construction (e.g., weighting or type of aggregation) [5].

### 1.1 Ranking of Universities

**Figure 1. Indicators and Weights for Ranking of Universities**

Shanghai Jiao Tong University Rankings (ARWU), 2008.

Criteria	Indicator	Weight
Quality of education	Alumni of an institution winning Nobel Prizes and Fields Medals	10%
	Staff of an institution winning Nobel Prizes and Fields Medals	20%
Quality of faculty	Highly cited researchers in 21 broad subject categories	20%
	Articles published in Nature and Science	20%
Research output	Articles in Science Citation Index Expanded, Social Sciences Citation Index	20%
Academic performance	Academic performance with respect to the size of an institution	10%

Times Higher Education Supplement Rankings (THES), 2008.

Criteria	Indicator	Weight
Research quality	Academic opinion: peer review, 6354 academics	40%
	Citations per faculty: total citation/full time equivalent faculty	20%
Graduate employability	Recruiter review: employers' opinion, 2339 recruiters	10%
International outlook	International faculty: percentage of full-time international staff	5%
	International students: percentage of full-time international students	5%
Teaching quality	Student faculty: full-time equivalent faculty/student ratio	20%

*Source: Authors based on [5]*

Occasionally, the raters of universities and the consumers of rankings do not pay much attention to the fact that rankings were initially conceived as a tool for measuring the effectiveness of higher education institutions. It is often assumed that highly ranked institutions are more productive, have higher quality teaching and research, and contribute more to society than lower-ranked institutions. However, the three main dimensions of institutions – teaching, research, and service – can differ or even conflict each other, and thus institutions that are performing well in one area may perform poorly along another dimension. For example, a small institution may be very efficient in educating a given number of students with limited resources, but not very efficient in the production of research. On the other hand, we might find a large institution that is very efficient in knowledge production but not in teaching undergraduate students [7]. Center for World University Rankings is using also patent activity as indicator for university ranking.

**Figure 2. Indicators and Weights for Ranking of Universities**

Criteria	Indicator	Weight
Quality of Education	the number of a university's alumni who have won major international awards, prizes, and medals relative to the university's size	25%
Alumni Employment	the number of a university's alumni who have held CEO positions at the world's top companies relative to the university's size	25%
Quality of Faculty	the number of academics who have won major international awards, prizes, and medals	25%
Publications,	number of research papers appearing in reputable journals	5%
Influence	the number of research papers appearing in highly-influential journals	5%
Citations	the number of highly-cited research papers	5%
Broad Impact	the university's h-index	5%
Patents	the number of international patent filings	5%

Source: Authors based on [8]

Some rankings evaluated only webometric activity [3], [4].

### 1.2 University Patenting

International patents are among the traditional and, at the same time, most important tools of legal protection for technical solutions and inventions. Translating patent data into intelligence service allows gauging its current technical competitiveness, to forecast technological trends, and to evaluate commercial potential based on new technologies developed by universities.

The initial study of Czech university patenting since January 1990 till June 2015 identified 4,398 university inventions or technical solutions published at database of the Industrial Property Office of Czech Republic. The previous study showed trends in total patent document filings of Czech universities. The results of these study also showed, that university patenting in Czech Republic is highly influenced by methodology of evaluation of the results of research organizations and results of finished programs approved by Office of the Government of the Czech Republic. The interesting metrics related to real commercial potential is geographical filing breadth. If any potential partner will appear or the university decided about PCT filing, it can be supposed that invention has commercial potential. Filing only Czech patent application has absolutely no commercial potential and it is only limitation for Czech spin-offs entities, because inventions are on other territories freedom to operate [10].

Universities are using the patent strategy for interesting inventions differently from businesses because they are usually trying to build commercial exploitation of their inventions. Universities are far more likely to use the Patent Cooperation Treaty (PCT) than other applicants. Subjects from private sectors tend to file disproportionately large numbers of domestic patents to protect an already established market, which is usually their home market. Universities mainly engage in "upstream" innovation and may thus possess less information about the commercial potential of their inventions than companies do; this also favors the "wait and see" strategy that the PCT offers, whether invention has some commercial potential, and moving it out of the university [8].

One way of measuring the commercial potential of university patenting is to examine PCT patent activity. If technology transfer office managers determined that an invention has sufficient internationally commercial potential, university has been chosen to file a PCT application on an invention. PCT applications allow applicants to seek broad international documentation for an invention before actually submitting a patent application. PCT patent applications are standardized worldwide with regard to different aspects, such as formal requirements and a high-quality international search. PCT application approval applies to the 144 PCT member countries and can help to drastically decrease patenting costs from national and regional applications. In 2013, universities filed 9,804 PCT applications. Shares of university filings in total PCT filings stood at 5.1% [8].

## 2 Material and Methods

Collectively in the world, the public sector organizations have created a set of legal protection that is lower in number of legal protection cases than the private sectors portfolio. In the Czech Republic is situation different and Czech universities belong to the most active entity in patent application filing. The question therefore arises whether specific detachment of scientifically technological thinking stems from a meagre university involvement in the process of commercialization of inventions developed by them, whether it also has other institutional base? The main goal of our study is threefold:

What are the most active Czech universities in PCT patent application filing? This study listing the 16 Czech universities that filed PCT patent application and is published by the World Intellectual Property Organization (WIPO).

What is the technology specialization of the top 10 the most active Czech universities? The International Patent Classification (IPC) and the WIPO Technology Classification were used in this study. This WIPO technology classification is a widely accepted technology grouping system for use in patent analytics.

Where is difference of technology specialization between top 10 the most active Czech universities and worldwide universities? This part of study provides comparison reveals interesting differences between countries, which might similarly affect licensing, the generation of start-ups, and other forms and specific factors of technology transfer on territories.

Is there statistically significant (linear) dependence among selected indicators as: global ranking, bigness of university, total patent activity, PCT patent activity?

### 2.1 Dataset

Our empirical analysis is based on a newly created dataset. Patent data were obtained from the database Espacenet from European Patent Office (EPO).

In stage 1, we identified bibliographic data of Czech universities that list one of the 12 universities as applicant or assignee. The search query was: "WO as the publication number AND CZ as the priority number AND univer\* or uceni or CVUT or VUT as the applicant" and 218 results found in the database.

In stage 2, we examined downloaded excel file to track different entities based on name of applicant. The results revealed that 12 Czech universities showed PCT patenting activity."

In stage 3, the individual datasets for each university were grouped together. Specialized excel file enables us to examine these documents and 'track' technology fields of each PCT document.

In stage 4, the individual datasets for each university were grouped together. Specialized excel file enables us to examine these documents and 'track' technology fields of each PCT document. We mined technology specialization by visualization of IPC Codes.

In stage 5, we identified areas where Czech university patenting is concentrated.

In stage 6, we compared technology specialization of Czech university patenting with top worldwide universities.

In stage 7, find out significant (linear) dependence among selected indicators as: global ranking, bigness of university, total patent activity, PCT patent activity by using SPSS Statistics Base v.22 from IBM.

## 2.2 Data Analysis

The metrics for assessing the technology fields were developed in excel sheet to extract IPC group from the dataset. The all IPC codes on group level listed on each PCT patent document has been used for the purposes of clustering university patent documents into 5 main technology areas with 35 technology fields in total. Data for statistically significant (linear) dependence among selected indicators are showed on figure 3. Data has been obtained from different sources.

Figure 3. Data for statistically significant (linear) dependence

Name of University	Patent Activity		Global Ranking		Bigness of university [10]							
	Total patent activity [7]	PCT patent activity [7]	The Ranking Web or Webometrics [8]	2016 Reviews & Rankings [9]	Nr. of professors	Nr. of associate professors	Nr. of lecturer / researcher	Nr. of Master's degree	Nr. of lecturer	pedagogical staff	researcher's staff	Total
1 Czech Technical University in Prague	858	35	363	3	188	335	905	91	6	39	354	1918
2 Palacký University Olomouc	119	35	618	5	498	810	1770	341	246	143	844	4653
3 Charles University in Prague	130	27	181	1	498	810	1770	341	246	143	844	4653
4 Technická univerzita v Liberci	339	26	1582	13	52	93	359	21	0	0	17	543
5 Brno University of Technology	361	25	651	4	136	266	568	147	4	16	201	1338
6 Tomas Bata University in Zlin	142	19	1423	14	41	95	196	51	34	21	32	469
7 Masaryk University in Brno	79	17	412	2	216	354	666	174	155	64	116	1744
8 University of Chemistry and Technology Prague	200	7	1370	17	69	101	234	21	0	0	204	630
9 Technical University of Ostrava	276	6	930	8	91	197	559	19	4	43	258	1171
10 University of South Bohemia	115	6	954	10	50	120	401	6	18	4	33	633
11 University of Pardubice	44	3	1486	15	58	110	236	136	2	0	93	635
12 University of Veterinary and Pharmaceutical Sciences Brno	13	2	2526	19	32	40	140	55			10	277
13 Jan Evangelista Purkyně University	14	2	2808	16	34	93	268	10	19	0	38	462
14 Czech University of Life Sciences Prague	453	1	1182	9	80	121	389	1	3	42	88	723
15 Mendel University of Agriculture and Forestry Brno	156	1	1290	11	59	117	236	74	0	15	206	707
16 University of West Bohemia	180	1	958	6	58	140	443	42	4	1	235	923

Source: Authors

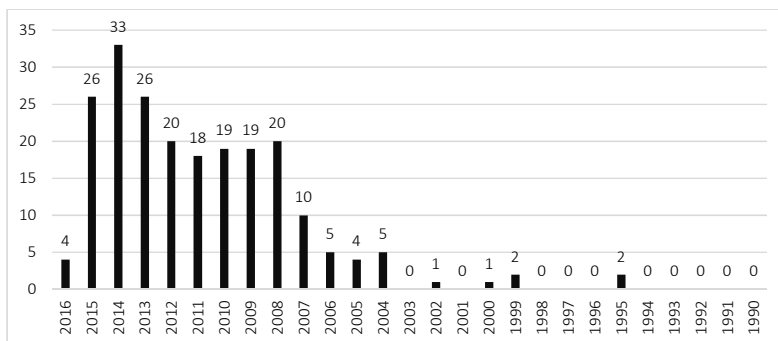
## 3 Results and Discussion

### 3.1 Patent Publications per Year

This metric refers to the total number of patent documents for all university according to publication date (see figure 4). The result shows, that Czech universities are more active in PCT

application filing especially during last ten year. This metric refers to the total number of patent documents per university (see figure 5).

**Figure 4. Total Nr. of PCT Application in Time**



Source: Authors

### 3.2 The Distribution of Pct Patent Application across Technology Fields

University patents cover many technology areas. This section provides insights into these areas and assesses the strength of university patents across different technology sectors for the top 10 the most active universities. An assessment of technology fields by university (Figure 5) suggests that top university universities tend to concentrate their PCT patent filings in chemistry (47 % of documents belongs to the chemistry). The top 5 technology areas with the greatest occurrence as the all listing are: Measurement, Pharmaceuticals, Medical technology, Organic fine chemistry, Biotechnology.

**Figure 5. The distribution of PCT patent application across technology fields, Top 10 Czech universities**

Technology Filed Description	Top 10 Czech universities - average		Czech Technical University in Prague		Palacký University Olomouc		Charles University in Prague		Technical University of Liberec		Brno University of Technology		Tomas Bata University in Zlín		Masaryk University in Brno		Technical University of Ostrava		University of Chemistry and Technology Prague		University of South Bohemia		
	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	
	204		35		35		27		26		25		19		17		7		7		7		6
Electrical engineering	6%	13	6%	2	3%	1	0%	0	4%	1	24%	6	11%	2	6%	1	0%	0	0%	0	0%	0	0%
Electrical machinery, apparatus, energy	3%	7	3%	1	3%	1	0%	0	4%	1	12%	3	0%	0	6%	1	0%	0	0%	0	0%	0	0%
Audio-visual technology	1%	2	0%	0	0%	0	0%	0	0%	0	4%	1	5%	1	0%	0	0%	0	0%	0	0%	0	0%
Telecommunications	1%	2	0%	0	0%	0	0%	0	0%	0	4%	1	5%	1	0%	0	0%	0	0%	0	0%	0	0%
Digital communication	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Basic communication processes	0%	1	3%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Computer technology	0%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
IT methods for management	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Semiconductors	0%	1	0%	0	0%	0	0%	0	0%	0	4%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Instruments	25%	54	29%	10	14%	5	44%	12	12%	3	36%	9	26%	5	18%	3	43%	3	43%	3	43%	3	17%
Optics	1%	3	0%	0	0%	0	0%	0	0%	0	0%	0	8%	2	0%	0	0%	0	0%	0	0%	0	17%
Measurement	17%	34	26%	9	6%	2	22%	6	4%	1	28%	7	11%	2	12%	2	29%	2	29%	2	29%	2	17%
Analysis of biological materials	4%	8	0%	0	6%	2	11%	3	4%	1	4%	1	5%	1	0%	0	0%	0	0%	0	0%	0	0%
Medical technology	12%	25	9%	3	9%	3	26%	7	8%	2	12%	3	21%	4	6%	1	14%	1	14%	1	14%	1	0%
Chemistry	47%	103	17%	6	89%	31	67%	18	35%	9	36%	9	32%	6	82%	14	43%	3	43%	3	43%	3	67%
Organic fine chemistry	13%	26	0%	0	49%	17	30%	8	0%	0	0%	0	6%	1	0%	0	0%	0	0%	0	0%	0	0%
Biotechnology	9%	18	0%	0	11%	4	26%	7	0%	0	4%	1	0%	0	29%	5	0%	0	0%	0	0%	0	17%
Pharmaceuticals	16%	32	0%	0	49%	17	33%	9	8%	2	4%	1	0%	0	18%	3	0%	0	0%	0	0%	0	0%
Macromolecular chemistry, polymers	6%	12	0%	0	0%	0	11%	3	12%	3	16%	4	11%	2	0%	0	0%	0	0%	0	0%	0	0%
Food chemistry	2%	4	0%	0	0%	0	0%	0	0%	0	5%	1	0%	0	0%	0	0%	0	0%	0	0%	50%	3
Basic materials chemistry	5%	10	0%	0	17%	6	0%	0	0%	0	16%	3	0%	0	0%	0	0%	0	0%	0	0%	17%	1
Materials, metallurgy	3%	6	3%	1	3%	1	0%	0	0%	0	4%	1	0%	0	6%	1	14%	1	14%	1	14%	1	0%
Surface technology, coating	2%	4	3%	1	0%	0	0%	0	4%	1	4%	1	0%	0	6%	1	0%	0	0%	0	0%	0	0%
Micro-structural and nano-technology	2%	5	3%	1	3%	1	0%	0	4%	1	0%	0	0%	0	0%	0	14%	1	14%	1	14%	1	0%
Chemical engineering	8%	17	3%	1	3%	1	4%	1	8%	2	8%	2	5%	1	29%	5	29%	2	29%	2	29%	2	0%
Environmental technology	4%	9	6%	2	6%	2	0%	0	0%	0	4%	1	5%	1	6%	1	14%	1	14%	1	14%	1	0%
Mechanical engineering	24%	55	54%	19	3%	1	7%	2	69%	18	20%	5	32%	6	6%	1	14%	1	14%	1	14%	1	17%
Handling	3%	7	11%	4	0%	0	0%	0	8%	2	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	17%
Machine tools	2%	4	6%	2	0%	0	0%	0	4%	1	0%	0	0%	0	6%	1	0%	0	0%	0	0%	0	0%
Engines, pumps, turbines	5%	10	26%	9	0%	0	0%	0	0%	0	4%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Textile and paper machines	7%	15	0%	0	0%	0	4%	1	42%	11	0%	0	16%	3	0%	0	0%	0	0%	0	0%	0	0%
Other special machines	6%	12	3%	1	3%	1	0%	0	12%	3	12%	3	21%	4	0%	0	0%	0	0%	0	0%	0	0%
Thermal processes and apparatus	3%	6	9%	3	0%	0	0%	0	0%	0	4%	1	0%	0	0%	0	14%	1	14%	1	14%	1	0%
Mechanical elements	3%	6	9%	3	0%	0	0%	0	0%	0	4%	1	0%	0	0%	0	14%	1	14%	1	14%	1	0%
Transport	1%	3	6%	2	0%	0	0%	0	4%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Other fields	7%	12	3%	1	0%	0	0%	0	23%	6	0%	0	5%	1	12%	2	14%	1	14%	1	14%	1	0%
Furniture, games	1%	2	0%	0	0%	0	0%	0	0%	0	0%	0	5%	1	6%	1	0%	0	0%	0	0%	0	0%
Other consumer goods	4%	9	3%	1	0%	0	0%	0	23%	6	0%	0	0%	0	12%	2	0%	0	0%	0	0%	0	0%
Civil engineering	1%	2	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	14%	1	14%	1	14%	1	0%

Source: Authors

### 3.3 Linear Dependence among Selected Indicators

Our results shows that total patent activity is not significant depended on bigness of university measured by number of employees, but PCT application is already depended. Our result shows that there is a significant (linear) dependence between PCT application and rankings, and also between the rankings and bigness of university measured by number of employees.

**Figure 6. Statistically significant (linear) dependence among selected indicators as: global ranking, bigness of university, total patent activity, PCT patent activity, made by SPSS**

		Total patent activity [7]	PCT patent activity [7]	The Ranking Web or Webometric 2016 Reviews & Rankings [9]	Nr. of professors	Nr. of associate professors	Nr. of lecturer / researcher	Nr. of Master's degree	Nr. of lecturer	pedagogical staff	researcher's stuff	Total	
Total patent activity [7]	Pearson Correlation	1	,443	-,422	-,396	,019	,032	,119	-,149	-,306	-,042	,076	,039
	Sig. (2-tailed)		,085	,103	,129	,944	,906	,660	,581	,268	,883	,778	,887
	N	16	16	16	16	16	16	16	16	15	15	16	16
PCT patent activity [7]	Pearson Correlation	,443	1	-,574	-,571	-,682	-,692	-,703	-,625	-,540	-,579	-,584	-,674
	Sig. (2-tailed)		,085	,020	,021	,004	,003	,002	,010	,038	,024	,018	,004
	N	16	16	16	16	16	16	16	16	15	15	16	16
The Ranking Web or Webometric 2016	Pearson Correlation	-,422	-,574	1	,891	-,627	-,648	-,653	-,552	-,500	-,608	-,603	-,637
	Sig. (2-tailed)	,103	,020		,000	,009	,007	,006	,026	,058	,016	,014	,008
	N	16	16	16	16	16	16	16	16	15	15	16	16
Reviews & Rankings [9]	Pearson Correlation	-,396	-,571	,891	1	,673	-,707	-,719	-,587	-,564	-,658	-,614	-,687
	Sig. (2-tailed)	,129	,021	,000		,004	,002	,002	,017	,028	,008	,011	,003
	N	16	16	16	16	16	16	16	16	15	15	16	16
Nr. of professors	Pearson Correlation	,019	,682	-,627	-,673	1	,996	,981	,932	,934	,963	,938	,995
	Sig. (2-tailed)	,944	,004	,009	,004		,000	,000	,000	,000	,000	,000	,000
	N	16	16	16	16	16	16	16	16	15	15	16	16
Nr. of associate professors	Pearson Correlation	,032	,692	-,648	-,707	,996	1	,988	,928	,926	,957	,943	,997
	Sig. (2-tailed)	,906	,003	,007	,002	,000		,000	,000	,000	,000	,000	,000
	N	16	16	16	16	16	16	16	16	15	15	16	16
Nr. of lecturer / researcher	Pearson Correlation	,119	,703	-,653	-,719	,981	,988	1	,875	,882	,943	,948	,992
	Sig. (2-tailed)	,660	,002	,006	,002	,000	,000		,000	,000	,000	,000	,000
	N	16	16	16	16	16	16	16	16	15	15	16	16
Nr. of Master's degree	Pearson Correlation	-,149	,625	-,552	-,587	,932	,928	,875	1	,897	,865	,851	,919
	Sig. (2-tailed)	,581	,010	,026	,017	,000	,000	,000		,000	,000	,000	,000
	N	16	16	16	16	16	16	16	16	15	15	16	16
Nr. of lecturer	Pearson Correlation	-,306	,540	-,500	-,564	,934	,926	,882	,897	1	,929	,804	,913
	Sig. (2-tailed)	,268	,038	,058	,028	,000	,000	,000	,000		,000	,000	,000
	N	15	15	15	15	15	15	15	15	15	15	15	15
pedagogical staff	Pearson Correlation	-,042	,579	-,608	-,658	,963	,957	,943	,865	,929	1	,890	,956
	Sig. (2-tailed)	,883	,024	,016	,008	,000	,000	,000	,000	,000		,000	,000
	N	15	15	15	15	15	15	15	15	15	15	15	15
researcher's stuff	Pearson Correlation	,076	,584	-,603	-,614	,938	,943	,948	,851	,804	,890	1	,961
	Sig. (2-tailed)	,778	,018	,014	,011	,000	,000	,000	,000	,000	,000		,000
	N	16	16	16	16	16	16	16	16	15	15	16	16
Total	Pearson Correlation	,039	,674	-,637	-,687	,995	,997	,992	,919	,913	,956	,961	1
	Sig. (2-tailed)	,887	,004	,008	,003	,000	,000	,000	,000	,000	,000	,000	
	N	16	16	16	16	16	16	16	16	15	15	16	16

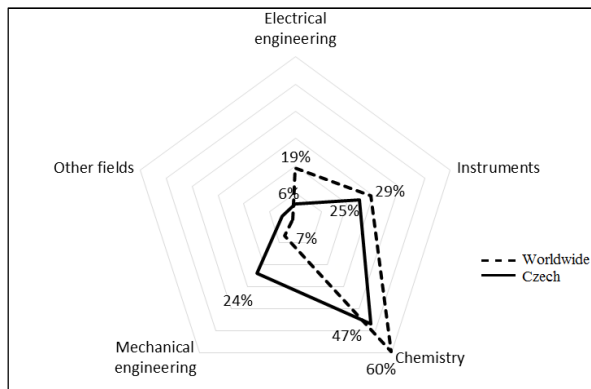
Source: Authors

### 3.4 The Comparison of Main Technology Areas for Top 10 the Most Active Czech Universities and Worldwide Universities

Another our previous (not published) study identified the top 10 the most active worldwide universities in PCT application filing. These universities are: University of California, University of Tokyo, Massachusetts Institute of Technology, University of Texas, Osaka University, Harvard College, Johns Hopkins University, University Florida, Columbia University, Kyoto University. We carried out for these universities with same approach also analysis of the distribution of PCT patent application across technology fields. These results have been compared with Czech university patenting. The results show that the most active worldwide universities are focused more on chemistry or electrical engineering. Czech universities are more active in mechanical engineering.



**Figure 7. The distribution of PCT patent application across main technology areas**



Source: Authors

#### 4 Conclusion

Universities are a complex, dynamic organizations constantly changing, year on year with respect to the faculty providing the teaching, to the form and nature of the curriculum offered, to the resources provided. We rank universities only regarding to PCT patent application and this metrics cannot be included as a measure of research productivity, because using metric of total number of PCT applications is not representative enough. Patents are important outcomes that indicate a level of activity or prestige, but productivity can be measured only with comparing with funding on research activities or based on incomes from licensing. These data about funding are not available. But metrics of total number of PCT patent application can be used such as metric that is indicative of the likelihood of a university patent being commercialized or used by third parties. The most active universities are Palacký University in Olomouc and Czech Technical University in Prague. But total number of 35 PCT applications shows, that this patent strategy is not using very often. Relating to the all patent cases, the highest productivity has Palacký University, because previously obtained results show that the propensity to apply in Palacký University (circa 29.4%). In contrast, Czech Technical University filed only 4.4% PCT application (35 case from 858 application in total) [9]. Our result showed that general patent activity has no influence on global ranking of universities, but PCT patent application activity has already have influence on global ranking and depends on bigness of university measured by number of employees.

Global markets have meant that technologists compete globally. It's no longer good enough to be the best in domestic country. Investors want firms with global capabilities and ambitions to compete in the global markets. The results of this study show that new approach of university patenting in Czech Republic should be required to stimulate translational research with industry. The best way how to increase the commercial potential is filing only international patents. It means decreasing the number of cases, when only patent application in Czech Republic is filed. International publishing of invention as soon as is possible must be followed.

#### Acknowledgements

This paper was supported by the research project - Economic and Managerial Aspects of Processes in Biomedicine, University of Hradec Kralove, Faculty of Informatics and Management, 2014.

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# Is Current Institutional Environment Suitable for Renewable Electricity Generation in the Czech Republic

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## Abstract

The main goal of this paper is to analyse the institutions in the area of electricity generated from renewable energy sources, with detailed focus on feed-in tariffs. Firstly policy introduction and literature overview is described. Regarding methodology, presented research is based on a standard economic methods, consisting of the methods of comparative analysis, deduction and synthesis. Based on the results, we can say that the institutional environment for all renewable energy sources in the Czech Republic is not similar, moreover it is not similar even for the same energy sources. Furthermore, the development of feed-in tariffs does not represent suitable environment for the support of electricity generated from renewable energy sources, since the predictability of the development of feed-in tariffs for new electricity power plant is very hard – the policy of economic support differs in particular years

*Keywords: energy policy; renewable energy sources; electricity; institutions*

JEL Classification: H23, Q48

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## 1 Introduction

### 1.1 Policy Introduction

Energy efficiency and renewable energies have a great potential for economic development in Europe's regions by boosting energy security, creating jobs and increasing regional autonomy, as well as helping to fight climate change [9]. The European Union has contributed greatly to the growth of these sectors in Europe, with the Europe 20/20/20 targets setting the mid-term policy framework, and a variety of programmes and tools providing finance and support for regional development.

Based on Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, the European Union as a whole has in 2020 target of a 20% share of energy from renewable sources and a 10% share of energy from renewable sources in transport. The countries and regions of central Europe vary greatly in their policy frameworks and have a wide disparity in their current performance and 2020 targets, regarding electricity generation, almost all countries are on track for meeting their commitments [9]. For the Czech Republic, the European Commission set a minimum 13% share of energy from renewable energy sources in gross final energy consumption. Achieving this goal must be also provided with at least a 10% share of renewables in transport.

Based on statistics of Ministry of Industry and Trade of the Czech Republic [15], the yield of gross production of electricity from renewable sources in 2014 on the total gross electricity generation was 10,7%, the share of renewable energies on primary energy sources was 9% and the share of renewable energy on final consumption, in accordance with international methodology of calculation, was 13,4%.

The following Tab.1 shows us the overview of energy generated from renewable energy sources in the Czech Republic in year 2014 in total.

**Table 1. Energy generated from RES in total in 2014**

	Energy generated from RES in total (Gj)	Yield on PES (%)	Yield on RES (%)
Biomass (except households)	43 440 723	2,5%	27,8%
Biomass (households)	49 638 229	2,9%	31,8%
Water power plants	6 873 203	0,4%	4,4%
Biogas	25 458 475	1,5%	16,3%
Biodegradable fraction of municipal solid waste	3 452 851	0,2%	2,2%
Liquid biofuels	13 513 816	0,8%	8,6%
Heat pumps	3 855 265	0,2%	2,5%
Solar thermal systems	690 902	0,0%	0,4%
Wind power plants	1 715 558	0,1%	1,1%
Photovoltaic power plants	7 642 328	0,4%	4,9%
Total	156 281 350	9,0%	100,0%

Source: Author, [15]

We can see that the highest share on renewable energy sources in year 2014 in the Czech Republic was represented by biomass (both used in households and outside households), the significant yield on primary energy sources (PES) was represented also by biogas and liquid biofuels.

## 1.2 Literature Overview

We can find mainly studies analysing and evaluating public policies and public support of renewable energy sources and their success in European countries as a whole [1, 13] or selected USA countries [2]; however most of the studies are represented by national case studies evaluating domestic economic instruments and state public policies supporting renewable energy sources, for example in Romania [21], Lithuania [3] or Spain [16].

Regarding institutional view, precisely scientific papers in the areas of energy policy and renewable energy sources, [12] focused on political-institutional barriers to energy efficiency, in more details on political obstructions, conflicting guidelines in the governance structure and lack of policy coordination. [7] analysed trade-offs in energy policy objectives in Germany, Spain and Denmark, precisely asked how institutions in an evolving electricity system can be designed to best achieve policy targets that are partly conflicting, dealing with support of renewable energy sources. Also [8] analysed institutions, discourses and the promotion of renewable energy and proposed so called discourse-institutional view. [5] presented comparative analysis of energy governance regarding nonconventional renewable energy sources in Brazil and Germany. The authors focused on the legal and regulatory framework and the institutions created to support renewable energy sources market development. [11] offered a new, interdisciplinary framework for the analysis of governing for sustainable energy system change by drawing together insights from, and offering critiques of, socio-technical transitions and new institutionalist concepts of change.

In the Czech Republic, we can find mainly economic analyses, for example [20] analysed costs connected with the growth of wind energy supply, [17] described photovoltaic sector and its development. [18] analysed consumer loss in photovoltaic power plants in the period 2010–2011 and [10] focused on the total historical and future costs of supporting photovoltaic electricity generation in the Czech Republic. The model estimation of such costs is accompanied by a methodologically unified comparison with the costs of supporting other renewable energy resources. [22] analysed the relationship between the increase of renewable electricity generation and the progress of public support for renewable electricity.

However, there is a general lack of studies analysing institutional background of renewable electricity generation in the Czech Republic. Accordingly, the main goal of this paper is to analyse the institutions in the area of electricity generated from renewable energy sources, with detailed focus on feed-in tariffs. For the purposes of the main goal fulfilment, 2 research questions should be discussed:

- 1) Is institutional environment similar for all renewable energy sources?
- 2) Does the development of feed-in tariffs represent suitable institutional environment for renewable electricity generation?

## **2 Material and Methods**

For the purposes of this paper, data from the Energy Regulatory Office (ERO) [6] were used, precisely feed-in tariffs for electricity generated from renewable energy sources in CZK per MWh in the period 2003 – 2016. Further data come from the Ministry of Industry and Trade (MIT) [15], regarding gross production of electricity from renewable sources in MWh in the period 2003 – 2014.

Research presented on the following pages is based on a standard economic methodology, consisting of the methods of comparative analysis, deduction and synthesis.

## **3 Results**

### *3.1 Institutional Support of Renewable Electricity Generation*

In the Czech Republic, the government introduced more institutions for support of renewable energy sources. Regarding legislation, the basic law is Act no. 165/2012 Coll., on promoted energy sources and on amendment to some laws and Act no. 458/2000 Coll., on business conditions and public administration in the energy sectors and on amendment to other laws (the "Energy Act"). The law is supplemented by conceptual documents – State energy policy of the Czech Republic (December 2014), National Renewable Energy Action Plan of the Czech Republic (2015) and National Action Plan for Smart Grids (2015).

In connection with law and conceptual documents, there are the following economic instruments supporting renewable electricity generation: grants on investments, feed-in tariffs, green-premiums on electricity prices, tax exemptions, tax reductions and refund of taxes. Under the above law, ERO sets out the scope and level of support in its price decisions. Focusing on grants on investments, we can distinguish the following [14]:

- 1) State programmes - State programme supporting energy savings and use of renewable energy sources regulated by the Ministry of Industry and Trade, New green savings programme regulated by the Ministry of the Environment and Programme for the replacement of boilers regulated by both the Ministry of the Environment and selected regional offices.
- 2) Operational programmes – Operational programme OPPIK regulated by the Ministry of Industry and Trade, Operational programme OPŽP regulated by the Ministry of the Environment and Operational programme OPRV regulated by the Ministry of Agriculture.

Focusing on the exemptions, reductions or refund of taxes, we can find special tax depreciation for renewable energy sources, as lower VAT tax rate [19], exemption for electricity generated from renewable energy sources (since 1.1.2016 with limited power installation up to 30 kW) from electricity tax, exemption for land connected with particular power station from property tax (excluding photovoltaic energy) and exemption for buildings after changing the heating system from fossil fuels system to a system using RES for five years from property tax [14]

Regarding feed-in tariffs and green premiums, ERO issues price decisions in the Energy Regulation Gazette; ERO sets out the scope and level of support for electricity generation from renewable energy sources, high-efficiency combined heat and power generation and secondary energy sources. Support for electricity generation is guaranteed for 15 – 30 years, depending on

particular renewable energy source. The following table 2 shows us the examples of guarantee for selected renewable energy sources.

**Table 2. Feed-in tariffs - examples of years of guarantee**

Sources	Years of Guarantee
Small hydro power plant	30
Biomass power plant	20
Biogas power plant	20
Wind power plant	20
Solar power plant	20

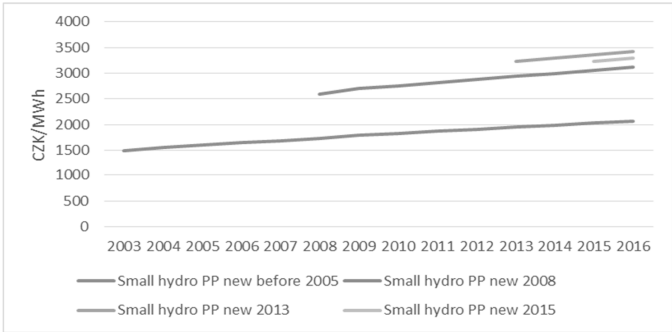
Source: [15]

Based on the current law, feed-in-tariffs for new producers are calculated every year, whereas the calculations are based on the current investment costs and, in the case of biomass, biogas and biofuels also on the current fuel prices. For existing sources, feed-in-tariffs are increased by 2% a year, with the exception of plants using biomass, biogas and biofuels. The development of feed-in-tariffs in particular years for particular renewable energy sources is analyzed in more details in the following chapter 3.2.

**3.2 Feed-in-Tariffs Comparison**

For the purposes of this article, we will focus in more details on selected years of electricity production start: 2003, 2008, 2013 and 2015. The following Figure 1 shows us the development of feed-in-tariffs for electricity generated in small hydro power plants, depending on the date of the production start.

**Figure 1. Feed-in-tariffs for small hydro power plants**

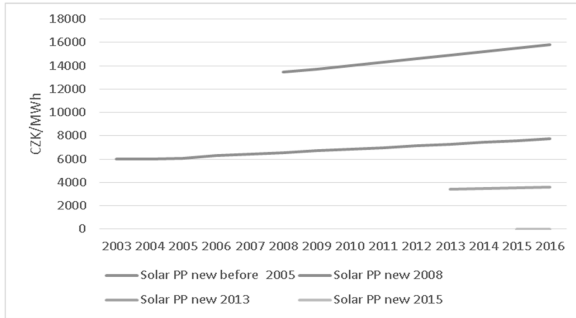


Source: Author based on [6]

Regardless regular annual increase in particular feed-in-tariffs, we can see also different level of support in the first year of the electricity generation and consequent different level of support in the following years. For example in year 2016 there is the lowest feed-in-tariff for MWh of electricity generated in power plant started with production in year 2003 and the highest feed-in-tariff for MWh of electricity generated in power plant started with production in year 2013.

The following Figure 2 shows us the development of feed-in-tariffs for electricity generated in solar power plants, depending on the date of the production start.

**Figure 2. Feed-in-tariffs for solar power plants**

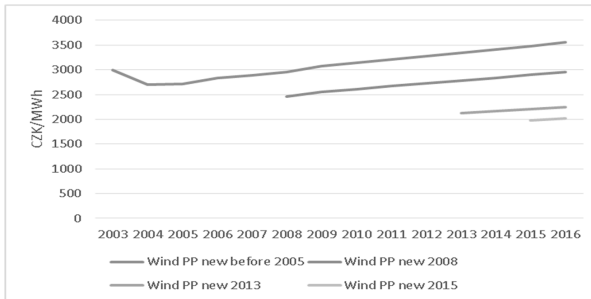


Source: Author based on [6]

There is similar situation as in the previous Figure 1 - you can see that the support for solar power plants differs depending on the date of the production start. Regardless regular annual increase in particular feed-in-tariffs, we can see also different level of support in the first year of the electricity generation and consequent different level of support in the following years. However, the development of feed-in-tariffs for electricity generated in solar power plants have different trend - Figure 2 shows us that in year 2016 there is zero feed-in-tariff for MWh of electricity generated in power plant started with production in year 2015 and the highest feed-in-tariff for MWh of electricity generated in power plant started with production in year 2008.

The following Figure 3 shows us the development of feed-in-tariffs for electricity generated in wind power plants, depending on the date of the production start.

**Figure 3. Feed-in-tariffs for wind power plants**

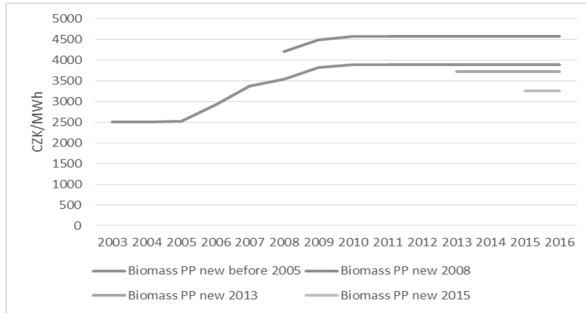


Source: Author based on [6]

Comparing Figure 3 with Figure 1 and Figure 2, we can see one more different trend - the development of feed-in-tariffs shows us decrease in the first year of the electricity generation support. In year 2016 we can see the lowest feed-in-tariff for MWh of electricity generated in power plant started with production in year 2015 and the highest feed-in-tariff for MWh of electricity generated in power plant started with production in year 2003.

The following Figure 4 shows us the development of feed-in-tariffs for electricity generated in biomass power plants, depending on the date of the production start.

**Figure 4. Feed-in-tariffs for biomass power plants**

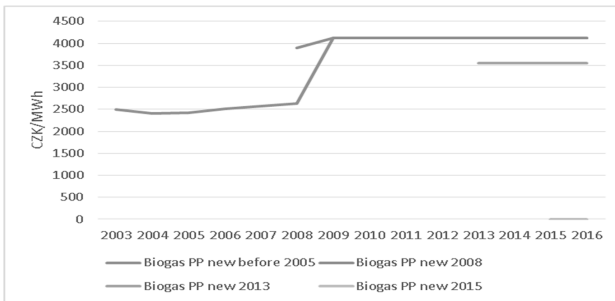


Source: Author based on [6]

Focusing on Figure 4, we can see that feed-in-tariffs for electricity generated in biomass power plants are different from electricity generated in small hydro, solar and wind power plants – there is no regular annual increase. Regarding the development of feed-in-tariffs, there is the similar trend as in case of solar power plants; on the other hand there are no zero feed-in-tariffs for producers started with electricity generation in years 2015-2016.

The following Figure 5 shows us the development of feed-in-tariffs for electricity generated in biogas power plants, depending on the date of the production start.

**Figure 5. Feed-in-tariffs for biogas power plants**



Source: Author based on [6]

Comparing Figure 5 with other figures, we can say that in case of feed-in-tariffs for electricity generated in biogas power plants there is no regular annual increase and the trend of the development of feed-in-tariffs in the first year of the electricity generation is similar as in case of solar power plants, including also zero feed-in-tariffs for the power plants started with generation in years 2015 and 2016.

#### 4 Discussion

For the purposes of the main goal fulfilment, 2 research questions should be discussed:

1. Is institutional environment similar for all renewable energy sources? Based on the previous chapter, we can say that institutional environment is not similar for all renewable energy sources, moreover it is not similar for the same energy sources since the level of economic support is based on the date of the electricity production start. Therefore some electricity generators are supported more than others, regardless their technical or environmental parameters.



2. Does the development of feed-in tariffs represent suitable institutional environment for renewable electricity generation? Based on the results, the institutional environment is not optimal and does not represent suitable tool for investments' planning and long term strategies of companies.

We should discuss also the question of regular annual increase of some feed-in tariffs. The following Table 3 shows us the comparison of the development of particular feed-in-tariffs (SH means small hydro power plants, SOL means solar power plants, WIND means wind power plants, BM means biomass power plants, BG means biogas power plants) with the development of the inflation index - consumer price index (CPI).

**Table 3. Comparison of selected feed-in-tariffs with consumer price index**

YEAR	CPI	SH	SOL	WIND	BM	BG
2003	95,5	1500	6000	3000	2500	2500
2004	98,1	1550	6000	2700	2500	2400
<b>2005</b>	<b>100,0</b>	<b>1600</b>	<b>6040</b>	<b>2720</b>	<b>2520</b>	<b>2420</b>
2006	102,5	1660	6280	2830	2930	2520
2007	105,4	1690	6410	2890	3375	2570
2008	112,1	1730	6570	2960	3540	2630
2009	113,3	1790	6710	3070	3820	4120
2010	114,9	1830	6850	3140	3900	4120
2011	117,1	1870	6990	3210	3900	4120
2012	121,0	1910	7130	3280	3900	4120
2013	122,7	1949	7273	3346	3900	4120
2014	123,2	1988	7418	3413	3900	4120
2015	123,6	2028	7566	3481	3900	4120
<b>2005 vs. 2015</b>	<b>123,6</b>	<b>126,8</b>	<b>125,3</b>	<b>128,0</b>	<b>154,8</b>	<b>170,2</b>

Source: Author, [6], [4]

We can see, that the increase of some feed-in tariffs is higher than increase of CPI; however there is no reason for such development. Comparing the results of this analysis with other scientific studies, Janda et al. [10] found that, based on the goals of Czech National Action Plan for Renewable Energy, the costs on photovoltaics support account for more than one half of all costs on renewable energy, combined production of electricity and heat and other secondary resources. We can say that in spite of zero support of new photovoltaics in years 2015 and 2016, the feed-in tariffs for solar power plants installed before these years are the highest – in some cases more than 3-times higher than feed-in tariffs for other kinds of renewable energy generation.

## 5 Conclusion

The main goal of this paper was to analyze the institutions in the area of electricity generated from renewable energy sources in the Czech Republic, with detailed focus on feed-in tariffs. Based on the results, we can say that the institutional environment for all renewable energy sources is not similar, moreover it is not similar even for the same energy sources. Furthermore, the development of feed-in tariffs does not represent suitable environment for the support of electricity generated from renewable energy sources, since the predictability of the development of feed-in tariffs for new electricity power plant is very hard – the policy of economic support differs in particular years.

The further research in this area should be focused on comparison of institutional environment for renewable energy generation in all Visegrad countries.

## Acknowledgements

Funded by the Erasmus+ Programme of the European Union, project no. 2016-1-CZ01-KA203-024040.

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Published by Masaryk University, 2017

1<sup>st</sup> edition, 2017 – number of copies 140

Printed by: ASTRON studio, a.s., Veselská 699, 199 00 Praha 9 – Letňany

ISBN 978-80-210-8448-3

ISSN 2336-1239