

arginální daňová sazba, efektivní průměrná daňová sazba, spo ně, ekologické daně, daň ze zemního plynu, daň z pevných pa jarety, Evropská unie, sazba daně, politika, vládní uskupení, v klus, daně z příjmů, sociální pojištění, Reforma veřejných finaj ňové zatížení, mzda, superhrubá mzda, Převodní ceny, spoje misionář, závislý agent, princip tržního odstupu, daňový mix, o litika EU, sazby daní, daň z nemovitostí, daň ze staveb, daň z stní koeficient, osvobození od daně, fiskální decentralizace, d ma, daňové zatížení, daň z příjmů fyzických osob, průměrná r tation system, tax rates, přeshraniční zápočty ztrát, domácí zá nsolidace, správa miestnych daní, miestny poplatok, územná , daňové príjmy, všeobecne záväzné nariadenie, vzdělávání d

**Proceedings of the 22<sup>nd</sup> International Conference** 

# Theoretical and Practical Aspects of Public Finance 2017

Praha, 7 and 8 April 2017

# University of Economics, Prague Faculty of Finance and Accounting Department of Public Finance

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tve, platba za výkon, platba za případ, kapitácia, mzda, efekti meňovanie, zdravotníctvo, mzdy, veřejné výdaje, evaluace ve dajů, plánování, odvětví obrany, resort, perspektivní plánován tácie, transparentnost, alokácia; higher education; returns to e es educational policy reform, primary balance, public debt, par is, fiskální decentralizace, meziregionální rovnost, fiskální red zpočty územní samosprávy, sdílení daní, dotace, decentralizá j správy, fiškálna decentralizácia, miera decentralizácie, rozpo zpočet samosprávneho kraja, VÚC, fiškálna politika, malé obc ní, výše, struktura, variabilita příjmy z daní, veřejné výdaje, ind ných výdajů, rozpočtové určení daní, hospodaření obcí, veliko

ajů, samostatná působnost, přen ravotnické účty, finanční spravec onomy, příjmy, výdaje, rozpočet, jištění, důchodové ojištění, nemc lidních důchodů ve starobní, inve vratnost investice do vzdělání, p



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## Prologue

On April 7 and 8, 2017 the Department of Public Finance organized already the 22<sup>th</sup> international conference "Theoretical and Practical Aspects of Public Finance" with almost 80 participants from the Czech Republic, Slovakia, and Poland.

The conference took place for the first time in March 1995 and since then it gained a significant position among similar events in both the Czech Republic and Slovakia. It is first of all a scientific conference, but it is relevant for practitioners and policy makers as well.

The number of participants in the last years is stable even when the number of similar conferences organized by other Czech universities is growing. The conference tries to offer enough space for young scholars including graduate students. The day before the conference starts there is organized a students' competition. Participation of students at the conference is highly encouraged so that 8 out of 29 papers included in this proceedings are authored or co-authored by graduate or doctoral students

The focus of the papers presented during the conference shows that after a few years when the center of attention were the challenges in the area of public finance caused by the European debt crisis and the continued slow economic recovery, we are back in let say normal times when the papers deal with broad range of topics.

The contributions were presented in three sessions: A - Tax Policy, B - Public Expenditure and C – Public finance and finance. This volume includes 40 papers from the conference out of the total of 29 submitted papers. All contributions and conference details are available at the web site of the conference at http://kvf.vse.cz/vyzkum/konference-tpavf/.

A third of the papers deals with the tax policy or tax system. The importance of the tax topics is caused by the weight taxes play in the political discussion and the frequency of tax law changes in the recent years. The remaining papers deal with a great variety of topics:

Regarding the applied methodological approaches, we can see a positive trend as the number of empirical papers which apply modern econometric methods grows. At the same time there are papers which present original primary data or have clearly interdisciplinary roots.

Savina Finardi University of Economics, Prague

# PART A – TAX POLICY

# It is possible to test similarity of tax system by econometric modelling?

## **Ondřej Bayer**\*

**Abstract.** The paper deals with possible approach to testing the similarity of the tax system using regression parameters from macro-econometric model. To test the similarity is used VAT revenue in the Czech Republic, Poland and the Slovak Republic. The actual method is based on the design of ADL-ECM model with selected explanatory variables. The first part is devoted to the description of the data and the methodology chosen, the second part of the paper deals with derived models. The last section is devoted to evaluation of results.

Keywords: Tax revenue, VAT, ADL-ECM model.

JEL Classification: H20

## **1** Introduction

The aim of this paper is to try to predict and measure differences in the settings of value added tax in selected countries using macro econometric model. The main idea to test the chosen problem is that if the construction of high-quality econometric model, it is possible to compare the similarity of tax systems using regression parameters of macroeconomic indicators. To test the selected aim was used value-added tax, because this tax should be in selected states of the European Union the most harmonized. Of all the EU Member States were selected Poland, Slovakia and the Czech Republic due to similar historical-economic and sociological factors.

The article is divided into several subchapters. The first part deals with defining and describing the development of selected tax revenue and selected explanatory variables together with the methodological definition of the methodology used. The second part deals with the design and description of actual econometric models for selected countries, together with a discussion of the results achieved against a target contribution. At the end the conclusion summarized obtained results.

As a basis for this contribution has been used several sources and literature. Data for econometric analysis were drawn from several publications. Arlt and Arltová (2009) describe the basic structure models based on time series, but also very well explain diagnostic tests and their interpretation. Construction of econometric models is engaged in the publication Doornik and Hendry (2013), who reported the theoretical background and detailed guidelines for statistical modeling in OxMetrics. Indicators of individual tax systems worldwide deals OECD (2017). Vančurová and Láchová (2012) conducted a detailed analysis of the Czech tax system and Wide (2012) describe the comparison of this system with other states. Specifically, value-added taxes in Europe is devoted to the publication Nerudová (2014).

## 2 Data and methodology

This part of the paper is devoted to a description and definition of the input data sources together with a description of the methodology chosen for econometric approach.

#### 2.1 Data

For the selected aim of paper was used database OECD (2017), from which were obtained all relevant variables in the period from 1995 to 2014. Due to the fact that some data are reported in the OECD database on national currencies that all relevant data is transferred to USD.

As explained variables were selected income in respect of VAT for the Czech Republic (CZ), Poland (P) and Slovakia (SVK). The development trend of response variables are summarized in **Figure 1: Trends in VAT revenue (in log-form billions USD)** 

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Given that in this variable are high differences between selected states, was used graph in the logarithmic form to illustrate the trend. All the countries show stable earnings growth of VAT until 2008, when due to the global economic crisis showed an annual reduction of VAT collection. This decrease is however short-lived, because in the next year continuous to grow continuously.

One of the explanatory variables is the development of the import volume in billions of dollars. This variable was chosen because exports are exempt from tax in some of the countries (in the Czech Republic export is exempt with deduction). The logic of this explanatory variable is that it shows how much goods and services needed to bring into the economy to meet demand. This indicator should provide a description of the international dimension of VAT, this indicator also may describing the development of consumption. The evolution of this indicator shows **Figure 2: Volume of Import (billions USD)**:







For this variable is not so clear linear trend as of VAT. Development itself can be divided into several periods. The first period from 1995 to 2002 shows a relatively constant evolution of import volume in the countries surveyed. The second period from 2003 to 2008 is linked to global economic growth, together with the input selected countries of the European Union (positive impact on the volume of import foregoes by two years the entry into the EU). From 2008 to 2014, are described the consequences of the economic crisis and the problems of dealing with the crisis, this issue is documented in another variable fluctuations observed in 2011. From the perspective of the chosen methodology would be better to have less volatile variable because excessive volatility can cause problem associated with heteroscedasticity and normality unsystematic component of derived models.

Another explanatory variable is the annual growth in the average wage. This indicator should mainly describe the excise component of tax revenue. It can be assumed that the growth of average wages should rise consumption and thus tax revenue. On the other hand, the average wage is a specific indicator because it is not sufficiently statistically robust. Probably it would be better to use the median wage, but these data were not available for all monitored states. And of course, the average wage should be a reflection of the economy as a whole, and therefore should be able to describe the evolution of the tax, from the perspective of foreign relationship. Development of this indicator describes the **Figure 3: Annual Average Wage (USD)** 







This variable has a similar development as import volume, so here are seeing the consequences of joining the EU and the effects of the economic crisis in 2008. In the case of Slovakia, see far more stable development of the average wage after 2008, when the oscillations in the next period are much lower. The consequence of this phenomenon may be that Slovakia is a member of the EMU since 2009. In terms of modeling can be a issue that variable is volatile in the last period.

The last explanatory variable is the development of the Brent oil price. This indicator was chosen as the indicator of exogenous shocks (specifically the economic crisis in 2008), which selected countries cannot influence - no one of the selected states are market-makers from the perspective of the global economy. Development itself describes the following **Figure 4: Oil prices (USD)** 



#### Figure 4: Oil prices (USD)



Development of oil prices shows a similar oscillation after 2008 as other explanatory variables, and therefore it should be a good indicator of exogenous economic events.

#### **2.2 Methodics**

Statistical method is based on the design ADL model. The first condition of this methodology is that the multivariate time series can be co-integrated. Co-integration itself is a specific relation between the observed time series, where there is a certain "equilibrium" state to which the observed series approaching. Relation between the observed time series can be according to (Arlt, Arltová, 2009) following:

1. Series are not integrated and do not share a co-integrating vector - the only possible treatment is individual differentiation and classic linear regression analysis, where the coefficients indicate only a short-term relationship. In the case of using the original non-stationary series would result in apparent regression.

Time series are non-stationary but integrated and share a common co-integrating relationship - long-term relationship can be solved either by using co-integration analysis or if the condition of weak exogeneity is fulfilled static regression and ADL transformation can be used to estimate the long-term relationship.

For construction of the model is important to test nonstationary of time series by the unit root test (ADF test). Co-integrated time series may only be non- stationary or integrated time series (Arlt, Arltová; 2009). Integrated means that after a certain degree of differentiation will become stationary time series (generally the most economic time series are of order I(1)).

The paper used a method of static regression-based on Engel Granger theorem, when it is assumed weak exogenity among the examined time series. This procedure is based on the principle that non- stationary time series

could be co-integrated if their residues from static regression are stationary time series and have the same order stationarity. Assuming that  $X_t$  and  $Y_t$  are I(1) co-integration of these series can be shown, if true:

$$Z_t = \alpha X_t + \beta Y_t \sim I(0) \tag{1}$$

Engel Granger's approach is based on creating a static regression:

$$Y_t = \beta_0 + \beta_1 X_t + u_t \tag{2}$$

From this equation find out if there is a stationary a series of common X and Y, since you can write:

$$\hat{u}_t = Y_t - \hat{\beta}_0 + \hat{\beta}_1 X_t \tag{3}$$

And if  $\hat{u}_t \sim I(0)$  then  $X_t$  and  $Y_t$  are cointegrated. This process, however, presupposes that the unsystematic component  $u_t$  has white noise character. In real terms, according to (Arlt, Arltová; 2009) may occur one of three options:

2.  $u_t$  is white noise, i.e. I(0)

 $u_t$  is I(0), but has autocorrelation and optionally has conditional heteroscedasticity

In the first case, the actual estimates of static regression are interpretations a long term relationship monitored time series.

In the second case, it is possible to eliminate the problem of autocorrelation and conditional heteroscedasticity using dynamic model. For further explanation is model extended by adding one delay endogenous and exogenous component, and has the form:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_t - \beta_3 X_{t-1} + e_t, \tag{4}$$

where  $\varepsilon_t$  is white noise.

By removing autocorrelation and conditional heteroscedasticity is possible to identify long-term relationships using the transcript on the error correction model (ECM), which has consistent estimates of regression coefficients similarly as static regression. For form of ECM is an important condition that  $u_t$  is I (0), if true there is cointegration relationship between selected variables, so there must be a relationship expressed by error correction (EC). Specifically if series  $Y_t$  and  $X_t$  are I(1) and exhibit a long-term relationship, so there must be some process that compensates the deviation from long term equilibrium. The relationship of these series can therefore be written by the EC system. The reduced form of the EC system in the case of one endogenous and one weakly exogenous process with one co-integration relationship has according to (Arlt, Arltová, 2009) form:

$$\Delta Y_t = \delta \Delta X_t + \tilde{\gamma}_1 [Y_{t-1} - (-\beta_2 / \beta_1) X_{t-1}] + u_t,$$
(5)

where  $[Y_{t-1} - (-\beta_2/\beta_1)X_{t-1}]$  is long-run relationship between series with co-integrated vector  $(\beta_l, \beta_2)'$ . Parameter  $\beta^* = (-\frac{\beta_2}{\beta_1})$  is long-run relationships. Parameter  $\tilde{\gamma}_1$  determines the force with which promotes long-term relationship (Arlt, Arltová; 2009). By this transcript is obtained relationship that estimate  $\beta^* \sim \hat{\beta}_1$  from static regression.

If the  $u_t$  je I(1) it is not possible to create a co-integration relationships between the monitored series and there is no long-term relationship, it is necessary to use individual first differentiation<sup>\*</sup> to obtain the short-term relationships and the resulting model is in the form of the regression equation:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t + u_t \tag{6}$$

#### **Testing econometric assumptions**

For actual econometric modeling is necessary to verify several assumptions which form the basis of chosen methodology.

First there is necessary to test the stationarity of selected variables in order to apply the methodology of cointegration analysis. To test the stationarity and order integration is used Augmanted Dickey-Fuller test (ADF). This test examines the statistical significance of the various delays in the time series for each variable. The logic of this test is that a sufficient differentiation can made any series stationary (get rid of the trend component). Tests hypothesis is stationarity of time series.

To evaluate the econometric model as a whole are essential Gauss-Markov assumptions (GM), which define a condition for obtaining the best possible, unbiased estimates (BLUE) using the OLS method (estimated using the least squares method). Violations can lead to quite noticeable distortion or full depreciation estimated model. Therefore testing was used standard tests SW OxMetrics. For autocorrelation is used Breusch-Godfrey test

<sup>\*</sup> First differential should be sufficient since there is a presumption that  $X_t$  and  $Y_t$  are I(1).

(marked as AR), for conditional heteroscedasticity GARCH test was used, for heteroscedasticity was used White test and normality of unsystematic component was tested by Jarque-Bera test<sup>\*</sup>.

## **3** Observations and Results

This section deals with the description and evaluation of individual models for selected countries.

It was first necessary to verify whether all the variables are I(1). Results of individual ADF tests are summarized in the **Table 1**.

Table	1:	ADF	tests
Table	т.	ADI	icsis

CZ_VAT	P_VAT	SVK_VAT	CZ_IMP	P_IMP	SVK_IMP	CZ_AW	P_AW	SVK_AW	OIL
4.650	3.350	2.469	1.548	0.890	1.847	1.469	1.323	2.725	0.678
real data t-adf critical values (T=19; 5%=-1.96 1%=-2.70)									
-2.264*	-2.258*	-3.468**	-3.562*	-4.604**	-3.198**	-3.068**	-4.878**	-2.023*	-4.399**
differenced t-adf critical values (T=18; 5%=-1.96 1%=-2.71)									

Source: Author

From the results of ADF tests it is clear that all the monitored variables are I(1), and therefore is possible to continue with the construction of models.

Model Czech long term relationship VAT revenue on selected indicators is shown in the Table 2

	Coefficient	Std.Error	t-value	t-prob	AR	ARCH	JB-test	White
CZ_VAT_1	0.741	0.128	5.810	0.000	1.235	0.414	7.686	1.086
Constant	32.640	12.760	2.560	0.022	[0.3227]	[0.5289]	[0.0214]*	[0.4034]
CZ_IMP	0.360	0.165	2.190	0.045				

#### Table 2: Model for CZVAT

#### Source: Author

From the model fell out other explanatory variables, except the import volume. The only problem in terms of diagnosis model is an abnormal distribution of residues of the model. Unfortunately, this problem is quite difficult to remove due to the number of observations. Generally it is stated that a sufficiently large number of observations ensure normality unsystematic component - in this case was used the maximum number of observations that can be obtained from the database of the OECD.

Polish VAT model has the following characteristics:

Table 3: Model for PVAT

	Coefficient	Std.Error	t-value	t-prob	AR	ARCH	JB-test	White
P_VAT_1	0.837	0.098	8.560	0.000	1.218	0.013	7.478	0.908
P_IMP	0.114	0.051	2.250	0.039	[0.3253]	[0.9112]	[0.0238]*	[0.4880]

#### Source: Author

The model came out in terms of diagnosis similarly as previous Czech model, the only problem is abnormal residues.

The latest model is the development of Slovak VAT. Here it should be noted that within the selected variables there is no co-integration vector and therefore was used only short term relationships captured by classical regression analysis from equation (6). The results of this model are summarized in the following table:

<sup>\*</sup> Detailed description of selected tests and their limitations and conditions cannot be provided due to the extent of the contribution, but more detail on this subject discussed, for example (Arlt, Arltová; 2009).

Table 4:	Model for	SVKVAT
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	Coefficient	Std.Error	t-value	t-prob	AR	ARCH	JB-test	White
DSVK_IMP	0.030	0.006	5.010	0.000	0.376	2.540	7.320	1.681
						[0.1294]	[0.0257]*	[0.2175]

#### Source: Author

There is also a problem with normality, which is not in the classical linear regression analysis to remove. In the case of the Czech Republic and Poland models can be rewritten using the ECM transformation from the equation (5). In Slovakia, it is used only classical regression analysis, and therefore can be rewritten from **Table 4**. The resulting equations are derived as follows:

$$CZVAT_t = 126.023 + 1.390 * CZIMP_t \tag{7}$$

$$PVAT_t = 0.687 * PIMP_t \tag{8}$$

$$\Delta SVKVAT_t = 0.031 * \Delta SVKIMP_t \tag{9}$$

Realistically, it is possible to compare only the dependence of VAT revenue to the Czech Republic and Poland, since both models are derived using the methodology ADL-ECM, which indicates a long-term relationship between the explained and the explanatory variable. The problem is that Czech VAT revenue is estimated with constant, which could distorts the comparison with Polish tax revenues. Based on the limitations from these results can be argued that the Czech VAT tax system is influenced more by developments in import than in the case of Poland. The difference between the VAT dependence on imported volume is approximately doubled in the Czech Republic compared with Poland. This result shows a relatively large difference in the tax system. Briefly explain this difference is the amount of VAT rates in the Czech Republic and Poland, which in 2014 were the Czech rates 21% and 15%; Poland has 23%, 8% and 5%. It can be seen roughly twice the load at reduced rates in the Czech Republic compared with Poland. Similar development has the VAT revenue per capita in the Czech Republic was 1478 USD and 970 USD in Poland in 2013. The result of regression coefficient reflects differences about the settings in the tax systems.

In the case of Slovakia, it is the result given only indicative because it is not possible to compare the long-term regression parameters with short term parameters derived using classical regression analysis

## 4 Conclusion

Overall not unequivocally say that the method is wrong because it specially VAT has several different rates and, unfortunately, the estimated models are not entirely consistent, which in the case of the Czech Republic, it is necessary to use a model with constant. A possible next procedure is to expand to other major taxes and adding more countries monitored in order to verify whether it is possible to believe similarity tax systems using econometric regression coefficients macroeconomic dimensions.

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## Changes in the Typology of Tax Mixes in EU Member States during the Crisis Relative to Implicit Tax Rates

#### Aneta Borůvková\*

**Abstract.** This paper examines whether fallout from the crisis has prompted changes in the way taxes are structured in EU Member States. Changes are evaluated by employing a method of mathematical statistics – cluster analysis. The main objective is to evaluate whether countries have migrated between groups (clusters) as a result of the crisis. The analysis focuses on changes between the "pre-crisis" period (2006-2007) and the "early crisis" period (2008-2009). The structures are analysed on the basis of the implicit tax rates of consumption and labour in their decomposed form (i.e. this covers only part of the tax mix). The then 27 Member States of the European Union are compared on the strength of Eurostat data.

**Keywords:** tax mix, implicit tax rate, cluster analysis **JEL classification:** H20

### **1** Introduction

The global economic, financial and fiscal crisis mainly started making itself felt in EU Member States in the second half of 2008. While some countries reported satisfactory economic growth in the first few months, the second half of that year was characterised by recession (European Commission, 2010a). As such, some Member States' economies passed through two completely conflicting periods in the year. There was a palpable impact on most countries' tax revenues, however, before 2008 had ended. Even excise duties, generally more resistant to economic crises and recessions, were affected. This brought home the scale of the crisis, with developments bucking the trend where indirect taxes had become increasingly important in tax systems.

Needless to say, the tax systems of the various EU Member States are very different and the effects of the crisis differed considerably from one country to the next. The crisis had repercussions not only for the revenue side of the central government budget, but also – obviously – for expenditure (incurred especially in the deployment of action to combat the crisis). Accordingly, elements of tax systems were modified and copious changes were made to tax policies. All of these tweaks and revisions, in tandem with the direct impact the crisis had on public finances, also triggered changes in tax structures (tax mixes).

The question is whether, in the period reviewed, "similarly" structured tax systems can be found among Member States and whether these "similarities" may have been altered by the crisis. The evaluation, then, relies on a cluster analysis. First, clusters are formed that "group together" countries with similar tax structures on the strength of an ITR assessment for both of the periods analysed. The changes are then evaluated.

## **2** Overview of literature

One of the first authors to grapple with the typing of tax systems by cluster analysis was Peters (1991). In subsequent years, there was an increase in the number of authors dealing with this area. Kemmerling (2009), for example, evaluated OECD countries and EU Member States against a tax background by employing cluster analysis. Kubátová (2013) set about typing the tax policies of OECD countries by reference to their tax mixes. The collective Vintilă, Onofrei and Tibulcă (2014) and Lazăr (2014) evaluated EU Member States on the basis of tax system typology.

According to Peters (1991), clusters are formed to evaluate countries on the strength of how big a share 11 types of tax contribute to overall tax revenues. The ways in which OECD countries generate their tax revenues (i.e. the structure thereof) were cross-checked. First, an analysis was conducted for 1965, before being updated for 1987. The only country to experience a cluster change was France, which switched from its original "Latin cluster" to "broad-based taxation". The cluster analysis resulted in countries being distributed among four clusters (1987):

- "Anglo-American" these countries place a greater emphasis on property taxation and corporate taxes, and personal income taxes are also above average. Excise duty is typically lower than average. US, UK, Australia, Canada, New Zealand, Japan, Switzerland
- "Latin cluster" reliance on indirect taxes and social security contributions. Countries where tax collection conditions are typically below par. A frequent factor is the high number of self-employed persons who are subject to taxation, suffusing the system with greater opacity. These countries impose taxes centrally. Italy, Ireland, Greece, Portugal

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- 3. "Broad-based taxation" - these countries do not rely on selected areas of taxation, but draw on large numbers of the tax instruments available to them. Netherlands, Luxembourg, Spain
- "Scandinavian countries" countries with a high share of personal income tax and employer-led social 4. security contributions in overall tax revenues. In contrast, these countries are characterised by a low share of corporate taxation in overall revenues.
  - Sweden, Denmark, Norway, Finland

Peters (1991) also notes that France underwent the greatest change, migrating from the Latin cluster to broadbased taxation. According to Peters, the main influence on this grouping and cluster distribution is exercised by political changes, the administration of taxation, international pressures and economics.

Kubátová (2013) types the tax policies of 26 OECD countries during the crisis (2007-2010) by drawing on statistics of changes in tax quotas and the related mixes. This analysis resulted in the distribution of countries into four clusters with common characteristics attributed to changes in the tax quota and in the shares in the overall tax revenues taken up by the individual tax groups. The cluster analysis laid bare a decline in the tax quota in most countries, although sporadic growth was also identified. The author also observes the following: "The individual taxes' shares in the overall tax burden also function differently and reflect, among other things, the way in which the governments of the various countries combat the crisis with differing approaches."

Lazăr (2014) analyses EU Member States. On the strength of a cluster analysis, the countries are grouped into six clusters based on overall tax revenues, direct and indirect taxes, and social contributions in 1999 and 2007-2011. The migrations are then assessed in detail.

Vintilă, Onofrei, Tibulcă (2014) explore EU Member States by k-means clustering in 2003, 2004, 2007, 2010 and 2011. Countries are broken down into three clusters (with the exception of 2011, when they were split into just two clusters). The evaluation relies on the share of overall tax revenue in GDP and the levels of revenue from indirect tax, direct tax and social contributions relative to GDP. By reference to changes in the groupings, the authors concluded that tax systems among EU Member States are increasingly similar.

## **3** Data and methodology

The main sources of data required for analysis are Eurostat statistics and the reports on "Taxation trends in the European Union" from 2008 to 2011. Data collation is based on ESA 95, reflecting the period under evaluation. The analysis is conducted using XLSTAT, a Microsoft Excel add-on. This is software delivering a set of statistical and analytical features. The work mainly draws on mathematical statistics, specifically the aforementioned cluster analyses.

Cluster analysis or clustering is a set of techniques to classify observed data into groups in order to maximise the similarity of observations within a single group and to minimise the similarity of observations in relation to other groups. These techniques can be used to detect associations and structures within a set (Raub, 2005).

Thus the method's main objective is to classify those entities that are most similar to each other into groups. and subsequently to characterise those groups in more detail. This is a method that examines the similarities between multidimensional objects, i.e. multiple variables are measured. The paper employs a k-means algorithm, i.e. a non-hierarchical sorting method where objects are distributed among a predetermined number of clusters in order to minimise the distance to the centroids. The calculation of distances relies on the Euclidean distance. The number of clusters is entered by the user. In our case, the values of the centroids are not known in advance and are determined iteratively from the data (Meloun, 2004).

In our case, the variables are individual decomposed components of implicit tax rates (ITRs) for consumption and labour (data extracted from Taxation trends in the European Union). Consumption ITRs are then broken down into four components - VAT, Energy, Tobacco and Residual. Labour ITRs are broken down into three components - PIT, Employees' SSC and Employers' SSC.

Graph 1 below shows the changes in the individual consumption ITR components between the periods examined.



Graph 1: Differences in the decomposed consumption ITR between period 1 (2006+2007) and 2 (2008+2009), (percentage points)

Explanatory notes: AT = Austria, BE = Belgium, BG = Bulgaria, CY = Cyprus, CZ = Czech Republic, DE = Germany, EE = Estonia, EL = Greece, ES = Spain, FI = Finland, FR = France, HU = Hungary, IE = Ireland, IT = Italy, LT = Lithuania, LV = Latvia, LU = Luxembourg, MT = Malta, NL = Netherlands, PL = Poland, PT = Portugal, RO = Romania, SI = Slovenia, SE = Sweden, SK = Slovakia, UK = United Kingdom.

In most EU Member States, there was clearly a relatively deep slump in the overall consumption ITR. The average consumption ITR also shrank within the European Union *per se*. This group includes consumption taxes, which are inherently entirely different. Taxes in the vein of value added tax account for the largest slice of the consumption ITR in all EU Member States. Other taxes, taken together, also form a significant part of this rate.

Graph 2 below is similar to Graph 1. It depicts changes in the individual labour ITR components between periods 1 and 2.







Explanatory notes: AT = Austria, BE = Belgium, BG = Bulgaria, CY = Cyprus, CZ = Czech Republic, DE = Germany, EE = Estonia, EL = Greece, ES = Spain, FI = Finland, FR = France, HU = Hungary, IE = Ireland, IT

Data source: Eurostat, own work

= Italy, LT = Lithuania, LV = Latvia, LU = Luxembourg, MT = Malta, NL = Netherlands, PL = Poland, PT = Portugal, RO = Romania, SI = Slovenia, SE = Sweden, SK = Slovakia, UK = United Kingdom.

Most countries reported a drop in the labour ITR. The graph above shows which components of this rate made the biggest contribution to the situation. The largest drop was recorded by employers' social security contributions. Again, the changes varied from one country to another. The situation in Lithuania is intriguing. The changes here took place on quite a large scale and the country reported the deepest slump in the PIT component. On the other hand, there was a groundswell in the remaining two components, relating to social contributions, between the periods (courtesy of measures related to mandatory social security contributions). This resulted in virtually no change in the overall labour ITR. There was no such "extreme" conflicting movement among the individual components in any other country.

### 4 Cluster analysis results

In both periods, the number of clusters was set at five (after testing the results for 4, 5 and 6, this number proved to be the most suitable). When the selected number of clusters was being tested, it also transpired that Denmark forms its very own cluster (the only EU Member State do so) and hence it is an object distant from the other ones tested (in both periods 1 and 2). In our case, it was locked out of the analysis, after which, then, 26 EU Member States were tested.

In period 1, four clusters have five members, while cluster 3 comprises six members, as illustrated by the following Table 1. There were evidently changes in the groupings within the individual clusters between period 1 and period 2. The countries that "migrated" in period 2 are listed in bold. In other words, nine countries were affected by such a change.

Period/cluster	Period 1 (2006+2007)	Period 2 (2008+2009)
1	Germany, Slovenia, Austria, Greece,	Germany, Slovenia, Netherlands,
	Poland	Luxembourg
2	Belgium, Finland, Sweden, Lithuania,	Belgium, Finland, Sweden, Austria, Hungary
	Latvia	
3	Bulgaria, Cyprus, Portugal, Romania,	Bulgaria, Cyprus, Portugal, Romania,
	Slovakia, Spain	Slovakia, Greece, Poland
4	Czech Republic, Estonia, France, Italy,	Czech Republic, Estonia, France, Italy, Spain,
	Hungary	Lithuania
5	Ireland, Malta, United Kingdom,	Ireland, Malta, United Kingdom, Latvia
	Luxembourg, Netherlands	
	Data source, VISTAT k means al	ustaning own work

Table 1: Clusters, periods 1 and 2

Data source: XLSTAT, k-means clustering, own work

Basic characteristics of the individual clusters:

- **Cluster 1**: The value of the ITR social contributions paid by employees is above the EU average for countries in this cluster. The social security system therefore appears to be important here.
- **Cluster 2**: These are usually countries where the tax burden is higher. Countries in this cluster have an above average PIT-related ITR and a high consumption ITR (VAT). Latvia and Lithuania have the lowest ITR values out of this cluster and migrated in period 2.
- **Cluster 3**: Countries with a very low ITR on personal income tax (PIT) and, frequently, a low ITR on employees' contributions are classified here.
- **Cluster 4**: These countries have the highest shares of employer-paid social security and also the lowest ITR on employee-paid contributions.
- **Cluster 5**: Countries in this cluster are characterised by the very low ITR on social contributions paid by employers. Generally speaking, these countries place no stress on the public insurance system. They tend to be the countries with the lowest tax burden within the EU.

The **Netherlands** and **Luxembourg** both migrated from cluster 5 to cluster 1. These are countries with similar tax burdens and they have a very similar ITR-related tax mix structure. Both are founding Member States. The changes made here in the years in question were also similar and prompted a rise in tax bands. The developments in these countries progressed more or less in line with the long-standing trend underpinning tax

policies. At first glance, then, there is no link between the financial crisis and these countries' inter-cluster migration.

**Austria** migrated from cluster 1 to cluster 2. It figures among countries saddled with a high tax burden, which is emblematic for cluster 2. The ITR on Employees' SSC and the ITR on PIT, and their ranking within the EU, was preserved to a certain degree between the periods. The movement between the clusters was mainly precipitated by a hike in the ITR on consumption. A higher rate of consumption taxation is more typical for cluster 2. In **Hungary**, the inter-cluster transfer was brought about, in some respects, by a cut in employer rates within the public health insurance system, and by measures related to PIT tax bands.

**Greece** and **Poland** both migrated from cluster 1 to cluster 3. Greece registered measures to boost the economy and scale down the PIT-derived incidence of tax. In particular, rates were cut for various taxable income bands. Poland experienced changes in tax policy that were similar to those in Greece. Again, measures were geared towards a lower incidence of personal income tax, mainly through rates. There was also a decline in the system of contributions (once again, mainly driven by rate reductions).

**Spain** repositioned itself from cluster 3 to cluster 4. This is one of the countries hardest hit by the crisis. In period 2, a whole raft of measures was introduced to clear up the fallout from the financial crisis (Eurostat, 2010). The Spanish ITR on Employees' SSC ranked eleventh in the EU in period 1, and then seventh in period 2, indicating that this was the main reason for the migration between clusters.

Lithuania made the move from cluster 2 to cluster 4 between the periods examined, i.e. it ended up in a cluster reporting a high share of social contributions in the tax mix (especially the Employers' SSC). Tax policy developments reflected this – between the periods examined there was a slump in the ITR on PIT (from seventh to sixteenth place measured according to the EU average). This sharp drop can be attributed to a cut in personal income tax from 24% to 15%, and to the introduction of a 6% rate on health insurance in 2009. In contrast, the Employers' SSC climbed to the top rungs of the ladder compared to other EU Member States. A new health insurance system was rolled out in that year and became part of the public insurance system. Some of these tax policy measures can be identified as having a counter-crisis bent.

**Latvia** migrated from cluster 2 to cluster 5 between the two periods. In that time, there was a drop in personal income tax rates from 25% to 23%, which can be considered the main reason for the switch to another cluster, in tandem with the fact that the ITR on Employers' SSC became further adrift of the EU average (in a downward direction).

## **5** Conclusion

The main objective of the analysis was to evaluate whether countries migrated between groups (clusters) as a result of the 2008 crisis. The analysis unquestionably confirmed that nine EU Member States had moved from one cluster to another. By reference to Eurostat data (2010) and observations concerning developments in tax policies, which often ran counter to established trends in the analysed period, we might contend that in most countries the changes were truly prompted by the crisis. The crisis had a direct impact on the countries' economic situation and related changes in tax components. Changes also came about as a result of the measures adopted, which – as mentioned above – often went against the grain. In this short period, the main measures touched on tax rates, minimum taxation thresholds and shifts in the tax bands. In other words, these fell short of tax reforms *per se*.

It should be underlined that the objective pursued by this paper is to evaluate the "turning" point before and during the crisis, hence it does not assess tax policies and measures taken at a later stage (needless to say, measures were subsequently implemented).

The standard deviations of each of the ITR components evaluated showed that countries within the European Union are closest to each other in terms of the tobacco tax burden. By and large, the countries are closer to each other in their overall consumption ITR than in the instance of labour taxation, where they exhibit greater degrees of disparity than with consumption. The greatest differences prevailing within the EU can be found in the ITR on Employers' SSC. This applies to both period 1 and period 2.

This paper included a cluster analysis of changes in the percentage points of each component of the implicit rates on consumption and labour between period 1 and period 2. Again, there were five clusters. This cluster analysis sought to identify relationships between tax mixes (the configuration of the level of the decomposed ITR on consumption and labour) and changes within the framework of such components. This resulted in the relatively interesting finding that, between certain countries, as a result of similarities in their tax structures, there may be a very similar correlation with respect to the way the crisis initially affected them. Here, we can identify pairs of countries that are grouped in the same cluster at all levels of the analysis.

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## **Urban Structures and Municipal Expenditures: First Results**

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**Abstract.** The objective is to investigate the relationship between the type of urban structure and the selected types of current municipal expenditure. For this purpose, we defined seven types of urban structure that can be found at the level of city blocks. In the next step, we defined different types of municipal expenditure (urban green, pavement, road, and public lighting maintenance) that were estimated by the data from the questionnaire that was sent to several Czech cities and Prague city districts. Finally, the municipal expenditure was calculated for each urban structures. The most expensive urban structure per hectare from the view of municipality is the urban structure of estates and high rises, which is caused by the large proportion of public space. If the population density is taken into account and municipal expenditure are calculated per inhabitant, the least costly urban structure is the urban block structure followed by the organic urban structure (historical centre), which is given by high population density and lower size of public space. The urban structure of single family houses is the most costly urban structure per inhabitant.

**Keywords:** population density, municipal expenditure, urban structure. **JEL Classification:** H72, R58

## **1** Introduction

The city is a mix of various urban structures that can be characterized for example as a historical city centre, housing estates or residential suburban area. Each urban structure can be characterised by the building and population density, size of transport and technical infrastructure and the proportion of urban green. The layout and proportion of municipal infrastructure in individual urban structures are not identical, which causes differences in the total construction expenditure and particularly differences in the maintenance (current expenditure). The maintenance expenditure may be calculated in two ways: (a) as expenditure per hectare or (b) as expenditure per inhabitant. Hence, the population density in the studied urban structure can significantly influence the results of economic analysis from the view of municipal budget. Certainly, from the point of view of the municipal budget that pays for the maintenance, the expenditure per inhabitant is the key indicator because the number of inhabitants affects both the income and expenditure of the municipality. The responsible municipal government should therefore require for any proposed residential or commercial development to be accompanied with a financial analysis of the future maintenance expenditures.

Carruthers and Ulfarsson (2003) examined the influence that alternative development patterns have on twelve measures of public expenditure: total direct, capital facilities, roadways, other transportation, sewerage, trash collection, housing and community development, police protection, fire protection, parks, education, and libraries. Through empirical analysis, they examine how the character of urban development affects per capita public outlays in a cross-section of 283 US metropolitan counties during the 1982-1992 time period. A separate equation is estimated for each measure of expenditure, providing substantive evidence on how density, the spatial extent of urbanized land area, property value, and political fragmentation affect the cost of services. By far the most salient finding of the analysis is that the per capita cost of most services declines with density and rises with the spatial extent of urbanized land area. This reinforces claim that urban sprawl undermines cost-effective service provision, and lends support to growth management and smart growth programs aimed at increasing the density and contiguity of metropolitan areas at least from the standpoint of public finance. In particular, the models show that there are savings to be gained in numerous areas, especially where both the density and the spread of the metropolitan area matter for the cost of service delivery.

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Solé-Ollé and Hortas Rico (2008) investigated the impact of urban sprawl with the aim to develop an accurate measure of urban sprawl so that they might empirically test its impact on municipal budgets. They undertake an empirical analysis using a cross-sectional data set of 2,500 Spanish municipalities for the year 2003 and a piecewise linear function to account for the potentially nonlinear relationship between sprawl and local costs. The estimations derived from the expenditure equations for both aggregate and six disaggregated spending categories indicate that low-density development patterns lead to greater provision costs of local public services.

In the Czech literature, the population density in the city and its economic impact were already studied by Pavel Janák in the 1920s (1929, reprinted in Hnídková, 2009). In the last decade, the municipal expenditure and its relation to the type of urban structure was studied for example by Kupčíková (2011) who investigated, in case of the city of Hradce Králové (Czech Republic), the spatial and economic characteristics of different types of urban structures. Kupčíková distinguished six types of urban structures: (1) historical city centre, (2) urban block structure from the 19th and beginning of the 20th century, (3) garden city structure (urban villas), (4) housing estate, (5) residential suburban area, (6) original village area. The average municipal expenditure, for example expenditure on the urban green, was observed in the period 2006-2010 and were divided by per total area of urban green in order to obtain expenditure. This calculation is then used to compare municipal expenditure per hectare and per inhabitant between urban structures.

Rybová and Šilhánková (2013) analysed the infrastructure needs of suburban areas and evaluated the economic cost of those infrastructure needs. Rybová and Šilhánková carried out an analysis of need of new transport and technical infrastructure construction in selected municipalities in suburban area of the city of Pardubice (Czech Republic). The expected infrastructure expenditures related to new residential developments are then compared with the budgetary limits of the studied municipalities.

Saidlová (2014, 2016) carried out a comparative analysis of the municipal expenditures of different urban structures on the set of eight selected cities in the Czech Republic in 2012. The municipal expenditure included in the study were: transport infrastructure, public green, public lighting, water supply and sewerage maintenance. The calculations showed that the least costly urban structures for maintenance per inhabitant were the urban block structure and housing estate. On the other hand, the most costly urban structures from the view of public budget were the residential suburban area and original village area.

Hudeček, Hnilička, Dlouhý, and Boháč (2016) presented a simple yet a real example from Prague on which can be shown that if the type of buildings is changed in the city block (atrium houses, row houses or single houses), the building and running expenditure per inhabitant can be 15 times higher for single houses than for atrium houses.

The objective of this paper is to investigate the relationship between the type of urban structure and the selected types of current municipal expenditure. We assume that urban structures differ in the size of municipal infrastructure, which is determined for example by the length of roads and pavements, total area of parks and greenery, length of sewerage and water pipes. Majority of these infrastructure is financed from municipal budgets.

## 2 Methods

As the first step, we define different types of urban structure that can be found at the level of city blocks. The urban structures differs in the area of public space and also by the population density. This means that from the view of the municipality the urban structures can highly differ in both investment and current expenditures per hectare or per inhabitant. Based on our expert knowledge we defined seven types of urban structure:

Organic urban structure (historical centre), Urban block structure, Garden city urban structure, Urban structure of single family houses, Urban structure of paired villas and row-houses, Urban structure of mixed building types, Urban structure of estates and high rises.

In the second step, we identified for each type of urban structure four typical city blocks of a given urban structure that can be found in the City of Prague. For each selected city blocks of a given urban structure we calculated the proportion of public infrastructure that includes pavements, roads and urban green. As an example of the method, we present four selected Prague city blocks (Dejvice, Žižkov, Vinohrady, and Vršovice) that were used for calculations in case of *urban block structure* (Figure 1). The first percentage value at each city block indicates the proportion of public space from the total area of the city block and the second value is the proportion

of urban green from public space. For sake of simplicity we assume that all infrastructure is owned and financed by the municipality.



Figure 5: Four Examples of Urban Block Structure

Source: own sources and calculations.

The average area of public infrastructure (pavements, roads, urban green) per 10,000 m<sup>2</sup> (1 hectare) are presented in Table 1. The public lighting is estimated in pieces. It can be for example observed that the largest proportion of public infrastructure is typical for *estates and high rises*.

Type of Infrastruct ure	Organic urban structure	Urban block structure	Garden city structure	Single family houses	Paired villas and row-houses	Mixed building types	Estates and high rises
Pavements (m <sup>2</sup> )	950	1,162	697	489	781	805	997
Roads (m <sup>2</sup> )	1,901	2,324	1,395	977	1,562	1,611	1,994
Urban Green (m <sup>2</sup> )	128	415	698	533	959	1,483	3,876
Public Lighting (pieces)	7	7	6	6	8	5	4

Table 5: The Area of Public Infrastructure per 10,000 m<sup>2</sup>

Source: own calculations.

In the third step, we defined several types of running cost that are financed from municipal budgets (see Table 2). The average unit expenditure in Czech Korunas (CZK) were estimated by data from the questionnaire that was sent to six Czech cities and two Prague city districts. Finally, in the fourth step, we calculated municipal expenditure per hectare and per inhabitant for each urban structure (see Results section)

#### Table 2: Current Municipal Expenditure - Average Unit Expenditure per Year in CZK

Type of Expenditure	Cost in CZK
Street Cleaning – pavement (m <sup>2</sup> )	9.01
Street Cleaning – roadway (m <sup>2</sup> )	4.27
Snow Cleaning – pavement (m <sup>2</sup> )	5.78
Snow Cleaning – roadway (m <sup>2</sup> )	4.43
Minor Repairs – pavement (m <sup>2</sup> )	5.79
Minor Repairs – roadway (m <sup>2</sup> )	5.64
Maintenance of Urban Green (m <sup>2</sup> )	20.53
Public Lighting - Energy (piece)	1,420.44
Public Lighting – Maintenance (piece)	1,075.16

Source: own calculations.

## **3** Results

For each type of urban structure we calculated the average area of public infrastructure that is financed by the municipality and multiplied that area by the average unit expenditure from Table 2. From this calculation we obtained estimates of total municipal expenditures for different types of infrastructure for each urban structure (Table 3). The most expensive urban structure from the view of municipality is the structure of *estates and hire rises*, which is determined by the large proportion of public space. On the other hand, the urban structure of *single family houses* is the least costly. However, it has to be taken into account that these expenditures are calculated per hectare and not per inhabitant. If the population density is taken into account and municipal expenditure are calculated per inhabitant, the results are quite opposite. The most efficient is the *urban block structure* followed by the *organic urban structure* (historical centre), which is given by high population density and lower size of public space. The urban structure of *single family houses* is now the most costly.

Type of Public Expenditure	Organic urban structure	Urban block structure	Garden city structure	Single family houses	Paired villas and row- houses	Mixed building types	Estates and high rises
Street Cleaning – pavement	8,571	10,519	6,270	4,344	7,106	7,311	9,057
Street Cleaning – roadway	8,123	9,971	5,943	4,118	6,735	6,930	8,584
Snow Cleaning – pavement	5,498	6,748	4,022	2,787	4,559	4,690	5,810
Snow Cleaning – roadway	7,037	10,344	6,166	4,272	6,988	7,190	8,906
Minor Repairs – pavement	5,508	6,760	4,029	2,792	4,566	4,698	5,820
Minor Repairs – roadway	10,730	13,170	7,850	5,439	8,896	9,153	11,338
Maintenance of Urban Green	2,662	8,314	13,905	11,140	19,631	30,185	79,563
Public Lighting – Energy	9,544	9,603	8,075	8,465	10,828	7,469	5,060
Public Lighting – Maintenance	7,225	7,270	6,113	6,409	8,197	5,654	3,830
Total Expenditure per 10 000 m <sup>2</sup>	64,898	82,699	62,373	49,766	77,506	83,280	137,968
Population Density per 10 000 m <sup>2</sup>	156	260	54	29	54	103	180
Total Expenditure per Inhabitant	416	318	1,155	1,716	1,435	808	766

 Table 3: Total Yearly Current Municipal Expenditure per 10,000 m<sup>2</sup> and per Inhabitant in CZK

Source: own calculations.

## 4 Conclusions

In the paper, we investigated the relationship between the type of urban structure and current municipal expenditures. The analysis shows that due to low population density the maintenance of city infrastructure per inhabitant is more expensive in cases of *garden city urban structure*, urban structure of *single family houses* and *paired villas and row-houses*. This means that there is an inequality among the municipal expenditure paid per one inhabitant living in different urban structures. Many theoretical and practical questions can arise from such observation. For example, is there an optimal urban structure? Should we reform the tax system based on the type of urban structure assuming that we will pay property taxes based on the area you live?

The results presented in this study should be considered as preliminary and further research is surely needed. Our experience shows that the expenditure data are very variable among municipalities, so the results are not easily transferable between the municipalities.

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## How political business cycle affects the implicit tax rates on labor and consumption in the EU?

## Lucie Formanová\* – Milan Křápek\*\*

**Abstract.** This paper deals with the influence of the political business cycle on implicit tax rates on labor and consumption in 28 EU countries between 2000 and 2012. The first aim of this paper was to analyze the development of implicit tax rates in relation to the timing of parliamentary election dates on a global level. Moreover, we focused on determining whether there are any differences in results between old and new European Union member states. Based on t-test we identified the effect of PBC in the case of new EU countries in both implicit tax rates, whereas we did not confirm it in old EU countries. Based on the results, we can conclude that the influence of PBC is more common in countries described as "new democracies".

**Keywords:** political business cycle, tax burden, implicit tax rates, labor, consumption, European Union

JEL Classification: D72, E62, H20

## **1** Introduction

The contribution deals with the issue of the political business cycle (hereinafter referred to as PBC). Dickson and Farnworth (2013) explain that PBC literature proposes that the election date can lead politicians to implement expansionary fiscal policies to improve chances of re-election. In our case (especially for the Eurozone countries), fiscal policy is the only remaining instrument that can influence voters' perceptions before elections (Efthyvoulou, 2012). Nordhaus (1975) dealt with PBC on the macroeconomic level, he assumed the opportunities parties and irrational voters. He focused on the dynamic relationship between inflation and unemployment. Dubois (2016) notes that more than 10 years passed when Rogoff and Sibert (1988) began to critize Nordhaus' theoretical assumptions. Hence, they introduced a model based on temporary information asymmetry between representatives of a legislative power (politicians) and their voters. As a result, the voters see the government's competency with a lag, therefore the politicians can manipulate with fiscal policy instruments and influence the public opinion. Despite the various versions of assumption, all PBC theories share the same idea: there are pre-election motives which create incentives for incumbent politicians to appear competent just ahead of elections. Moreover, Štiková (2008) or Efthyvoulou (2012) add that a politician's affiliation is not important because regardless of ideology of governments, the incumbent politicians try to use expansionary fiscal policy before elections to please the voters and maximize their popularity. But it is essential to fulfill one condition, the direct election system (Sjahrir, Kis-Katos and Schulze, 2013). Based on PBC theory, the fiscal policy should be influenced in pre-election, election and post-election years.

Fiscal policy then offers many areas for scientific research. From this point of view, research can be focused on a global macroeconomic level, as Nordhaus (1975), Andrikopoulos (2004) or Štiková (2008); or further on the government's budget balance, as Efthyvoulou (2012), Klomp and Haan (2013) or Doležalová (2013). Other research focuses only on portions of public budgets (expenditure or revenue). Rogoff (1990), Sedmihradská et al (2011), or Plaček at al (2014), for example, focus on the composition of expenditure side. In contrast, there are opinions that analysis should be focused on the revenue side of public budgets, especially due to a fact that the citizens are more sensitive on tax changes than on expenditure ones. Therefore, Haselswerdt and Bartels (2015) employed a series of survey experiments to identify that the citizens react more favorably to tax breaks than to equivalent spending programs. They explain it simply; there is a direct impact on tax payers via their disposable income. Smatrakalev (2006) further considers taxpayers as voters who can express their opinion in the upcoming elections.

For these reasons, we will focus on the revenue part of public budgets and we will deal with tax area in great detail. It is an object of scientific research of many authors, for example Mikesell (1978), Petterson-Lidbom (2003), Ehrhart (2013), Foremmy and Riedel (2014), Morozumi, Veiga and Veiga (2014) or David and Formanová (2016). The authors assume that the representatives of legislative power are those who are responsible for tax policy

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determination and therefore implement such measurements to influence their voters. Simply, it is clearly based on the PBC theory. In other words, the attractive tax policy should be implemented in pre-election and election. The post-election years are associated with reverse trends in a tax policy setting (Spěváček, 2002), whereas there is common consensus in the development of tax policy in relation to PBC theory that there is no uniform tax instrument as a variable which should be included into an analysis. According to David and Formanová (2016), it is possible to divide them into to 2 groups: i) tools for tax policy determination (nominal and effective tax rates) or ii) indicators expressing the results of its determination (total tax liability or total tax collection). As nominal rates, we can consider the rates which are imposed by the law, which are usually expressed as some percentage. Despite being very easy to obtain, there are some disadvantages because they cannot be considered as a sufficiently suitable instrument for testing PBC theory because of their uniformity for all taxpayers on the territory of the state. They do not take into account other aspects influencing final tax liability, such as non-taxable items or tax credits. We consider these factors as a significant field of tax policy which can be used by representatives of legislative power. Based on that, the effective tax rates are being calculated and express what percentage of income each tax payer pays in taxes. Hence, they can be considered as a convenient instrument for analyzing the existence of PBC in relation to tax policy setting. This assumption was confirmed by Brychta (2010) who calculated the effective tax rates of selected tax payers on individual income tax on the territory of the Czech Republic. His recommendation for future research suggests testing the development of effective tax rates depending on the changes in the political field. The second group of indicators includes total tax collection or total tax liability of taxpayers. The indicator of total tax collection is very frequently used by researchers such as Khemani (2004), Ehrhart (2013) or Morozumi, Veiga and Veiga (2014). Nevertheless, according to Foremmy and Riedel (2014) or Pettersson-Lidbom (2003) there are some significant disadvantages. The total tax collection can be influenced by factors other than the PBC, such as the development of economy or just by the tax authority's inability to collect taxes. Therefore, instead of it, an alternative indicator for total tax liability can be used.

Another essential question which should be taken into the account is what taxes to include in the analysis. The tax systems of modern economies involve direct and indirect taxes. The direct taxes include income or property taxes; indirect ones involve taxes levied on consumption. Morozumi, Veiga and Veiga (2014) focused only on income taxes, namely on individual income taxes. They claim that income taxes are more salient than other types of taxes, and therefore are very visible for tax payers. Moreover, taxpayers of individual income taxes are generally registered voters who can express their opinion in elections. Foremmy and Riedel (2014) focused on business tax in the case of German municipalities. Corporate income taxes are levied on business activities on the territory of the state and they are especially visible for a group of owners. Conversely, the indirect taxes are levied on all citizens of the country, simply because they are included in prices of all products and services. Therefore, any changes in indirect taxes can influence all citizens of the country. Furthermore, the opinion of Ehrhart (2013) is to analyze the tax structure instead of development of individual taxes, pointing out that no significant changes in overall tax revenue may mask a considerable electoral manipulation in the tax policy determination. In her research, she focused on the impact of the electoral cycle on the composition of tax revenues (direct versus indirect taxes) in 56 developing countries between 1980 and 2006. Her results revealed the significance of the pre-electoral political budget cycle, when she found out that the political representatives are using especially indirect taxes (e.g. value added tax) to increase their popularity prior to parliamentary election. Additionally, Formanová and Mádr (2016) focused on the effects of the parliamentary election on the tax structure in 11 new EU member states. They found that PBC does not have any effect on the direct tax revenues, whereas they identified a minimal impact on the indirect tax revenues. Formanová and David (2016) then incorporated all EU member states into the analysis, and found a slight impact on indirect and direct tax revenues in election years.

In addition, there are complex indicators expressing the total tax burden of tax payers in individual states. These include the traditional tax burden indicator, as well as its alternatives. Within a traditional indicator, we can include a tax quota in simple or compound form. Kotlán and Machová (2013) point to the problem of that indicator in involving tax revenues as the only factor expressing the tax burden of tax payers. Their statement is based on the Laffer curve in that it is evident that a higher tax burden does not necessarily mean higher tax revenues to public budgets. Moreover, Kubátová (2015) indicates that a problem with the value of nominal product because is the existence of shadow economy. Because of this critique, the new "alternative" indicators are formed, including, for instance, the world tax index or implicit tax rates. The world tax index is an overall multi-criteria indicator of tax burden expressing overall tax burden of tax payers, because it does not work only with the tax collection (as tax quota) but takes into the account other aspects of tax policy, such as tax progression, administrative difficulty of tax collection, a range of tax exceptions, etc. (Kotlán and Machová, 2013). Both above mentioned indicators were analyzed with the aim to compare results in interpretation of the influence of PBC on each tax burden indicator. The influence of PBC was not confirmed in both cases, but findings did reveal significant differences in development of both indicators which could lead to different conclusions of analysis (Formanová, 2016). The implicit tax rate can be considered as the second alternative indicator of tax burden. It expresses what tax burden is levied on specific activities (capital, labor and consumption). In our paper, we will focus on implicit tax rate on labor and consumption. The implicit tax rate on labor (hereinafter as ITRL) is a ratio of taxes and social security contributions on employed labor income to total compensation of employees. It is defined as the sum of all direct and indirect taxes and employees' and employers' social contributions levied on employed labor income, then divided by the total compensation of employees working in the economic territory increased by taxes on wage bill and payroll. Further, the implicit tax rate on consumption (hereinafter as ITRC) is defined as all consumption taxes divided by the final consumption expenditure of private households on the economic territory. (Eurostat, 2017).

Based on the above mentioned literature review, it is clear there is no unified opinion on which tax indicator is convenient to use in political business cycle analysis. Therefore, the main objective of this paper is to investigate if there are any significant signs of electoral cycle on examples of implicit tax rates (labor and consumption) in all EU member states between the years 2000 and 2012. Furthermore, based on Doležalová (2013), it will be analyzed whether there are any differences in results between old and new European Union member states.

## 2 Source data and methodology

The data of implicit tax rates on labor and consumption was obtained from the database Eurostat (2016). The ITRL is defined as the sum of all direct and indirect taxes and employees' and employers' social contributions levied on employed labor income, divided by the total compensation of employees working in the economic territory increased by taxes on wage bill and payroll. The ITRL is calculated for employed labor only. According to Eurostat (2017), ITRL should be seen as a summary measure that approximates an average effective tax burden on labor income in the economy. The ITRC is defined as all consumption taxes divided by the final consumption expenditure of private households on the economic territory. The indicators ITRL and ITRC are presented in percentage form and indicate the tax burden on specific activities in individual countries over the period 2000-2012. From input data, according to formula 1, the pace of growth was calculated. The values state the percentage change of tax burden indicator in comparison with previous years.

pace of growth = 
$$\frac{\text{implicit tax rate}_{t+1} - \text{implicit tax rate}_{t}}{\text{implicit tax rate}_{t}}$$
(1)

The terms of parliamentary elections were obtained and verified from the International Foundation for electoral systems (2016), European Election Database (2016) and Election Resources (2017). In the observed time period, there were 90 parliamentary elections. In the first part of the calendar year (January to June) 51 parliamentary elections took place, in the second part (July to December) there were 39 terms of elections. The classification of individual years is divided into pre-election, election, immediately post-election and non-election years. If we take into account the calculation of implicit tax rates (from the legislation in force on 1<sup>st</sup> January of the taxation period and the term of all parliamentary election years. On the basis of PBC theory, we expect a decrease of analyzed indicators in pre-election and election years. Despite PBC theory, we use an alternative classification of years and therefore we assume a decline in values in immediately post-election years which could be explained by i) fulfillment of pre-election promises or ii) realization of attractive tax policy immediately prior to parliamentary election dates with effect from the beginning of the next year.

The verification of the influence of parliamentary election date on implicit tax rates (labor and consumption) in the European Union will be realized via the t-test (formula 2).

$$t = \frac{\left|\overline{x_1} - \overline{x_2}\right|}{\sqrt{\frac{s_1^2}{n_1} + \sqrt{\frac{s_2^2}{n_2}}}}$$
(2)

The aim of the t-test is to test a two-sided hypothesis about the decrease or increase in average values. We assume a normal distribution of both groups. Based on data availability, the analysis is based on a level of significance of 10%. We are going to test the following theoretical assumptions:

- In pre-election and election years and immediately post-election years, there is a decrease in ITRL (ITRC),
- and in non-election years, there is an increase in ITRL (ITRC).

We are going to analyze the development of each implicit tax rate (labor and consumption) separately, and like the work of Doležalová (2013), we are going to divide the EU countries into 2 groups (old and new member states) to test the influence of PBC individually for both. Those considered to be new European member states countries which have become a member of the EU since 2004 (Bulgaria, Czech Republic, Estonia, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia, Slovakia). Old EU member states include Belgium,

Denmark, Finland, France, Ireland, Luxembourg, Germany, the Netherlands, Portugal, Austria, Greece, Spain, Sweden and UK. At the end of our research we will compare results for both categories of implicit tax rates and groups of countries with the objective to reveal similarities or differences in their development. Our analysis includes 28 countries (15 old and 13 new) from 2000 to 2012. Our source data yields 364 observations for each representative of implicit tax rates.

## **3** Results and discussion

Based on the classification of years (see the methodology section), the average percentage changes in implicit tax rates (labor and consumption) were calculated. The results are presented in Table 1.

		ITRL		ITRC			
	EU (28)	New (13)	Old (15)	EU (28)	New (13)	Old (15)	
Pre-election years	-0.00287	-0.00152	-0.00387	0.00511	0.01304	-0.00111	
Election years	-0.00002	-0.00825	0.00706	-0.00352	-0.00774	0.00014	
Post-election years	-0.00347	-0.00849	0.00061	0.00251	0.00788	-0.00196	
Non-election years	0.00313	0.00578	0.00075	0.01139	0.02622	-0.00195	

Table 1: The average percentage change in ITRL and ITRC in relation to parliamentary election date

Source: Own calculations.

In the case of implicit tax rate on labor, there are slight decreases in values in all election-influenced years for all European Union states. In immediately post-election years, a decline in values was confirmed. In the relation to the country classification, the effect of the electoral cycle is more common for new EU member states than old ones. This corresponds with the verified assumption in our methodology. In non-election years, we identified an increase in average values for all countries, regardless of country classification. The results for implicit tax rate on consumption vary more. In pre-election years, we identified a slight decrease only in the case of old EU countries, and an increase for new EU countries. Reverse results were received in election years. In immediately post-election years, there are declines in average values of ITRC in only old EU countries. In the remaining non-election years, there is an increase of indicator (with exception of old countries). To summarize the results, we can outline that there are significant differences between analyzed countries especially in the case of ITRC.

Moreover, based on PBC theory we created 2 groups of years. Among an election year group, we include years which should be influenced by political cycle in relation to the term of parliamentary election. This is pre-election, election and immediately post-election years. In the second group (non-election) we classified remaining non-election years.

	ITRL			ITRC		
	EU (28)	New (13)	Old (15)	EU (28)	New (13)	Old (15)
Election	-0.00316	-0.00776	+0.00071	+0.00110	+0.00344	-0.00086
Non-election	+0.00313	+0.00578	+0.00075	+0.01139	+0.02622	-0.00195

Table 2: The average percentage change in ITRL and ITRC in election and non-election years

Source: Own calculations.

In Table 2 the development of average percentage change in ITRL and ITRC is shown. When focusing on implicit tax rates on labor, we found slight decreases which could be caused by PBC, especially in the case of new EU countries. Furthermore, we detected their increases in non-election years for all EU countries. In regard to implicit tax rate on consumption, there is a minor decrease of average values in both observed time periods in the case of old EU countries. These findings suggest a year-to-year reduction of tax burden levied on consumption. Our results deviated from that of Formanová and David (2016) or Formanová and Mádr (2016) in respect to new EU countries. Our results did not prove any significant declines in the election-influence years.

Finally, we separately verified, via t-test, the theoretical assumption about the political business cycle for implicit tax rates on labor and consumption. Within our analysis we tested whether the average values differ

between election and non-election years. Firstly, we focused on the average values of implicit tax on labor and the received results are displayed in Table 3.

$\alpha = 0.10$	P-value	The result of t-test	Conclusion – existence of PBC	
EU (28)	0.1714	Average values are same.	No	
Old (15)	0.9940	Average values are same.	No	
New (13)	0.0799	Average values are different.	Yes	

Table 3: Testing the existence of impact the political business cycle on ITRL via t-test

Source: Own calculations.

In the case of the implicit tax rate on labor, the p-value of the t-test for all EU implies that there are no considerable differences in average values between election and non-election years on a 10% significance level. For this reason, the existence of PBC cannot be confirmed globally. However, it is important to mention the p-value for new EU member states, as it is clear there are, on the 10% significance level, differences in average values between election and non-election years. Therefore, we can partly confirm our theoretical assumption about realization attractive tax policy in election-influenced years with the aim to persuade voters. The results do not correspond with the previous study conducted by Formanová and Mádr in 2016. It could be caused by using the different tax indicators or by including the wider range of years, which might be influenced by parliamentary election date.

In addition, we focused on implicit tax on consumption. The results, which are presented in Table 4, indicate that on a 10% significance level there are differences in average years, especially in new EU countries. This result is probably caused by decreasing the pace of growth in election-influenced years in comparison with non-election years. This conclusion complies with our previous findings. In the case of old EU countries, we identified a decline of average value ITRC in all observed time periods, therefore we cannot confirm our theoretical assumption about the influence of PBC.

Table 4:	Testing	the existence	of impact	t the politica	l business	cvcle on	<b>ITRC</b> via t-tes	t
				1		•		

$\alpha = 0.10$	P-value	The result of t-test	Conclusion – existence of PBC	
EU (28)	0.0851	Average values are different.	Yes	
Old (15)	0.8581	Average values are same.	No	
New (13)	0.0330	Average values are different.	Yes	

Source: Own calculations.

Based on Doležalová (2013), we analyzed the influence of PBC separately for 2 groups of countries. We found out that there are significant differences in results between new and old EU countries. Our results revealed the effect of the electoral cycle, especially in new EU countries. This group is created by countries referred to as new democracies (short-time of democracy), therefore our results correspond with the findings of Efthyvoulou (2012) or Brender and Drazen (2005), who suggest that PBC is generally common for less developed economies because there is the lack of familiarity with electoral politics.

## 4 Conclusions

In our study, we focused on the political business cycle and its influence on alternative tax burden indicators. We analyzed the development of implicit tax rates on labor and consumption between 2000 and 2012. Within our analysis we used an alternative classification of years and we assumed that in pre-election, election and immediately post-election years there might be a decrease in analyzed indicators. The inclusion of post-election years between years which could be influenced by electoral cycle can be an alternative solution of PBC research. Furthermore, we included in our analysis, the length of democracy. According to Doležalová (2013), we divided 28 EU countries into 2 groups (13 new and 15 old) and analyzed if there are any differences in results. In the case of new EU countries, we revealed the influence of the electoral cycle in both analyzed indicators (ITRL and ITRC). These findings partly correspond with our previous studies, especially in the case of ITRC (see Formanová and Mádr, 2016). We suppose that the differences in results can be caused by the alternative classification of years. Furthermore, we did not detect any effect of PBC on implicit tax rates in old EU countries. Based on diverse results across EU countries, we can confirm that the influence of PBC is more common in countries labeled as new

democracies. Concerning our results and previous studies, we recommend future studies focus especially on the indicator representing the date of parliamentary elections, which we consider a key aspect in testing PBC theory.

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## Effective Tax Rate of Employees and Self-employed

#### Lucie Kábelová\*

**Abstract.** The aim of this paper is to calculate and discuss effective tax rates of employees and self-employed for personal income tax in the Czech Republic. These calculations show how the tax burden in the Czech Republic differs between employees and self-employed and thus clearly indicate possible distortions that might exist in effective taxation. In this paper, the effective tax rate in the Czech Republic is also compared to other European Union Countries.

**Keywords:** personal income tax, effective tax rate, self-employed, employees, tax burden, lump-sum expenses,

JEL Classification: H25

## **1** Itroduction

Taxation and tax burden itself of self-employed persons is different compared to taxation of employees in the Czech Republic. Not only the difference was pointed out by European Commission (2013) or OECD (e. g. 2010, 2011), but there are also academic studies discussing whether the system of personal income tax is fair both for employees and self-employed.

Self-employment is favored by the preferential tax treatment granted to this type of employment, at the expense of higher tax burden of employees, and as opposed to the predominance of traditional working practices. In the Czech Republic, self-employed has a possibility to apply so called lump sum expenses instead of real expenses. The role of lump sum expense is special within the Czech Republic. As compared to other EU countries, the percentage of lump sum expenses are high and they are often criticized as distortive. The highest rate of lump sum expenses is up to 80 % of income. That means that tax base of individuals can be highly reduced. Nevertheless, the height of the tax base is crucial also for the health and social security contribution. And, similarly to regular employees, self-employed are eligible for several tax deductions such as mortgage interest and pension insurance.

The fact that self-employed has a possibility to lower the tax burden on a much lower level than employees could cause that persons in some industries are misclassified as entrepreneurs but their only and exclusive customers are their employers, commonly referred to as "švarcsystem". Employment in this form brings better tax optimization both for the employer and the person with income from independent activity. This practice is especially beneficial for the employer as he does not need to pay any social contributions for these workers.

It's not possible to gauge this phenomenon accurately, because boundary between "proper" and "fake" selfemployment is rather blurry. Vlach (2013) mentioned in his study, that 10 % of surveyed employers reported to have hired fake self-employed. This can be certainly significantly understated. As Vlach (2013) mentioned further, the study presented an expert estimate of between100-200 thousands of persons, which accounts for between 15% to 30 % of the total number.

One of the requirements of the tax system and taxation itself is neutrality. That means every subject should be taxed the same way. In other words, taxation should be non-distortive and fair (Kubátová, 2015). In tax law, the so called statutory tax rate is determined. Although, this statutory tax rate has not amply sufficient explanatory power of tax burden. That is the reason why effective tax rate is used for calculating tax burden.

The aim of this paper is to calculate and discuss effective tax rate for employed and self-employed in the Czech Republic. In this paper, effective tax rate and tax burden in the Czech Republic is also compared to European Union (EU) countries.

#### 1.1 Tax burden on wages in EU countries

The tax and social security contribution burden is measured by OECD as the "tax wedge" - or as the total taxes paid by employees and employers, minus family benefits received as a percentage of the total labor costs of the employer.

Based on OECD data (2015), in the Czech Republic, the tax wedge for the average single worker increased by 0,2 percentage points from 42,6 to 42,8 % between 2000 and 2015. In this period, the average tax wedge across the OECD decreased by -0,7 percentage points from 36,6 % to 35,9 %.

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Figure 6: Effective Tax Rate of Employees by OECD, EU countries

Source: OECD

The highest average tax burdens for childless single workers earning the average wage in their country were observed in Belgium (55.6 %), Austria (49.4 %), Germany (49.3 %) and Hungary (49.0 %) The lowest were in Chile (7 %), New Zealand (17.2 %), Mexico (19.5 %) and Israel (20.5 %).

According to OECD Taxing Wages (2016), in the Czech Republic, the average single worker faced a net average tax rate of 23.3 % in 2015, compared with OECD average 25.5 %.

Figure 2 shows income tax plus employee and employer social security contributions in EU countries as a % of labour costs calculated by OECD. This is for single individual without children at the income level of average worker. Calculation includes payroll taxes where applicable. As figure 2 shows, income tax as a % of a labour costs differs in the EU countries, but employee's social security contribution doesn't that much. Lot of differences can be found in the social security contribution paid by employer.



Figure 7: Income tax plus employee and employer social security contributions as a % of labour costs, 2015

Source: OECD

As Figure 2 shows, Denmark, Iceland, Australia and New Zealand are specific as the social security contribution paid by employee has a minimum of percent of labour costs. According to OECD studies, Denmark has the highest effective tax rate within the EU countries. As figure 2 shows, this is just for income tax. If the social security contribution paid by employee and employer is also used for calculating the effective tax rate, the highest effective tax rate has Belgium with the biggest part of social security contribution paid by employer.

#### 1.2 Methodology

This paper focuses on taxation of individuals and calculates and compares effective tax rate for employees and self-employed.

Data used in this paper was gained from Analysis of Development of Household incomes and expenditures of the Czech Republic, that was published by Ministry of Labor and Social Affairs (MPSV). This database contains data about average earnings of employees and self-employed during the selected period of 2015.

One of the options to compare taxation of employees and self-employed is to compare the tax rate. The statutory rate is enacted by the law and is 15 %. As statutory tax rate does not express the real tax burden of person, to compare taxation of employees versus taxation of self-employed, the effective tax rate was calculated.

The effective tax rate was calculated as bellow:

$$ETR = \frac{PIT + PHC + SSC}{GR}$$
(1)

where ETR = Effective Tax Rate
- PIT = Personal Income Tax
- PHC = Public Health Contribution
- SSC = Social Security Contributions
- GR = Gross Revenue

For the calculation of effective tax rate, average revenue collected by the MPSV was used.

At this is a model situation, these assumptions were used in case of employees:

- super gross salary as a tax base
- tax deduction was used
- no other tax deductions were used
- health and social security contribution was calculated

## 2 Analysis

Following figurers capture indicators of taxation of individuals in chosen time period of the year 2015. Figure 3 shows calculated effective tax rate of employees and self-employed.



Figure 3: Effective Tax Rate of Employees and Self-Employed (including super gross salary)

Source: MPSV, own calculations.

Number 1 is average income, fallowing numbers then states for multiple of average income simulating the higher income of persons. By MPSV (2015), the average income for employees was 34 821 CZK, for self-employed it was 33 010 CZK.

For self-employed effective tax rate starts at 11,5 %, for employees it starts at 25 %. In this calculation super gross salary was used to calculate the personal income tax. Effective tax rate of employee inclusive social security contribution and public health contribution paid both by employee and employer is shown as "Employee+Employer (SG)" and its height over 60 %.

Super gross salary is one of the often discussed aspect of high tax burden of employees. Super gross salary is a specific process in personal income tax of employees and between the EU countries, the Czech Republic is the only one which uses super gross salary at this time.

In that case, figure 4 shows effective tax rate of self-employed compared to employees without using of super gross salary in calculation of personal income tax.



Figure 4: Effective Tax Rate of Employees and Self-Employed

Source: MPSV, own calculations.

For self-employed it is starting at 11,5 %, for employees it's starting at 20 %. In this calculation super gross salary was not used to calculate the personal income tax. Effective tax rate of employee includes social security contribution and public health contribution paid by employee and starts at 20 %. Total tax burden of employee that includes also social security contribution paid by employer starts at 55 %.

## **3** Conclusions

The aim of this paper was to calculate and discuss effective tax rates of employees and self-employed for personal income tax in the Czech Republic. Different taxation of employees and self-employed has been highly discussed topic within the Czech Republic, mainly because of discrepancies between effective taxation of self-employed and employees. The question is whether employees are taxed more and the tax burden should be lower, or self-employed are taxed underload and the tax burden should be higher.

It is no question that lump sum expenses has a significant role in this context, as they influence both the tax base and social security. On the other side, super gross salary has a big impact on tax burden of employees, as it is not only their income that is taxed, but also social security contribution paid by employer.

With the information about average income, the average effective tax rate was calculated. From analyzed data it is clear that there is a difference between taxation of self-employed and employees, as the taxation of self-employed is much lower than taxation of employees. This could lead to a distortive behavior of the individuals and could cause false self-employment.

#### Acknowledgements

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## Labour costs and income inequality in the CR

## Zdeněk Sadovský\* – Jitka Matějková\*\*

**Abstract.** The focus in this paper is on labour costs and the progression of employee taxation at various income levels, as expressed by a commonly used indicator of overall labour taxation. In addition, calculations based upon an indicator created by the authors are presented. The authors believe this indicator does a better job of assessing labour costs in the CR, that is to say, the indicator reflects actual labour taxation by providing information on the percentage of all tax payments incurred per CZK 1.00 of net wage. The significance and meaning of the proposed introduction of a progressive tax is analyzed from the standpoint of income equality to assess its potential effect.

**Keywords:** employee, total taxation, motivation, income equality **JEL Classification:** E 62,D 14, H 24, H 71

## **1** Introduction

For some time we have pointed out the instability of the legislative environment in the Czech Republic, particularly its tax environment, which impacts negatively on the self-employed and on entrepreneurs in small and midsize enterprises. Another topic of long-term interest for us has been the high price of labour. Recently, the Prime Minister and Chairman of the Government presented a partial proposal for a "tax revolution" that would involve progressive taxation for natural persons and businesses alike. He justified this by saying the proposal targeted greater income "equality".

At its basis, income equality involves the measurement of poverty, well-being, and the degree of redistribution present in the tax and social security systems. [3] There are many ways to approach this measurement task. Most often, the indicator is taken to be the ratio between the average income of the wealthiest and poorest fifths of the population, or else the Gini coefficient is employed.

Another recognized method is the S80/S20 Income Inequality Coefficient, according to which in 2015, the highest-income fifth of the population had 3.5 times more income than the lowest-income fifth. In recent years, the value has oscillated between 3.4 and 3.6. [2] Generally, income in the CR is distributed rather equally.

This statement may be illustrated by the Robin Hood index (Hoover Index). This index provides the percentage of income that would have to be redistributed to obtain a more uniform distribution. In 2015, the index stood at 17.4% in the CR. This means that, to attain income equality, an amount less than the income of the poorest fifth would have to be redistributed from the wealthiest. [2]

In this paper, our focus is on the proposed progressive taxation of employee income. We will compare the proposal to the current system for various income categories and analyze labour costs. In doing so, we will try to judge whether the proposal is a genuine instance of the 'Let the Wealthy Pay' slogan, or simply a pre-election marketing ploy. The paper also targets the impact the proposed tax changes would have on employee net wage.

For entrepreneurs, the self-employed, and particularly for small and midsize businesses, a stable tax system is crucial. In the Czech Republic, unfortunately, such a system is presently missing. In this article, we react to the government's proposal and calculate the tax burden on employee labour.

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## 2 Data and Methodology

What is presented here is primarily based upon real-world calculations and current law. The total taxation of labour is calculated on the basis of established methodology; its actual amount is calculated using the authors' own indicator. The paper makes use of basic statistical methods, descriptive methods, as well as analysis and synthesis.

#### Current employee labour taxation — monthly wage in 2017

The table shows employee income ranging from the 2017 minimum wage of CZK 11,000 up to a gross monthly income of CZK 200,000.

The calculations indicate total and actual labour taxation. [5] It is clear that the highest total taxation levels impact high income employee groups. Degression obtains only for incomes exceeding CZK 150,000.

#### $TT[\%] = [(SGW-NW) : SGW] \times 100$

The last row of the table presents the indicator of actual labour taxation (ALT). The actual taxation of employee labour is calculated as the ratio of tax levies (TL) paid by the employee to those paid by the employer on the net wage (NW) received by the employee.

#### ALT [%] = (TL/NW) x 100

#### TL = HI EER+POS EER+HI EEE+POS SS EEE+TAD+ST-TB

For a gross monthly income of CZK 150,000 and 200,000, the average social security base is considered because at this level employees reach the ceiling Social Security payment during the course of the year. The third column comprises the average wage for 2017.

GW	11,000	20,000	28,232	30,000	40,000	50,000	60,000	80,000	100,000	150,000	200,000
HI EER	990	1800	2541	2700	3600	4500	5400	7200	9000	13,500	18,000
SS EER	2750	5000	7058	7500	10,000	12,500	15,000	20,000	25,000	28,232	28,232
HI EEE	495	900	1271	1350	1800	2250	2700	3600	4500	6750	9000
SS EEE	715	1300	1835	1950	2600	3250	3900	5200	6500	7340	7340
SGW	14,800	26,800	37,900	40,200	53,600	67,000	80,400	107,200	134,000	191,800	246,300
TBIT	14,800	26,800	37,900	40,200	53,600	67,000	80,400	107,200	134,000	191,800	246,300
TBD	2220	4020	5685	6030	8040	10,050	12,060	16,080	20,100	28,770	36,945
TAD	150	1950	3615	3960	5970	7980	9990	14,010	18,030	26,700	34,875
ST	0	0	0	0	0	0	0	0	0	2596	6095
NW	9640	15,850	21,511	22,740	29,630	36,520	43,410	57,190	70,970	106,614	142,690
TT in %	35	41	43	43	45	45	46	47	47	45	42
ALT in %	53	69	76	77	81	83	85	87	89	80	73

Table 1 – Taxation of employee labour – monthly wage - 2017 (in CZK)

Source: authors' calculation based upon the law (Sadovský, Matějková 2017)

Legend:

HI = health insurance SS = social security EER = employer EEE = employee ST = solidarity tax SGW = supergross wage GW = gross wage NW=net wage CZD = total taxation TB = tax bonus TBIT = tax base for income tax TBD = tax before deductions TAD = income tax after deductions

GW	11,00 0	20,00 0	28,23 2	30,00 0	40,00 0	50,00 0	60,00 0	80,000	100,00 0	150,00 0	200,00 0
HI EER	990	1800	2541	2700	3600	4500	5400	7200	9000	13,500	18,000
SS EER	2750	5000	7058	7500	10,00 0	12,50 0	15,00 0	20,000	25,000	28,232	28,232
HI EEE	495	900	1271	1350	1800	2250	2700	3600	4500	6750	9000
SS EEE	715	1300	1835	1950	2600	3250	3900	5200	6500	7340	7340
SG W	14,80 0	26,80 0	37,90 0	40,20 0	53,60 0	67,00 0	80,40 0	107,20 0	134,00 0	191,80 0	246,30 0
TBI	14,80	26,80	37,90	40,20	53,60	67,00	80,40	107,20	134,00	191,80	246,30
Т	0	0	0	0	0	0	0	0	0	0	0
TBD	2220	4020	5685	6030	8040	10,05 0	12,06 0	16,080	20,100	28,770	36,945
TAD	0	0	881	1226	3236	5246	7256	11,276	15,296	23,966	32,141
ST	0	0	0	0	0	0	0	0	0	2596	6095
TB	2584	784	0	0	0	0	0	0	0	0	0
NW	12,37 4	18,58 4	24,24 5	25,47 4	32,36 4	39,25 4	46,14 4	59,924	73,704	109,34 8	145,42 4
TT in %	16	31	36	37	40	41	43	44	45	43	41
ALT in %	19	44	56	58	66	71	74	79	82	75	69

 Table 2 – Taxation of labour for an employee with two children – monthly wage - 2017 (in CZK)

Source: authors' calculation based upon the law (Sadovský, Matějková 2017)

The monthly tax on the tax base rounded up hundreds of CZK is 15%. If the supergross wage is used, taxation exceeds twenty percent of employee's gross wage. At low income levels, progression is ensured by tax discounts, for high income levels by the solidarity tax. Labour taxation comes especially in the form of high health insurance and social security levies.

The progression is clearly visible if the total taxation in Table 1 and Table 2 is compared. Table 2 considers payers who apply for the bonus for two children. The tax bonus amount is calculated using the increased deduction for the second child scheduled to take effect as of January 2017.

## **3** Discussion

We take as our starting point the presence of the supergross wage, which we consider to be one of the worst ideas in recent memory. Progressive taxation, however, is something different. According to a leading economist [9] the current system of taxation of natural persons may be the best in the world from the standpoint of tax equality. In our opinion, this is a case of 'if it isn't broken, don't fix it'. Unfortunately, the system has become the object of criticism and discussion of it has recently been on the level of pure politics. Our own objective is to eschew politics and analyze whether the proposed modifications actually make sense.

#### MODEL A - The ČSSD proposal to reform general employee taxation

Tables 3 and 4 include the same range of employee incomes as do Tables 1 and 2: from the 2017 minimum wage of CZK 11,000 up to CZK 200,000. They show potential taxation using four tax brackets as proposed by ČSSD. These are: a 12% rate for incomes up to CZK 30,000; a 15% rate for incomes ranging from CZK 30,000 to CZK 40,000; a 25% rate for incomes ranging from CZK 40,000 to CZK 50,000 and a 32% rate for incomes above CZK 50,000.

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GW	11,000	20,000	28,232	30,000	40,000	50,000	60,000	80,000	100,000	150,000	200,000
HI EER	990	1800	2541	2700	3600	4500	5400	7200	9000	13,500	18,000
SS EER	2750	5000	7058	7500	10,000	12,500	15,000	20,000	25,000	28,232	28,232
HI EEE	495	900	1271	1350	1800	2250	2700	3600	4500	6750	9000
SS EEE	715	1300	1835	1950	2600	3250	3900	5200	6500	7340	7340
SGW	14,800	26,800	37,900	40,200	53,600	67,000	80,400	107,200	134,000	191,800	246,300
TBIT	14,800	26,800	37,900	40,200	53,600	67,000	80,400	107,200	134,000	191,800	246,300
TBD	1776	3216	4548	4824	6834	10,184	14,472	23,048	31,624	53,094	74,504
TAD	0	1146	2478	2754	4764	8114	12,402	20,978	29,554	51,024	72,434
ST	0	0	0	0	0	0	0	0	0	2596	6095
NW	9790	16,654	22,649	23,946	30,836	36,386	40,998	50,222	59,446	82,290	105,131
TT in %	34	38	40	40	42	46	49	53	56	57	57
ALT in %	51	61	67	68	74	84	96	113	125	133	134

Table 3 – Taxation of employee labour – monthly wage - proposal by ČSSD (in CZK)

Source: authors' calculation on the basis of the proposed legislation (Sadovský, Matějková 2017)

Table 4 –	Wage taxation	for an employee	with two children	- monthly wage -	- proposal by ČS	SSD (in C	ZK)

GW	11,000	20,000	28,232	30,000	40,000	50,000	60,000	80,000	100,000	150,000	200,000
HI EER	990	1800	2541	2700	3600	4500	5400	7200	9000	13,500	18,000
SS EER	2750	5000	7058	7500	10,000	12,500	15,000	20,000	25,000	28,232	28,232
HI EEE	495	900	1271	1350	1800	2250	2700	3600	4500	6750	9000
SS EEE	715	1300	1835	1950	2600	3250	3900	5200	6500	7340	7340
SGW	14,800	26,800	37,900	40,200	53,600	67,000	80,400	107,200	134,000	191,800	246,300
TBIT	14,800	26,800	37,900	40,200	53,600	67,000	80,400	107,200	134,000	191,800	246,300
TBD	1776	3216	4548	4824	6834	10,184	14,472	23,048	31,624	53,094	74,504
TAD	0	0	0	20	2030	5380	9668	18,244	26,820	48,290	69,700
?DS?	2734	1588	256	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	2596	6095
NW	12,534	19,388	25,382	26,680	33,570	39,120	43,732	52,956	62,180	85,024	107,865
TT in %	15	28	33	34	37	42	46	51	54	56	56
ALT in %	18	38	49	51	60	71	84	102	116	126	128

Source: authors' calculation on the basis of the proposed legislation (Sadovský, Matějková 2017)

The argument in favour of progressive taxation is based upon two unsubstantiated and misleading statements:

- a) that it is in place in almost all European countries,
- b) and that the current situation is unfair to the poor.

It is an evident fact—one experts are aware of—that the tax rate is but a single criterion. Each European country has its own system, with different deductibles and discounts in place to modify income inequality. In practice, this means a country with a high tax rate that nevertheless allows cost-of-living deductions for the family of an entrepreneur may be more advantageous than one in which the base rate is lower, but there are only minimal deductions and discounts available. Tax equality is a highly contentious term. But as the tables demonstrate, income equality in the Czech Republic is ensured in other ways.

At https://www.spravedlive-dane.cz/ citizens may calculate what their net wage will be once the proposal takes effect. The calculator does not work for incomes over CZK 100,000—it merely congratulates the user on his or her income. The website also states that the CR used progressive taxation until 2007, and that the flat tax gives the greatest benefit to those with the greatest wealth. It further states that 21 EU states employ progressive taxation. But the website provides no information about the fact that the so-called supergross wage was not taxed before,

and that the 'flat tax' is in fact not flat, since it incorporates a combination of discounts and the solidarity tax that make it effectively progressive. Proposals put forth by the political parties should be a focus for economists, not marketing specialists.

#### MODEL B -The ANO proposal to reform general employee taxation

In reaction to the ČSSD proposal, ANO has presented its own, so far somewhat vague, proposal to reduce the taxes of all income groups up to the income level eligible for the solidarity tax. For 2017, the solidarity tax is paid on incomes of at least CZK 112,928. The current system would continue to apply to the high-income group.

This model is handicapped by the vagueness of its current formulation. Despite this, it does introduce a degree of discrimination against higher income groups into the system. A proposal detailing how much to take and whom to take it from would undoubtedly be of greater significance.

#### **Comparison of European Countries Using the Income Inequality Indicator**

Over the long term, compared to European countries, the CR, along with the Nordic countries of Norway, Finland, and Iceland shows one of the lowest values for the Income Inequality Indicator. By contrast, the greatest income inequality is present in Romania and Bulgaria (>6.0) and the Baltic countries, along with Spain and Greece. The average coefficient for the EU countries has oscillated around 5.0 over the long-term, with no significant change over the most recent decade.[5]

#### Results

An analysis of the data presented in the table demonstrates that the proposal as currently written will not balance income inequality, it will simply increase the tax rate on high-income natural persons. If adopted, the proposal would demotivate people from working in physically and psychologically demanding positions and dissuade them from pursuing continuing education. In essence, it would punish the successful. It is only a slight exaggeration to say it could function as an instruction manual for instituting unequal taxation but equal wages and salaries. It is unfortunate that the wages of MPs and senators, including compensation payments, are not taxed the same way as "ordinary" people. It would be interesting if the salary of most MPs was based on their average wage for the most recent five or ten years before taking office, valorised the same way as retirement pay. It must likely be constantly emphasized that the money for the state budget does not grow on trees but comes out of taxes paid on the productive work of approximately 20% of the ranks of entrepreneurs and the self-employed.

According to the Social Democrats, the proposal will redistribute income above-average earners to those with lesser earnings, and will do so without burdening the national budget. Both the calculations and the logic make clear that, while low wage earners will see only token modifications to their tax rate, those with high incomes will experience a substantial reduction in net income.

To conclude, it may be stated that the proposal examined here directly contradicts what the state should support, namely motivating people to get an education, to better their qualifications, and to make the effort to get better jobs by dint of their personal development, conscientious attitude to work, and diligence.

Economists know and our calculations show—especially the indicator of the actual taxation of labour—that the taxation of labour in the Czech Republic is high, as is the degree of solidarity. Figure 1 gives a clear overview of the current and proposed taxation of labour. The latter will minimally reduce the tax burden on low and middle income wage earners at the same time it significantly increases the tax burden on those with high incomes. The constantly rising minimum wage does not benefit the business environment, nor does lack of stability in the law, particularly the laws on taxation. From the above, it follows that attention should be paid to cutting state budgetary expenditures and bureaucracy (by, for example, not expanding the number of bureaucratic positions, eliminating redundant agencies, and reducing the administrative burden).



## Figure 1: Comparison of existing and proposed total and actual labour taxation at various gross monthly income levels



#### Labour costs in the CR

Our calculations show clear ties between labour costs and employee taxation. According to our analyses, labour costs in the Czech Republic rest not primarily on taxation, but rather on insurance-related costs, particularly the social security paid by the employer. These payments are a source of income for the state budget. It is open to question whether a revenue shortfall here could be compensated for by tax increases in other areas. Once again the question arises as to whether healthcare and social taxes—because that is what health insurance and social security charges in fact are—should not be based at least partially on a voluntary, truly insurance-like, principle.

## 5 Conclusion

A number of researchers have found that income equality in the Czech Republic is high compared to other countries both inside and outside the EU. The indicators calculated for total and actual labour taxation make clear that the proposal described as MODEL A would bring only a small-scale increase in the net income of low and middle income groups at the expense of a rapid reduction in the net income of employees earning a gross salary of over CZK 50,000. Meantime, the proposal runs in the opposite direction from state incentives for people to educate themselves and obtain higher paying positions. We think its potential effect will therefore be demotivating. We reject the hypothesis that the "tax revolution" will contribute to increased income equality in the CR.

The proposal described in MODEL B seems acceptable, although it does contain a populist comment regarding the way the highest income group is currently taxed. The proposal remains problematic, though, because it is currently uncertain and lacking in detail.

Our analyses give rise to conclusions and recommendations to improve employee conditions. These recommendations include: cutting state budget expenditures, and permanent shrinking the state bureaucracy by freezing bureaucratic hiring, eliminating costly redundant agencies, and creating the conditions to increase employee remuneration by lowering actual labour costs, specifically social security.

Our final recommendation consists in maintaining the current system of employee taxation, i.e., rejecting proposals for progressive taxation as unjustifiable. At the highest level, we recommend limiting bureaucratic expenses and generally reducing the actual cost of labour.

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## How the Procedural Rules of both the Common Corporate Tax Base and the Common Consolidated Corporate Tax Base Directive should be implemented in the Czech Republic?

#### Hana Skalická\*

**Abstract.** In October 2016, the European Commission introduced the proposals on both the Directive on the Common Corporate Tax Base and the Directive on the Common Consolidated Corporate Tax Base. Currently, the Member States give their statements to these proposals. The aim of this paper is to analyze how the Czech Republic should implement the procedural rules of these directives. In particular, which body should be authorized to administer the taxpayers, which authority will be entitled to perform tax audit, which authority will be authorized to issue tax assessment, which remedies will be available for taxpayers and which body should have a power to decide them.

The paper uses standard methods of scientific work as method of description, comparative analysis, and methods of synthesis, deduction and induction.

**Keywords:** CCTB, CCCTB, Tax Administration, Tax Audit, Principal Tax Authority, Competent Tax Authority

JEL Classification: K34, K41, H21

## **1** Introduction

On 25 October 2016, the European Commission presented the proposal for the Directive on Common Corporate Tax Base ("CCTB Directive") and the Directive on the Common Consolidated Tax Base ("CCCTB Directive"). Both these directives contain also some administrative provisions.

Contrary to the proposal from 2011, when the European Commission presented the proposal for the Directive on Common Consolidated Corporate Tax Base, currently there were presented two proposals instead of one. In other words, the European Commission suggests to the Member States of the European Union to agree on the calculation of the common corporate tax base first and then, when there will be the agreement on it, to conclude on rules for consolidated corporate tax base. Both the common corporate tax base ("CCCTB") and the common consolidated corporate tax base ("CCCTB"), should be obligatory for the companies with the consolidated turnover higher than EUR 750 million. The other corporate taxpayers can opt both for the CCTB and for the CCCTB.

The original proposal from 2011 was formally withdrawn by the European Commission on the 28 February 2017. Even if the discussion on harmonization of direct taxation are held for more than 70 years and there has not been achieved the conclusion, currently the European Commission presented this ambitious proposal not in the name of harmonization of direct taxes, but in the name of fight against illegal tax planning. With regard to the fact that Anti-Tax Avoidance Directive, which was introduced also in the name of the fight against base erosion and profit shifting, was passed very quickly, maybe also the chances on passing of proposals both on the common corporate tax base and on the common consolidated corporate tax base are higher.

The aim of this paper is to analyze how the Czech Republic should implement the procedural rules contained in the proposal for the CCTB and the proposal for the CCCTB Directive. In particular, which body should be authorized to administer the taxpayers, which authority will be entitled to perform tax audit, which authority will be authorized to issue tax assessment, which remedies will be available for taxpayers and which body should have a power to decide them.

The paper uses standard methods of scientific work as method of description, comparative analysis, and methods of synthesis, deduction and induction.

# **2** Directive on the Common Corporate Tax Base and its procedural provisions

Under the Article 2 (1) of the CCTB Directive, a company that applies the rules of this Directive shall cease to be subject to the national corporate tax law in respect of all matters regulated by this Directive. The company will fall

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under the tax administration of the Member State in which it is tax resident or in which its permanent establishment is situated. In line with Article 64 of the CCTB Directive, such a company should just announce to the tax authority of the Member State of his residency that he falls under the scope of the CCTB Directive.

Such taxpayer shall cease to be subject to the national corporate tax law in respect of all matters regulated by the CCTB Directive, but from the procedural point of view, it stays under the power of local tax authorities.

It implies that local tax authorities will have to apply two systems of calculation of the corporate tax base in parallel: 1. national, i.e. in the case of the Czech Republic rules contained in Act no. 586/1992 Coll., on Income Taxes ("ITA"), and 2. CCTB rules to taxpayers for whom the CCTB will be obligatory or who will opt for it. Despite of this fact, the procedural rules will be the same for all corporate taxpayers in the country. The tax procedure rules in the Czech Republic are stipulated in the Act no. 280/2009 Coll., the Tax Procedure Code ("Tax Procedure Code").

# **3** Directive on the Common Consolidated Corporate Tax Base and its procedural provisions

The CCCTB Directive contains administrative and procedural provisions in Art. 46 - 68. Unlike from the CCTB Directive, these are more detailed.

### 3.1 Principal Tax Authority and Competent Authority

The CCCTB Directive defines so called: "principal tax authority" and "competent authority".

The principal tax authority means the competent authority of the Member State in which the principal taxpayer is resident for tax purposes or, where it concerns a permanent establishment of a non-resident taxpayer, the Member State in which that permanent establishment is situated.

The principal taxpayer is defined in Art. 3 (11) of the CCCTB Directive as follows:

- (a) a resident taxpayer that forms a group with its qualifying subsidiaries, with one or more of its permanent establishments located in another Member State or Member States or with one or more permanent establishments of a qualifying subsidiary that is resident in a third country;
- (b) a resident taxpayer designated by the group that is composed of only two or more resident taxpayers which are immediate qualifying subsidiaries of the same parent company resident in a third country;
- (c) a resident taxpayer that is the qualifying subsidiary of a parent company resident in a third country, where that resident taxpayer forms a group with only one or more permanent establishments of its parent;
- (d) a permanent establishment designated by a non-resident taxpayer that forms a group with only its permanent establishments located in two or more Member States;

If we simplify this definition, it is the parent company of the group.

The competent authority means the authority designated by each Member State to administer all matters related to the implementation of this Directive. Therefore, it is up to each Member State to determine such a body.

Under this Directive, the principal tax authority has the leading role in the tax administration of the group, because the principal taxpayer shall submit the consolidated tax return of the group with the principal tax authority. The principal tax authority is entitled to issue tax assessment. In the case of tax audit coordinates tax audit of group members.

The competent authorities should provide all necessary assistance to the principal authority during the tax audit and appellate process. Next, the taxpayer may request from the competent authority of the Member State an opinion on the implementation of the rules of the CCCTB Directive on a specific transaction or series of transactions that it plans to carry on. The opinion of the competent authority should be binding, unless the courts of the Member States of the principal tax authority subsequently decide otherwise.

When the competent authority disagrees with a decision of the principal tax authority, it may challenge that decision before the courts of the Member State of the principal tax authority within a period of three months. In such a case, the competent authority should have at least the same procedural rights as those enjoyed by a taxpayer under the law of that Member State in proceedings against a decision of the principal tax authority.

#### 3.2 Tax Return and the Tax Assessment

The principal taxpayer shall submit the consolidated tax return of the group with the principal tax authority. The deadline is the nine months from the end of tax year. All members of the group must have the same tax year. Usually it will probably be the calendar year.

Consolidated tax return should be treated as an assessment of the tax liability of each group member. However, there can arise the difference in the case that in some country is used the system of self-assessment, when no action of competent authority is used, and the system under which the competent authority has to issue payment order. The difference could arise not only in the request to activity of competent authorities, but also in the time of tax assessment. In the countries with self-assessment system, to which the Czech Republic also belongs, the tax will be assessed by expiration of the time-limit for submitting tax return (if the tax return was submitted on time), but in countries with different system the tax will be assessed later – by issuing payment order by respective authority.

The consolidated tax return should be verified by the principal tax authority and, if required, amended tax assessment shall be issued in maximum three years from the final date of submission of consolidated tax return or, where no return was submitted, not later than three years following issuance of a tax assessment based on the estimate of the principal tax office and based on available information. So the CCCTB Directive stipulates also the time-limit for tax assessment, by whose expiration the right of the state to assess the tax expires.

Prior to issuing amended tax assessment, the principal tax authority should consult the competent authorities. Those authorities may express their views within one month of consultation.

The competent authority may call on the principal tax authority to issue an amended tax assessment. Failure of the principal tax authority to notify within three months of that call to the competent authority that it undertakes to issue that amended tax assessment shall be treated as refusal.

#### 3.3 Tax Audit

Tax Audit may be either initiated by the principal tax authority, or by a request for initiation of the competent authorities. The principal tax authority and the other competent authorities should jointly determine the scope and content of an audit and the group members to be audited.

Tax audit of group members should be coordinated by the principal tax authority. The principal authority should also compile the results of all audits.

Tax audit should be conducted in accordance with the national legislation of the Member State in which it is carried out, subject to such adjustments that are necessary to ensure a proper implementation of the rules of the CCCTB Directive.

#### **3.4 Remedies**

The CCCTB Directive stipulates two kind of remedies: (i) administrative appeals, and (ii) judicial appeals.

#### **Administrative Appeals**

An appeal can be submitted by a principal taxpayer in maximum sixty days of the receipt of the act appealed against. An appeal shall not have any suspensory effect on tax liability of a taxpayer. Appeals shall be heard by an administrative body that according to the law of the Member State of the principal tax authority is competent to hear appeals at first instance. That administrative body shall be independent from the tax authorities in the Member State of the principal tax authority. If in some country is not such administrative body, the principal taxpayer may file a judicial appeal directly.

The administrative body entitled to decide the appeal can change the decision of the principal tax authority, confirm the decision of the principal tax authority or annul such decision. The appeal shall be decided by administrative body in six months. If no decision is received by the principal taxpayer within that period, the decision of the principal tax authority shall be deemed to have been confirmed. Where the decision is annulled, the administrative body should remit the matter to the principal tax authority. In such a case, the principal tax authority is obliged to issue new decision within sixty days. The principal taxpayer may appeal against it to administrative body again, or directly to the court.

#### **Judicial Appeals**

Where the decision of the principal tax authority has been varied or confirmed by the administrative body, the principal taxpayer shall have the right to appeal directly to the courts of the members State of the principal tax authority within sixty days of the receipt of the decision of the administrative appeals body.

A judicial appeal shall be governed by the law of the Member State of the principal tax authority. When making a submission to the court, the principal tax authority should consult it with the other competent authorities. The competent authorities shall provide all necessary assistance to the principal tax authority.

## 4 Financial Administration and Tax Courts in the Czech Republic

#### 4.1 Czech Financial Administration

Currently, the corporate income tax is administered by Czech Financial Administration. The structure of Czech Financial Administration is stipulated in the Act no. 456/2011 Coll., on the Financial Administration of the Czech Republic ("Act on the Financial Administration").

The corporate taxpayers should submit corporate income tax return to the Financial Office. The Financial Office is the lowest administrative body in the whole Financial Administration. In the Czech Republic, the Financial Offices are on the level of regions. Each Financial Office has its branches on the level of district towns. However, the branches form a part of the Financial Office. In other words, the branches are not subordinated to the Financial Office, but they are the part of it. The financial offices are also authorized to perform tax audit, issue tax assessment or additional tax assessment.

The immediately superior authority to all financial offices is the Appellate Financial Directorate. There is only one such directorate for the whole Czech Republic. It is located in Brno. This body deals with all appeals in tax proceedings. The deadline for filing an appeal is 30 days from the delivery of the payment order/additional payment order. The appeal should be lodged to the tax administrator who issued the decision. If the tax administrator does not allow the appeal, he passes it without undue delay to the appellate authority. Generally, the submitted appeal does not have the suspensory effect and the tax additionally assessed (respectively the difference on additionally assessed tax) is due in substitute period of 15 days from the date of legal force of the payment order/additional payment order. Therefore, if the appeal is submitted, then the decision on tax assessment is not in legal force, so the tax (or difference on tax) is payable after the decision on appeal is legally effective (i.e. when the decision of the Appellate Financial Directorate is delivered to the taxpayer). In fact, this is a suspensory effect, although the law defines it as the postponement of due date of additionally assessed tax.

In the hierarchy of Czech Financial Administration, above the Appellate Financial Directorate is the General Financial Directorate. Its role is preparation of methodical decrees and processes of the Financial Administration. The taxpayer will not meet with this authority during the tax proceedings, because the first instance tax administrator is the Financial Office and the second instance is the Appellate Financial Directorate. Even in the case of extra-ordinary remedies during the tax proceedings the taxpayer communicates with the first instance body.

On the top of the hierarchy, there is the Ministry of Finance. The taxpayer can meet with this institution during the tax proceedings only if he/she asks for waiver of tax or tax accessories. In such a case is authorized to decide the Ministry of Finance. However, the taxpayer submits the application to the first instance tax administrator and it internally contacts the Ministry of Finance.

In some cases, the role of the first instance and second instance tax administrator has the Specialized Financial Office. Under Article 11 of the Act on the Financial Administration, the Specialized Financial Office is authorized to administer selected taxpayers. Between such selected taxpayers belong mainly the financial institutions and the legal entities established for the purposes of business which achieved the turnover higher than CZK 2 billion per the corporate tax period and members of the VAT group under the Act no. 235/2004 Coll., on value added tax. The exhaustive list of types of selected taxpayers is contained in Article 11 (2) of the Act on the Financial Administration. The seat of the Specialized Financial Office is Prague. In the case of the Specialized Tax Office there is a specific subject-matter jurisdiction. The authority competent to decide on appeals submitted against decisions of first instance tax administrators from the Specialized Tax Office are the officials also from the Specialized Tax Office, but from other department (they are considered as second instance officers).

### 4.2 Tax Courts in the Czech Republic

In the case of tax disputes, the taxpayer can submit the petition to the court within the administrative justice. The procedural rules are stipulated in Act no. 150/2002 Coll., on the Administrative Court Proceedings.

The first instance court in tax matters is the regional court. The taxpayer should submit the petition in 2 month time-limit starting by the delivery of the decision on appeal. The petition can be lodged only against the final decision of the tax administrator, i.e. against such the taxpayer exercised its right to appeal and when respective authority decided on such an appeal.

Next, either the taxpayer of the tax administrator can submit the remedy against the judgment of the regional court. This remedy is called cassation complaint and the deadline for submitting it is 2 weeks from the delivery of the judgment of the regional court. The competent court is the Supreme Administrative Court. This court is located in Brno.

If the taxpayer is not successful in front of the Supreme Administrative Court, the last chance how to enforce the law in the territory of the Czech Republic (without using the EU or international courts) is submitting of the constitutional complaint to the Constitutional Court of the Czech Republic. Such a complaint should be submitted in 2 months from the delivery of the judgment of the Supreme Administrative Court. The taxpayer has to find the conflict with the Constitution of the Czech Republic; otherwise the constitutional complaint will not be admissible. The detailed conditions are stipulated in the Act no. 182/1993 Coll., on the Constitutional Court.

# **5** Potential Implementation of procedural rules of the CCTB and the CCCTB Directive in the Czech Republic

#### 5.1 Competent authority

During the implementation of both the CCTB and the CCCTB Directive, the Czech Republic should decide mainly on which administrative body should play a role of the competent authority

As stated above in this paper, the competent authority should be the authority designated by each Member State to administer all matters related to the implementation of both the CCTB and the CCCTB Directive. In the situation when the Czech Republic will be the country of tax residency of the principal taxpayer, the competent authority will play a role of the principal tax authority.

There is a question, whether the Czech Republic could designate as the competent authority some body from current structure of the Financial Administration. If so, then it should be Specialized Financial Office, with regard to the fact that the administration of both the CCTB and the CCCTB will require very special knowledge. In the case of the CCCTB even knowledge of procedural administrative rules and procedural court rules in other Member States. So, if the Czech Republic will decide that the Specialized Tax Office would be the competent authority, then it should probably decide also on creation of special department inside of the Specialized Tax Office. In such a department will work specialist just on the CCTB and the CCCTB.

To request this special knowledge on all Financial Offices in the Czech Republic would be very expensive and not realistic. On the other hand, to establish brand new office dealing just with the CCTB and the CCCTB would be more demanding from the organization and approval perspective.

The special department of the Specialized Financial office should administer the corporate taxpayer subject to the CCTB and/or the CCCTB including authorization for performing of tax audit and issuing tax assessment/additional tax assessment.

Also Ms. Hrdinkova even in congress of IFA held in 2008 in Brussels stated that the only practicable way is to delegate administrative rights and duties in each case to one national authority only and to provide the relevant conflict of law rules a prior stage. (Ulli, 2009).

#### **5.2 Administrative Appeals**

In the Art. 67 (1) of the CCCTB Directive is stated that: "Appeals against amended tax assessments or tax assessments ... shall be heard by an administrative body that according to the law of the Member State of the principal tax authority is competent to hear appeals at first instance. That administrative body shall be independent from the tax authorities in the Member State of the principal tax authority." It implies that the authority empowered to decide on administrative appeals in the Czech Republic should not be the Specialized Financial Authority, because it is not independent from the tax authorities of the first instance.

The CCCTB Directive uses the phrase: "independent from the tax authorities", although defines what is meant by "tax authorities". There are two possibilities of interpretations:

- tax administration, i.e. in the Czech Republic all bodies belonging to the Financial Administration (in particular: Financial Office, Specialized Financial Office, Appellate Financial Directorate, and General Financial Directorate), or
- the financial office i.e. in the Czech Republic just the first instance Financial Office and the Specialized Financial Office.

If we will apply the first possible interpretation - i.e. the whole tax administration, then the administrative body empowered to decide on administrative appeals should be the body outside the Financial Administration. If we use the secondly mentioned interpretation, then we can draw a conclusion that the administrative appeals should be decided by some body from the Financial Administration - e.g. the Appellate Financial Directorate.

However, if the firstly mentioned interpretation is correct (that it should be the body outside the Financial Administration), then in the case that the Czech Republic will not quickly establish such a body, then the principal taxpayer may lodge a judicial appeal directly.

#### **5.3 Judicial Appeals**

Under the Art. 68 of the CCCTB Directive, judicial appeals shall be governed by the law of the Member State of the principal tax authority. It means that the Czech courts will have the power to decide them only in the case when in the Czech Republic will be located the principal taxpayer.

In such a case the judicial appeals should be decided by national courts. In my opinion, the Czech Republic can use the same courts as in the case of Czech tax court proceedings – i.e. regional court and the Supreme Administrative Court just with the exemption in the local jurisdiction of the regional courts. There should be chosen just one regional court, in which should be established specialized senate on the CCTB and the CCCTB matters.

## **6** Conclusions

The aim of this paper was to analyse how the Czech Republic should implement the procedural rules of these directives. In particular, which body should be authorized to administer the taxpayers, which authority will be entitled to perform tax audit, which authority will be authorized to issue tax assessment and which body should have a power to decide remedies. Whether is possible to use any body from Czech Financial Administration and courts with jurisdiction in tax matter or not.

The Member States should first designate their competent authority. The author concludes that in the Czech Republic it could be the Specialized Financial Office, in particular to establish new special department with specialization in the CCCTB and the CCCTB in this office.

However, the Specialized Financial Office should not be empowered to decide on administrative appeals. If the Specialized Financial Office will be the competent authority, then it will not be independent from the tax authorities. The author suggests to delegate this power to the Appellate Financial Directorate, and if neither this body is considered as "independent from the tax authorities", then to establish brand new body. Otherwise the taxpayer can submit an appeal directly to the court. On the other hand, Czech authorities and courts will decide both on administrative and judicial appeals only in the situation when in the Czech Republic will be located the principal taxpayer. And, this will probably not happen in many cases. From this point of view the establishment of new authority empowered to decide on administrative appeals is too luxury.

Regarding the court proceedings, the author suggests to use the current court structure just with the exemption on the local jurisdiction of the regional court. For the CCTB and the CCCTB matters there should be just one regional court competent to decide the cases for the whole Czech Republic.

However, the CCTB and CCCTB Directives are "just" proposals now and no one knows whether they will be passed and if so, when. It the administration of the CCCTB there could arise obstacles like "administrative shopping", because the taxpayer can have a tendency to locate the principal taxpayer to the country with the most relaxed tax authorities and with the highest standard of the taxpayers rights. The solution of this could be to set that the principal tax authority is in the country with the highest revenues of the group.

With regard to the fact that the competent authorities from different Member States could have different interests during the tax audit of the group members, their cooperation could not be effective. In authors' opinion, the best would be to establish one institution on the EU level -e.g. the European Specialized Financial Office and the court disputes about the CCTB and the CCCTB should be decided by the Court of Justice of the EU instead of local courts.

We will see how the process of harmonization of direct taxes in the EU will continue. It could be long time run, so there could be a lot of space for amendments of both the CCTB and the CCCTB proposals.

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## SMEs and its Compliance Cost of Transfer Pricing: Czech, Slovak and Poland Case

### Veronika Solilová\* – Danuše Nerudová\*\*

**Abstract.** Current literature revealed that compliance costs of taxation are regressive with regard to firm size and significantly higher in case of enterprises with foreign branch or subsidiary in comparison with enterprises which are not internationalized. Moreover, compliance costs are increasing through strict and difficult transfer pricing rules among European countries. Unfortunately, there is not exist study determining compliance costs of transfer pricing issue in the literature. Therefore the aim of paper is to determine compliance costs of transfer pricing issues in case of SMEs and Medium-sized enterprises in the selected countries. The results are based on the questionnaire distributed between Czech, Slovak and Poland parent companies having subsidiaries in Europe and Czech, Slovak and Poland subsidiaries having parent company in Europe. The survey of compliance costs of transfer pricing revealed that compliance costs of transfer pricing are very significant and in case of SMEs represent range between 32.5 % (Slovak Republic) up to 98.9 % (Czech Republic) of corporate tax collection based on the costs indicator and the range of 20.1 % (Slovak Republic) up to 51.7 % (Czech Republic) of corporate tax collection based on the time indicator. **Keywords:** Small and medium sized enterprises, transfer pricing rules, compliance costs

JEL Classification: M1, H26, F23, G38

## **1** Introduction

SMEs are usually less well-equipped than LEs with financial and human resources. Therefore they usually cannot use benefits resulting from tax planning strategies and the application of tax planning's instruments. Moreover, they are facing a lot of disadvantages due to their size which can have distortive impacts on commercial decisions, business forms and business activities. In addition, the disproportionately high impact of regulatory requirements also creates the disproportionately high compliance costs of taxation, which have a regressive character with regard to firm size (Cordova-Novion and De Young, 2001, Slemrod, 2006, Shaw et al., 2008, Obermair et al., 2008 and others). Further, OECD stated that compliance cost of taxation in case of SMEs represent 46 % of incurred costs (OECD, 2001). Moreover, (Slemrod, 2006) adds that compliance costs of taxation usually depend, inter alia, on size (in a regressive way), sector, and multinationality.

Nerudová et al. (2009) and Cressy (2000) highlight that compliance costs of taxation are significantly higher in case of enterprises with foreign branch or subsidiary in comparison with enterprises which are not internationalized. Moreover, compliance costs are increasing through strict and difficult transfer pricing rules among European countries. Unfortunately, current literature does not cover study determining compliance costs of transfer pricing issues in case of SMEs.

The aim of paper is to determine compliance costs of transfer pricing issues in case of SMEs and Mediumsized enterprises having tax residence in the Czech Republic, Slovak Republic and Poland (i.e. Czech, Slovak and Poland parent companies having subsidiaries in the EU and Czech, Slovak and Poland subsidiaries having parent company in EU) based on data collection through questionnaire, using costs and time indicator.

## 2 Theoretical background

From the current point of view, the compliance costs were defined by Sandford (1995) as the burden imposed upon taxpayer as a result of their taxation obligation. Accordingly to this definition, a lot of international comparative studies can be found in literature. Globally, four major findings on compliance costs of taxation should be highlighted there. Firstly, compliance costs are significant and high. Based on the OECD survey, it represents 46 % of incurred costs in case of SMEs (OECD, 2001). Secondly, compliance costs are regressive i.e. SMEs face the disproportionately high compliance costs of taxation than LEs (Slemrod, 2006, Shaw et al., 2008, Obermair et al., 2008, Cordova-Novion and De Young, 2001, Chittenden et al., 2000 and others). Thirdly, compliance costs are not reducing over time (Obermair et al., 2008). Finally, compliance costs of taxation usually depend, in alia, on size, sector and multinationality (Slemrod, 2006). Chittenden et al. (2000) adds that SMEs bear hundred times higher compliance costs of taxation than LEs.

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Further, compliance costs represent one of tools for the measuring of complexity of tax system, whose measurement is problematic in the area of economy as state Pavel et al. (2015). It is mainly due to the above mentioned reasons, further due to the fact, that compliance costs can support tax evasion/avoidance and increase for business active across borders, i.e. are significantly higher in case of enterprises with foreign branch or subsidiary in comparison with enterprises which are not internationalized as stated Nerudová et al. (2009) and Cressy (2000), and due to the fact, that compliance costs represent inefficient use of scarce resources in the economy.

In respect of drivers for compliance costs of taxation, KPMG (1996 and 2006), Evans (2003) and Green (1994) identified significant drivers in the form of changes of tax system or taxes and complexity of tax system or tax regulation. Shaw et al. (2008) add that lower compliance costs of taxation are usually in countries, where the tax or tax system is simple. Therefore, tax policymakers should decide between complexity and simplicity, and between a more frequent change or more consultative change.

The compliance costs of corporate taxation in case of the Czech Republic were determined by Vítek et al. (2008) in the amount of 5.5 % and by Pudil et al. (2004) in the amount of 5.3 % as a portion of compliance costs to corporate tax collection. European Commission recognizes that high compliance costs in the field of transfer pricing can negatively affect the Internal Market, therefore the EU Transfer Pricing Forum developed EU Transfer Pricing Documentation in the form of Code of Conduct with aim to harmonize transfer pricing documentation obligation and requirements in Europe. However, Solilova and Nerudova (2016) and Silberztein (2013) also recommend the introduction of simplified measurements in the area of transfer pricing. Further, in the long run, the European Commission recommends shifting from separate approach, which is represented by arm's length principle, to comprehensive approach in the form of CCCTB, where transfer pricing transactions would have any impact on the group's tax base due to their elimination.

## 3 Methodology

To reach the aim of the paper, firstly the determination of costs or time of transfer pricing of SMEs were determined through results of questionnaire in the selected countries, particularly in the Czech Republic, Slovak Republic and Poland. For this purpose, the weighted average value of compliance costs was applied as follows:

$$\bar{x} = \frac{\sum_{i=1}^{n} W_i X_i}{\sum_{i=1}^{n} W_i}$$
(1)

where weight (w) represents no. of answer for each costs or time set in questionnaire and x represents values from individual spread of costs or time set in questionnaire, particularly in three forms:

- A: Calculation based on the median values of individual spread of costs/time set in questionnaire,
- B: Calculation based on the highest values of individual spread of costs/time set in questionnaire.

Secondly, the determination of compliance costs of transfer pricing for whole category of taxpayer (SMEs and Medium-sized enterprise) was performed. For this purpose the number of SMEs and Medium-sized enterprises operating in the EU were needed. Based on the European Commission (2015) and its annual report about SMEs, there should be more than 1.01mil. of SMEs acting in the Czech Republic, 1.46 mil. of SMEs acting in Poland and 388.3 th of SMEs acting in the Slovak Republic. However, these amounts cover mainly micro enterprises and relatively small portion of small and medium-sized enterprises. Therefore the Amadeus database was used for the estimation of amounts of SME acting in the researched countries (for details see table 1 below), which were applied for the determination of compliance costs of whole group of SMEs and Medium-sized enterprises.

Then the indicator of compliance costs of transfer pricing to corporate tax paid was measured. For the purpose of study, corporate tax paid was used from website of Ministry of Finance of each researched country. In addition, compliance costs were determined based on the two indicators, namely costs and time indicator. To identify compliance costs based on the time indicator, the salaries of tax advisor were also needed to determine before final determination of compliance costs of transfer pricing issues as according to the results of questionnaire, time needed for the solution of transfer pricing issues were only known (see table 1 below).

Country	Salary Tax Advisor	Cost per working hour <sup>3</sup>	No. SMEs	No. Medium -sized
Czech Republic	CZK 65,000 <sup>1</sup>	EUR 14.6 per hour	468,745	60,702
Slovak Republic	EUR 2,000	EUR 12.26 per hour	235,936	30,874
Poland	PLN 18,000 <sup>2</sup>	EUR 26.4 per hour	1,337,233	124,599

Tab	le 1	<b>:</b> ]	Data	for	calcu	lation	of	comp	liance	costs

1) Average exchange rate CZK/EUR for 2015 is CZK 27.283 per 1 EUR

2) Average exchange rate PLN/EUR for 2015 is PLN 4.18 per 1 EUR

3) Total working hours for 2015 is 1,957.5 in all three countries.

(Source: own calculation, Amadeus, Hays Salary Guide).

The measurement of compliance costs through questionnaire was done by a stratified random sampling from the Amadeus database. Firstly, in the Amadeus database were selected three groups of enterprises: (i) medium sized entities, (ii) small entities and (iii) micro sized entities. Secondly, those entities have to own a branch or a subsidiary between 25% and 100% of capital, for only these entities are affected by the transfer pricing issues and are considered as associated companies. Then a stratified random sampling was done for the selection of the final representative sample which was questioned through questionnaire. Altogether the representative sample covers 300 entities from the selected countries. The questionnaire contains 33 questions covering general transfer pricing issues, compliance costs of transfer pricing and tools for decreasing of those compliance costs. Summary of received answers are presented in table 2 below, altogether we received 82 answers from SMEs having tax residence in the Czech Republic, Slovak Republic and Poland (i.e. Czech , Slovak or Poland parent companies having subsidiaries in the EU and Czech, Slovak or Poland subsidiaries having parent company in the EU). The average return on the questionnaire is 27%<sup>\*</sup> for the selected countries. The data were collected online through the application GoogleApps.

 Table 2: Summary of answers

Country	Representative sample	No. answers	Return on the questionnaire in %
Czech Republic	100	29	29
Slovak Republic	100	22	22
Poland	100	31	31
Total	300	82	27

(Source: own calculation).

## 4 Results and discussion

The aim of the paper was determination of compliance costs of transfer pricing issues in the selected countries based on the results of questionnaire, particularly in the Czech Republic, Slovak Republic and Poland. Compliance costs of transfer pricing issues cover managing of transfer pricing documentation, country-by-country reporting, advance pricing agreements (hereinafter APA) and transfer pricing methods. Unfortunately, almost 50 % of respondent is not able to estimate time and costs necessary for the consideration of the most suitable transfer pricing method as an important part of transfer pricing documentation. Moreover, nobody from respondents has experience with advance pricing agreement. Therefore determination of compliance costs of transfer pricing omits above mentioned parts and covers managing of transfer pricing documentation and country-by-county reporting.

As is obvious from the table 3, managing of transfer pricing documentation, which also covers the consideration of the most suitable transfer pricing methods, takes usually up to 100 hours in case of Poland, between 101 and 200 hours in case of the Slovak Republic and between 201 and 300 hours per year in case of the Czech Republic. However, huge portion of respondents were not able to estimates time necessary for managing of transfer pricing issues. It can be caused by the fact that a lot of them use tax advisory service for this kind of tax compliance. In respect of borne costs for managing of transfer pricing documentation, the survey revealed that in case of the Czech Republic almost 38 % of respondents spent up to EUR 6,000 per year and almost 35 % of respondents spent up to EUR 9,000 per year contrary with Slovak Republic with 41.2 % of respondents who spent between EUR 1,000 and 3,000, as well as in case of Poland with 21.1 % of respondents (for more details see table 3 below).

As regards to the country-by-country report, in case of the Czech Republic 50 % of respondents spent between 25 and 56 hours per year with its preparation and spent costs up to EUR 500 per year (27 % of respondents) and between EUR 501 and 1,000 per year (38 % of respondents). In case of the Slovak Republic, only 2 respondents estimated costs and time for managing this issue, particularly up to 24 hours and EUR 500. In case of Poland,

<sup>\*</sup> The overall representative sample covers EU28 except Malta and Cyprus, particularly 2,600 entities. The overall return on questionnaire is 5.5% (144 respondents). In the case of the Czech Republic, Slovak Republic and Poland we have the highest amount of respondents.

almost 48 % respondents set no obligation, although more than 10 % respondents determined time up to 24 hours or between 57 and 96 hours in this case and spent costs up to EUR 2,000 (for details see table 4 below).

15. Please estimate the time necessary for preparation of transfer pricing documentation.	Czec	ch Republic	Slovak	Republic	Pola	nd
When doing the estimation, please take into account also the time necessary for up-date of transfer pricing documentation.	No.	%	No.	%	No.	%
Up to 100 hours	3	10.3	4	23.5	4	21.1
101 - 200 hours	6	20.7	5	29.4	3	15.8
201 - 300 hours	7	24.1	3	17.6	3	15.8
More than 500 hours	-	-	2	11.8	-	-
I am not able to estimate	11	37.9	3	17.6	9	47.4
There is not an obligation to prepare transfer pricing	2	6.9	-	-	-	-
documentation in our country						
16. With respect to the previous question, please estimate the costs related to this issue.	No.	%	No.	%	No.	%
Up to EUR 1,000	1	3.4	3	17.6	1	5.3
EUR 1,001 – 3,000	4	13.8	7	41.2	4	21.1
EUR 3,001 – 6,000	11	37.9	2	11.8	1	5.3
EUR 6,001 – 9,000	10	34.5	2	11.8	1	5.3
EUR 9,001 – 12,000	1	3.4	-	-	-	-
EUR 16,000 - 20,000	-	-	-	-	2	10.5
I am not able to estimate	-	-	3	17.6	10	52.6
There is not an obligation to prepare transfer	2	6.9	-	-	-	-
pricing documentation						

Table 3: Transfer pricing documentation – costs and time

(Source: own calculation).

Table 4: Country-by-country report - costs and time

17. If your enterprise has the obligation to fill country- by-county report as an annex of income tax return, please estimate the time necessary for its preparation.	Czech Re	public	Slovak I	Republic	Poland	
	No.	%	No.	%	No.	%
Up to 24 hours per year	6	21.4	2	12.5	2	10.3
25 – 56 hours per year	14	50.0	-	-	-	-
57-96 hours per year	2	7.1	-	-	2	10.3
More than 152 hours per year	-	-	-	-	1	5.3
I am not able to estimate	4	14.3	10	62.5	5	26.3
No obligation	2	7.1	4	25.0	9	47.4
18. With respect to the previous question (country-by- country report), please estimate the costs related to this	Czech Re	public	Slovak I	Republic	Ро	land
issue.	No.	%	No.	%	No.	%
Up to EUR 500	8	27.6	2	12.5	1	5.3
EUR 501 – 1,000	11	37.9	-	-	2	10.3
EUR 1,001 – 2,000	4	14.3	1	6.3	1	5.3
More than EUR 2,000	-	-	-	-	1	5.3
No obligation to prepare country-by-country report	2	6.9	5	31.3	8	42.1
I am not able to estimate	3	10.3	8	50.0	6	31.6

(Source: own calculation).

According to the results of survey, weighted average time needed for transfer pricing issue (i.e. for transfer pricing documentation and country-by-country report) was determined in the selected countries in very similar range, particularly between 210 and 276 hours per year<sup>\*</sup> (almost 27 up to 35 working days) in case of the Czech Republic, between 205 and 260 hours per year in case of the Slovak Republic and in case of Poland between 204 and 268 hours per year. However, weighted average of compliance costs differs slightly through selected countries. The lowest one were determined for the Slovak Republic, namely between EUR 3,632 and 4,857 per year. The highest one were determined for Poland, namely between EUR 7,439 and 8,856 per year. In case of the Czech Republic, the weighted average of compliance costs was set between EUR 6,430 and 7,704 per year. Taking into account assumed amount of Medium-sized enterprises acting in the researched countries (see table 1 above),

<sup>\*</sup> It is determined according to the median and the highest values of individual spread of time set in questionnaire.

compliance costs of transfer pricing as a portion to corporate tax collection are between 10.69 and 12.81 % (Czech case), between 15.79 and 18.80 % (Poland case) and between 4.25 and 5.67 % (Slovak case). As is obvious, the highest one is in Poland, which correspondents with the highest value of compliance costs for representative sample, as well as in case of Slovak Republic for the lowest one (for details see table 5 below).

Country	Туре	Compliance costs for representative sample (in EUR/per year)*	Compliance costs for whole group of Medium-sized (in mil. EUR)	Corporate tax collection in 2015 (in mil. EUR)	Compliance costs of transfer pricing / corporate tax collection (in %)
Czech	Α	6,430	390.3	2 650 71	10.69
Republic	В	7,704	467.6	3,030.7	12.81
Slovak	Α	3,632	112.1	2 640 5	4.25
Republic	В	4,857	149.9	2,040.5	5.67
Dolond	Α	7,439	926.9	5 868 12	15.79
Poland	В	8,856	1,103.4	3,808.4 -	18.80

 Table 5: Determination of compliance costs of transfer pricing for Medium-sized – based on the costs indicator

\* based on the formula (1)

A) Calculation based on the median values of individual spread of costs set in questionnaire.

B) Calculation based on the highest values of individual spread of costs set in questionnaire.

1) Average exchange rate CZK/EUR for 2015 is CZK 27.283 per 1 EUR. Corporate tax collection for 2015 is CZK 99.6 billion.

2) Average exchange rate PLN/EUR for 2015 is PLN 4.18 per 1 EUR. Corporate tax collection for 2015 is PLN 24 530 mil.

(Source: own calculation, MF Czech Republic, MF Slovak Republic, MF of Poland).

Further, the compliance costs of transfer pricing were also determined through time indicator. As is obvious from the table below, compliance costs are lower than compliance costs determined above through costs indicator. However, the position of highest and lowest compliance costs is the same as in previous case (for details see table below).

## Table 6: Determination of compliance costs of transfer pricing for Medium-sized – based on the time indiaetor

		1	luicator		
Country	Type*	Compliance costs for representative sample (in EUR/per year) <sup>1</sup>	Compliance costs for whole group of Medium- sized (in mil. EUR)	Corporate tax collection in 2015 (in mil. EUR)*	Compliance costs of transfer pricing / corporate tax collection (in %)
Czech	Α	210*14.6 = 3,066	186.1	2 650 7	5.10
Republic	В	276*14.6 = 4,029.6	244.6	5,050.7	6.70
Slovak	Α	205*12.26 = 2,513.3	77.6	2 640 5	2.94
Republic	В	260*12.26 = 3,187.6	98.4	2,040.3	3.73
Doland	A	204*26.4 = 5,385.6	671.1	5 969 1	11.44
Folalid	В	268*26.4 = 7,075.2	881.6	5,008.4	15.02

1) based on the formula (1)

A) Calculation based on the median values of individual spread of time set in questionnaire.

B) Calculation based on the highest values of individual spread of timeset in questionnaire

(Source: own calculation, MF Czech Republic, MF Slovak Republic, MF of Poland).

In addition, compliance costs of transfer pricing based on the two indicators (costs and time) were determined for whole group of SMEs, although only for the Czech Republic and Slovak Republic. In case of Poland, the current legal framework allows an exemption from transfer pricing documentation requirements in case of small transaction up to set limit. Therefore, the compliance costs for whole group of SMEs are omitted in case of Poland, as we assumed that small enterprises would fulfil this legal condition for a small transaction. As is obvious, compliance costs of transfer pricing are vastly different from the previous results and represent least one fourth of corporate tax collection in case of the Slovak Republic (time indicator) up to 98.9 % in case of the Czech Republic (costs indicator) (for details see table 7 below).

			Cost indicator		]	Fime indicator	
Country	Type*	Compliance costs for representative sample (in EUR/per year)*	Compliance costs for whole group of SMEs (in mil. EUR)	Compliance costs of transfer pricing / corporate tax collection (in %)	Compliance costs for representative sample (in EUR/per year)*	Compliance costs for whole group of SMEs (in mil. EUR)	Compliance costs of transfer pricing / corporate tax collection (in %)
Czech	А	6,430	3,014.1	82.6	3,066	1,437.2	39.4
Republic	В	7,704	3,611.2	98.9	4,029.6	1,888.9	51.7
Slovak	Α	3,632	856.9	32.5	2,513.3	529.9	20.1
Republic	В	4,857	1,145.9	43.4	3,187.6	752.1	28.5

 Table 7: Determination of compliance costs of transfer pricing – for SMEs

\* based on the formula (1)

A) Calculation based on the median values of individual spread of costs/time set in questionnaire.

B) Calculation based on the highest values of individual spread of costs/time set in questionnaire.

(Source: own calculation).

## 5 Conclusion

The aim of paper was to determine compliance costs of transfer pricing issues in case of SMEs for the selected countries, namely the Czech Republic, Slovak Republic and Poland, based on data collection through questionnaire and using cost and time indicator.

The survey of compliance costs of transfer pricing of Medium-sized enterprises revealed that compliance costs of transfer pricing through costs indicator represents amount of 4.25 % (Slovak Republic) up to 18.80 % (Poland) of corporate tax collection. In case of time indicator the compliance costs of transfer pricing were determined lower, particularly as an amount between 2.94 % (Slovak Republic) up to 15.02 % (Poland) corporate tax collection. However, taking into account whole group of SMEs, compliance costs of transfer pricing were determined in the range of 32.5 % (Slovak Republic) up to 98.9 % (Czech Republic) based on the costs indicator and in the range of 20.1 % (Slovak Republic) up to 51.7 % (Czech Republic) based on the time indicator.

Based on the conducted research, we think that tax policymakers should carefully design new tax obligation in the area of transfer pricing and should also address the disproportionately high tax compliance burdens faced by SMEs. In this respect, we can recommend an application of some simplified measurements for transfer pricing for decreasing compliance costs of transfer pricing, such as simplified transfer pricing documentation, exclusion of micro entities from the transfer pricing requirements or implication of safe harbour<sup>\*</sup> for selected industries and types of transactions (i.e. for loan, royalties, intangibles or others).

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<sup>\*</sup> Safe harbour is determined usually as a range of arm's length rate, which are accepted by tax administrators. After that taxpayers may not incur costs and time for the determination of arm's length rate/margin resulted into lower compliance costs of taxation.

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## The Impact of Pension Reforms in Poland on Public Finances

#### Marek Szczepanski\*

**Abstract.** The cognitive aim of this article is to analyze the impact of the pension reform introduced in Poland since 1999 on the state of public finances. The author also intends to estimate the expected costs of re shortening of the statutory retirement age in Poland, which will happen from October 2018.

The study shows that shortening of the statutory retirement age in Poland since October 2018 will have a negative impact on the labor market and the state of public finance in Poland - both in the short and long term. Polish case shows that even economically viable pension reforms (for example gradual lengthening of the statutory retirement age for men and women) can be reversed. Poland is also gradually withdrawing from the partial privatization of the public pension system, which has proved to be detrimental to the public finance. This proves how complex and difficult it is to reform pension systems and how serious the consequences of underestimating the actual cost of these reforms may be.

**Keywords:** pension reforms – statutory retirement age – public finance. **JEL Classification:** H53, J26.

# **1** Introduction - the statutory retirement age as one of the basic parameters of the pension system

Statutory retirement age is one of the main and relevant parameters of pension systems (Żukowski 2012, Pacud 2016). The State is responsible for the determination of age, but it raises a number of controversies both for the theory of social policy, as well as for different groups of stakeholders. It especially concerns employers, employees, current and future retirees, as well as politicians, who are all too familiar with this important social problem. Establishing the retirement age has both economic and financial dimensions closely related to demographic and legal ones (the realization of the acquired right to pension), as well as an institutional one (the obligation of state institutions to pay benefits for the elderly in an efficient and effective manner).

The literature of social policy highlights the need to take into account different circumstances in determining the statutory age of entitlement to receive pensions. The expected state of public finances should not be the only prerequisite, albeit a very important one. At stake there are also legal conditions (compliance with the Constitution, European law and International law), as well as important social considerations (e.g. the question of whether the statutory retirement age should be fixed at the same level for all, or take into account different life situations of women and men, persons engaged in certain occupations, etc.). Of course, the state is obliged to alter the statutory retirement age in a way to adjust the legal system to economic, demographic and social conditions.

An additional impulse for the discussion on the statutory retirement age in Poland, which has long been pending in the scientific community involved in public policy and pension economics, has become a project to return to the previously applicable statutory retirement age. At the time of writing this article (May 2017) one of the key slogans of the presidential election campaign and the parliamentary elections in Poland from 2015 has already been completed, and the Polish parliament passed the law on the restoration of the previous retirement age (60 for women, 65 for men) from October 1<sup>st</sup>, 2017. However, it is not too late to discuss it, even after the adoption of the law once again changing the statutory retirement age in Poland. One can in fact assume that the changes in this area, not least because of demographic and economic factors, will never be definite, just as the process of reforming the pension system.

### **2** Demographic threats to pension systems

One of the key determinants of the impact of the statutory retirement age for public finances is demography. Under the influence of demographic aging of the population most countries of the European Union extended and gradually equalized the retirement age and women to men, in spite of the fact, that such a solution was very unpopular and raises social protests. Reducing the retirement age Poland is an exception from this general trend.

Traditional pension schemes financed on the basis of intergenerational contract have been able to provide decent pensions, especially in the more affluent countries, where pension contributions and taxes deducted from wages allowed to accumulate a sufficiently large share of pension rights, and next generations of workers have

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been adequately numerous in proportion to those of retirees (e.g. four people contributing in relation to one pensioner). Already in the last decades of the twentieth century economically developed countries (to simplify, they can include the OECD member states and Poland) started to face threats to financial sustainability of their pension systems in the form of **the process of demographic aging**. Lengthening life expectancy and a simultaneous fertility decline means that the age pyramid is gradually becoming reversed: the number of people of retirement age increases, while the number of people of working and pre-production age decreases.

People of retirement age on average live longer now and thus no longer receive benefits from pension systems, which in principle (public systems) should provide a stream of benefits for the rest of life (*life annuity*) after reaching the statutory retirement age and the fulfillment of certain requirements (e.g. the relevant periods of contribution in insurance systems). Predicted changes in intergenerational proportions worldwide are demonstrated by fig. 1 and fig. 2.



Figure 1. The share of persons aged 60+ in the total population, by country as of 2015

Source: World Report on Aging and Health, WHO 2015, p. 44.



Figure 2. Predicted share of persons aged 60+ in the total population, by country, as of 2015

Source: as in figure 1, p. 44.

As one can see from the above forecasts, in the middle of this century Poland will be in the group of countries marked with the most intense color, where population aging will be the most intense. However, changes in the ratio between the working population and retirees, detrimental to the financial sustainability of pension systems, will occur much earlier - in the period 2020-2030 (see. Fig.2).

Eurostat demographic forecast predicts that the ratio of the number of people of working age to the number of people past working age will increase over the years until 2060 - both in the variant with lengthened retirement age and without it (faster in the latter case). While in 2013, 1,000 people of working age corresponded to 295 retirement age individuals; in 2060 this number is expected to reach 786 people. Figuratively speaking, if statistically today there is one pensioner against about 3 persons of working age, in 2030 there will be only 2 such persons, and in 2060 - only 1.4. Like any long-term forecast, this one is based on certain assumptions and may not be one hundred percent accurate. An active pro-family policy will be able to somewhat mitigate the negative consequences of demographic aging, but a complete reversal of the trend now appears unlikely.

As a matter of fact, the aforementioned demographic processes represent a very serious challenge to the longterm financial sustainability of pension systems. At the moment in Poland the balance of the Social Security Fund (SIF) in Poland, from which pensions are distributed, is negative, and subsidies from the state budget to ensure the continuity of payment amount to more than 50 billion PLN.

Medium-term forecast of revenue and expenditure of SIF indicates its deficit's durability, despite a decrease in new pensions due to gradual lengthening of the retirement age since 2013 (of about four months a year, eventually to a uniform level of 67 years of age for both men and women). If the statutory retirement age is again reduced to 65 years of age for men and 60 for women, this deficit will increase even more.

Depending on the development of economic situation, the balance of SIF in the perspective up to 2020 (relatively near) will remain permanently negative (see. Table 1).

Description		2016	2017	2018	2019	2020
Variant 1	SIF balance	- 54	-56	-59	-62	-62
forecasts	billion PLN					
(basic)	SIF balance	-2,9	-2,8	-2,7	-2,6	-2,6
	in % of GDP					
Variant 2	SIF balance	-61	-66	-70	-75	-79
forecasts	billion PLN					
(pessimistic)	SIF balance	-3,4	-3,4	-3,5	-3,5	-3,6
	in % of GDP					
Variant 3	SIF balance	-47	-46	-46	-44	-43
forecasts	billion PLN					
(optimistic)	SIF balance	-2,5	-2,3	-2,1	-1,9	-1,4
	in % of GDP					

Table 1. The balance of SIF in 3 variants of revenue and expenditure forecast of the Social InsuranceFund for the years 2016 – 2020

Source: Revenue and expenditure forecast of the Social Insurance Fund for the years 2016-2020. Social Insurance Institution, Warsaw 2014, p. 28-30.

## **3** "Reforming the reform" or its further deformation

The response to the expected demographic change and the associated risks to the financial stability of pension systems and public finances came in the form of reforms introduced in many countries, including Poland, in the late twentieth and early twenty-first centuries. Some of them were parametric (e.g. the extension of the statutory retirement age, lengthening the required contribution periods to reach full pension rights, etc.) without prejudice to the primary funding mechanism based on the generational contract (apportionments) and the applied formula for calculating pensions (i.e. defined benefit, guaranteeing that pensions remain proportional to wages). Some countries opted for a comprehensive, radical reform of their systems. Poland was among them.

A new PAYG pension system introduced in Poland in 1999 was supposed to ensure both risk and funding sources diversification: in addition to the first pillar administered by the Social Insurance Institution (ZUS), a completely new second capital pillar was introduced (investing pension contributions on the capital market via private companies called universal pension companies). By design, this multi-pillar system was to be more resistant to demographic risk, and further support the development of the economy through the investments of open pension funds (OFE).

A less visible, but a very important change affecting the height of future pension benefits was the replacement of *defined benefit* formula with *defined contribution*. The new formula for calculating pensions is to divide the capital of pension rights (accumulated in the two pillars, in a book-entry form in Social Insurance Institution or Open Pension Fund accounts, with coverage in financial assets) by the number of months of further life expectancy for a given generation (demographic cohorts) of people who retire. This solution was supposed to support the long-term financial stability of the pension system, as the introduction of the concept of defined-contribution automatically adjusts the amount of benefits to longer life expectancy. Few people remember today that the creators of the pension reform already in 1999 intended to change the retirement age and introduce a uniform age of 62 for both men and women.

It should be noted, however, that the improvement in the long-term financial stability of the system (as it turns out, it is still permanently deficit) is supposed to be achieved at the expense of deterioration in another important parameter of the pension system, namely the income adequacy of pension benefits. The new public pension scheme does not guarantee any specific level of pension benefits in relation to earnings, and the only guarantee applies to the minimum pension. While in the old pension system the replacement rate was approx. 70%,

the benefits from the new system will not exceed 40-50% of the income earned during the working life, and according to some estimates, women may receive only approx. 30%.

The effects of the global financial crisis of 2007-2009 and an increase in explicit public debt caused by the necessity to reimburse pension contributions transferred to OPF to ensure current pension payments (for people who have acquired the right to benefits in the previous system) have all led to a gradual reduction of the second capital pillar in the reformed pension system. First, contributions directed to open pension funds were reduced, and then half of the assets of the funds of approx. 150 billion PLN invested in Treasury debt was written off, or *de facto* nationalized, and the members of pension funds received (in exchange for financial assets) the equivalent in accounting records on separate sub-accounts in ZUS. This "reform of the reform" by the government of the former PO-PSL coalition meant re-increasing the state's role in the pension system and at the same time limiting the role of the market and an increase in debt hidden in ZUS, as well as an increase in demographic and general systemic risk in the Polish pension system (Szczepański, 2013 pp. 170-171).

As aptly stated by Bielawska K. "fiscal crisis brought back retirement age priority actions to the agenda" (Bielawska 2015, p. 286). January 1, 2013 marked an entry into force of the provisions of the Act of 11 May 2012 amending the law on pensions from the Social Insurance Fund. The most important changes included the following:

- 1) gradual lengthening of the retirement age for women and men to achieve an equal level of 67 years of age (about one month in relation to people born in each quarter of the year, which is gradually about four months per year),
- 2) reduction of the basis for calculating pensions according to defined-contribution by the amount of previously received pensions, granted before reaching retirement age,
- 3) introduction of the possibility of partial retirement before reaching the statutory retirement age,
- 4) gradual unification of insurance coverage for women and men up to 25 years qualifying for the lowest pension (effective from 2022.).

New law regulations which will be introduced since October  $1^{st}$ , 2017, will re-establish the former statutory retirement age in Poland (60 years for women and 65 for men). It will be the new **minimum retirement age** – people who would like to work longer will have a chance to stay at work and the employers would not have the right to force them to finish working activity.

The changes in statutory retirement age which will be introduced in Poland are going against those in most European Union countries. In the EU member states the general, statutory retirement age varies: in 2013 it varied for men from 62 years of age in Slovakia, 61 (NDC) and 65 (guarantee pension) in Sweden to 67 years of age in Greece. The vast majority of EU member states have already decided to increase the statutory retirement age for both men and women. In some countries there is already a mechanism in place to automatically adjust (lengthen) the general retirement age to the average further life expectancy - e.g. The Czech Republic, Denmark, The Netherlands, Greece, Cyprus, Italy and Portugal (Bielawska, Pieńkowska-Kamieniecka 2015 p.88).

# 4 Projected cost and result of re-shortening of the statutory retirement age in Poland

Changes in the pension system regarding the statutory retirement age can only be assessed against a wider context of the "reforming the reform" of 1999 or – according to critics – a destruction of that reform. They refer to undoing the changes started in 2013 (gradual lengthening and aligning of the retirement age). The justification of the presidential project submitted in the previous Sejm's term of office indicated that the total cost of lowering the retirement age for public finances in the years 2016-2019 will amount to approx. 40 billion PLN, of which approx. 30 billion PLN would go to the State budget. The document lacks any specific calculations and many experts say that the real cost will be much higher. It would also be helpful to prepare a long-term forecast of the cost of restoring the general retirement age from 2012 - until 2050, and at least for the next 30 years. The effects of pension reforms should be considered in such long-term perspectives. According to government estimates, the lower retirement threshold will cost the budget an estimated 10 billion PLN (\$2.4 billion) a year starting in 2018, with costs set to approach 20 billion PLN a year by 2021 (Strzelecki 2016). It means that the state budget deficit will be about 4% higher in 2018 due to the changes in statutory retirement age<sup>\*</sup>. Nevertheless, the budget deficit should not exceed 3% of GDP – of cause, under the assumption that of course, it is assuming that there is no significant economic downturn.

From a macroeconomic point of view, shortening the period of professional activity is not advisable. A decrease in the number of people participating in the GDP has a significant impact on the operation and financial condition of pension schemes (Góra, Rutecka 2013, p.735). In the long term, would deepen the projected deficit of the Social Insurance Fund. It can also weaken economic growth and the competitevness of the country. The

<sup>\*</sup> According to the budget law for 2018, state budget revenues in Poland will amount to over 325 billion PLN and spending - more than 384 billion PLN; the maximum level of the deficit will not exceed PLN 59.3 billion PLN.

<u>changing</u> of <u>the statutory retirement age in Poland undoubtedly will have a negative impact on</u> the state of the public finance in Poland. Full assessment of the financial impact of the change in statutory retirement age in Poland will be possible after October 1<sup>st</sup>, 2017. The question how many Polish citizens will actually retire in 2017 is still open. It could be between 300 000 to 550 000 persons. The more eligible persons will benefit from the possibility of retirement, the higher willbe the cost for public finances caused by subsidies from the state budget to the Social Insurance Fund.

From the point of view of an individual, the assessment of retirement or longer work period is more complicated. In the new pension system in force since 1999, which is based on individual retirement accounts, the height of pension is determined by the following two factors: the state of individual retirement accounts and the age when benefits begin to be received (Góra 2008, p. 78). Thus, early retirement automatically reduces the benefits. Early retirement in defined contribution systems means a reduction in benefits in case of a postponement of this decision and further work. The re-shortening of the statutory retirement age in Poland will result in a gradual reduction pension benefits but drastical of (see figure 3). Microeconomic effects of this change of the basic parameter of the pension system, which is the retirement age, will be also negative.



Figure 3: The percentage of the last salary which will provide a pension (replacement rate) in relation to the statutory pensionable age

#### Source: Polish Financial Supervision Authority, own calculations

<u>Evaluation of the social impact of this change, however, is more complicated</u>. For many people due to health reasons or bad relations at work or other important causes (e.g.: help in the education of grandchildren for women), the decision to retire at the age proposed in the draft of the presidential project will also be rational. Such people will not maximize their usefulness in microeconomic terms (by working longer they would receive higher pension benefits).

Therefore, there are no strong economic arguments in favor of returning to the general retirement age in force in Poland prior to 2013. <u>A positive aspect of the changes is that reduced retirement age gives the right</u>, <u>but not the obligation to retire</u>. Persons interested in work, have the right to remain at work and enjoy protection

#### from dismissal.

From the point of view of an individual (a participant of pension system), the assessment of retirement or longer work period is more complicated. In the new pension system in force since 1999, which is based on individual retirement accounts, the height of pension is determined by the following two factors: the state of individual retirement accounts and the age when benefits begin to be received (Góra 2008, p. 78). Thus, early retirement automatically reduces the benefits. Early retirement in defined contribution systems means a reduction in benefits in case of a postponement of this decision and further work. No one denies this fact and some Poles seem to have realized this. However, for many people due to health reasons or bad relations at work or other important causes (e.g.: help in the education of grandchildren for women), the decision to retire at the age of 65

for men and 60 for women will also be rational. Such people will not maximize their usefulness in microeconomic terms (by working longer they would receive higher pension benefits).

## 5 Conclusions

Shortening of the statutory retirement age in Poland since October 2018 will have a negative impact on the labor market and the state of public finance in Poland - both in the short and long term. Polish case shows that even economically viable pension reforms (for example gradual lengthening of the statutory retirement age for men and women) can be reversed. Poland is also gradually withdrawing from the partial privatization of the public pension system, which has proved to be detrimental to the public finance. This proves how complex and difficult it is to reform pension systems and how serious the consequences may be underestimating the actual cost of these reforms.

Polish experience also suggests that further changes in the pension system should be preceded by a debate with the participation of specialists from various fields of science (social policy, finance, public law etc.), as well as different groups of stakeholders (especially: employers, trade unions). Lack of a such public debate about the gradual extension of the retirement age was one of the causes of reversal of the reform of statutory retirement age.

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## Assessment of the Interactions between Social Security Contributions and Selected Socio-Economic Indicators

## Jan Široký\* – Eva Jílková\*\*–Jolana Skaličková\*\*\*

**Abstract.** Social security contributions represent an important levy of a tax nature both from the perspective of revenues of the state budget and from the perspective of the burden of individual taxpayers. The paper aims to identify some of the relations and links between macroeconomic indicators of the size of social security contributions which are designed on the basis of mutual indicators of the gross domestic product and also to compare the size of social security contributions to selected socio-economic indicators.

Using general scientific methods, the correlation analysis and the conformity of the order of economic and socio-economic indicators, the paper identifies the relevant dependencies of selected indicators on a sample of selected EU states and can serve as a starting point for further research in this area.

**Keywords:** Social Security Contribution, Tax Quota, Inequalities, Living conditions, Correlation analysis.

JEL Classification: H11, H23, E20

## **1** Introduction

While taxes or their predecessors have existed almost since the formation of states, social security contributions date back to 1898 when they were introduced by Bismarck on the territory of the contemporary Germany (Atkinson, Stiglitz, 1980). Social security contributions (hereinafter "SSC") do not fully correspond to the best known definition of the tax which defines it as a form of revenues of public budgets by means of which a part of the nominal income of the business entity on the irrecoverable basis according to predetermined rules is legally drawn and which has a non-purpose character (e.g. James, Nobes, 2016). While some of the economists regard them as a specific type of insurance contributions, for which a taxpayer receives a particular consideration, and also state that in the majority of states SSC payments are directed to specific funds, often outside the state budget, the prevailing opinion of tax theorists is that SSC are a levy of a tax nature (Atkinson, 2006). This statement is supported by the fact that a large part of the structural elements of SSC agrees with the personal income tax and also SSC and the personal income tax often have the same incidence. By their nature, social security contributions are levied on the labour income, relate only to the personal income including the income of self-employed individuals but, however, are not imposed on the income from capital assets. In the OECD classification of taxes, SSC are kept under the item 2000. Therefore, they are included in the tax levies and tax quota.

The previous statement illustrates the lingering dilemma of where to incorporate the social insurance, or whether to perform the description of SSC as a part of the analytical description of the personal income tax or not. Williams puts the requirement for a clear separation of the description of the tax theory from SSC (Williams, 1978) due to the difference in their structures. While the personal income tax is progressive in all standard states (even the states which use a flat rate of taxes incorporated the tax relief in the form of allowances, deductions or credits in this tax), SSC are mostly linear and often have a ceiling on the payment of contributions. Therefore, the impact of SSC can be regressive and work against the principle of vertical equity which is applied in the personal income taxation of individuals. The opposite approach is the requirement for the integration of SSC into the personal income tax, either in theoretical explorations (Adam, Loutzenhiser, 2007, or Lindbeck, Persson, 2013) or directly in the tax levy practice (Dilnot, Webb, 1989).

From a macroeconomic perspective, SSC form a significant component of revenues of public budgets (Kubátová, 2015), and a considerable advantage is the ease of their collection). Social security contributions increase the distortion effects of the personal income tax on the labour market (Auerbach, 2007). If SSC is calculated from financial means of salaries, it becomes a part of the labour costs and enters the implicit tax rate on labour. From this reason, the labour-intensive productions are disadvantaged. Although the higher costs of the

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labour factor (production force) support the trend towards rationalization, i.e. the greater substitution of labour by capital, they worsen the prospects of employment.

The aim of the paper is to identify the links between SSC and economic or socio-economic indicators and, in particular, to assess the relation between the size of social security contributions and selected indicators of the standard of living of the population.

### 2 Data and Methodology

For this research, the data and indicators of seven EU Member States: the Czech Republic (CZ), France (FR), Latvia (LV), Poland (PL), Austria (AT), Slovakia (SK), and Sweden (SE) were used. The reason was the inclusion of the states with one of the highest tax quotas (France and Sweden), the opposite was the inclusion of the states with one of the smallest tax burdens (Latvia and Slovakia). The selection of states is also represented by a founding member of the EEC, the two states which acceded the EC in 1995, and the three states which joined the EU in the same year as the Czech Republic. The compared states also include the Eurozone states and states outside the Eurozone. Another reason for the selection is also the existence of states with the "old" tax system (France, Sweden and Austria), states with substantial amendments to the tax system (the Czech Republic, Poland and Slovakia), and the state with a completely "new" system of taxation due to the constitution of the new state (Latvia). The reason for the selection of states was also the possibility to obtain the relevant informationbySchelleckens et al. (2015, 2016), and Denis, Hemmelgarn, Sloan et al. (2014, 2015) and own contacts in the IBFD. The same reason also conditioned the examined five-year period (2009 - 2013).

The research was based on the positivistic economics. The general scientific methods of analysis, comparison, deduction, and synthesis were used. The mathematical-statistical method of the correlation analysis was pivotal for the determination of the results. The exchange rate on the last working day of the year was taken into account for states outside the Eurozone. The comparative analysis is based on the data from the section Living conditions (Income and Living Conditions) introduced by the European Union for their investigation of the social situation in households (Eurostat, 2017) which, in addition to the income levels of households, also include a variety of other conditions concerning the way and quality of living, living facilities, health, etc.

The correlation analysis was used to investigate the mutual symmetrical dependencies. Instead of the mutual causality, this method highlights the intensity of the mutual relation. For the purpose of measuring the strength of the linear dependence of quantitative data, the Pearson correlation coefficient was used. It can be expressed by the formula 1:

$$r_{xy} = \frac{s_{xy}}{s_x s_y} = \frac{\sum_{i=1}^{n} (x_i \cdot \bar{x}) (y_i \cdot \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i \cdot \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}},$$
(1)

where  $s_{xy}$  is the covariance of the variables X and Y,  $s_x$  is the determinant deviation of the variable X,  $s_y$  is the determinant deviation of the variable Y (for more see Anderson, Sweeney, Williams, 2008).

The Spearman correlation coefficient is used to measure serial correlations. Both the correlation coefficient of serial numbers and the Pearson correlation coefficient can acquire the values within the interval  $\langle -1, 1 \rangle$ . Its essence consists in the substitution of values of variables with their serial numbers.

It is calculated by the formula:

$$r_s(x,y) = 1 - \frac{6\sum_{i=1}^n (p_i - q_i)^2}{n(n^2 - 1)},$$
(2)

where  $p_i$  is the order of the arranged values  $x_i$  and  $q_i$  is the order of the arranged values  $y_i$  (for more see Hindls, Hronová, Seger, 2012).

The authors set the hypotheses related to the total tax quota, the essential constituent of which are social security contributions:

- I. There is a significant relation between the size of the total tax quota and social security contributions.
- II. Countries which have high social security contributions have a higher level of old age pensions.

## **3** Results

Within macroeconomic analyses, the standard indicators (see also Široký, Střílková, 2014) were investigated and subsequently compared on the basis of the tax quota (TQ): The total tax quota as a ratio of taxes and SSC to the gross domestic product (GDP), the ratio of SSC to the total GDP and when divided into SSC paid by employers,

employees and self-employed individuals, which means mainly macroeconomic indicators, and calculations derived from the average wage (or rather microeconomic environment)

#### 3.1 Relation between SSC and macroeconomic indicators

The ascertained or calculated indicators were summarized in three tables and a graph.

contribu	contributions (SSC) to the gross domestic product (GDP) in %. The fatto of SSC to GDP in %.								
	AT	CZ	FR	LV	PL	SK	SE		
2009	42.1/13.0	36.5/16,4	44.9/13.9	30.1/11.2	33.5/14.0	29.1/11.1	45.1/7.1		
2010	44.0/13.7	35.5/16,0	45.1/15.0	29.9/14.0	33.1/13.2	28.8/11.9	46.2/8.6		
2011	42.9/13.4	36.1/16.6	45.2/14.6	28.5/10.4	34.2/14.2	27.9/11.1	45.5/7.6		
2012	43.1/14.9	35.0/15.6	45.0/17.0	27.9/8.4	32.5/12.3	28.3/12.5	44.2/7.2		
2013	44.1/15.8	35.2/15.7	46.1/18.0	28.0/8.7	33.0/13.4	27.9/12.2	44.6/7.5		

**Table 1**: The size of the tax quota (TQ) including SSC: the ratio of tax revenues (TR) and social security contributions (SSC) to the gross domestic product (GDP) in %. The ratio of SSC to GDP in %.

Source: Schelleckens et al., 2015, 2016, Denis, Hemmelgarn, Sloan et al., 2014, 2015 and IBFD, own calculation.

Table 1 show both a significant effect of SSC on the total tax quota of the analyzed states and a mutual interaction between the size of the total tax quota and partial tax quota of SSC, which is evident from the first comparison.

Table 2: The size of the tax paid (without SSC) from the average wage of employees in %

	AT	CZ	FR	LV	PL	SK	SE
2009	15.9	11.9	14.1	13.0	9.0	10.1	19.1
2010	15.8	12.1	15.0	14.1	8.8	9.5	16.7
2011	15.9	11.7	14.7	13.5	7.9	9.6	16.1
2012	16.1	11.9	14.9	14.0	7.1	10.0	17.0
2013	16.2	12.0	14.6	13.1	6.9	9.4	18.0

Source: Own Calculations.

Table 3: The ratio of the total SSC paid by employers and employees to the average wage in %

	۸T	C7	ED .	IV	DI	SV SV	SE
	AI	CL	ΓK	LV	L L	ы	SE
2009	48.8	45.0	49.0	40.1	45.1	41.7	46.0
2010	49.1	45.1	48.1	39.1	45.1	41.3	46.1
2011	48.2	44.5	48.9	39.1	44.9	41.1	46.0
2012	48.4	44.5	49.3	39.2	44.8	41.0	45.3
2013	49.4	45.0	49.1	39.4	45.0	41.6	45.2

Source: Own Calculations.

Table 2 and Table 3 which were calculated by the authors demonstrate the importance of SSC in total tax contributions of employees and a significant amount of SSC when taking into account both contributions of employees themselves and employers.

Social security contributions are an important constituent of the compound tax quota. It is therefore interesting to focus on the relation between these two quantities. The relation between the total tax quota and social security contributions were studied using the calculation of correlation coefficients. First, the Pearson correlation coefficient was evaluated. It reached statistically significant values in the Czech Republic and Poland only (tested at the level of significance of 0.05). Its values are also relatively high in the other countries. The specific values of the indicator are shown in Table 4.

Tuble 4. Values of contention coefficients								
	AT	CZ	FR	LV	PL	SK	SE	
Pearson correlation coefficient	0.660	0.922	0.726	0.855	0.927	-0.238	0.813	
Spearman correlation coefficient	0.900	0.900	0.600	0.900	0.900	-0.200	0.700	
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Table 4: Values of correlation coefficients

Source: Own Calculations.

The Spearman correlation coefficient between the compound tax quota and social security contributions proves a statistically significant relation in 4 countries (the Czech Republic, Latvia, Poland, Austria). Its values are lower, but not inconsiderable in France and Sweden (see Table 4). A completely different result of the correlation coefficient in Slovakia (low negative value of the coefficient) is caused by the different development of the tax quota and social security contributions. It is clear that changes in the tax quota are related to other factors or their combinations than those which were examined by us.

Figure 1does not show any trend as well. The authors are aware of the fact that the short time series cannot be a sufficient source of data. Nevertheless, the above charts illustrate the situation in selected states quite fundamentally. It is impossible not to notice that both the tax quota of Sweden, France and Austria and their economic level surpass the other selected states of the EU. A significant difference of the economic level and the social system of Sweden from the other selected states is logically confirmed both graphically and in calculations of the correlation coefficients. In the case of Sweden, the correlation coefficients do not reach the critical values for the Pearson correlation coefficient, therefore sophisticated conclusions cannot be done. To get more valuable outputs, a longer period of time should be tracked. Similar conclusions can be made in the case of France and Austria.





#### 3.2 Relation between SSC and the income inequality in the society

Examination of the level of income of the population and its comparison to different socio-economic indicators is the starting point for assessing the level of social security and, in particular, the standard of living of the population. The standard of living of the population is described e.g. by indicators within the Eurostat investigation: Living conditions. From this investigation, we used the coefficient of income inequality S80/S20, the value of which corresponds to the ratio of the volume of income attributable to 20% of people with the higher value of this coefficient corresponds to the higher income differentiation. The median of income of the elderly which can be found in the Eurostat investigation under the section Income and is constructed as a ratio of the median of equivalized disposable income of people under 64 years of age is the second used indicator.

The subsequent comparison includes comparing the level of social security contributions to the indicators assessing the income inequality in the society, i.e. the median of income of the elderly and the S80/S20 coefficient. Table 6 presents the average values of 3 indicators – the median of income of the elderly, the S80/20 coefficient and social security contributions in relation to the GDP. The values of the S80/S20 coefficient range in the interval  $<1;\infty>$ , where the higher values indicate the increasing income inequality in the society and vice versa. In practice, the coefficient ranges in the interval <2;12> (see Lapáček, 2008), which is confirmed by the coefficient values in table 5.

The higher the median of income of the elderly is, the higher old-age pensions are paid in the state, i.e. there are minor differences between the income of the elderly and economically active persons. The median of income of the elderly has the highest values in France and Poland. By contrast, the lowest values are observed in the Czech Republic and Sweden.

the enterty								
	Median of income of t	S80/3	S20	SSC/GDP				
	Average	Order	Average	Order	Average	Order		
AT	0.92	3	4.96	5-6	14.16	3		
CZ	0.82	6	3.48	1	16.06	1		
FR	1.00	1	4.48	4	15.7	2		
LV	0.83	5	6.18	7	10.54	6		
PL	0.94	2	4.96	5-6	13.42	4		
SK	0.84	4	3.70	3	11.74	5		
SE	0.78	7	3.64	2	7.6	7		

 Table 5: The order of states, according to social security contributions, S80/S20, and the median of income of the elderly

Source: Own calculation using the Eurostat data (2017).

The S80/S20 indicator belongs to one of the basic indicators of the income inequality in the society. The lower its value is, the higher equality the state is characterized by. According to table 5, the Czech Republic and Sweden rank among the states with the greatest equality, which corresponds with their order within the framework of the indicator of the median of income of the elderly. By contrast, the inequality is higher in Austria, Poland, and Latvia. The interesting thing is the order of France, Poland, and Austria which can be assumed to have the higher level of the income inequality compared to Latvia which, however, has the highest value of the S80/S20 indicator. The Czech Republic and France rank among the countries with the largest social security contributions, the lowest values are accounted for Latvia and, surprisingly, Sweden. The results reflect particularities for each country. The Czech Republic which traditionally ranks among the countries with the low level of the income inequality has a very high value of social security contributions. Paradoxically, however, there is a very low level of old-age pensions. In the analyzed period, the situation in France was characterized by a high level of old-age pensions, high social security contributions and the average income inequality in the society compared to the monitored states. Sweden reported a low value of social contributions and low pensions, however, it ranks among the most egalitarian countries in the world. On the other hand, Latvia which is characterised by a predisposition to the income inequality recorded the low level of pensions and low social security contributions. According to all indicators, Austria, Poland and Slovakia were in the middle of the ranking and did not show any extreme values.

## **4** Discussion and Conclusions

Social security contributions are an integral part of the tax levy system of developed countries. Their importance for the public budgets, economy as a whole and total levy burden of individual taxpayers is obvious.

In some theoretical works (Boden, 2011), social security contributions have other meaning than the theory of taxation from the perspective of its social functions and its potential impact on the social policy. The problem also arises in situations where SSC (or the part of them) are directed to autonomous funds of public budgets or even private legal funds.

The authors are aware of the constraints of their research. They can lie in the existence of other voluntary SSC of taxpayers (in particular, self-employed individuals) which are not recorded in macroeconomic indicators. The authors work only with the average wage of taxpayers who apply for the basic tax relief (Credit for AT, CZ, FR, or Allowance for LV, PL, SK and SE) without taking into account the other tax reliefs (e.g. on children). The ratio of the average wage is an appropriate benchmark to eliminate different wage levels in selected states, however, when using multiples of the average wage other results are possible to be achieved. In the borderline cases of high wages, ceilings of SSC will be entered into the calculation in some countries and, on the contrary, it would be appropriate to figure social security benefits in the calculation of very low wages.

The international comparison of social security systems always faces a variety of difficulties. A different way of collecting data seems problematic (cf. European Commission, 2017 versus OECD, 2015), where the same designation of the indicator can contain different content, which makes comparisons logically impossible. Some of the indicators needed for the comparison of living standards from the perspective of social security are difficult to access.

The other socio-economic indicators, e.g. the number of years of life expectancy when a citizen receives an old-age pension and additional criteria (e.g. the progressivity of the system, see Slintáková, Klazar, 2012) can be appropriate to be included in a possible further analysis of the examined issue.

Before examining the links between indicators, the authors set two hypotheses. The first assumption was based on the existence of the relation between the size of the total tax quota and the size of the basic macroeconomic indicator of the gross domestic product. The authors disproved this relation. The second assumption was that states which have high social security contributions have a higher level of old-age pensions. The assumption was not confirmed on a sample of all examined states. While most states reported the level of social security contributions and the value of pensions as corresponding, the Czech Republic was the exception, where despite the high level of social insurance contributions the income of the elderly is low.

The conducted research also confirms the autonomy of selected EU Member States in the design and amount of social insurance contributions.

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# **Czech Tax Mix and Welfare Regimes of Labour Taxation**

#### Jaroslav Vostatek\*

**Abstract.** To great extent, tax models are interconnected with welfare regimes of individual social security branches. This is shown in tax mixes – as these are significantly different in four basic welfare regimes and labour taxation models: a liberal, conservative, social-democratic and neo-liberal model. By the OECD definition, tax wedges do not include contributions to mandatory private insurance and savings.

Regarding welfare regimes, the Czech tax mix is indistinct, the assumptions of the 1993 reform have not been fulfilled and complex reforms of pensions and health care have not been realized. Therefore, we focus "only" on options of simple rationalization of labour taxation including social security contributions that will however reflect in the reported tax mix.

Keywords: Czech tax mix, labour costs, welfare regimes, social security contributions

**JEL Classification:** H24, H55, J32

## **1** Introduction

Almost ten years ago, a paradigmatic reform of income tax consisting in the introduction of flat-rate tax was realised in our country. It should had been followed by major restructuring of social security contributions, including the increase of gross wage level to the level of total labour costs. This neo-liberal system should have been complemented by privatisation of social security; in this regard, we witnessed an unsuccessful attempt to perform a partial privatisation of the Czech "pension insurance" only. The aim of this paper is first to formulate the role of labour taxation (personal income tax and social security contributions) in Czechia from the perspective of welfare regimes, as they were defined by Esping-Andersen (1990); we extend his range of welfare regimes with a neo-liberal regime. We submit a comparative analysis of the Czech labour taxation and of the whole Czech tax mix with the welfare regimes and corresponding typical foreign tax mixes and systems of labour taxation and with average labour tax burdens of OECD and EU countries. We start with the question of definition of the tax which reflects in the measurement of components of the tax mixes and labour taxation. Then we demonstrate the extent of policy inertia (Turner, 2016) in our country, in comparison with the foreign standards.

OECD includes compulsory social security contributions paid to general government in total tax revenues. Imputed and voluntary contributions plus those paid to private funds are not treated as taxes. Not including contributions to mandatory private pension savings or health insurance schemes might be in line a neo-liberal welfare regime, but it results in a dramatic distortion when we compare e.g. the Czech tax mix with the Chilean one. Conversely, the inclusion of social security contributions into the tax mix for the comparative purposes is very practical (Kubátová and Vítek, 1997), albeit it does not correspond to the social-economic definition of social insurance in a conservative and social-democratic welfare regime, where social insurance is mainly understood as an instrument to apply the principle of equivalence between the benefits and premiums (in professional literature, the term "Bismarck model" is often used, with earnings-related benefits). As opposed to this scheme, there is a Beveridge model where the benefits do not depend on earnings or the premiums paid. The contradiction of these two models is very important in our country, as in principle, the two main public expenditure programmes do not have a character of social insurance. Often, we quite legitimately speak of the "health tax" and "pension tax".

## 2 Taxation Welfare Regimes

Leaving aside the times when liberals principally refused to assess citizens' income (and thus an entire system of yield taxes supplemented with excises was implemented in practice), liberalism can be characterized by the dominance of the income tax in the tax mix. Therefore, the income tax as the queen of the liberal tax system may or should have been proportional, the tax should not change income relations formed in the market. After the World War I, a new significant tax "channel" (pillar) came to existence not only in our country – turnover tax as a general consumption tax, introduced "due to a pitiful state of public finances" in the post-war period; from the personal and material tax bearability perspective, it will not stand up to criticism (Engliš, 1929). In recent decades, the star of value added tax (VAT) rises to prominence, this tax stands up to the criticism regarding its material tax bearability, due to missing "cascade" effect. If the current liberals are fine with the existence of the VAT (or sales

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tax in the US) as a fact, they might as well as "be happy" with the existence of a progressive income tax - as a counterbalance to the degressive VAT.

The tax system of the New Zeeland before the last tax reform may serve as an example of a modern liberal tax mix. In 2009, the personal income tax (with moving progression of rates from 12.5% to 38%) returned 53% of all tax income, with the share of VAT (GST) being 21% and corporate income tax 17% (the remaining 9%: excises, custom duties and some fees). The social security contributions are practically non-existent there (only a contribution to mandatory insurance of non-occupational accidents of employees at 1.45% rate from earnings up to 118 191 \$ annually). The state provides a rather generous flat-rate pension to all residents. Since 2014, the tax reform has emphasized the role of a significantly universal VAT tax: its flat rate has been increased to 15%. Personal income tax rates have been reduced to 10.5% - 33%, corporate income tax rate dropped from 30% to 28%. The income taxes contributed to the New Zeeland's tax mix with 55.4%, the taxation of consumption with 38.4% and property taxes with 6.2%. Thus, the liberal labour taxation model is very simple; it consists from progressive personal income tax only.

The modern conservative (Christian-democratic) tax mix is different from the modern liberal mix "only" by the existence of distinct social insurance premiums. We neglect here a frequent existence of state provisions for civil servants financed from public budgets. From the perspective of defenders of a conservative welfare regime, the social insurance is outside the state budget and the premiums are at most a parafiscal receipt, and at any case they do not represent a tax. However, for the sake of our comparison, we must consider these premiums as part of the total labour costs. At the same time, fundamental construction parameters of social insurance are important; 4-5 social insurance branches have separate premiums paid to autonomous social insurance funds (e.g. 6 industrial and 6 local health insurance funds operate in the Austrian worker health insurance). Earnings caps are applied to great extent for the calculation of premiums and the same caps are used for the calculation of cash benefits. As a rule, these caps amount up to 200% of the national average earnings (NAE) in the given system. There are also (usually somewhat higher) caps for the mandatory participation in individual branches of social insurance; if the income exceeds this limit, the insured may leave the system. Halving the premium between the employer and the employee is (was) explained as a token of alignment of possibilities and interests of both social partners in the social market economy, it is a typical feature of the conservative regime; the exception being social accident insurance where the premiums are paid by the employer, as this concerns a labour risk as such; it is usually the smallest component of the total premiums so the fact that the premiums for social accident insurance are not divided may be neglected. Here, the theory can also explain any potential state subsidies of some areas of the social insurance - by doing so, the state may and should finance e.g. non-contributory periods in social pension insurance (e.g. day-long care for small children), The employee premiums on social insurance are deducted from the tax base of an employee's salary.

Germany is an example of a conservative tax mix. The social insurance premiums are consistently not reported as part of the tax system. From 2015 OECD data follows that these premiums represent 38% of the total revenue from taxes and premiums – and is the main German tax channel. The income tax in all forms (31%), or personal income tax (23%) is the second biggest tax channel. In Germany, the wage tax is progressive owing to the progression of rates (with the maximum rate being 45%), wage up to  $\notin$ 8,652 annually is exempt from tax. The taxation of consumption (28%) is the third tax channel, and it includes the VAT (19%). In Germany, the total labour taxation significantly dominates over the taxation of consumption and as part of labour taxation, premiums prevail over the personal income tax (38:23). The conservative regime of labour taxation thus consists in social insurance premiums and secondly, in a progressive wage tax. We may add that contribution-financed systems which are funded and most-often administered by bipartite or tripartite governing bodies independently of the government budget, have historically tended to be more generous since contributions are earmarked for specific benefits and thus do not depend on overall government budget decisions (Morel and Palme, 2012). Social-democratic tax mix also "works" with social insurance premiums, however these premiums are exclusively paid by employers and they do not fund health care for employees (and their families) as opposed e.g. to Germany and Austria. Here, the social insurance premiums are (relatively more) used for the purposes of economic and social policy, such as to support employment of young and elderly persons. In a way, this policy is and may be financed by the non-existence of the earnings cap to pay the premiums, while caps are applied in relation to employees, e.g. when determining the contribution to pension savings/insurance (with a cap around 120% NAE).

Sweden is an example of a social-democratic tax mix. Personal and corporate income taxes represent approx. 38% from total tax revenue. The share of the personal income tax alone is roughly 27%. Social security contributions have a 34% share, and it is estimated that approx. 60% of these contributions have a character of tax and only 40% can be considered standard social insurance premiums (Skatteverket, 2016). The employees pay a contribution to NDC pension insurance at 7% rate (16% is credited to their personal NDC account), however this contribution is deducted from their personal income tax. The employers pay a 31.42% payroll tax without the earnings cap. The consumption taxation (VAT and excises) represent approx. 29% of total tax revenues. The total

labour taxation amounts to approx. 60% of all tax revenues, while the social security contributions participate in the total labour taxation with 56%, the remaining revenue represents personal income taxation (Skatteverket, 2016). The role of the above-mentioned employee contributions to NDC may be subject to discussions. A special role of the state income tax – with two rates (20% and 25%) and non-taxable minimum, which is higher than NAE, is also interesting. Regional income taxes have proportional rates in the range from 29.2% to 34.7%, with considerably lower non-taxable minimums; revenues from regional taxes represent approx. 90% of all income tax revenues. Among other, regions finance health care. The social-democratic model of labour taxation (in its Swedish version) thus consists in approx. 55% of social security contributions in the form of proportional income tax and approx. 45% of flat-rate municipal income taxes and dual-rate state income tax, the progressivity of which is given by non-taxable minimums. The deduction of employee contributions to pension insurance from the income tax base has a specific role here, most likely it reduces the progressivity of the income tax.

The neo-liberal tax mix "does not know" social insurance premiums, as in this welfare regime the entire social security is cancelled, privatised, the ideal taxation being the consumption taxation, preferably a universal one. The disadvantage of the VAT (or American sales tax) is that it does not reflect on the poor; this may be partially "rectified" by the differentiation of the VAT, i.e. in Great Britain. From this perspective, the ideal tax would be a general expenditure tax, with a tax return where sufficiently non-taxable minimum would be applied. However, such consumption taxation is not very practical and therefore current neo-liberals recommend to "keep" the income tax as the basic tax, which is to be significantly modified by income deductions that are not directly related to consumption - i.e. any capital income. Also, contributions to certified private insurance and savings schemes should be deducted, i.e. particularly contributions to mandatory and voluntary pension savings or insurance, health savings or insurance etc. From this perspective, the economy would also be helped by deductions of interest from mortgage and other loans. The neo-liberal tax welfare regime does not even include corporate income tax, as it does not represent taxation of final consumption. Therefore, a greatly modified personal income tax, supplemented by VAT or single-phase sales tax to split the tax burden into two channels, with lower tax rates is a fundamental part of the neo-liberal tax mix. In the ultimate neo-liberal version, the personal income tax has a flat rate and a tax bonus (or tax-free minimum) that will substitute any social benefits. The neo-liberal model of labour taxation then includes only (a duly modified) personal income tax and (with neo-liberals "gritting their teeth") employee contributions to private savings or insurance, deductible from the income tax base.

Partially, the US may serve as an example of the neo-liberal tax policy, as their key federal income tax has less revenue than amount of tax expenditure related to this tax. Interests from mortgages and similar loans up to \$1 million annually can be deducted from the tax base. According to Trump, these tax deductions are "key to keeping the country's economy alive". Due to the deductions, the share of personal income taxation in the total US tax mix is "only" approx. 39% (which is much more than the average for OECD countries). "Payroll taxes", collected from employees and employers, take the second place with 24%; rate of "premiums" to health insurance of seniors (Medicare) is proportional, while the premiums to pension "insurance" is degressive, owing to the existence of the income cap. From the neo-liberal standpoint (Friedman, 1962), these taxes are bad, because they are not progressive. The consumption taxation, particularly in the form of sales taxes collected from sales to end-consumers in most US states, is the third American tax channel (17%).

Each of the tax welfare regimes has its own internal logic which is based on the relevant social philosophy. Therefore, they may or might serve as the basis, objective of the tax policy of relevant political parties. If we take into account the existence of the VAT and excises in EU and other countries, it is obvious that individual tax welfare regimes mostly differ in the attitude to social insurance premiums and the role and construction of the personal income tax, and subsequently to the corporate income tax and capital income taxation.

## **3** The Czech Tax Mix

Social security contributions are the most prominent Czech tax channel (43% of total public revenue in 2016); they consist of "social insurance premiums" and "public health insurance premiums" according to the Czech legislation. The taxation of consumption (34%) with its two basic components: VAT (22%) and excises (12%) is the second most significant tax channel. The income tax (20%) consisting in the personal income tax (10%) and corporate income tax is only the third tax channel – see Figure 1. These data on the Czech tax mix give the impression of a dominating role of the social insurance in our country – the role of these premiums in the tax mix being even greater than in Germany. In principle, the personal income tax is a wage tax; the quantitative significance of self-employed taxation is close to zero in our country.

The Czech public health insurance is not an analogy to the German and/or Austrian statutory (social) health insurance. The health insurance premiums were introduced during the Czech tax reform in 1993; the rate of premiums is 13.5% from gross wages and the premiums are split between the employees and employers in 1:2 ratio. This ratio of premiums was achieved by splitting mechanically the former social security contributions and former wage tax.



Figure 8: Czech tax mix in 2016

Source of data: Czech Ministry of Finance (2017).

In more post-communist countries, the public health insurance is based on individual participation in the insurance, which means that the premiums must also be paid by persons without income from employment or business activities, unless the state pays the premiums for them. The so-called state insured persons, for whom the premiums are paid by the state, are mostly pensioners and children. For these persons, the premiums are assessed at the total rate of 13.5% from artificial calculation bases, with the result being that the calculated premiums are neither adequate to the risk nor the average costs. From the fiscal perspective, the premiums paid by the state is in fact a simple state subsidy, formally calculated from the calculation base "to arrive at the exact sum" allocated to the health sector by the government decision. Other persons without gainful activities pay premiums calculated from the official minimum wage which also do not cover the risks related to these persons - it represents a kind of low head tax. The original intention (in 1992) was to establish a system of "occupational" (departmental, sectorwide, company and other) insurance companies (non-profit institutions) in addition to the General Health Insurance Company; with the result resembling Austrian or German sickness/health funds. 28 occupational insurance companies were established, of which 6 have survived to this day, of which 2 are departmental -i.e.state owned). Although all these insurance companies have a universal licence to provide public health insurance, in fact there is not actually any important competition between them; following the ban on client solicitation by dealers, the numbers of the insured with each of the insurance companies do not significantly change, with the dominant position being held by the General Health Insurance Company. One of the "occupational" insurance companies is in fact related with private network of health care providers. The situation has long been ripe "to turn out one way or another" - more than ever it is necessary to clarify what health care welfare regimes is to be applied here.

The former right-wing governments tended to the Dutch reform of health insurance -a non-consistent neoliberal model – the major part of premiums continue there to be paid by the percentage from wages, and conversely, the so-called nominal premiums (constructed as a head tax, paid by the employees and other clients) are determined by individual health insurance companies in the absolute amount. The fundamental problem here is that the Dutch health reform did not bring reductions of increasing expenditures on health care. And nobody in Europe wants to introduce an extremely complicated neo-liberal Obamacare. Therefore, "we are left with" the choice of between the model of universal health care, resp. social-democratic welfare regime, and conservative regime of social health (sickness) insurance. Now we are much closer to the first alternative. From the labour taxation perspective, it is a question whether health insurance premiums constructed as proportional payroll tax should further exist. In Great Britain, Mirrlees Review recommended to cancel their national insurance contributions, from which the universal health care is partially financed (Mirrlees et al., 2011). In Sweden and other countries with social-democratic system of health care financing, health insurance premiums have never been introduced and the health care is taxfinanced. In Sweden, health care is mostly provided by regions and their main revenue source is the regional flatrate income tax. The analysis of the Czech health insurance premiums may be concluded by saying that the Czech premiums paid by employees and employers is a proportional income tax that can be fully integrated in labour taxation paid by employees and employers.

The Czech sickness insurance premiums and contribution to the state employment policy are paid by employers in the total amount of 3.5% from gross wages (as part of the so-called social insurance premiums). From our perspective, it is critical that these two social security subsystems have a predominant character of social insurance

and the corresponding premiums should exist in the future as well. However, there is a room for rationalization of the benefit construction, e.g. according to the German example.

More than from 60%, the Czech old-age "pension insurance" is a liberal system of a flat-rate pension (Vostatek, 2016), therefore it should not be financed (fully or mostly) from pension insurance premiums. In line with the modern pension theory and policy, it is necessary to divide this "pension insurance" into the solidary pension pillar (financed from general taxes) and social old-age insurance (financed by premiums). The social old-age insurance as such belongs both to the conservative and social-democratic welfare regime. The flat-rate pension fits into both the liberal and social-democratic regime. Our aim here is not to recommend a transition to one or another pension model corresponding to the social policy of a true liberal, Christian-democratic or social-democratic party. Our task is to recommend a "mere" rationalization of the current system of financing of old-age pensions that has a direct impact on the labour taxation in Czechia. At the same time the rationalization of disability and widow/widower pensions is necessary - since all Czech pensions include the same "basic amount" which is annually valorised to 9% NAE. This basic amount of pensions is a remnant of the cost-of-living allowance introduced in 1990 - this benefit should have long been "dissolved" in any construction of old-age, disability and survivor pensions. The modern social-democratic concept of disability pensions assigns these pensions to sickness insurance, minimizes widow/widower pensions to temporary benefits over a span of several months (following partner's death) and transforms orphan pensions into a universal supplement to universal child benefits. With higher universal flat-rate old-age pensions, also the survivor pensions in the liberal pension system no longer make sense and disability pensions are here integrated with other benefits, e.g. unemployment benefits. Conservative systems have experienced minor reforms of disability and survivor pensions from social insurance. The most important fact for our analyses is that setting the flat-rate old-age pensions aside from the social insurance will "free" approx. 11% of the current pension insurance premiums at 28% from gross wages (Vostatek, 2016). For comparison: in Germany, current social pension insurance premiums amount to 18.7% from wages with an earnings cap about 200% NAE (400% NAE in Czechia), employees and employers pay 9.35% each. Germany manages "carefully" the premium rate as the labour cost component; they subsidize e.g. non-contributory periods from the state budget.

## 4 Rationalization of the Czech Labour Taxation

The need for the transformation to a welfare regime in line with the general conception of the government social policy arises from the analysis of the character of Czech pension and health insurance premiums; the minimum program, or the objective for the academic circles, would be the rationalization of the premiums so that they would only finance real social insurance. In this regard, we have immediately "available" 13.5% from wages (the entire premiums for health insurance) and 11% from the current pension insurance premiums.

The simplest solution to our problem is to cancel premiums paid by the employees at 11% from wages; the integration into the wage tax seems to be the solution. At this occasion, it would be useful to switch the tax base to the gross wage. At the same time, the wage cap in the current pension insurance premiums paid by employees would be cancelled. Conversely, for the sake of simplification, the solidarity surcharge to personal income tax can be cancelled and the progressive nature of the flat-rate income tax can be emphasized by increasing the basic tax credit. The redefining or even reconstruction of tax deductions and credits will be an important "detail". In line with OECD recommendation, it is desirable to cancel the tax credit for spouses.

What should be done with the "unnecessary" social and health insurance premiums paid by employers poses another question. For pension insurance premiums, approx. 17% from the salary should be sufficient, which means that the employee premiums cancelled by us can be considered the current pension insurance premiums at 11% rate from wages. The premiums paid by employers, which is unnecessary in the system, are thus reduced to health insurance premiums. The problem of the necessary reform of the financing of health care system does not have to be necessary connected with the rationalizing tax reform. Therefore, we leave the health insurance premiums at 13.5% rate paid by employers as a proportional labour taxation.

It is said that the labour tax burden in form of social security contributions paid by employers is high in Czechia. According to OECD (2016a), Czechia has the 8<sup>th</sup> highest tax wedge among the 34 OECD member countries in 2015; the tax wedge with single employee with an average wage amounted to 42.8% in Czechia, while the OECD average stood at 35.9%. With married one-earner couple with 2 children the wedge stood to 26.6% in Czechia, almost identical to the OECD average (26.7%). This may be a token of an above-average intensive support of families with children in Czechia which must however be paid from something from a model perspective – from general taxes. However, for the overall assessment of labour costs in relation to net wages, child-free employees, or their taxation in all known forms, is decisive.

The tax wedge, calculated regularly by OECD, is not a qualified foundation for a potential proposal to reduce employer's social security contributions. As defined by OECD, the tax wedge does not give a true picture of all

critical components of overall taxation. The OECD staff is aware of that and therefore they calculate and compare broader compulsory payment wedges in the last period – for OECD countries and for 21 EU countries; this indicator consists of a tax wedge and non-tax compulsory payments (NTCPs) in relation to total labour costs. By doing this, OECD no longer ignores employer and employee contributions to private savings and insurance schemes. NTCPs are very significant at least in 7 OECD countries and thus they modify the overall ranking of countries by the broader tax wedge. We have no NTCPs and thus we were overtaken by the Netherlands in the ranking due to the inclusion of the quasi-mandatory system of occupational pensions. The non-weighted average of OECD countries has increased to 38.6%; the average compulsory payment wedge for EU 21 reached 43.1% being higher than the Czech wedge at 42.8% (OECD, 2016b). However, the broader OECD tax wedge does not sufficiently reflect full labour costs – e.g. in the USA, there is not reflected the mandatory health insurance introduced by Obama's reform. Adequately, the new workplace pensions in Great Britain and soft compulsion pensions called KiwiSaver in New Zealand should be included into the compulsory payment wedges. Thus, the need to reduce social security contributions in our country does not follow from the tax wedge data. On the contrary, the problem is that OECD continues to publish commonly narrow tax wedges only, while one must search for the broader tax wedges on OECD website.

The necessary rationalization of the Czech labour taxation is relatively simple: it mainly consists in the inclusion of employee contributions to the income tax and subsequent modification of employer social security contributions. The basic problem of its realization is the social security policy procrastination (Turner, 2016).

## **5** Conclusions

The Czech tax mix is affected by the tax reform introduced in 1993 which could not be based on any looming concept of social policy. Until present day, it is not fully clear which direction the old-age pensions and health care systems should take, due to the extreme extent of policy inertia. The public choice of a pension and health care welfare regime shall strongly impact the Czech tax mix, particularly the income and labour taxation. However, even today we can reflect elementary redistribution processes in the current social security system, particularly the factual dominance of the flat-rate pension in the "pension insurance" and universal provision of health care, which does not give rise to the existence of health insurance premiums, in the rationalization of the Czech labour taxation. The rationalization of the labour taxation thus shall result in the increased share of the personal income tax and reduction of the share of social security contributions. The progressivity of the personal income tax may simply be maintained or increased by valorisation of the basic tax credit.

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## Carbon taxation in the European countries

## Jarmila Zimmermannová\* – Miroslav Hájek\*\* – Ladislav Rozenský\*\*\*

Abstract. This paper is focused on using the concept of carbon tax in the European countries with detailed overview of  $CO_2$  tax proposals the Czech Republic. The introductory section presents fundamental scientific studies, and current scientific articles dealing with the issue of environmental and carbon taxation. The methodology of the paper is focused on the comparative analysis using the Eurostat data, the national statistical data and the conceptual documents. Results of the comparison show that the use of carbon tax is currently not uniform and both subjects of taxation and tax amounts in the individual countries differ. The comparison with the development of emission allowance prices within the EU ETS indicates that nearest to this market price are carbon taxes in Norway and Island, where they are also systematically linked with the EU ETS system. In the Czech Republic, the carbon tax has not been introduced so far, only various tax rates have been discussed in respect to interconnection with the EU Emission Trading System.

Keywords: CO<sub>2</sub> taxation, tax rate, emission allowances, EU ETS, comparison JEL Classification: H23

#### **1** Introduction

The general concept of taxes for pollution dates back to 1920. It was introduced by British economist Arthur Pigou. The concept builds on the idea that if the environmental and social costs are not included in the price of activities they induce, the government may establish their value by applying suitable taxes (Barnes, 2008). If the government introduces a tax at the amount of costs for the elimination of caused pollution, the enterprise will be led to reduce the pollution to an effective tolerable level (Samuelson, Nordhaus, 1995).

One of taxes frequently mentioned in connection with the issue of global climate change is a so-called carbon tax. Carbon tax belongs to environmental taxes imposing payment on the production, distribution or use of fossil fuels. Its size then depends on the amount of carbon, which leaks into the atmosphere from burning the specific fuel. As a rule, the government sets the price for one ton of carbon, which is then used to establish the rate of taxation for electric energy, crude oil and natural gas (Dowdey, 2009).

If we focus on scientific studies published recently around the world and dealing with carbon taxes, these include case studies in specific countries and the analysis of impacts from the introduction of carbon tax in those countries. One of these countries is for example Spain where the authors focused on the direct and indirect effects of an environmental tax on Spanish products, based on their  $CO_2$  emission intensities. For this purpose, they applied environmental input-output (EIO) and price models (more in Gemechu et al., 2013).

Another interesting scientific paper studies  $CO_2$  taxation in its dual role as a climate and a fiscal policy instrument in Portugal (more in Pereira and Pereira, 2014). It develops marginal abatement cost curves for  $CO_2$  emissions associated with the  $CO_2$  taxation using a dynamic general equilibrium model of the Portuguese economy. Simulation results show that a tax of 17.00 Euros per tCO<sub>2</sub> has the technical capacity to limit the growth of emissions to 62.6 Mt CO<sub>2</sub> in 2020, consistent with the existing climate policy target for Portugal. The paper highlights the importance of public spending behaviour when projecting the net impact of  $CO_2$  taxes on the public revenue and public account and in the designing of policies to promote fiscal consolidation.

Yet another scientific study discusses the carbon and energy taxation in Malaysia (more in Solaymani, 2017) - the country, which is one of the top  $CO_2$ -emitting countries in the ASEAN region. The study implements two environmental tax policies - carbon and energy taxes, in order to examine the impacts of these policies on the reduction of carbon emissions in the whole of the economy by applying a computable general equilibrium model. Based on the results, the carbon tax is more effective than the energy tax for Malaysia to achieve 40 % carbon reduction target in comparison with its level in 2005.

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The next interesting study is focused on the economic and environmental effects of a carbon tax in South Africa, using a dynamic CGE modelling approach (more in van Heerden et al., 2017). The paper proposes a CO<sub>2</sub> based levy on coal, gas and petroleum fuels and models possible impacts of such a tax on the South African economy using the computable general equilibrium (CGE) 53-sector model. The model shows that the carbon tax has the capacity to decrease South Africa's greenhouse gas (GHG) emissions by between 1 900MtCO<sub>2</sub>-equiv. and 2 300MtCO<sub>2</sub>-equiv. in the period between 2016 and 2035.

The scientific studies indicate that the carbon tax is a useful instrument for reducing the  $CO_2$  emissions. Although the European countries use nowadays the trading with emission allowances within the EU ETS as a main tool for reducing the  $CO_2$  emissions, some of them have the carbon taxes, too. The main objective of the paper is to compare the amounts of carbon tax rates (EUR/t  $CO_2$ ) in selected European countries with the current stock market price of 1 ton  $CO_2$  (1 permit EUA).

## 2 Methodology

As explained in the introductory section, some countries have introduced another economic tool to protect the atmosphere in addition to the relatively widespread use of quotas and trading with emission allowances – a carbon tax. Thus, they have developed a mixture of protective tools by the use of which they can better respond to environmental problems and mend externalities. These countries include also some European states that are bound in the EU ETS system such as the United Kingdom, Ireland, France and the northern countries of Denmark, Finland, Norway and Sweden. The carbon tax was introduced partly to fill the gaps, which emerged after the commission of the EU ETS system covering big polluters and to achieve a comparable and fair business environment. It represents one of mechanisms to facilitate the comparison at favourable circumstances such as the simplicity and predictability of the system, which facilitate long-term investments that are essential in the concerned sectors.

Linking up with the paper objective, basic data were collected about carbon taxation in the selected countries, especially the year of adoption, characterization and tax rate. Detailed data were compared in some EU member countries with a long-term experience with the carbon tax (Denmark, Finland, France, Ireland, Great Britain and Sweden). The comparison included the indicators of carbon tax rates, yields and the revenue/social income ratio.

Current research is focused on a general-equilibrium model with both tax-versus-trading under uncertainty, and revenue-recycling, which would fill an important gap in the theoretical literature (Pezzey and Jotzo, 2012). Importantly, adjustments to emissions trading systems can address a number of the concerns raised about such systems in their pure form. These adjustments can lead to many of the features of a carbon tax being included in an emissions trading scheme and start creating a continuum between pure price and pure quantity instruments (Goldblatt 2010). In contrast to uniform taxes, under tradable emissions permits (TEPs), the fall in permit price produced by technology adoption reduces the benefits of violating the environmental regulation at the margin and leads firms to modify their compliance behaviour (Villegas-Palacio and Coria 2010). According Matsumoto (2008) in this paper, the imputed price of carbon is compared with the carbon tax that imposes the common tax rate on all countries, which is the most efficient tax in theory

Carbon tax proposals in the Czech Republic were analyzed according to the types of taxed commodities. Specifically, the tax rates were compared against the EC Directive and three proposals were compared, prepared by the Ministry of Finance and Ministry of the Environment, which were not passed by the government and by the Parliament. Subsequently, a comparison was made of the tax rates with the market price of CO<sub>2</sub>.

## **3** Results

The below Table 1 brings an overview of carbon tax applications in selected countries in year 2016. The northern European countries in particular initiated the carbon tax and its spreading across the EU territory. It can be expected that this economic tool will help rectify the competitive environment on the fuel market. At the same time, the participating countries expect the new instrument to help in the solution of problems with transmissions.

Country/Province	Year of adoption	Characterization	Tax rate [EUR/tCO2]*
Denmark	1992	Carbon tax covers all consumption of fossil fuels (natural gas, crude oil and coal). There are some exemptions for EU ETS sectors, for energy intensive processes, exported goods, fuels in refineries and other exceptions in the transport sector. Fuels used in electric power generation are exempted from the payment of carbon tax too because energy production is included in another tax.	27.63 (2014)
Finland	1990	The calculation was originally based only on the carbon content only. Currently, it is a combination of carbon and energy tax, which covered only heat and electricity generation at the beginning but was later extended to include also transportation and heating fuels.	31.20 (2013)
France	2014	In December 2013, the French Parliament passed a tax on energy products, which is based on the $CO_2$ content in fossil fuels. The tax does not cover EU ETS sectors. At the same time, it covers the following fuels: natural gas, coal and oils. France plans to increase the carbon tax rate to 56 EUR/tCO <sub>2</sub> in 2020 and to 100 EUR/tCO2 in 2030.	22 (2016)
Island	2010	All importers and exporters of liquid fossil fuels (natural gas, petrol, aviation fuels and other) are obliged to pay carbon tax regardless whether it is a personal or business use. The tax changes to reflect the approximate value of emission allowance in the EU ETS system.	8.91 (2014)
Ireland	2010	Carbon tax is defined for sectors, which are not covered by the EU ETS system. Excluded are also nearly all emissions from farming. The tax is applied to petrol, heavy fuels, Diesel, petroleum, LPG, natural gas, coal and other.	20 (2013)
Mexico	2012	Supplementary tax – compensates the use of natural gas as compared with the other fossil fuels; natural gas alone is not subject of taxation. Business entities obliged to pay the tax are given a possibility to pay it by means of credits from CDM projects in Mexico.	0.46-2.28 (2014) Depending on the fossil fuel
Norway	1991	In Norway, up to 55 % of all emissions are covered by the carbon tax. The remaining emissions are covered by the domestic system of emission trading, which was linked with the EU ETS in 2008.	3.57-61.5 (2014) Depending on the fossil fuel and use
Sweden	1991	Carbon tax was introduced as a part of energy reform. Included are the following fossil fuels: natural gas, light fuel oils, heavy fuel oils, LPG, coal, petrol and other household fuel oils. Facilities falling under the EU ETS are currently excluded with the exception of district heating from 2014.	149.74 (2014)
Switzerland	2008	Carbon tax covers all fossil fuels used for energy. Swiss companies can be given exemption from carbon tax payment provided they participate in the EU ETS.	60.61 (2014)
United Kingdom	2013	A minimum price (Carbon Price Floor) is set, which includes all entities using fossil fuels for electric power generation. The measure has replaced the existing fee for climate change (Carbon Change Levy).	20.83 (2016)

	Table	1:	An	overview	of	carbon	tax	appl	ications	in	year	201	6
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Source: MoE, 2016; own work

<sup>\*</sup> Currency units were converted according to CNB current exchange rates as of 29 September 2016

Furthermore, we will focus on existing carbon taxes in six EU member countries in more detail, precisely in Denmark, Finland, France, Ireland, Great Britain and Sweden. Relatively significant is the fact that these are the developed EU countries with the GNP average above 100 % of EU average.

The following Figure 1 presents a comparison of carbon tax rates and GNP per capita in this European countries in year 2015.



Figure 1: Carbon tax rate and GNP per capita in selected EU member countries in Y2015

#### Source: Eurostat, 2017

We can see that there was apparently no dependence between the amount of carbon tax rate and GNP per capita in year 2015. At the same time, it is obvious that the rate of carbon taxes in Sweden significantly exceeded the rates in the other countries.

The above-mentioned European countries had also a relatively high ratio of collected environmental taxes to total taxes and social income in year 2015 (for more details see Table 2). The ratio of carbon tax yield/social income ranges from 4.5 % (France) to 8.9 % (Denmark).

Country	mil. EUR	% of tax and social income
Denmark	10.751	8.9
Finland	5.964	6.7
France	42.937	4.5
Ireland	4.397	8.5
Great Britain	50.624	7.4
Sweden	10.295	8.0

Table 2: Carbon tax yield in selected European countries in 2015

Source: Eurostat, 2017

Regarding the proposals of  $CO_2$  taxation in the Czech Republic, it should be mentioned, that all of them were prepared in connection with the government decisions and following analyses based on both the revision of Directive 2003/96/EC and EU ETS market development.

The revision of Directive 2003/96/EC, which was not approved by all EU member countries and was finally cancelled after long discussions, proposed two components of general energy tax – the energy component based on the energy content in the fuels, and the  $CO_2$  component based on the environmental impact of particular fuels. The proposal for the  $CO_2$  component of the energy tax represented an amount of 20 EUR per ton  $CO_2$ .

Simultaneously, the Ministry of Finance of the Czech Republic prepared its own proposal for  $CO_2$  taxation, based on the government decision connected with public budget savings planned for years 2013 - 2015. The new  $CO_2$  taxation was not proposed for all energy commodities, only for heating fuels, precisely for brown coal, black coal, natural gas and heating oils; the tax rate was 15 EUR per ton  $CO_2$ . The  $CO_2$  taxation was planned to come into force from 1 January 2014.

The following Table 3 shows both the tax rates proposed by the Revision of Directive 2003/96/EC and by the Ministry of Finance. Moreover, there you can see two additional tax rates, which were discussed in the material prepared by the Ministry of the Environment in 2016.

		Light Heating Oil	Heavy Heating Oil	Brown Coal	Black Coal	Natural Gas
1	Ministry of Finance proposal (€/tCO <sub>2</sub> )	15	15	15	15	15
2	Directive 2003/96/EC Revision (€/tCO <sub>2</sub> )	20	20	20	20	20
3	CO <sub>2</sub> part of Energy Tax – Proposal by the Ministry of the Environment $(€/tCO_2)$	10	10	10	10	10
4	CO <sub>2</sub> part of Energy Tax – Proposal by the Ministry of the Environment $(\notin/tCO_2)$	-	3.53	3.81	3.78	2.85

Table 3: An overview of CO<sub>2</sub> tax proposals in the Czech Republic

Sources: COM, 2011; MoF, 2012; MoE, 2016

Regarding the material prepared by the Ministry of the Environment, it should be mentioned that it is not a new proposal of  $CO_2$  tax rates in the Czech Republic, but a comparison of possible  $CO_2$  tax rates, based on different tax bases. The first tax rate is based on the market price of  $CO_2$  emissions on the stock exchange and this tax rate reflects also the development of this market price. This possibility reflects equal conditions for polluters under the EU ETS and out of the EU ETS. The second proposal is based on a fixed tax rate of 10 EUR per one ton  $CO_2$ .

Based on the tax rate reflecting the EU ETS development, the document prepared by the Ministry of the Environment says that if the EUA market price is 5 C/EUA, the tax rate for particular fuels will differ from 2.85 C/tCO<sub>2</sub> (natural gas) to 3.95 C/tCO<sub>2</sub> (coke). We can say that the emission component of energy tax based on the development of EUA market price of CO<sub>2</sub> is more suitable; on the other hand, the Ministry does not recommend it due to the long legislation process connected with regular changes of EUA market price.

Regarding the EUA market price development, the below Figure 2 shows the development of the EUA auction price in the period from January 2016 – February 2017.

8 7 6 5 EUR/EUA 4 3 2 1 0 11.1.2016 25.1.2016 14.3.2016 29.3.2016 3.5.2016 12.7.2016 28.7.2016 5.09.2016 22.11.2016 06.12.2016 9.2.2016 25.2.2016 14.4.2016 23.5.2016 13.6.2016 28.6.2016 16.8.2016 29.09.2016 L8.10.2016 07.11.2016 12.01.2017 30.01.2017 02.2017 4

Figure 2: EUA auction price development

We can see that the EUA auction price fluctuated in the period from January 2016 to February 2017 from 3.94 EUR/EUA to 7.45 EUR/EUA.

Sources: EEX, 2017; own work

## **4** Discussion and Conclusions

Results of the comparisons presented in the above section Results show that the use of carbon taxes is currently not uniform and individual countries differ both in the subjects of taxation and in the tax rates. Comparing with the development of actual emission allowance price within the EU ETS illustrated in Figure 3 we can see that nearest to this EUA market price are the carbon tax rates in Norway and Island (see Table 1) where the carbon taxes are also systematically linked with the EU ETS. In spite of the fact that Norway and Island are not the EU member countries, they joined the EU ETS system together with Liechtenstein as early as in 2007.

In the Czech Republic, the carbon tax has not been introduced so far; only various tax rate options have been discussed with respect to interconnection with the EU ETS system.

The main objective of this paper was to compare the rates of carbon taxes (EUR/t  $CO_2$ ) in some European countries with the actual stock market price of 1 ton  $CO_2$  (1 permit EUA). It is possible to conclude that the actual stock market price of 1 ton  $CO_2$  differs in a majority of cases from the amount of carbon tax rates used in the sector of power generation in the European countries.

Regarding further research in this area, it should be focused in more details on the efficiency as well as the environmental and economic impacts of  $CO_2$  taxation and  $CO_2$  emission allowances in Norway and Island, where these two economic instruments are currently linked.

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# **PART B – PUBLIC EXPENDITURES**

# Consolidated balance sheet of local self-government entity in Poland – legal bases and its usefulness

## Dorota Adamek-Hyska\* – Marzena Strojek-Filus\*\* – Aleksandra Sulik-Górecka\*\*\*

**Abstract.** The consolidated balance sheet of the local self-government entity reflects fully and integrally its assets and financial situation. Moreover, it covers, in most cases, the following undertakings: the local self-government entity, self-government budgetary entities (including the office), self-government budgetary establishments, independent public (self-government) health care units, self-government cultural institutions (e.g. public libraries, theatres, museums), controlled companies or partnerships, co-controlled companies or partnerships and companies or partnerships under substantial influence (e.g. community partnerships, special purpose vehicles established under public private partnership).

The aim of the paper is to analyze and evaluate the legal basis for the consolidation of the balance sheet in Poland, to indicate the scope of its usefulness and practical problems associated with the use of consolidation procedures. The study focuses predominantly on the purposes, various accounting principles and usefulness of a consolidated balance sheet of a local self government entity.

According to the analysis conducted in the paper, there is still insufficient awareness of the essence of the consolidation of the financial statements in the context of public finances in Poland. It also seems that the state authorities, local self-governments, and all other current and potential users of the reports prepared by public finance sector entities should better recognise the new quality of financial information presented in the consolidated financial reports.

**Keywords:** consolidated balance sheet, local self-government entity. **JEL Classification:** B22

## **1** Introduction

In Poland, the local self-government entity (municipal, district or provincial) is legally, organizationally and politically an independent entity. From the financial and accounting point of view, the local self-government entity is seen as a multi-facility enterprise, which accomplishes its role in terms of public tasks of local (sub-local or regional) importance, own tasks through its organizational units (e.g. self-government units and budgetary establishments as well as cultural institutions) or it may conduct economic activity on its own (in the alternative, by a local self-government legal entity) sometimes even beyond the public utility tasks, while concluding civil contracts with other entities (Ignatowski, 2007, p.14).

This entity is characterized by a complex and inconsistent reporting system because, apart from a financial report, it draws up a consolidated balance sheet, numerous budget reports, a budget execution report and other descriptive reports (e.g. information about the condition of properties). The paper focuses on the consolidated balance sheet of the local self-government entity. The specific nature of this report leads to the cause and effect analysis of preparing the consolidated balance sheet in these entities.

This paper aims to analyze and evaluate the legal basis for the consolidation of the balance sheet in Poland, to indicate the scope of its usefulness and practical problems associated with the use of consolidation procedures.

An indispensable source of information for the attainment of the indicated purpose is literature studies in the field of budget accounting, public finance and consolidated financial reporting. Additionally, a comparative-descriptive analysis of the collected material and a critical analysis of the legislation were used.

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# **2** The essence of the consolidation of funds in the public finance sector and their reporting representation

In the case of complex holding structures there are capital dependencies between entities, including ownership ones. Through the acquisition of equity stake one entity may start the control of another entity, although the two still remain legally separated. Both entities are also reporting entities. Each of these entities prepares its financial statements. Consequently, the controlled entity presents its assets, capital and financial results. At the same time, the dominant entity presents in its report all the controlled assets and capital, including those that belong to the controlled entity. There is replication of information on the same assets, capital and financial result in the indicated financial reports. A group of entities (dominant and controlled, which is the parent company and subsidiary) creates a capital group. A capital group is a single economic unit, i.e. one economic entity. Entities within the group may be in other capital relationships with various entities outside the group. These are relations of joint control and significant influence.

An analogy to holding structures, operating in the capital market, can be identified in the public finance sector, including local self-government sector. Local self-government entities form a hierarchical ownership relation with regard to the organizational units established by them, in which they resemble a capital group. This relationship is shown in Figure 1.

Figure 1. Ownership dependency in the public finance sector



#### Source: own elaboration

Local self-government entities provide part of their resources to the organizational units they established in order to carry out specific tasks. Therefore, there has been a shift of assets from one entity to another. Entities at all levels, as reporting entities, prepare their financial statements in which they present resources and funds they have at this level. In this case, too, there is replication of information in the financial statements, that is, there is the phenomenon of the multiplication of assets, funds and results of operations of these entities. The user of these reports has hampered assessment of economic and financial situation of these units and the entire sector. A simple fact of combining accounts by adding the appropriate entries does not make it easy to obtain information of adequate quality (Strojek-Filus, 2013, p. 36). It only provides summary information containing distortions of the characteristics of the assets and funds involved within the public finance sector.

Consolidation of financial statements serves the purpose of the presentation of entities' financial information in such a way as if they were one entity (IFRS 10 'Consolidated Financial Statements'; Art. 55 of the Accounting Act of 29 September 1994). As part of the consolidation procedures, the full method eliminates the resources and capital/ funds that replicate in the separate financial statements. This is achieved by excluding the shares of the dominant entity in a related entity and the corresponding capital/ fund of the related entity. At this stage, the difference in the consolidation and capital attributable to minority interests (non-controlling interests) should also be shown. As a result, the consolidated financial statements present both the assets, funds/capital and financial result of consolidated entities, taking into account the ownership interests, that is, from the point of view of the owner of the dominant entity. Resources and capital/ funds, which are replicated in the statements of entities of intermediate levels are subject to eliminations. The main effect of these procedures is to 'capture' and present the consolidated capital/fund held by the dominant entity (e.g. Alexander, Archer, 1996; Skinner, 2008). The effects of internal operations within the group are also subject to eliminations and adjustments, generating, inter alia, revenues, costs or settlements. It is worth noting that the literature identifies four main concepts (theories) of consolidation, which refer to obtaining a consolidated capital effect. Ignatowski (2003) presents the following consolidation theories of financial statements:

- ownership,
- dominant entity,
- extended dominant entity,
- economic entity.

The ownership concept – as opposed to the others – assumes indicating assets and capital/funds only in this part which stems from the shares held. The remainder of the assets and capital/funds is ignored. The ownership concept is the basis of the proportional method, which in practice was eliminated from the IAS/IFRS, and in the solutions adopted by the Act, it may be used as an alternative to the valuation of the joint control relationship.

The other concepts have a different approach to the principles of valuation and disclosure of assets and capital/funds belonging to minority shareholders, the extent of goodwill disclosure and the adopted scope of the consolidated entries (Schroeder, Clark, McCullers, 1991, p. 53). The essence of the differences between the mentioned concepts is a different approach to various groups of beneficiaries. The current provisions of the basic act regulating the accounting in Poland – the Accounting Act – are based on the concept of the extended dominant entity. In contrast, solutions of the International Accounting Standards/International Financial Reporting Standards are based on the concept of economic entity (e.g. Ignatowski, 2003; Strojek-Filus, 2013, p.45). The consolidation effect of the capital in the financial statements is also achieved when using the equity method, but without presenting the asset entries of the associated entity. For this reason, this method is called the line – by line consolidation), and it is in fact the only method of share valuation (e.g. Ignatowski, 2012, p. 815; Graham, 2013; Willis, 2013).

In the light of the presented aspects of the consolidation of financial statements, it is important not only to consolidate the statements of public sector entities, but also how it should be done. The consolidation of financial statements is necessary in order to achieve the effect of consolidated funds and assets, as well as to present real financial results and other achievements of the public finance sector entities. The procedures for consolidating individual statements should be clearly and transparently presented in detailed regulations. Properly carried out consolidation of financial statements must take into account the restatement and adjustment of individual financial statements of related entities to adapt them to the principles, methods implemented by the dominant entity, which is to ensure the full comparability of the data.

The consolidated financial statement in order to duly fulfill the information function should show the effects of consolidation in both the balance sheet and the profit and loss account. There is also important the adjustment of revenues and expenses arising from transactions carried out between entities The adjustments and eliminations relating to e.g. the depreciation of fixed assets or amortization of intangible assets should be properly recognized in the profit and loss account, and secondarily in the balance sheet. Limiting the consolidation of the financial statements of the financial statements of the possibility of an expanded interpretation and assessment of the interrelationship between the entities included in the consolidation. In the case of the public finance sector entities, it is particularly important because of the need to control the efficiency of utilizing the involved assets of the State Treasury and local self-government entities.

According to Kostrzewa (2011), the implementation of wider scope of the consolidated financial statement should be preceded by the execution of the International Public Sector Accounting Standards in Poland. The adoption of these standards will ensure the uniformity of principles and methods used, inter alia, in the valuation. It is also vital that they are based on the accrual accounting concept. The adoption of this concept will allow introducing, to much greater extent, solutions for the consolidation of the financial statement typical for the commercial sector.

# **3** Evaluation of regulatory sphere in relation to the consolidation of the balance sheet of the local self-government entity

Only local self-government entities have been drawing up a consolidated balance sheet in the Polish public finance sector since 2002. However, to date this report has not been included in legally defined scope of financial reporting of local self-government entities. According to current regulations, the financial statement of this entity includes (Regulation of the Minister of Finance dated 5 July 2010 on specific accounting rules and the charts of accounts for the state budget, local government budgets, budgetary units, local government budgetary establishments, state special purpose funds and state budgetary units domiciled outside the Republic of Poland, further referred to as the Regulation):

- report on budget execution,
- cumulative balance sheet including data resulting from the balance sheets of local self-government entities and budgetary establishments,
- cumulative profit and loss account, including data resulting from the profit and the loss accounts of local selfgovernment entities and budgetary establishments,
- combined statement of changes in funds, including data resulting from the statements of changes in funds of local self-government entities and budgetary establishments.

Therefore, the consolidated balance sheet of a local self-government entity is not included in the financial statements, is not passed by the board of the entity to its decision-making body, is not considered by the audit committee of the decision-making body, is not approved by the decision-making body, and is not the basis for adoption of a resolution on the discharge to the board of a local self-government entity under Polish law on public finances.

The Regulation contains an appendix with a pattern of the consolidated balance sheet and some specific rules of its preparation by the local self-government entity (Table 1).

Table 1: Legal regulations o	f the consolidated balance sheet	of a local self-government entity
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Legal bases	Contents
	1. The Board of the local self-government entity prepares a
	consolidated balance sheet, applying the provisions of the Accounting
	Act, assuming that the dominant entity is the local self-government
	entity.
	<b>2.</b> The consolidated balance sheet should include information to the
	extent specified in the Appendix to the Regulation.
	<b>3.</b> The information contained in the consolidated balance sheet of the
	local self-government entity may be disclosed in more detail than
	specified in the Appendix to the Regulation, if it follows the needs and
	specifics of the entity.
	4. The reports are drawn up in the Polish language and Polish
The Regulation	currency.
	<b>5.</b> Figures are indicated in zloty and grosz.
	<b>6.</b> Boards of local self-government entities provide consolidated
	balance sheets in written form and in the form of an electronic
	document to the competent regional accounting chambers.
	7. Boards of local self-government units can transmit the consolidated
	balance sheets in the form of an electronic document only when the
	authenticity of their origin and the integrity of their content will be
	guaranteed with a secure electronic signature.
	8. Regional Accounting Chambers submit to the Ministry of Finance
	consolidated balance sheets of local self-government entities in the
	form of an electronic document by 14 July of the following year.

Source: own elaboration

The data contained in Table 1 emphasize the purely formal nature of the specific rules in preparing the consolidated balance sheet by the local self-government entity. The specified regulations of the public finances must be used in conjunction with the general regulations of accounting law (i.e. the Accounting Act). Unfortunately, such an indication of legal basis of the consolidated balance sheet of the local self-government entity raises a number of inconsistencies, mainly related to the following issues<sup>\*</sup>:

- the parent company prepares the consolidated financial statement of the capital group, including the data of the parent company and its subsidiaries at all levels, as well as all the other subsidiaries, i.e. joint subsidiaries and associated entities; while in the case of local self-government entities, the indication that the entity is the dominant entity, without taking into account its organizational specificities and operating principles, becomes inadequate and raises many doubts regarding the direct application of legally defined definition of the parent company, subsidiary, joint venture, associate, or a major investor;
- Polish accounting law indicates, among others, the scope of the preparation of consolidated financial statements of the capital group, i.e. the balance sheet, profit and loss account, cash flow statement, statement of changes in equity and notes; in the case of a local self-government entity, only a consolidated balance sheet is prepared;
- a legally defined pattern of a consolidated balance sheet of a local self-government entity differs from the model of the consolidated balance sheet set out in the Accounting Act, among others, data concerning the result of the execution of the budget of local self-government entity, the cumulative result of the budget, or the value of the assets of liquidated entities;

<sup>&</sup>lt;sup>\*</sup> More on the controversy surrounding the consolidated balance sheet of the local self-government entity in Poland has been written in Ignatowski (2007), pp. 13-36; Hellich (2012), pp. 170-178, Adamek – Hyska (2013).

- the parent company prepares the consolidated financial statement, including the consolidated balance sheet, no later than within 3 months from the balance sheet date, on which the annual financial statement is drawn up; in the case of the local self-government entity, the consolidated balance sheet is drawn up and submitted to the Regional Accounting Chamber by 30 June of the following year, and the Regional Accounting Chamber transfers the balance to the Ministry of Finance by 14 July of the following year;
- the parent company prepares the financial statement of the capital group in a paper form; while the local selfgovernment entity is obliged to submit the consolidated balance sheet to the Regional Accounting Chamber in both paper and electronic form or in electronic form only;
- the local self-government entity may never make use of the possibility of not preparing the consolidated balance sheet.

The Polish law on public finances contains no specific consolidation procedures, so that each entity of local self-government in order to prepare the consolidated balance sheet selects appropriately the full consolidation method, the proportionate consolidation or the valuation of interests based on the equity method, under legal regulations contained in the Accounting Act.

## **4** Discussion

The carried out discussion gives the rise to the observation that the main recipients and, at the same time, users of the consolidated balance of the local self-government entity are the Regional Accounting Chambers and the Ministry of Finance. However, the conducted studies show that neither the Regional Accounting Chamber nor the Ministry of Finance uses the received data and information in compiled analyzes, ratio and descriptive evaluations of the economy and the financial position of the local self-government entities and entities controlled by them is not fully analyzed.

Given this fact, the question of the usefulness of the consolidated balance sheet of the local self-government entity raises, which in its individual scope includes a number of entities of a different organizational and legal form, often using different accounting policies.

For conscious and responsible management of the local self-government entity, the consolidated balance sheet provides comprehensive data on the economic and financial situation of the entity, including all possible assets relationships with other organizational units, presented in a systematic manner, in accordance with accepted principles, taking into account the fact that the local self-government entity is considered as a joint entity by both the public finance law and the accounting law. However, the analysis conducted in the paper shows that there is still insufficient awareness of the essence of the consolidation of the financial statements in the context of public finances in Poland. It also seems that the state authorities, local self-governments, and all other current and potential users of the reports prepared by public finance sector entities do not recognize sufficiently the new quality of financial information presented in the consolidated financial reports. This situation translates into the regulatory realm, which still does not introduce legal solutions in this area.

The authors did not find any empirical studies with a similar profile and scope. However a lot of incorrectnesses appear in exemplary inspection reports, evaluating the quality of financial reports of the public sector. According to the results of the control of public entities in Opole region in 2014, among 48 controlled entities the incorrectnesses were noticed in 18 of them (Inspection report of public entities in Opole, 2014).

The authors critically evaluate the current state of the legal issues concerning the consolidated financial statements of the public finance sector in Poland. According to the authors, the lack of appropriate regulations concerning the scope of the consolidated report contributes to the generation of a truncated set of information contained only in the consolidated balance sheet. It seems necessary to extend the obligation of consolidation onto other elements of the financial statements, in particular the profit and loss account. In turn, the lack of appropriate legal regulations defining the rules and procedures for the consolidation in the case of local self-government entities causes too much freedom in the preparation of the consolidated balance sheet.

## **5** Conclusions

The consolidated balance sheet of each entity of the local self-government should fully and accurately reflect its financial position, taking into account the financial position of both entities subordinated to the local self-government entity and directly related to it. However, it has been noted in the paper that the regulations on accounting law and public finances are inconsistent in terms of the consolidated balance sheet of the local self-government entity, thereby introducing considerable information chaos in the annual reporting of this entity. In practice, this chaos is a clear obstacle to carry out consolidation procedures and reduces the usefulness of the presented reporting data in the public finance sector.

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# Performance Evaluation of Cultural Sector in the Czech Republic and EU - Member Countries

#### Eva Ardielli\*

**Abstract.** Culture and Arts represent the essential part of human existence, especially in terms of historical, symbolic, aesthetic and spiritual values. Despite its undisputed social importance this sector is also becoming more important from economic perspective in the last years. The cultural sector can be described as a growing segment of the economy with high rates of GDP growth and dynamic development of employment. This fact reinforces the importance of the sector within the European Union, as GDP growth and a high level of employment belong among the primary goals of the Community, in accordance with European legislation and key EU documents.

Despite all the importance of the cultural sector, economic benefits are difficult to quantify. From this reason, the paper is focused on the problematic of performance evaluation of the cultural sector. The evaluation is based on the usage of MCDM methods (TOPSIS and WSA) and offers the interesting results of performance comparison for cultural sector on the international level – in the case of EU member countries.

**Keywords:** Cultural sector, evaluation, MCDM methods. **JEL Classification:** H11, H41, Z18

## **1** Introduction

The cultural sector is from the European or national perspective often designated as a dynamic segment of the economy, which is also characterized by high rates of GDP growth. Great potential of the cultural sector is also seen in field of supporting employment and creating new jobs (European Commission, 2006). However in the past the culture was in the terms of economic benefit largely ignored and degraded only on the unproductive sector. For example Craik (2005) states the cultural policy as not justifiable policy of government in terms of essentiality and unavoidability with other public good policy domains as prisons, defense or infrastructure. Moreover the area of culture is just one small component of the public agenda that governments are obliged to support. However in recent years the importance of this sector is growing and also it is paid more intense attention to this area on the European Union (EU) level (Colombo, 2006, van der Pol, 2008 or European Commission, 2006).

Despite the economic contribution of the cultural sector is difficult to quantify. Therefore the evaluation and comparison of the socio-economic performance of the cultural sector with other industry fields belong to the current trends (UNESCO, 2009 or Throsby, 2004). This paper is focused on the problematic of performance evaluation in the cultural sector. The objective is to evaluate the performance of the cultural sector in the Czech Republic (CR) based on the selected multi-criteria decision-making methods (MCDM) and to compare the result with other EU countries. The scope of evaluation includes the non-industrial cultural sector (fine arts, scenic arts and cultural heritage) and industrial cultural sector (film, music, book publishing and printing). This approach allows more accurately measuring of the economic and social performance of the culture.

#### **1.1 Performance Measuring in the Culture**

Performance measuring in the public sector has received much attention in recent years and is nowadays considered as necessity. It is given by the fact that the public funds are limited and the governments are under increased pressure of citizens in sense "giving value for money" (Mihaiu, 2014). Performance measuring has been introduced above all in many public organizations in order to ensure transparency of public decisions and the use of public funds and to increase performance. But it is also the appropriate instrument for measuring of the overall performance of a country's public sector (Van de Walle, 2008). For example ECB (2003) is comparing 23 OECD countries (18 European and 5 non-European countries) based on "Total public sector performance indicator" or the World Bank (2016) is monitoring for this purpose 213 based on "Government effectiveness indicator", which is part of the World Bank Governance Indicators dataset. Performance measuring is applied increasingly in public sectors of health or education. However as stated by Chiaravalloti (2014), due to the evidence-based evaluation

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policies introduced by many European governments since the 1990s, performance evaluation has become also a dominant means of government control of the publicly funded cultural sector. So the evaluation and comparison of the socio-economic benefit of the cultural sector with other industry fields belong also to the current trends (Throsby, 2004). But in practice is performance measuring in cultural sector dealing with number of difficulties as defining performance, identifying suitable performance indicators or implementation of a performance management system, as stated by Mihaiu (2014). Performance in public sector can be characterized by a wide range of perspectives including: efficiency, effectiveness, economic, social and environmental dimensions. Also a large range of indicators was introduced for purpose of performance measuring (Keyvan-Ekbatani and Cats, 2015). Performance indicators are traditionally focused on financial measures (Turbide and Laurin, 2009) but actually there were by many authors justified also non-financial indicators above all in case of measurements in not-for-profit organizations (Kaplan and Northon, 2001, Cai and Wang, 2012). The vast majority of organizations in cultural sector (not-for-profit organizations performing artistic disciplines as circus, dance, music, theatre or variety) use multiple indicators to measure their performance (Turbide and Laurin, 2009).

The assessing of national cultural sectors from the point of view of the economic importance of cultural sector can be done in different ways, contexts and approaches (UNESCO, 2009 and Chiaravalloti, 2014). The basic approaches used to measure the performance and economic contribution of cultural sector are based on variables of macroeconomic aggregates - gross value added, turnover, employment, business activity. The aim of these indicators is to measure the dynamic of culture sector at the economic level and to provide reliable data as the basis for future decision-making in this area (UNESCO, 2009). All this areas were included also into the presented research to compare the state of culture sector in EU countries.

The methods used for the performance evaluation in public sector are very broad. In case of performance evaluation public organizations in selected public sectors are often used Data Envelopment Analysis (DEA) as for cultural services, libraries or zoological gardens (Wang, et al., 2016, Vrabková, 2016 or Bečica, 2016) or Balanced Scorecard (Badia and Borin, 2012, Kaplan and Northon, 2001). There are used also other measuring approaches as economic-size and structural analysis, cluster analysis or cultural satellite accounts (UNESCO, 2009). As stated by Shaout and Yousif (2014), for the evaluation of the selected sectors of national economies are often used MCDM methods (TOPSIS, WSA, VIKOR, AHP) for example for evaluation of performance in health system (Karadayi and Karsak, 2014, Hejduková and Kureková, 2016) or performance evaluation of public transportation services (Keyvan-Ekbatani and Cats, 2015). The MCDM methods were chosen also for the evaluation of performance in cultural sector in the presented paper.

#### 1.2 Importance of Culture in the European Union and the Czech Republic

Culture is one of Europe's greatest strengths: it is a source of values and identity and gives the continent a sense of belonging. It also contributes to people's well-being, to social cohesion and inclusion. The cultural and creative sectors are a driver of economic growth, job creation and external trade (Eurostat, 2016; European Commission, 2006). Cultural and creative industries are estimated to be responsible for over 3 % of the EU's gross domestic product and jobs (Europa, 2017). Culture was at EU level firs time legislatively enshrined in the Maastricht Treaty in 1992. Now it is specified in the Article 167 of the Treaty of the Functioning of the EU. In accordance with this article the EU shall contribute to the flowering of the cultures of the member states, while respecting their national and regional diversity and at the same time bringing the common heritage to the fore (Eurostat, 2016). The main activities in this area are framed by the European Agenda for Culture, which aims to reinforce the role and position of culture in an increasingly globalised world (Europa, 2017). The importance of cultural sector is also declared in the Lisbon Strategy, document Europa 2020 and other strategic documents. However, at the EU-level does not exist the harmonization of the laws and regulations of the EU member states in the field of culture. The responsibility for this field is uniquely given to individual member states. EU in the field of culture only supports and complements the member states.

The EU main objective is to ensure policy development and dialogue in the field of culture and to support the cultural and creative industries and professionals (by means of a variety of initiatives). The EU promotes the development of the cultural sector and aims in this area significant financial resources. The EU supports these objectives through the Creative Europe programme, which is supporting Europe's cultural diversity and heritage and provides variety of opportunities for culture sector organizations and professionals or the MEDIA programs for support of the European audiovisual industry. The main policy actions are set out in the Work Plan for Culture for 2015 - 2018. This work plan sets out the main priorities for European cooperation in cultural policymaking: inclusive and accessible culture, the promotion of cultural heritage, support to the flowering of the cultural and creative sectors, and promotion of cultural diversity and of culture in EU external relations (Eurostat, 2016).

The cultural sector is important also in the Czech Republic. With the phenomenon of Cultural and creative industries including in its wider definition of the whole area of culture a new paradigm is emerging for cultural policy which perceives and takes into account all aspects of the functioning and benefits of culture to the quality

of life and to social and economic growth (Žáková and Bednář et al., 2015). In order to provide a comprehensive picture of the performance of culture in the Czech Republic, the Cultural Satellite Account was created covering all sectors that fall into the core of Cultural and creative industries, with the exception of the digital content. According to the macroeconomic results of the culture account, it can be stated that the share of culture on gross value added in the Czech Republic was 2.26 % in the year 2013.

National legislative determination is a prerequisite for the functioning of the overall cultural sector. Currently is applied the State Cultural Policy of the CR for years 2015 – 2020 and the Arts Support Concept for the years 2015 - 2020 (MKCR, 2017). The current task is to prepare a Strategy for Support of Cultural and Creative Industries following the Arts Support Concept. In this context should be prepared incentives and fostered programs and projects to support the arts market and related business activities.

## 2 Problem Description and Selected Indicators

The performance measuring and evaluation plays an important role in public policy and they are applied in various economic fields. (Mihaiu, 2014, Turbide and Laurin, 2009). As the possible option how to evaluate the performance of cultural sector is to use socio-economic indicators describing the cultural sector (UNESCO, 2009, Chiaravalloti, 2014). MCDM is commonly used to obtain the results based on a range of performance indicators (Keyvan-Ekbatani and Cats, 2015). In this paper was evaluated the overall performance of cultural sector of the Czech Republic on the national level in comparison with other EU countries. The measurement of cultural performance in this paper is not limited only to publicly funded culture (although this issue is also very significant in relation to public finances), but there is evaluated the state of overall cultural industry of the countries, because this is the prerequisite for a competitive economy and contributes to economic growth and employability, as stated in Lisbon strategy. The evaluation is based on the procession of 12 selected socio-economic culture indicators monitored by Eurostat that are reflecting the performance of cultural sector. The selected indicators have multiple character, see table 1 and it was giving equal weight to each of them.

Indicator	Characteristic
GVA - Gross value added (I1)	At basic prices. In sector of arts, entertainment and recreation,
	in percentage of total.
FCE - Final consumption expenditure of	For recreation and culture, in % of total.
households (I <sub>2</sub> )	
CE - Cultural employment (I <sub>3</sub> )	Number of workers (employees and self-employed) in the
	cultural field in percentage of total employment.
TS - Students in tertiary education	Provided by universities and other higher education
studying culture-related fields (I <sub>4</sub> )	institutions in fields - Arts, Humanities, Journalism and
	information and Architecture and town planning.
NCE - Number of cultural enterprises (I <sub>5</sub> )	Count of the number of enterprises active during the reference
	period as a percentage of total services.
CST - The cultural sectors' turnover $(I_6)$	The total value of market sales of goods and services by
	cultural enterprises
VAE - Value added in cultural sectors (I <sub>7</sub> )	As % of value added in total services of cultural enterprises.
PRB - Persons reading books (I <sub>8</sub> )	1 book or more in the last 12 months, in %
PPC – Persons visiting cinema (I <sub>9</sub> )	At least once in the last 12 months, in %
PPT - Persons visiting theatre and concerts	At least once in the last 12 months, in %
(I <sub>10</sub> )	
PPCS - Persons visiting cultural sites (I <sub>11</sub> )	Visiting historical monuments, museums, art galleries or
	archaeological sites. At least once in the last 12 months, in %
PRN – Persons reading newspapers ( I12)	At least once a week in the last 12 months, in %

Fable 6: Culture	indicators	and their	characteristics
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#### Source: Eurostat (2016).

The indicators are this way describing the economic importance of national cultural sector in the country and also the importance of the output for culture consumers. There is also reflected the expansion and dynamics of cultural sector and the willingness of individuals to be active within this sector. This way are the indicators comparing the EU countries from the point of view of performance and competitiveness of cultural sector on international level. For the evaluation of cultural sector in this research were compared the results of two MCDM methods, TOPSIS and WSA. Both TOPSIS and WSA method are operations research methods. TOPSIS method is based on the usage of the principle of minimizing the distance from the ideal option. It arranges the alternatives

according to the indicator of relative distance from baseline (hypothetically worst) alternative (Chen and Hwang, 1992). This method determines in the result the overall order of alternatives. WSA method is based on the principle of utility maximization. It arranges the alternatives in the order according to the total utility, which is taking into account all represented criteria (Fiala 2008).

The research was based on the selected indicators from the dataset of Eurostat related to the Culture statistics. Culture statistics' presents a selection of indicators on culture pertaining to the following topics: cultural employment, international trade in cultural goods, cultural enterprises, cultural participation, use of internet for cultural purposes and private cultural expenditure (Eurostat, 2016). From this dataset were selected the comparable data of the year 2014.

## **3** Methods

The methods TOPSIS and WSA provide the complete ranking of the alternatives starting from the best towards the worst one. TOPSIS method is based on the selection of alternative that is closest to the ideal solution and furthest from baseline solution; see Shih, Shyur and Lee (2007). Application of TOPSIS method is as follows: Creation of normalized criterial matrix R according to following formula (1):

$$\mathbf{r}_{ij} = \frac{\mathbf{y}_{ij}}{\sqrt{\sum_{i=1}^{m} \mathbf{y}_{ij}^{2}}},\tag{1}$$

where  $r_{ij}$  are elements of matrix R; i = 1, 2, ..., m; j = 1, 2, ..., r;  $y_{ij}$  are the original input data for alternative i and criterion j; m is the number of alternatives.

Calculation of weighted criterion matrix W by following equation (2):

$$\boldsymbol{w}_{ij} = \boldsymbol{v}_i \cdot \boldsymbol{r}_{ij} \tag{2}$$

in such a manner that each column of the matrix R will be multiplied by the corresponding weight criterion  $v_i$ ;  $w_{ij}$  is weight normalized value and  $v_i$  is weight of criterion.

Determination of the ideal and basal alternative relative to the matrix values *W*, see following formulas (3) and (4):

$$H_j = max_i w_{ij} \tag{3}$$

$$\boldsymbol{D}_{\boldsymbol{i}} = \boldsymbol{m} \boldsymbol{i} \boldsymbol{n}_{\boldsymbol{i}} \boldsymbol{w}_{\boldsymbol{i} \boldsymbol{j}} \tag{4}$$

for i = 1, 2, ..., m and j = 1, 2, ..., r.

Distance calculation of alternatives from the ideal alternative, respectively basal alternative, see formula (5) and (6):

$$d_i^+ = \sqrt{\sum_{j=1}^r (w_{ij} - H_j)^2}$$
(5)

$$d_{i}^{-} = \sqrt{\sum_{j=1}^{r} (w_{ij} - D_{j})^{2}}$$
(6)

for all i = 1, 2, ..., m; and j = 1, 2, ..., r.

Calculation of the relative distance indicator of variants from baseline variant by formula (7):

$$c_i = \frac{d_i^-}{d_i^+ + d_i^-} \tag{7}$$

where i = 1, 2, ..., m;

Arrangement of variants by non-growing values of  $c_i$ .

WSA method is based on linear utility function. The method provides complete ranking of alternatives according to their total utilities. Application of WSA consists of the following steps:

Normalization of input data using following equation (8):

$$r_{ij} = \frac{y_{ij} - D_j}{H_j + D_j} \tag{8}$$

where  $r_{ij}$  are the normalized values for *i* alternative and *j* criterion,  $y_{ij}$  is original value of alternatives according to the criterion *j*,  $D_j$  are the values of the basal alternative and  $H_j$  are values of the ideal alternative. Calculation of the total utility according to the following formula (9):

$$\mathbf{u}(\mathbf{a}_{i}) = \sum_{j=1}^{k} \mathbf{v}_{j} \mathbf{r}_{ij}$$
(9)

where  $u(a_i)$  is the total utility of the alternative  $a_i$ ,  $r_{ij}$  are normalized values from the previous step,  $v_j$  is the weight of *j*-th criteria and *k* is the number of criteria.

#### **4** Results

In the research, there was selected the final list of alternatives (EU-28 countries) and criteria (12 culture indicators). The performance of cultural sector in the EU countries and the comparison of the position of the Czech Republic were evaluated by usage of TOPSIS and WSA method. In this part of the paper there are presented the application results of TOPSIS and WSA methods.

On the basis of the TOPSIS method there was performed the calculation of the total relative indicator of distance from basal alternative  $c_i$ . The values of the calculated indicator range between 1 and 0. Value 0 corresponds to the basal alternative; value 1 corresponds to the ideal alternative. Based on the result, it was possible to determine the order of the EU countries in terms of the culture sector performance, from the best to the worst, as shown in table 2.

Order	Variant	Distance (ci)
1	Sweden	0.65544
2	United Kingdom	0.65175
3	Denmark	0.64967
4	Luxembourg	0.63204
5	Germany	0.61443
6	France	0.60663
7	Finland	0.56406
8	Austria	0.55584
9	Poland	0.54812
10	Belgium	0.54494
11	Netherlands	0.53389
12	Estonia	0.52578
13	Spain	0.51982
14	Greece	0.51534

 Table 2: Performance of cultural sector in EU countries by TOPSIS method (2014)

Source: Own research.

Evaluation of the culture sector in the EU countries in 2014 according to TOPSIS method showed that on the best places are Sweden (1. position), United Kingdom (2. position) and Denmark (3. position). The lowest performance was found out in Lithuania, Bulgaria and Romania. The Czech Republic ranked on the 17. position.

WSA application was processed based on the calculation of the total utility of each alternative. Then the total utility of alternatives was ordered from the highest to the lowest. The values of the calculated total utility range between 1 and 0. The ranking of EU countries is represented in table 3. Evaluation of cultural sector according to WSA method in EU for 2014 presented that on the best places were United Kingdom (1. position), Sweden (2. position) and then Denmark (3. position). On the worst place ranked Lithuania, Bulgaria and Romania. The Czech Republic ranked same as in TOPSIS method on the 17. position.

The selected methods allowed the comparison of EU countries in terms of cultural sector performance. Cultural sector performance depends on the values of 12 selected economic and social indicators – performance indicators. The indicators  $I_{1-}I_{12}$  describe the socio-economic outputs of the cultural sector.

#### Table 3: Performance of cultural sector in EU countries by WSA method (2014)

Order	Variant	Benefit
1	United Kingdom	0.71651
2	Sweden	0.71207
3	Denmark	0.67486
4	Luxembourg	0.64932
5	Germany	0.64084
6	France	0.63433
7	Austria	0.58642
8	Finland	0.58557
9	Belgium	0.57420
10	Netherlands	0.57158
11	Estonia	0.54805
12	Poland	0.54640
13	Italy	0.52840
14	Spain	0.52698

Order	Variant	Benefit
15	Greece	0.51982
16	Malta	0.51675
17	Czech Republic	0.49335
18	Slovenia	0.48063
19	Ireland	0.46947
20	Hungary	0.43258
21	Latvia	0.42922
22	Croatia	0.41366
23	Cyprus	0.41111
24	Slovakia	0.39705
25	Portugal	0.39576
26	Lithuania	0.34382
27	Bulgaria	0.25981
28	Romania	0.23753

Source: Own research.

Cultural sector with significant value added, share of employment, well-educated population, innovative and active businesses and sufficient participation of citizens on the output could be considered a prerequisite for the competitiveness of the sector. The results showed also significant differences among EU countries (notably the EU-15 countries and the so-called Eastern countries that joined the EU later). The position of the Czech Republic was evaluated as slightly below average.

## **5** Conclusions

In this paper was introduced the evaluation of cultural sector performance in EU countries according to 12 selected culture indicators by usage of MCDM methods. The results of the evaluation by TOPSIS and WSA method in the year 2014 acknowledged that the best ranking in this area obtained United Kingdom, Sweden, Denmark and Luxembourg similarly by WSA and TOPSIS method. The worst performance was reported in Bulgaria and Romania. The Czech Republic was evaluated by TOPSIS and WSA method similar as country with slightly below average performance of cultural sector in EU countries on the 17. position. When evaluating the applicability and relevance of used methods, it is for the purpose of performance evaluation more objective and therefore more suitable TOPSIS method, which reflects the variability. The WSA method then always exalts the extreme values before the average values.

The cultural sector promotion is one of the aims on the European level. Cultural industries are supported by European Commission to ensure that the cultural sector is able to increasingly contribute to employment and growth across Europe. This involves the provision of direct financial and technical support. In the Czech Republic, the Strategy for Support of Cultural and Creative Industries is being prepared, following the Arts Support Concept. In this context the support programs and projects are also being prepared. In 2017, an awareness-raising office on Cultural and creative industries should be funded to provide information on how to use programs to support cultural industries. Other programs should be addressed using the Operational Programs.

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# **Overview and Perspective of Voluntary Municipal Associations**

## Eduard Bakoš\* – Petra Dvořáková\*\*

**Abstract.** The Czech Republic has very fragmented structure of public administration. The structure of municipalities according to their size shows that vast majority of municipalities have less than 1,000 inhabitants. This factor significantly affects the financing of their activities, because it is an important principle for allocation of shared taxes. Revenues of municipalities limit their management and provision of services for citizens. This can be solved by establishing voluntary municipal associations (VMAs) as one of the possible forms of municipal associations in the Czech regions and seek to scope a research agenda on VMAs by identifying data sources that can reveal the extent of VMAs in the Czech Republic. Partial objective is to point out potential problems in data reporting, which makes VMAs analysis difficult. The results of preliminary research demonstrate a variety of region approaches to collecting data on VMAs.

**Keywords:** municipalities, inter-municipal cooperation, voluntary municipal association, compound indicator of inter-municipal cooperation intensity.

JEL Classification: H77, R58

## **1** Introduction

The settlement structure of the Czech Republic is highly fragmented, which is reflected in a large number of municipalities from the perspective of public administration organization. Tendency of the past 25 years to create smaller residential units is based on historical events, especially forced collectivization in the 60s of the 20th century. The establishment of the independent Czech Republic opened the door for a return to local government in the tradition of the first republic of Czechoslovakia. Many municipalities took advantage of this opportunity, as is evident from the numbers of the Interior Ministry. There were 4,120 registered municipalities in 1989 and during 1990 emerged 1,684 new ones. This process continued in the following years till the adoption of the legal constraints that the new municipality must have at least 1,000 inhabitants. At present, a new municipality is created exceptionally; their total number has stabilized at less than 6,300 (Ochrana, Půček, Špaček, 2015, p. 140).

Mentioned number is considered to be too high according to the area of the Czech Republic. Moreover, approximately 80% of Czech municipalities have less than 1,000 inhabitants. These municipalities are often economically weak, and according to some authors are not able to provide an optimal social and technical infrastructure to their residents. In the past, lack of funds was solved by subsidy titles from the center administered by district offices. The problem arose after the abolition of district offices when this agenda should have been managed by municipalities themselves (Ochrana, Půček, Špaček, 2015, p. 140). It has created space for possible cooperation between municipalities and between municipalities and other entities that have an interest in the successful functioning of the municipality.

The main goal of this paper is to describe voluntary municipal associations in different regions and seek to scope a research agenda on VMAs by identifying data sources that can reveal the extent of VMAs in the Czech Republic. Partial objective is to point out potential problems in data reporting, which makes VMAs analysis difficult. The results of preliminary research demonstrate a variety of region approaches to collecting data on VMAs.

The paper is structured as follows: Firstly, the paper provides a brief overview of the inter-municipal cooperation in the world, than in the Czech Republic. Secondly, development of the number of voluntary municipal associations is described and compound indicator of inter-municipal cooperation intensity is created. Thirdly, the paper presents obtained results in relation to development of inter-municipal cooperation and approaches which are used for collecting data on VMAs.

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## **2** Inter-municipal Cooperation from the International Perspective

While IMC trends and forms differ internationally, overall it is a widespread phenomenon. For example, Warner (2006) mentions IMC as the third most common way of providing local government services in the US, after direct production and privatization. Internationally, the general trend toward IMC is increasing, with the recent financial crisis spurring some efforts (Mix et al., 2016). Increasing amount of open data in the public sector contributes to both the rise of relevant information and the evaluation challenge of IMC.

Kwon and Feicock (2010) noted that "local government responses to the demands for, and barriers to, intermunicipal cooperation are expected to proceed in two stages that reflect efforts to solve both the problems of fragmentation in service responsibility and the problems they encounter in bargaining among themselves to craft solutions such as service agreements".

Hulst and Monfort (2011) distinguish between four basic types of inter-municipal cooperation: quasiregional governments, planning forums, service delivery organizations and service delivery agreements. Their research on specific countries demonstrates that the national institutional context to a large extent explains the presence or absence of the different types in a country.

Frère et al. (2014) found that inter-municipal cooperation internalizes spending spillovers among municipalities in the same community. However, they found that benefit spillovers among municipalities not members of the same community remain significant, suggesting that communities are too small as regards this particular goal of inter-municipal cooperation.

Bel and Warner (2016) made meta-analysis of 49 studies dealing with inter-municipal cooperation. They analyzed several factors such as fiscal constraints, professional management, spatial and geographic factors, community wealth and economies of scale. They concluded that the financial savings can be one of the motivations why to cooperate, but cooperation effect is not yet completely clear. They do not found clear support for economies of scale in their analysis. There are many other factors, in particular the organizational and spatial character, which strongly influence the reasons for collaboration.

Inter-municipal cooperation in the Czech Republic is being dealt with only a marginal problem. Sedmihradská (2011) asserts that inter-municipal cooperation units offer an efficient, equitable, and feasible solution as they can improve situations in small municipalities through information provision and the design of targeted measures.

## 2.1 Inter-municipal Cooperation in the Czech Republic

The possibility of cooperation between municipalities is governed by Act no. 128/2000 Coll. on Municipalities. The cooperation is meant primarily within the independent competence, but the Administrative Code (Act no. 500/2004 Coll.) enables also cooperation within the delegated competence.

Generally there are three possible ways of cooperation concerning legal rules (see § 46 of the Act no. 128/2000 Coll. on Municipalities):

- 1. (public) contract concluded to fulfill a specific task;
- 2. (public) contract about establishing a voluntary municipal association;
- 3. establishing a legal body under public law by two or more municipalities.

First situation was quite usual when municipality did not want to establish a voluntary municipal association for some reason. Such contracts have been concluded according to the Ministry of Interior by approximately 48 % of municipalities (Ochrana, Půček, Špaček, 2015, p. 140). From the perspective of the Ministry these are mono-functional volumes that are relatively unstable and often fall apart when the task for which they were established is finished. In practice it is e.g. contracts about providing public transportation, joint project (sewage, municipal waste landfill, etc.), the realization of cultural events, educational activities etc. Number of these agreements is gradually reducing according to the Ministry because practice showed voluntary municipal association as a better form of inter-municipal cooperation (Ochrana, Půček, Špaček, 2015, p. 140).

#### Voluntary Municipal Associations as a Special Form of Inter-municipal Cooperation

Establishing voluntary municipal associations (also referred as VMAs) is one of the possibilities how to solve outlasting Czech local administration problem – its fragmentation (Ochrana, Půček, Špaček, 2015, p. 140). Municipality can become a member of a voluntary municipal association based on § 49 of the Act no. 128/2000 Coll. on Municipalities as was already mentioned above. Such membership should lead to a better protection of municipality as well as better enforcement of common interests. Municipalities can establish new VMA or join the existing ones. VMA is a corporate body, which operates with its own budget in accord with rules set by the 5<sup>th</sup>

part of the Act no. 250/2000 Coll., on Budgetary Rules for Local Governments. § 38 is highly important as it states principles of assets management - VMA administers assets which were included within by the VMA's members according to the VMA's status or which VMA gained by its own activity.

VMA's budget belongs to a public budgetary system. It does not have assigned any share on tax revenues (according to the Act no. 243/2000 Coll. on Budgetary Determination of Revenues of Some Taxes) nor is it intended for collecting local fees (based on Act no. 565/1990 Coll. on Local Fees). VMAs operate within independent power of municipalities only and therefore they can not obtain a contribution for performance of delegated power (as is enabled by § 62 of the Act no. 128/2000 Coll., on Municipalities). Main resource of VMA's budget remains received transfers mainly from member municipalities or acquired funds from the European Union Funds or Czech Ministries for project realization. It is not without an interest that state budget does not have a special subsidy title only for VMAs. According to the Ministry of Finance VMAs are active in the area of water management, regional development and providing municipal services (PSP ČR, 2017, Part G, p. 3). Other activities which may be performed by VMAs are listed in § 50 of the Act no. 128/2000 Coll. on Municipalities.

The data of the Ministry of Finance shows the volume of funds managed by VMAs. Estimated revenues of VMAs were 3.5 bln. CZK in the year 2016. One third (1.2 bln. CZK) was created by own revenues while two thirds (2.4 bln. CZK) were transfers, which were supposed to be used on investments. The result of the budgetary year was expected as positive (surplus 0.3 bln. CZK) in 2016 as well as in 2017 (surplus 0.2 bln. CZK) (PSP ČR, 2017, p. 14). Review of VMAs management comes under the competence of the regional authority within its delegated powers (§ 42 art. 2 and § 53 of the Act no. 128/2000 Coll. on Municipalities). Regional authority has one more legal relationship to the VMA except possible review of its budget. It manages the register of VMAs where all VMAs are compulsorily listed (§ 49 of the Act no. 128/2000 Coll. on Municipalities).

## **3** Material and Methods

The municipalities historically tend to group in associations. The reason is that some municipalities are too small to be able to provide certain public services by their own, expecially long-term investments in water management and sewage infrastructure, the collection of waste, etc. Moreover, they expect cost savings due to economies of scale. Another reason may be a higher possibility of receiving a grant not only from national but also international sources (e.g. EU subsidies).

The number of VMAs changes every year. There is not so intense rise lately as was common during 90s (see Kutáček, Šelešovský, 2003, p. 149). Nevertheless data fluctuate. Number of VMAs is followed by different sources, namely registers administered by the Regional Offices, database Monitor (information portal of the Czech Ministry of Finance, which allows free entry to budget and accounting information from all levels of state administration and autonomy) and Institute for Spatial Development. Different sources offer different data. We suppose that it is based on following reasons.

The registers administered by the Regional Offices add newly established VMAs to the existing list. The legal documents like founding contracts and statutes that define basic information about VMAs (such as year of establishment, list of member municipalities and levels of initial investments from municipalities) are usually available via the register of VMAs as well. The deletion of terminated VMAs has no clear rules. Attitude of individual regions differ as well as terms of regular updates of VMAs' registers. This can cause discrepancies in actual and presented number of VMAs in registers.

Application Monitor collects data from individual VMAs that are active, i.e. manage their finances and report it to the Ministry of Finance. Therefore there could exist VMAs which are not active in actual year but which are still functioning. Data on VMAs are published every quarter year and an archive of annual data since 2001 is also available in the database.

Case of Institute for Spatial Development is special because it tracked VMAs till March 2016 within the database of the Czech micro-regions. Most of them have legal status of VMA. Then the database was moved to the Ministry of Regional Development, which is the founder of the Institute. The database shows number of VMAs that are interested in the overall development of their territory. It means that not all the VMAs are counted as some of them can have different reason of foundation.

If we summarize approaches of mention data sources, it is visible, that results would differentiate. Numbers from the regional registers were applied in table 1 to describe characteristics of registers. We used dataset by the Ministry of Finance to compare nowadays situation with the year 2002 (in table 2) as the primal research Kutáček, Šelešovský (2003) used it as well. The simple number of existing VMAs cannot express the actual intensity of inter-municipal cooperation. More variables should be taken into account as shows following indicator.

Equation for compound indicator of inter-municipal cooperation intensity calculation includes ratio of number of municipalities in a region to a number of VMAs, ratio of number of inhabitants in a region to a number of VMAs and ratio of a regional area to a number of VMAs. Its usage enables to evaluate the intensity of intermunicipal cooperation in an individual region. Introduced criterions are valued differently. The highest value goes to the number of municipalities in a region ( $w_a = 50$  %), then to the number of inhabitants ( $w_b = 30$  %) and finally, to the regional area ( $w_c = 20$  %) according to the authors Kutáček, Šelešovský (2003, p. 147).

#### Compound indicator of inter-municipal cooperation intensity

$$k_{i} = w_{a} * \frac{\frac{x_{ai}}{y_{i}}}{\frac{1}{100} * \sum_{i=1}^{n} \frac{x_{ai}}{y_{i}}} + w_{b} * \frac{\frac{x_{bi}}{y_{i}}}{\frac{1}{100} * \sum_{i=1}^{n} \frac{x_{bi}}{y_{i}}} + w_{c} * \frac{\frac{x_{ci}}{y_{i}}}{\frac{1}{100} * \sum_{i=1}^{n} \frac{x_{ci}}{y_{i}}},$$
(1)  
where  $x_{a}$  = number of municipalities in the region  
 $x_{b}$  = number of inhabitants in the region  
 $x_{c}$  = area of the region  
 $y_{i}$  = number of voluntary associations of municipalities in the region  
 $w_{a} + w_{b} + w_{c} = 1$   
 $w_{a} = 0.5; w_{b} = 0.3; w_{c} = 0.2$   
Source: Kutáček, Šelešovský (2003, p. 147).

## **4** Results and Discussion

For the purpose of this paper we went through websites of the individual regional offices. The aim was to find all registers of VMAs across regions and compare provided form and information. First thing we focused on was the form of publication according to the Open Data philosophy (Hausenblas, 2015). This philosophy evaluates openness and accessibility of provided documents from level 1 (scanned document) to level 5 (data in the web linked to other data). It is visible from the table 1 that seven Czech regions are on the second level (structured data, e.g. Excel file) while eight are on the third level (non-proprietary open format, e.g. CSV). The higher rank region obtained, the better result it means.

Generally, there is no uniformity in managing registers of VMAs. Few regional offices included VMAs register inside administrative agenda, few within trade licensing office and others into regional development agenda. Usually it took a while to find relevant register and it often required usage of website search. Moreover data are presented very variously as was mentioned above. Some regional offices offer file with the list of VMAs (the Hradec Králové Region, The South Moravian Region, The South Bohemia Region, the Zlín Region), other collect and expose also basic document of individual VMAs (see table 1). The highest level is represented by regions that use on-line database of VMAs (The Pilsen Region, The Ústí Region and the Vysočina Region).

The difference is also in how regional authorities perceive the obligation of municipalities to report their data changes as was mentioned above. While some regional offices present the idea that no generally valid legal regulation impose obligation on VMAs to notify office in case of data change, they themselves warn that the register may not contain the actual data. On the contrary others emphasize the obligation to notify the VMAs change in its details based on the Act no. 304/2013 on public registers of individuals and legal entities.

Register of Region	Number of VMAs	Form of publication (according to Open Data)	Register VMAs is downloadable	Documents of individual VMAs are available
Central Bohemia Region	126	3	NO	YES
Hradec Králové Region	52	2	YES	YES
Karlovy Vary Region	16	3	NO	YES
Liberec Region	31	2	NO	NO
Moravian-Silesian Region	44	2	YES	NO
South Bohemian Region	60	2	YES	YES
South Moravian Region	134	2	YES	NO
The Olomouc Region	59	3	NO	YES
The Pardubice Region	59	3	NO	YES
The Pilsen Region	55	3	NO	YES
The Ústí Region	41	3	NO	YES
Vysočina Region	91	3	NO	NO
Zlín Region	44	2	YES	YES
Total	816	-	-	-

Table 1: VMAs Registers Administered by the Czech Regions

Source: Author based on Hausenblas (2015) and websites of individual regions (2017).

Table 2 shows number of VMAs in regional division. Nowadays the highest number of VMAs belongs to the South Moravian Region (129 VMAs), followed by the Central Bohemia Region (111 VMAs) and the Region Vysočina (65 VMAs). The division is similar to the year 2002 when the winner was the Central Bohemia Region (101 VMAs) followed by the South Moravian Region (85 VMAs) and the Region Vysočina (65 VMAs). The other side of the scale occupied the Region Karlovy Vary, the Liberec Region and the Moravian-Silesian Region in 2002, which are almost at the same positions comparing to current situation. Only the Moravia-Silesian Region was replaced by the Ústí Region.

It was already mentioned that simple number of existing VMAs could not express the actual intensity of intermunicipal cooperation. More variables should be taken into account as offers e.g. compound indicator of intermunicipal cooperation intensity. The indicator was firstly formed in 2002 (see Kutáček, Šelešovský, 2003, p. 150). It considers also area of the region and number of inhabitants, not only simple number of VMAs in individual regions. The mentioned variables (area of the region and number of inhabitants) were chosen because they best describe the size of the region. And they are also used for tax-sharing purposes.

By indicator usage we can evaluate quite precisely intensity of VMAs activities in a region. The equation (1) states the smaller the value  $(k_i)$ , the more intensive cooperation can be found in the region. We conducted comparison with the year 2002 similarly to the simple number. The results in 2002 showed that the South Moravian Region had the lowest number followed by the Olomouc Region and the Region Vysočina. The situation thirteen years later looks alike. The most intensive inter-municipal cooperation was in the South Moravian Region followed by the Pardubice Region and Hradec Králové Region. The poorest results were in the Karlovy Vary Region, the South Bohemian Region and the Moravian-Silesian Region in 2002. Year 2015 showed similar list – the Ústí Region, the Moravian-Silesian Region and the Karlovy Vary Region.

2002 (as at 15.11.2002) 2015 (as at 31.12.2015)	Number of VMAs 2002 (y <sub>i</sub> )	Number of VMAs 2015 (y <sub>i</sub> )	Number of VMAs/number of municipalities 2002 ( (X <sub>ai</sub> /y <sub>i</sub> )	Number of VMAs/number of municipalities 2015 ( (X <sub>ai</sub> /y <sub>i</sub> )	Compound indicator of intermunicipal cooperation intensity 2002 (k <sub>i</sub> )	Compound indicator of intermunicipal cooperation intensity 2015 (k <sub>i</sub> )	Change in indicator between years 2002 and 2015
Southern Moravia Region	85	129	7.6	5.2	4.9	4.8	-0.1
The Pardubice Region	42	56	10.8	8.1	6.1	5.9	-0.2
Hradec Králové Region	37	52	12.1	8.6	7.0	6.4	-0.6
The Olomouc Region	49	52	8.0	7.7	5.2	6.6	1.4
Vysočina Region	65	65	11.2	10.8	5.7	6.9	1.2
Zlín Region	30	40	10.0	7.7	7.0	6.9	-0.1
Central Bohemia Region	101	111	11.4	10.3	6.2	7.3	1.1
Liberec Region	26	26	8.3	8.3	5.9	7.7	1.8
The Pilsen Region	47	46	10.7	10.9	6.5	8.2	1.7
South Bohemian Region	31	55	20.1	11.3	12.2	8.3	-3.9
Karlovy Vary Region	9	15	14.7	8.8	12.4	9.5	-2.9
Moravian-Silesian Region	26	39	11.6	7.7	11.7	10.0	-1.7
The Ústní Region	29	32	12.2	11.1	9.2	10.3	1.1
Total/Average	577	718	11.4	8.7	7.7	7.0	-0.7

Table 2: Compound indicator of inter-municipal cooperation intensity

Source: Kutáček, Šelešovský (2003, p. 147), CSO (2017), MF ČR (2017).

## **5** Conclusions

The paper was focused on monitoring inter-municipal cooperation and its intensity in the Czech Republic, specifically in the form of voluntary municipal associations. Their simple number would hardly explain the quality of their cooperation and that is why we used compound indicator of inter-municipal cooperation intensity. The data showed more intensive cooperation nowadays than in the year 2002.

Our recommendation for the current situation is to specify the obligation to report changes of data concerning voluntary municipal association to the regional offices, which administer register of associations. Under current conditions registers may contain incorrect data, making it difficult to analyze. It would also be beneficial to unify the appearance of individual registers held by regional authorities. The information in the registers differs in the details and forms of publication (from simply putting the list via xls file to the database with sort-order and search options or a combination of the mentioned).

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# The Medium-term Financial Sustainability of the Czech public Health Insurance System

# Jakub Haas<sup>\*</sup> – Anita Golovkova<sup>\*\*</sup>

**Abstract.** This paper deals with the forecast of the Czech public health insurance system in the period of 2018-2020. In recent years, the expenditures on healthcare have been exploding very quickly. The strong growth of the Czech economy has provided sufficient resources for covering of the expenditures rally. The authors strive to answer the question, what will happen if the economy swings to the recession. Two alternative scenarios are constructed to project two types of an economic slump. The paper quantifies the risk for the state budget in the range of 10-40 bill. CZK and indicates the risk of delays in payments to health care providers. Both risks could be mitigated by immediate increasing the reserve ratio of the health insurance companies. **Keywords:** Czech public health insurance, financial sustainability **JEL Classification:** H51, I13

## **1** Introduction

"The problem of sustainability presents itself as an accounting problem, where health system revenue is insufficient to meet health system obligations." (Thomson, Foubister, Mossialos., p. xiv). When talking about sustainability of public finance, a discussion usually focuses on long-term view in connection with demographical changes (i.e.OECD). This affects mainly social systems, including public health insurance system. However, we can not omit a medium-term sustainability which is determined by other factors than demographic changes. The purpose of this paper is to point out the risks of current unsustainable trends of financing the Czech public health insurance system in the mid-term period and quantify potential impact on the reserves of the health insurance companies and the state budget. Unsustainability is demonstrated by the projection of possible economic recessions in the three-year horizon. Projected recessions have the same parameters as the real 2009 and 2012-2013 recession in the Czech republic.

The paper is divided into five parts. In the following chapter, we describe the development of the system in recent years to understand where the current trends came from. The next chapter is devoted to the construction of baseline projection and two alternative scenarios of economic recession. Then, the results of the models are discussed and implications for policy-makers are formulated. In the end, the conclusion is added to highlight the most important findings.

## **2** Public health insurance system in recent years

Table 1 shows the basic parameters of the Czech public health insurance system during 2004-2017, provided by the Ministry of Finance which collects and elaborates data reported by the health insurance companies. Dataset represents most comprehensive and stable source of information on the Czech public health insurance system and includes the subsidy from the state budget that accounts for approximately one quarter of the overall revenues. The 2017 year parameters are based on the plans of the health insurance companies. The period of 2014-2017 is determined by expansive reimbursement decree, although the year 2016 brings the surprisingly lower rate of growth of expenditures on healthcare. In 2014 and 2015, the compensation for abolished out-of-pocket fees took place as the singular influence of expenditures.

On the contrary, regular influence is the effort of the government to assure promised increasing in the salaries and wages in the segment of bed-care. This effort is mostly visible in 2017 (increase wages by 10 %) and it is going to continue in 2018. Apart from that, rather restrictive reimbursement decrees were applied in order to deal with financial resources shortage during a mild but long recession.

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Year	2004	2005	2006	2007	2008	2009	2010
Revenues in mil. CZK	157,053	168,881	182,833	202,808	211,360	212,199	215,615
Expenditures in mil. CZK	156,811	168,417	180,011	185,610	200,592	218,630	222,500
Surplus(+)/deficit(-)	242	464	2,822	17,198	10,768	-6,431	-6,885
							2017
Year	2011	2012	2013	2014	2015	2016	plan
Revenues in mil. CZK	220,391	223,631	228,568	241,258	252,586	264,853	276,590
Expenditures in mil. CZK	225,547	230,371	229,905	239,012	252,003	258,999	276,566
Surplus(+)/deficit(-)	-5,156	-6,740	-1,337	2,246	583	5,854	23

 Table 1: Czech public health insurance system (2004-2017)

Source: data sent at the request from the Ministry of Finance of the Czech Republic

Deep crisis in 2009 deteriorated health insurance companies' reserves that were accumulated during the times of previous economic boom. This development is visible in Figure 1."Reserves" are here defined as the whole liquidity of the health insurance companies on the bank accounts, not only sources held in Reserve Funds. They serve as the buffer that can absorb negative shocks without financial intervention from the state budget and without negative impact on quality and access of healthcare. Thus they ensure financial stability of the public health insurance system.

"Reserve Ratio" means the share of "reserves" on the overall expenditures:

$$Reserve \ Ratio = \frac{Reserves}{Expenditures} \ x \ 100 \ \%$$

We include even operational and investment expenditures as their share of overall expenditures is marginal and relatively stable. And what is more, health insurance companies use savings in operational and investment expenditures to subsidy payments to healthcare providers when necessary.



Figure 1: Reserve Ratio of the public health insurance system

Source: data sent at the request from the Ministry of Finance of the Czech Republic

From Figure 1 is also visible that high Reserve Ratio appeared very helpful to sustain the both recession of 2009 and 2011-2012 without increasing subsidy from the state budget. The long period of economic boom in the previous decade was contributed to the reserve accumulation up to nearly 19 % overall expenditures of the system. The following recessions decrease Reserve Ratio by 12 p.b. to approximately 6 %.
## **3** Baseline prognosis and alternative scenarios

For our purposes, we construct two alternative scenarios. The first one simulates the mild but long recession, the second one simulates deep recession similar to the 2009's economic slump and slow recovery. The baseline prognosis data are connected with the Macroeconomic Forecast published by the Ministry of Finance in January 2017.

The input parameters crucial for difference from baseline projection are following: the nominal growth rate of wages and salaries (Ministry of Finance of the Czech Republic, p.37) and the number of unemployment persons. The first dominantly affects the revenues from the public health insurance that generally covered people without income. The second mainly determines the subsidy from the state budget in the short and mid-term period.

The output parameter and result of the alternative scenarios is deficit/surplus defined as the difference between overall revenues and overall expenditures. Deficit/surplus is directly projected to the sum of reserves of the public health insurance system. As each model brings a simplification, all alternative scenarios are based on several assumptions. The common assumptions for both models are:

- Annual growth rate of expenditures is equal to the average of 2016 and 2017 growth rate.
- 2017 growth rate of expenditures and other parameters are taken from the Cabinet approved plans of the public health insurance companies.
- Models are static. It means we assume no reaction on the worsening of revenue situation such as lowering payments to providers of healthcare.
- Public health insurance companies automatically subsidies their Basic Funds by financial sources from other funds when necessary.
- The change in the subsidy from the state budget is only a matter of the change in the number of unemployed and the agreement between the ministers of health and finance. This agreement means that the year-to-year increase in state subsidy will reach circa 3.5 billion CZK in the period of 2018-2020. State budget subsidy is calculated as follows:

State budget subsidy = No. of persons covered x 12 x monthly rate per person

- Monthly rate per person is equal to 969 CZK (2018), 1,018 CZK (2019) and 1,067 (2020).
- The change in the volume of collected public health insurance is equal to the growth rate of volume of wages and salaries for baseline projection.

The Table 2 displays input parameters for each alternative scenario and their comparison with the baseline prognosis. For Alternative Scenario 2, we assume the same increase in the number of persons state budget pays the public health insurance for that occurs in 2009-2011 when the rate of unemployment rapidly grew. The increase for the same parameter of Alternative Scenario 1 was nearly halved.

No. of person (covered state budget subsidy)	2017	2018	2019	2020
Baseline projection	6,010	6,000	6,000	6,000
Alternative Scenario 1	6,010	6,090	6,130	6,110
Alternative Scenario 2	6,010	6,184	6,267	6,269
State budget subsidy in bill. CZK	2017	2018	2019	2020
Baseline projection	66.4	69.8	73.3	76.8
Alternative Scenario 1	66.4	70.8	74.9	78.2
Alternative Scenario 2	66.4	71.9	76.6	80.3
Public health insurance collected in bill. CZK	2017	2018	2019	2020
Baseline projection	207.9	217.3	227.0	236.6
Alternative Scenario 1	207.9	212.3	217.2	225.5
Alternative Scenario 2	207.9	206.9	207.9	213.6

#### Table 2: The Parameters of different scenarios

Source: own projection

The development of the collection of public health insurance revenues was copied from the past experience. For Alternative Scenario 1 the period of 2012-2014 was reproduced in terms of year-to-year changes. For

Alternative Scenario 2 the deep crisis of 2009 was projected and then a slow recovery of 2010-2011 was reproduced.

## **4** Results and implication for financial sustainability

From the assumptions described in the third chapter we calculated projected revenues in Table 2. Now we compare them with projected revenues in order to quantify deficit of the public health insurance system. The results of alternative scenarios and the differences between them and the baseline projection are displayed in Table 3. As the expenditure numbers are the same for all three models the variance in deficits and reserves is caused by the different projection of the revenues.

Parameters/scenario	2017	2018	2019	2020
Overall expenditures in bill. CZK	276,6	289,8	303,7	318,2
Surplus(+)/deficit (-) in bill. CZK	2017	2018	2019	2020
Baseline projection	0,0	0,1	-0,4	-1,9
Alternative Scenario 1	0,0	-3,8	-8,7	-11,6
Alternative Scenario 2	0,0	-8,1	-16,3	-21,4
Reserves in bill. CZK	2017	2018	2019	2020
Baseline projection	20,8	20,9	20,5	18,6
Alternative Scenario 1	20,8	17,0	8,3	-3,3
Alternative Scenario 2	20,8	12,8	-3,5	-24,9

**Table 3: Output parameters of different scenarios** 

Source: own calculations

The impacts on the Reserve Ratio of the public health insurance system are pictured in Figure 2. Even baseline projection indicates the steady fall of Reserve Ratio as the overall expenditures continue to grow. Alternative Scenario 1 leads to exhausting of reserves during the year 2020, Alternative Scenario 2 results in the quick negative progression.



Figure 2: Reserve Ratio projections 2017 - 2020

The negative value of reserves means that debts after deadline occur. They are represented by the delays of payment to the providers of healthcare. These delays might have a negative impact on the quality and access to the healthcare. It would happen that the wages and salaries of doctors, nurses and other workers in the healthcare

Source: own calculations

sector are also delayed. Two impacts that the policymakers strive not to occur. And the stakeholders, especially trade unions and Czech Medical Chamber, usually put press on policymakers in order to raise the state budget subsidy instead of lower the expenditures on healthcare or raise the health insurance rate.

What is important, the increasing subsidy from the state budget because of rising unemployment would not prevent the system from rising deficit. But we want to answer the question what additional amount of the subsidy would avoid delays of payment. The theoretical minimal increase is equal to the amount when Reserve Ratio reaches 0 %. Nevertheless, keeping zero reserves would not be sufficient to deal with fluctuating payments to healthcare providers when revenues are fluctuating too within a month. This requires Reserve Ratio reaches at least 2% austerity level. This level is set according to long term experience with health insurance companies which had problems with cash-flow when debts after deadline occurred. With this assumption, Table 4 displays the needed increase in the subsidy from the state budget and also quantifies potential risk from the state budget that current policy-makers have to bear in mind.

Scenario	2017	2018	2019	2020
Baseline projection	***	***	***	***
Alternative Scenario 1	***	***	***	9.7
Alternative Scenario 2	***	***	9.4	30.3

Table 4	Increase in	the state	hudget	subsidy to	avoid	delaved	navment
Table 4	increase m	the state	Duugei	subsidy to	avoiu	uelayeu	payment

Source: own calculations

Of course, there is always a possibility of lowering the pace of health-related expenditures. Future development needs not to keep growth rate that occurs in recent years. However, the strong pressure from stakeholders, especially trade unions, makes this impossible to realize. This implies much more probable pressure on the state budget to compensate for missing sources of health insurance revenues.

## 5 Conclusion

Our models of alternative scenario indicate the inappropriate current configuration of the Czech public health insurance system from the view of mid-term financial sustainability. The recent high growth rate of healthcare expenditures relies on strong growth of the domestic economy. External negative shock leading to mild recession would lead to a sizeable deficit and a decrease in reserve ratio of health insurance companies. The deeper crisis would eliminate reserves very quickly and lead to undesirable delays of payments to healthcare providers.

Current Reserve Ratio of the public health insurance system is insufficient to sustain negative revenue shock in comparison with the 2008 level, which allowed overcoming economic recessions of 2009 and 2012-13. Economic recovery from 2014 onwards has not been used for adequate restoration of reserves. Instead of that, the rapid growth of expenditures has been progressing and it requires more and more sources, both from the collection of public health insurance revenue and the state budget.

The mild but long recession similar to the slump of 2011-2012 would wind up reserves of public health insurance companies during 2020 and require additional sources of 9,7 bill. CZK. The crisis similar to the one of 2009 would liquidate reserves after two years and require additional sources of 39,7 bill. CZK to avoid payment delays to healthcare providers. When consider unwillingness of policymaker to lower healthcare expenditures it is more likely they would find these additional sources in the state budget.

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# Evaluation of the innovation potential of public service providers – the offer of innovation of public services

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Abstract. The objective of the paper is the evaluation of innovations offered by local public services based on the use of information-communication technologies using the concept of evaluating the innovative potential of the organization. Evaluation of the innovation potential of the executive branch of local government through the concept of a value chain and the diamond model provides us with the answer to the research question: the process of development and implementation of innovative concepts of public services fails for reasons of low motivation and innovation potential of the providers of local public services. The conclusion can therefore be deduced that local governments, concurrent with employee initiative, will monitor the needs of their citizens and implement the mechanisms of innovation of local public services in their own development strategy which will result in innovation of local public services based on the needs of citizens.

**Keywords:** diamond model, innovations, innovative potential, municipality, value chain.

JEL Classification: H11, H43, O31

## **1** Introduction

Many innovations of public services are based on the use of information-communication technologies and such technologies can significantly contribute to the realization of one of the key conditions for successful implementation of innovations in the system of public services which is the direct involvement of a citizen as a consumer of public services in the innovation process of this service (Von Hippel, 2007). A stimulus for innovation is identification with the new idea of not only all those involved externally in the provision of public services, i.e. building social capital, but also from those within the body itself. Failure to adopt innovation of public services, respectively its frequent understanding as "extra work" by public employees themselves, is often behind the failure of such innovation (Coinsidine et al., 2009). From this perspective, it is important to address the innovation potential of public organizations as providers of public services which determines the supply of public services innovation. The paper focuses on evaluation of the innovations offered by public services based on the use of information-communication technologies.

## 2 Theoretical framework

Current evaluation of the innovations on offer of gives priority to the evaluation of the innovation potential of organizations. Research into the characteristics of organizations which have an impact on their innovation potential has been carried out in numerous studies (Burns and Stalker, 1961; Damanpour 1991). There are a large number of studies of the other features of organizations influencing their ability to innovate. A summary of 83 studies published concerning this issue in the period 1980-2003 was attempted by the authors Vincent, Bharadwaj, and Challagalla (2004) using meta-analysis; they defined 15 factors of the innovation capacity of organizations: economic (competitiveness (+) turbulence (+), uniformity (-), urbanization (+), organizational (hierarchy (+), complexity (+), formalization (+) functional coordination (+), specialization (+), demographic (age (+), management education (+), professionalism (+), number of employees (+) and processes (dichotomous evaluation of innovation (-), an inter-sectoral evaluation of innovation (+)).

In the evaluation of the various combinations of the above-mentioned factors, several models evaluating the innovation potential of an organization have been devised: the diamond model (Tidd, Bessant, Pavitt, 2005), the innovation channel model (Hansen and Birkinshaw, 2007), the innovation funnel model (Barber, 2011). The

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diamond model works with five areas of evaluation: strategy, processes, organization, networking and learning (Tidd, Bessant, Pavitt, 2005). Evaluation of each area is represented by the individual axes of the diamond. The greater the area of the pentagon, the higher the organization's innovation capacity (**Figure 9**).

#### Figure 9: Evaluation of the innovation capacity of an organisation – Diamond model



Hansen and Birkinshaw (2007) perceive the process of innovation as a value chain. The process involves three stages: the generation of ideas, development of ideas in the form of innovation and finally, the diffusion of innovation. **Figure 10** shows the three phases of the innovation process along with the identification questions and indicators of the individual phases.

J	G	eneration of ide	as	Developmer innov	nt of ideas - D vation i	Diffusion of nnovation
	Creation within the organization's departments	Inter- departmental cooperation in the organization	Organization's external cooperation	Allocation of funding sources	Initial results	Diffusion of innovations
Questions	Are department staffs the authors of their own creative ideas?	Are creative ideas generated at work within the organization?	Does the organization support acceptance of creative ideas from external sources?	Is the organization effective in creating resources for funding creative ideas?	Is the organization effective in developing creative ideas into new products and/or processes?	Is the organization effective in the dissemination of creative ideas?
Indicators	Number of creative ideas within the department	Number of creative ideas within the organization	Number of creative ideas gained from external sources	Percentage of funded creative ideas to their total number	The percentage of creative ideas that bring economic effect to the number of those funded	The percentage of penetration of the target markets dominated by target consumer groups

Figure 10: The process of innovation as a value chain

Source: Adapted from Hansen a Birkinshaw (2007).

The questionnaire to evaluate the innovation potential of an organization through the value chain (Figure 10) normally contains statements to 2-3 questions from each part of the value chain with possible answers: Disagree = 1 point, Agree = 2 points. They are completed by employees from different departments of the organization. The lower the score the worse the outcome of the evaluation of the innovation potential of the organization. Subsequently, the average from the responses for each part is compiled and the area with the lowest number of points is the one to which the organization should give priority when building their innovation potential (Hansen, Birkinshaw, 2007).

## **3** Methodological framework

The objective of the paper is the evaluation of innovations offered by local public services based on the use of information-communication technologies using the concept of evaluating the innovative potential of the organization. In relation to the fulfilment of the stated objectives, a scientific background in the form of research questions is formulated, the authenticity of which is the subject of the application part of the paper: The development and implementation of innovative concepts of public services fail because of weak innovation potential providers of local public services. In evaluating the innovation potential of providers of local public services which translates into innovations offered by these services, we will use the concept of the diamond model and value chain. The innovative potential of local governments will be assessed in five areas, as identified by the diamond model (**Table 7**), transformation of qualitative data to quantitative, the same as in assessing the value chain concept (agree = 2, disagree = 1).

Field	Criteria
	Development strategy of a municipality
Strategy	Innovation as part of the development strategy of a municipality
	Mechanisms for implementation of development strategy of a municipality
Drogosog	Innovation of local public services
Flocesses	Monitoring the needs of citizens
	Initiating new ideas in providing public services by local government employees
Organisation	Implementation of new ideas in the provision of public services by local government
	employees
Naturalina	The existence of relationships with external organizations; individuals bringing new
Networking	information; exchange experiences; building social capital - public-private-civic mix and co-
	creation in the innovation process
	Education of local government employees
Learning	Learning from own and transferred experience (e.g. from other local government,
	organizations)

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#### Source: Author's own.

The basic methods of scientific research are those of classification analysis, comparison and abstraction in the development of theoretical and methodological framework for dealing with; methods of causal analysis and comparison in the application part, and methods of synthesis and partial induction in drawing conclusions of the research.

The subject of the research is specific innovation projects of local public services which use informationcommunication technologies. Specifically, the projects under the appeal Electronisation of municipality services "eMestá" launched in 2013 to obtain non-repayable grants (hereinafter NPG) in order to provide access to municipal electronic services. The main aim should be the electronisation of those local government services that are genuinely within the competencies of local government.

Data collection methods in the primary research, with respect to the applied evaluation concept of the diamond model, is a structured questionnaire. The questionnaire was distributed to all 32 towns which participated in the appeal Electronisation of municipality services "eMesto" to obtain NPG, however, completed questionnaires we returned from only 25 towns (Bardejov (BE), Humenné (HE), Košice (KE), Levice (LV), Liptovský Mikuláš (LM), Lučenec (LC), Michalovce (MI), Nitra (NR), Nové mesto nad Váhom (NM), Nové Zámky (NZ), Partizánske (PE), Piešťany (PN), Považská Bystrica (PB), Prešov (PO), Ružomberok (RK), Senica (SE), Snina (SV), Spišská Nová Ves (SN), Šaľa (SA), Topoľčany (TO), Trebišov (TV), Trnava (TT), Vranov nad Topľou (VT), Zvolen (ZV) and Žilina (ZA)). Seven of the surveyed towns, despite repeated written, telephone, and even personal requests for the requested information refused to cooperate. Nevertheless, the selected sample can be considered representative. We transcribed the information received through a numeric code following which we statistically processed using statistical methods:

- 3. Chi-square test (tests the representativeness of the selected sample),
- 4. Multiple response analysis and Spearman correlation coefficient (evaluates the innovation potential of the executive branch of local government within the diamond model and innovation offered by local public services based on information-communication technology). For evaluation, we use statistical software IBM SPSS Statistics19; for testing we consider the significance level of 0.1.

## 4 Results and discussion

The analysis of innovation offered by local public services leads to testing the scientific hypothesis of the low innovation potential of providers of local public services, which is one of the reasons for the failure of the creation process and successful implementation of innovations of local public services. The key is the evaluation of the innovative potential of the executive branch of local governments in the following areas: strategy, processes, organization, networking and learning, as identified in the evaluation of the diamond model. Each individual area is provided with statements to which the employees of the assessed organizations express their affirmative or negative arguments. The qualitative features in the form of statements / responses are transformed into quantitative indicators as in the value chain concept: agree / yes = 2, disagree / no = 1. For each question, in the event of a "yes", the local government is permitted an "open" answer with the possibility to give a more detailed description, respectively to provide examples to the issue of local public services where innovation is implemented. These responses are evaluated separately.

We evaluate the innovation potential of 25 from 32 towns involved in the appeal for the electronisation of local public services in the e-Mesto project. The information obtained from the research questionnaire is processed and evaluated by means of multiple response analysis and is based on the responses to questions asked of local governments based on the evaluation concepts of the innovative potential of the organization - value chain and diamond model. **Table 8** clearly illustrates the towns' answers to the questions.

Evaluated field	Question	% of surveyed towns which responded "YES" to this question
Processes	Do you monitor the needs of your citizens?	96.00%
Networking	Has your local government established relations with external organizations and / or individuals who generate new information and exchange of experience?	96.00%
Learning	Has your local government inspired other local government by their successful innovations, innovative techniques and projects?	96.00%
Learning	Are your local government employees continuously educated by trainings, etc.?	92.00%
Organisation	Do your local government employees initiate new ideas in the provision of public services?	84.00%
Organisation	Do your local government employees implement new ideas in the provision of public services?	80.00%
Strategy	Is innovation part of the development of the municipality?	76.00%
Strategy	Does your town have a prepared strategy for the development of the municipality?	72.00%
Processes	Is it possible to state there is existing innovation of local public services in your municipality?	72.00%
Strategy	Are the mechanisms for implementation of the strategy for development of the municipality innovative?	52.00%
	Are you involved in any other project dealing with electronisation?	24.00%
	Did you submit an application for NPG for the project: Electronisation of municipality services "eMestá"?	20.00%

# Table 8: Evaluation of the innovation potential of the executive branch of local government – innovation offered by local public services.

Source: Author's own

The innovative capacity of the individual towns was evaluated by a modification of the diamond model and value chain. Within the framework of the evaluation according to the value chain concept, a town can receive a highest score of 20 points based on their responses if the answer to each question (YES = 2 points) and a lowest score of 10 points for a negative answer to each question (NO = 1 point). The results for evaluation of innovation capacity of municipalities according to their replies to the value chain concept are illustrated in **Graph 1**.

# Graph 1: Evaluation of the innovation capacity from the perspective of the municipalities (value chain concept)



The average number of points achieved in the evaluation of the value chain concept was 17.76 points. The lowest score was achieved by Ružomberok (12 points). The towns with the most points are Bardejov, Humenné, Košice, Liptovský Mikuláš, Lučenec, Nové Zámky, Trebišov, Zvolen and Žilina (20 points).

We evaluated the innovation potential of the towns by means of the diamond model in terms of strategy, processes, organization, networking and learning from the towns' responses to a number of issues in each field. The average gained points from the responses to each area we apply to each of the axes of the diamond model representing the evaluated fields. **Graph 2** illustrates the results of the evaluation of innovation capacity from the perspective of the local governments in the diamond model.

#### Graph 2: Evaluation of innovation capacity from the perspective of the local governments (diamond



-BJ, HE, KE, LV, LM, LC, NM, NZ, TO, TV, ZV, ZA -TT -VT -NR, PB, SE -SV - SN - PN - PO - MI - SA -PE -RK Source: Author's own

The areas of the diamond corresponding to individual towns vary in relation to their innovation potential in the different evaluated areas. The towns with high innovative potential in all evaluated areas include Bardejov, Humenné, Košice, Liptovský Mikuláš, Lučenec, Nové Zámky, Trebišov, Zvolen and Žilina. Towns with a lower evaluated potential in all areas are Nitra, Michalovce, Považská Bystrica, Senica, Partizánske and Ružomberok. The remaining towns achieve differing evaluations in various fields.

The evaluated towns have the largest reserves in the area of strategy. Law no. 309/2014 Coll., amending and supplementing Law no. 539/2008 Coll. on regional development support imposes an obligation to establish a Programme of economic and social development (hereinafter PHSR) of the community (§ 5) that, as a basic strategic document for development may be accompanied by other documents: Concept of development of informatization of local governments, Programme for urban development, Strategy for tourism development. Community plan of social services of the town, Programme for housing development, Programme for waste management, Priority town development and Development plans of the town; however, these documents were presented by only some of the towns. Moreover, innovation as expressed by the local governments in these documents appears sporadically. Towns introduce innovation namely in communicating with citizens (sending information via SMS notification, e-mail or RSS feeds), and the use of renewable energy and waste management. More than 70% of the towns declared that they have a strategy for development and that innovation is a part of it,

however, half of the towns lack the mechanisms for implementing the strategy. The declared efforts to innovate in the interest of development can therefore be considered more or less as a formality.

Insofar as we view the evaluated area "process", as a positive it can be seen that 96% of the towns, according to their response, monitor the needs of their citizens, and more than 70% of this is achieved also thanks to innovations of local public services. Innovation is most often cited by the towns as the electronization of public services, electronic discussion forums for the townspeople, mobile applications through which citizens can draw attention to illegal waste dumps or the poor condition of public spaces, and communicating through Facebook. Monitoring the needs of the citizens takes place through the City Monitoring application, web sites, Facebook, offices of first contact and questionnaires.

The answer to the question of the role played by local government employees in the innovation process is evaluated in the "organisation" area. 80% of the towns claimed that the authors of ideas and innovation and their implementation are their own employees. According to the responses, it is notably innovations in communication with citizens, monitoring of citizens' needs and providing benefits for those members of the population with permanent residency.

According to claims, local government employees of more than 90% of the towns are continuously educated through courses (mainly focused on legislative changes, to increase computer literacy, e-learning courses, etc.). Similarly, according to the claims by more than 90% of the towns and local governments, the same number, as a whole, also learn in that they take on the positive experience of innovation from other local governments, not only from Slovakia but also from abroad, e.g. cross-border projects, conferences and forums.

Local governments not only take on the positive experiences from other local governments, but build cooperation with external organizations and individuals; this is claimed by more than 90% of the towns in the evaluation of the "networking" area. The towns declare the building of partnerships with other municipalities in Slovakia and abroad, regional development agencies, suppliers of information systems, businesses and so on.

Those mentioned claims by the local governments but also sound controversial in relation to the real manifested activities in the form of innovation of local public services by means of electronisation. Only 24% of towns have been involved in projects for electronisation of local public services and only 20% actually launched the project of electronisation, e-Mesto. Three towns - Košice, Nitra and Žilina implemented the project for electronisation of local public services in the e-Mesto appeal in 2015 with support in the form of NPG. Banská Bystrica launched the electronisation of local public services in 2013 using its own resources. The remaining 32 towns, despite the possibility of support through NPG, have not launched the project for electronisation of local public services. Seven of them even refused to give reasons why it happened. The other towns interviewed stated a lack of time for project implementation and failure to comply with Ministry of Finance deadlines, early termination of the project in the design phase due to non-completion of public procurement, or termination of the contract due to the Government Office for NPG for towns with a population over 20,000 as reasons. So, if the towns failed in the specific e-Mesto project for electronisation of local public services, the logical question in relation to their declared effort to upgrade local public services through electronisation is if they have engaged in other projects for electronisation of local public services. The towns of Levice, Nové Mesto nad Váhom, Banská Bystrica, Ružomberok, Senica and Snina are implementing their own projects for electronisation of public services (Electronisation of municipal services Levice, Electronisation of Nové Mesto nad Váhom, Electronisation of municipal services Ružomberok). The towns of Piešťany and Trnava participated in the DATA Centrum project villages and towns. Partizánske uses the iPoint portal system.

Using the Spearman correlation coefficient, we can confirm a moderately strong direct correlation between towns receiving the NPG for the e-Mesto project for electronisation of local public services and engaging in other projects, their own project or no project at all (p-value 0.017, rs = 0.473). If a town did not receive NPG, it is very probable that they did not implement their own project, respectively it is still in the preparatory phase of a proposal for the electronisation project. The towns of Nové Zámky and Topol'čany are currently in the preparatory phase of the electronisation of public services. Bardejov, Humenné, Liptovský Mikuláš, Lučenec, Michalovce, Prešov, Trebišov, Vranov nad Topl'ou, Spišská Nová Ves, Šal'a and Zvolen stated that they have not as yet continued with electronization.

## 5 Conclusion

Evaluation of the innovation potential of the executive branch of local government through the concept of a value chain and the diamond model provides us with the answer to the research question: the process of development and implementation of innovative concepts of public services fails for reasons of low motivation and innovation potential of the providers of local public services. The next question is which components of the innovation potential impact on the offer of innovation of local public services using information-communication technologies.

There is a strong correlation between the implemented mechanisms utilised in innovation within the framework of the strategy of development of municipalities and existing innovations in the provision of local public services (p-value 0.000, respectively 0.003; rs = 0.871, respectively 0.637). Innovations allow the local governments to more intensively monitor their citizens' needs and adapt to these needs by the nature of innovation and the course of the innovation process (p-value 0.083; rs = 0.361). The nature of innovation, in addition to the needs of citizens, is determined by the success of innovation processes in other municipalities (p-value 0.083; rs = 0.361). Initiating elements in the innovation process of local public services are local government employees (0.003; rs 0.637), whose inspiration is once again found in already successfully implemented innovation in local public services of other municipalities in Slovakia and abroad. The conclusion can therefore be deduced that local governments, concurrent with employee initiative, will monitor the needs of their citizens and implement the mechanisms of innovation of local public services in their own development strategy which will result in innovation of local public services based on the needs of citizens (p-values of 0.074, 0.003, 0.013, respectively 0.053; rs = 0.389; 0.637; 0.511, respectively 0.400).

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# Time-varying Effects of Public Debt on the Financial and Banking Development in the Central and Eastern Europe

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**Abstract.** In this paper we investigate the time varying effects of domestic public debts on the financial development, private credit and banking performance in the countries of the Central Eastern Europe, Balkan and Baltics region. By analyzing the empirical relationships among indicators and ratios of financial development and banking performance, we test their time-varying responses to changes in public debt through the described transmission channels. The econometric results suggest that the growth of public debt has negative impact on private credit over the short-midterm horizon. This might imply the crowding-out effect of public debt on private credit in the region. The growth of public debt positively impacts the banking sector efficiency only over the short-term period, while we observe only minor time effects in responses to changes in public debt on the financial stability and access indicators.

Keywords: sovereign debt, private credit, financial development, Central Eastern Europe

JEL Classification: B22

#### **1** Introduction

In theory, domestic public debt can bring many benefits to the countries. It plays an important role for growth and raising funds for long-term development projects and supports financial systems in credit intermediation and during crisis periods. In contrast, excessive public debt can have long-term negative consequences. As a result of the previous global financial and economic crises, recent government deficit and debt ratios skyrocketed in many countries and represent potential threat to financial stability, especially in the low interest rate environment. Even though the effects of the public debt on financial development and economic growth have been widely explored, the empirical studies show rather mixed results across geographies and with different responses in long and short run. In our paper we investigate the effects of public debt on the financial development and performance of banking sector in the Central Eastern European (CEE) countries. The other subject of our interest is an examination of time-varying effects of domestic public debt on the financial development of the countries. We contribute to the existing literature in two ways. Firstly, we focus specifically on the economies and banking sector of the CEE, the Balkan and Baltics region and secondly we analyze the magnitude of effects over the long and short term horizons.

The rest of this article is organized as follows. In Sections 2 and 3 we present the topic and brief review of the existing empirical literature. Section 4 describes the data and the econometric methodology. The empirical results and our conclusions are presented in Section 5 and 6 respectively.

## 2 Literature review

Public spending plays an important role in supporting economic growth and is a key variable in influencing of the sustainability of financial development and public finance (Izák 2011a). The government is an important intermediator in the allocation of capital and resources in the economy. The easiness in access to financial sources for private businesses improves their financial stability (Jakubík and Teplý 2011) and contributes to higher stability of the financial sector as whole (Teplý and Tripe 2015, Raudeliuniene, Stadnik and Kindaryte 2016). Public debt shocks have positive and persistent influence on economic activity (Guerini et al. 2017). Their empirical study of the U.S. economic data further suggests that in contrast, rising private debt has a milder positive impact on GDP. The analysis of the possible transmission mechanisms reveals that public debt "crowds in" and facilitates private consumption and investment in the US. Respectively, the development of local financial markets facilitates domestic public debt and may lower the cost of government borrowing (Ilgün 2016), thus impacting the financial systems positively.

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On contrary, the growth of the government debt raises concerns about the "crowding-out" effect, when the public debt reduces the credit supply to private sector. Emran and Farazi (2009), Ayadi et al. (2015), Ilgün (2016) find empirical evidences supporting the negative effects of government borrowing on private credit in developing countries. Ismihan and Ozkan (2012) suggest that in countries where credit to government makes up a major share of the total bank lending, public debt is likely to harm financial development, with unfavorable implications for economic activity. Their results show a potential contractionary effect of fiscal expansions especially in countries with limited financial depth and financial development, for example in case of developing countries. Azzimonti and Francisco (2012) investigated the casual relation between government borrowing and financial liberalization. The evidence obtained in their study indicates that government debt increases when financial markets become internationally integrated. Since the government is an important contributor to the financing of the small and medium enterprises (SME) segment in less developed countries, Janda and Zetek (2013, 2015) point out that the growing government debt might decrease the supply of SME's funding sources on the market and in general impacts negatively price of financing, either due to the supply-demand consideration or because of higher country risks.

By studying the relation between public debt and financial development, Kutivadze (2011) finds a positive correlation between the development of the domestic debt market and financial development. The results of the analysis provide strong evidence which supports the key role of the financial development on the development of the domestic debt market. In contrast, Altayligil and Akkay (2013) find a negative relationship between domestic indebtedness and financial development in the Turkish economy. The impact of public debt on the banking sector performance was explored by Hauner (2008; 2009). His results indicate that the banking sector which primary lends to the public sector tend to grow more slowly. The public debt raises the profitability of the banking sector and reduces the efficiency of banks in developing countries in the short-run. In advanced economies, there appears to be no impact on profitability but a positive one on efficiency.

Most studies agree that the level of a country's economic development and the nature of the government debt are important factors among others to be evaluated. Moreover, the size and the composition of the government debt have important direct and indirect effects on the financial sector. However, the direction and its time-varying nature of impacts are ambiguous and scarcely an issue addressed in the related literature. The short and long-run effects of relationship between the public debt and the aggregate output were by Gómez-Puig et al. (2015) based on the sample of the 10 EU countries. The empirical findings indicate a negative effect of public debt on output in the long-run. But they admit the possibility of a positive effect in the short run depending on the characteristics of the country and of the final allocation of public debt. Afonso and Jalles (2017) also point on the fiscal sustainability as a time-varying reality. They find that the time-varying coefficients of fiscal sustainability increase with the share of foreign currency debt, the share of longer-term debt, the share of debt held by the central bank, and the share of marketable debt.

#### **3** Domestic public debt and financial system

It is widely believed that the financial development and stability of the countries' economies can be effected by public debt through several channels. From macroeconomic view, a fiscal tightening may have a negative impact on the credit supply. It may hinder the output and the capacity of the businesses and households to borrow from banks and as a consequence, the volume of private debt may decrease (Andrés et al. 2016).

On a microeconomic level, public debt might affect private debt through liquidity and risk channels (Klinger and Teplý 2014; Altavilla et al. 2016). The liquidity channel works through the exposure of banks to risky governmental bonds. A large investment of domestic banks in their own government also known as "home bias" amplifies the link between banks and the sovereign. Although in such situation it is possible for the banks to reduce the borrowing costs and provide liquidity during times of stress, but it could create incentives for countries to postpone fiscal adjustments until the stock of debt reaches very high levels (IMF 2015). The countries with high home bias tend to experience the debt distress at higher levels of debt than countries with low home bias. Furthermore, banks' exposure to sovereign debt potentially reinforces the negative feedback loop between weak public finances and financial instability in a country (Stádník 2013; Acharya et al. 2014; IMF 2016).

The other channel is the risk transmission channel. It refers to the risks existing in concentration of large sovereign exposures, primarily governmental bonds that could lead to large balance sheet losses and potentially to shortage in funding and liquidity. This situation might create a precautionary motive for banks to deleverage their balance sheet and thus it will reduce credit supply to private firms and households. Most of the studies indicate that the financial sector and governmental debt are closely related. When vulnerabilities build up in the banking sector, for example in form of a high leverage or financial distress, markets expect eventual government bailouts (Šútorová and Teplý 2014a). It might have a pass-through or contagion effects on the banks holding significant sovereign exposure due to the increase in sovereign risk premiums. In such situation, usually the banking

supervision authority steps in with tighter regulatory measures, for example to increase the liquidity buffer, capital or lower bank leverage, which reduces the private credit as a consequence (Šútorová and Teplý 2014b; Altavilla et al. 2016; IMF 2016).

The globalization effect and the overall development of financial markets intensifies the international transmission of financial shocks. The strength and speed of contagions in such terms can vary over the time and largely depends on how liquid are the financial markets (Fungácová and Jakubík 2012; Stádník 2014) and how cross-sectionally they are correlated (Ilgün 2016). Furthermore, the empirical study by Afonso and Jalles (2017) reveals that the composition and characteristics of the sovereign debt do have various time effects. The financial system of countries becomes more sustainable if they contract a higher share of long-term public debt and if it is held by the central banks or if it is easily marketable. These facts motivate us to examine further the time-varying effects of the public debt with focus on the Central Eastern Europe.

## 4 Data and methodology

In order to analyze the effects of domestic public debt on the financial development of the banking sector in the CEE countries, we apply the conceptual framework developed by the World Bank. It provides a comprehensive means to benchmark various aspects of the financial development of the economies. The four main areas that characterize a well-functioning financial system are: financial depth, access, efficiency and stability. These categories are represented by the set of corresponding proxy variables which are applied in our empirical analysis. In our analysis we use the World Bank's Global Financial Development Database that provides a detailed set of historical macroeconomic country data. Van Dijk Bankscope data is used for evaluating the economic performance of the banking sector. Our dataset consists of historical ratios for the period from 1995 to 2014 from a sample of the 26 countries of the Central Easter Europe, the Balkan and the Baltic regions. The summary of variables for the regression model is provided in Table 1.

Variables	Obs	Mean	Std	Min	Max
Private debt to GDP (%)	520	35.40	25.81	1.17	135.96
Credit provided by domestic banks to government and state owned enterprises to GDP (%)	520	8.29	8.20	0.02	48.57
Average return on assets (%)	520	1.74	3.76	-51.54	20.69
Bank credit to bank deposits (%)	520	125.72	178.44	8.64	2861.07
Liquid assets to deposits and short term funding (%)	520	39.44	16.73	6.01	101.41
Bank deposits to GDP (%)	520	32.81	21.35	1.94	100.20
Consumer price index (2010=100, average)	520	76.90	32.36	0.43	325.36
GDP per capita (log)	520	8.39	1.06	5.83	10.63
Banking crisis dummy (1=banking crisis, 0=none)	520	0.14	0.35	0	1

**Table 9: Summary statistics** 

Source: Global Financial Development Database June 2016; Bankscope; IMF; World Bank; own calculations

The subject of our interest is domestic public debt that is measured by the ratio of credit provided by domestic commercial banks to government and state owned enterprises to GDP. In the first step, we identify the time lags of the independent variable "public debt" in equation (1). This procedure enables us to assess the strength of sensitivity and responsiveness of the public debt over time in relation to the financial system represented by variable private credit. These results serve as an input for the more comprehensive analysis that incorporates the time-varying components in the regression model in equation (2). In equation (1) we apply the finite distributed lag model (Wooldridge 2008) as below:

$$Y_t = \alpha + \delta Y_{t-1} + \beta_0 X_t + \beta_1 X_{t-1} + \beta_n X_{t-s} + \varepsilon_t \tag{1}$$

where  $Y_t$  denotes private debt as a main indicator of the financial development with most impact on the banking sector.  $X_t$  is a variable of public debt and s is the number of lag years (maximum 5 years). The coefficients are depicted in Figure 2. The most impact of public debts on the financial system we observe only for the CEE region with time lags over a two years period (as coefficients show the statistical significance with P-values <0.05, denoted as \*\*). The R-square (0.80) and F test (0.000) prove the significance of the results explained by the

regression model set up. For EU countries, the time effect of public debt on private credit is obviously not so strong visible within the 5 year horizon (coefficients are small and statistically significant only in a few cases).



Figure 2: A lag distribution of the impact of public debt on the private credit

Source: World Bank's Global Financial Development Database and own calculations

The results for the CEE region are notable because the parameter  $\beta_t < 0$  for the lag *t-1* and *t-2* points to the short term crowding-out effect on private credit by government borrowing similarly indicated by Emran and Farazi (2009). Noting the results of the equation (1), we consider the three years lag in the regression model in equation (2) with an additional lag of three years to cover the entire response range. This regression model identifies the growth of the level of financial development as a function of the initial level of financial development and other time-variant explanatory variables. The econometric model is similar to (Ayadi et al. 2015) and can be defined as follows:

$$\frac{Y_{i,t}}{Y_{i,t-s}} - 1 = \alpha_0 + \delta Y_{i,t-s} + \beta_n X_{i,t-s} + \varepsilon_{i,t}$$

$$\tag{2}$$

where *Y* is one of the financial development indicators according to the World Bank definitions: a) the depth measurement refers to the private debt that is denoted by the domestic credit to private sector as a percentage of GDP; b) banking sector efficiency is a ratio of bank return after tax on total assets (ROA); c) the access to financial system and its stability indicator is represented by the ratio of liquid assets to deposits and short term funding in %. Liquidity ratio is a proxy for the pass through channel between sovereign exposure and financial system under assumption of the financial market distribution and liquid financial markets (Stádník 2014, Stádník and Miečinskienė 2015); d) the ratio of total saving deposits in banking system to the GDP refers to the access to the financial system and the country's banking sector development (Janda and Turbat 2013).

X is a vector of control variables and s is the number of lag years. To avoid problems of endogeneity and remove the impact of short-term cyclicality, the model is specified as a growth rate over regression variables for the non-overlapping periods comprised of s+1 year. Our specification uses three-year non-overlapping periods for bank-related variables that serve as a proxy for the analysis of financial development.

Three control variables are included in the regressions in order to avoid possible variable biases. Real GDP per capita is used as a proxy of economic development (Izák 2009; Fungácová and Jakubík 2012). The ratio of total bank credit as a share of total deposits refers to the financial resources provided to the private sector by domestic money banks. We use the consumer price index (CPI) to capture the inflationary impacts on the financial development of economic growth in developing countries. However, the picture can be different for the advanced economies with a lack of economic growth, where the moderate inflation is expected to have generally positive effects. The ratio of the bank deposits to GDP (in %) is applied to measure how accessible the financial systems are to households and corporates. It also indicates the overall development and the size of financial systems in the countries.

The dummy of banking crisis is applied (1=banking crisis, 0=none) for the corresponding years. The banking crisis affects significantly the sovereign debt through the governmental support or bailouts (Janda et al. 2013) and pricing of sovereign risk premiums. In addition, there might be time-invariant fixed effects due to the countries profiles captured in  $\varepsilon_{it}$  and the unknown intercept  $a_o$ . The estimations are based on fixed-effects panel regressions.

Hausman tests show the appropriateness of the fixed-effects model in comparison to the random-effects and pooled OLS regressions.

## **5** Results

The results from the regression model defined in the equation (2) are presented in Table 2 and Table 3. The effects of public debt growth on the financial depth and banking stability are exhibited in Table 2, and the public debt impact on the banking sector efficiency and access to financial system in Table 3. In each Table, the columns I, II, III and IV indicate the results of the regression model without or with time lags in the explanatory variables. In column I (t=0), both dependent and explanatory variables are regressed without any time lag for the illustrative and comparison purposes. In columns II (t-1), III (t-2) and IV (t-3) the explanatory variables are time-lagged up from one to three years respectively in order to reflect the magnitude of the time-varying effects. The robust p - values and the t -statistics for individual significance are indicated in both Tables.

Our findings suggest that the growth of public debt has negative impact on private credit over the time period from two to three years. These results could support the evidences of 'crowding-out' effect of public debt on private credit, similarly noted by Emran and Farazi (2009) and Ayadi et al. (2015). The coefficients of bank credit to government are negative and statistically significant at the 5% level (p value <0.05) in the regression models (II, III and IV) with time lags on variables up to the three years.

As for the variables of banking efficiency (ROA), our study shows that the growth of public debt impacts the banking sector performance and efficiency positively, but only for the short term period of one to two years in the CEE region. The coefficients are positive and statistically significant in the models (II and III). In contrast, Hauner (2008) suggests that the public sector borrowing from the domestic banking system increases the profitability but reduces the efficiency of banks in developing countries. The differences of the regions in terms of institutional and economic factors could give an explanation of the origin of such deviations in banking efficiency. Another reason could be that the countries are at different stages of financial and banking development.

The banking stability and financial system access indicators measured by the liquidity ratio and the ratio of bank deposits to GDP respectively are not evidently influenced by changes in public debt over the examined time horizon. The regression coefficients of the explanatory variable "public debt" for both ratios are only in a few cases statistically significant (II) that indicates rather only minor time effects in response to changes in public debt. Obviously, more specific and sophisticated analysis will be required to capture the closer links and to confirm the strength of the risk and liquidity transmission channels in the financial system of the CEE region. As expected, the dummies of banking crisis are negatively related to the banking performance and financial stability indicators.

## 6 Conclusions

In this article we investigated the time-varying impacts of domestic public debts on the financial development, private credit and banking performance in the countries of the Central Eastern Europe, Balkan and Baltics region over the period 1995 to 2014. We tested the time varying effects of public debt on financial system and banking sector performance focusing on main financial development areas according to the conceptual framework of the World Bank i.e. financial depth, access, efficiency and stability. Our econometric results suggest that the growth of public debt has negative impact on private credit over the short-midterm horizon in case of the CEE, the Balkan and the Baltics countries. On opposite, we do not find clear evidences of it for all EU countries. Our findings could imply possible crowding-out effects of public debt on supply of private credit in the CEE region. The growth of public debt positively impacts the banking sector efficiency only for a short-term period. We do not observe a strong response to changes in public debt over the studied period for the banking stability and financial system access indicators represented by the liquidity ratio and the bank deposits to GDP ratio. This motivates us to develop further the methodological approach to the empirical analysis of responses for the liquidity and risk channels.

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	Growth of private debt (%)					Bank deposits to GDP (%)				
Variables	Ι	II	III	IV	Ι	II	III	IV		
	( <b>t=0</b> )	( <b>t-1</b> )	( <b>t-2</b> )	( <b>t-3</b> )	( <b>t=0</b> )	( <b>t-1</b> )	( <b>t-2</b> )	( <b>t-3</b> )		
Public debt to CDP (%)	-0.001	-0.007*	-0.014*	-0.009*	-0.006	0.014	0.001	0.001		
Tublic debt to GDT (%)	(-0.25)	(-2.76)	(-2.71)	(-1.99)	(-1.17)	(1.04)	(0.75)	(0.85)		
Lag of dependent variable	0.020*	-0.005*	-0.008*	-0.017*	-0.097*	-0.523*	-0.910*	-1.037*		
	(-12.58)	(-5.86)	(-5.49)	(-8.43)	(-6.07)	(-1.33)	(-2.38)	(-2.27)		
Private debt to GDP	-0.019*	-0.005*	-0.008*	-0.017*	0.009*	-0.001*	-0.004*	-0.003*		
	(19.97)	(-1.68)	(0.007)	(-1.06)	(5.21)	(-2.31)	(-4.64)	(-4.41)		
Consumer price index	-0.001	-0.002	-0.002	-0.002	0.001*	-0.001	-0.001	-0.001		
(2010=100, average)	(0.60)	(-1.68)	(-1.27)	(-1.06)	(3.74)	(-1.69)	(-1.65)	(-0.99)		
GDP per capita (log)	0.032	0.192*	0.191*	0.165*	-0.682*	0.002*	0.003*	0.002*		
	(0.66)	(3.76)	(2.69)	(2.11)	(-5.43)	(2.11)	(2.84)	(2.76)		
Bank deposits to GDP (%)	-0.001	-0.001	-0.008*	-0.006	-0.012*	0.014	0.017	0.001		
	(-0.48)	(-0.12)	(-3.14)	(-1.57)	(-3.73)	(0.61)	(0.8)	(0.03)		
Banking crisis dummy	-0.028	-0.029	-0.058	0.041	0.079	0.010	0.028	0.027*		
(1=banking crisis, 0=none)	(-1.00)	(-0.79)	(-1.02)	(0.58)	(1.11)	(0.51)	(1.27)	(1.25)		
_cons	0.427	0.364	-0.679	-0.176	-0.979	-0.100	-0.093	0.028		
	(1.14)	(1.58)	(-1.26)	(-0.29)	(-5.79)	(-0.58)	(-0.59)	(0.2)		
Observations	520	520	520	520	520	520	520.	520		
F test	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000		
R-sq	0.29	0.21	0.24	0.34	0.40	0.33	0.43	0.48		

Table 2: Public debt effect on financial system depth and banking stability

Table 3: Public debts effect on the banking sector efficiency and stability

	Average return on assets (%)				Liquid as	sets to depo funding	sits and she g (%)	ort term
Variables	Ι	п	III	IV	Ι	II	III	IV
	(t=0)	( <b>t-1</b> )	( <b>t-2</b> )	( <b>t-3</b> )	( <b>t=0</b> )	( <b>t-1</b> )	( <b>t-2</b> )	( <b>t-3</b> )
$\mathbf{D}_{\mathbf{r}}$	0.033	0.008*	0.003*	0.002	0.007	0.006*	0.001	0.002
Public debt to GDP (%)	(1.06)	(3.19)	(2.23)	(0.97)	(0.06)	(1.9)	(0.4)	(0.97)
Lag of dependent variable	-2.845*	-1.103*	-1.077*	-1.007*	-0.472*	-0.014*	-0.012*	-0.008*
	(-7.83)	(-24.54)	(-23.85)	(-22.15)	(-14.13)	(-11.5)	(-9.89)	(-7.3)
Private debt to GDP (lag)	-0.088*	-0.000	-0.000	-0.000	-0.089*	-0.001	-0.001	-0.001
	(-0.84)	(-0.42)	(-0.86)	(-0.31)	(-2.41)	(-0.72)	(-1.03)	(-0.31)
Consumer price index	0.030	-0.001	-0.001	0.000	0.009	-0.001	-0.001*	0.001
(2010=100, average)	(0.48)	(-0.67)	(-1.53)	(0.74)	(0.41)	(-1.26)	(-2.27)	(0.74)
GDP per capita (log)	-0.593	0.001	0.002	0.001	-6.378*	-0.005*	-0.002	-0.092*
	(-0.08)	(-0.33)	(1.33)	(0.92)	(-2.51)	(-2.76)	(-0.89)	(-3.09)
Bank deposits to GDP (%)	-0.133	-0.029	-0.044	-0.092*	-0.254*	-0.059	-0.050	0.001
	(-0.71)	(-0.75)	(-1.32)	(-3.09)	(-3.96)	(-1.13)	(-1.14)	(0.92)
Banking crisis dummy (1=banking crisis, 0=none)	-1.955	-0.090*	-0.085*	-0.081*	0.008*	0.018	0.016	0.081*
	(-0.46)	(-2.59)	(-2.5)	(-2.42)	(2.07)	(0.41)	(0.36)	(2.42)
_cons	12.611	0.221	0.348	0.677*	12.356*	1.249*	1.091*	0.676*
	(0.22)	(0.73)	(1.38)	(3.01)	(4.09)	(3.03)	(3.12)	(3.01)
Observations	520	520	520	520	520	520	520	520
F test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-sq	0.50	0.48	0.50	0.51	0.43	0.53	0.52	0.47

Source: Global Financial Development Database; World Bank; IMF; Bankscope; own calculations. \* denotes p - values below <0.05 In parentheses, we show the t –statistics.

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# Sustainability of Regional Government Debt in Czech Republic

#### Milan Jílek\*

**Abstract.** Analysis of debt sustainability at the level of subnational government is not very frequent, however, it gained importance with the increased concern about government debt sustainability in the wake of the recent economic crisis. The aim of the paper is to test the sustainability of regional government debt in Czech Republic. Czech regional governments have been established in the year 2000, thus having rather short history of operation. Nevertheless, their rising debt is a source of concern. The analysis concludes that the level of debt ratio is low, however it is rapidly rising. The unit root tests suggest that the non-stationarity cannot be ruled out for debt ratio of regional governments and that the debt variable cannot be considered as mean reverting. This conclusion in further supported by the result of the dynamic panel regression analysis, where the lagged debt ratio coefficient has a negative sign and is statistically significant in two specifications. Therefore, it is unlikely that the debt sustainability condition postulated by Bohn (1998) is met by Czech regional government budgetary behavior.

**Keywords:** regional government debt, government debt sustainability, fiscal reaction function,

JEL Classification: E62, H74

## **1** Introduction

The fiscal policy issue of responsiveness to increasing government debt and cyclical macroeconomic development is frequently discussed in economic literature. There is an abundant literature providing theoretical background (for example Alesina & Tabellini, 1990; Eslava, 2011) and empirical knowledge about the patterns on fiscal behavior of governments. Typically, the fiscal reaction function concept is used, following the influential work by Bohn (1998). Fiscal reaction functions relate the performance of fiscal policy, usually measured by primary balances, to public debt and other variables controlling for macroeconomics conditions. Bohn used the fiscal reaction function to set condition for fiscal sustainability postulating that a positive and significant debt coefficient is a sufficient precondition to meet the intertemporal budget constraint. He found direct evidence for corrective actions by examining the response of the primary budget balances of US government to changes in the debt to GDP ratio. The primary balances were found to be an increasing function of the debt to GDP ratio for the period 1916 to 1995. While the univariate regression of primary balances on debt failed to find a significant correlation, more sophisticated equation for primary balances motivated by Barro (1979) tax-smoothing model showed a significant conditional impact of debt on primary balances. Therefore, the debt to GDP ratio should possess the mean reverting property.

Fiscal reaction functions have been frequently used at the central or general government levels. The empirical approach to fiscal reaction function can follow two distinct paths. First is the estimation of government-specific fiscal reaction function. This approach can be recommended in case of long time series availability. Second approach is the estimation of fiscal reaction function using panel data, which is the inevitable choice when the available time series are rather short. The usual empirically tested baseline scenario includes lagged government debt levels and output gap. These studies frequently provide evidence that government meet the fiscal sustainability condition. To find more detailed view of fiscal behavior, sets of economic, institutional and political variables are employed (Afonso, 2008; Ayuso-i-Casals, Deroose, Flores, & Moulin, 2009; Pikhart, Pfeifer, & Chmelová, 2015; Plodt & Reicher, 2015).

Analysis of debt sustainability at the level of subnational government have been less frequent, however, it gained importance with the increased concern about government debt sustainability in the wake of the recent economic crisis. Brothaler (2015) used data panel of Austrian municipalities and tested municipal budgetary policies using an adapted version Bohn's (1998) sustainability test and found significant and sufficient reaction of primary balances on lagged debt.

The aim of this paper is to test the sustainability of regional government debt in Czech Republic. Czech regional governments have been established in the year 2000, thus having rather short history of operation. Nevertheless,

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their rising debt, albeit being still relatively low, is a source of concern. This concern has recently materialized in the adoption of the new Act of the Rules of Budget Responsibility, covering also the regional and municipal government levels. There is a continuing discussion whether the new act is needed or not. This paper brings some economics based argumentation to this discussion.

## 2 Regional Government Debt in Czech Republic – stylized facts

The relative size of Czech regional government budgets revenue is approximately 3.5 % of GDP and 9 % of general government revenue. Czech regional governments are primarily financed by transfers from central government (approximately 60 % of revenue) and by tax sharing arrangement (approximately 30 % of revenue). There are no regional autonomous taxes in the revenue mix and the overall revenue autonomy is thus very low. The expenditure side of the budget can be characterized by prevailingly current expenditure, encompassing almost 90 % of total revenue.

The regional governments started to issue debt, prevailingly in the form of medium term bank credits, in 2001 (figure 1). Up to the present, there were no bonds emitted by Czech regional governments. The average rate of growth of the share of regional government debt, due to the zero starting position, was explosive until 2006, however the index declined and oscillates near the value 1 since 2010 (figure 2). The mean debt ratio (medium and long term bank loans in percent of gross regional product) kept rising, after a small correction in 2010, with high dynamics until 2014, reaching the level 0.8 %. The level is not particularly high, but the dynamics is a source of concern. The mean primary balance to gross regional product ratio, after the period of moderate surpluses between 2002 and 2005, showed almost regular switching of surpluses and deficits until 2014.





Source: Author's calculation, Ministry of Finance of Czech Republic, Monitor, ARIS, ÚFIS, Czech Statistical Office

The figure 3 shows the individual time series of medium and long term bank loans of regional governments in percent of gross regional product. There are differences among regions, starting from Plzensky kraj with negligible debt ratio, to Olomoucky kraj with more than 2 % debt ratio. Nevertheless, the general tendency of debt ratio growth seems to be similar across regions.

Figure 12: The rate of growth of regional government bank loans and of general government debt



Source: Ministry of Finance of Czech Republic, Monitor, ARIS, ÚFIS





## 3 Empirical Approach and Model

The object of the analysis are regional governments in Czech Republic. Prague, being capital and region at the same time, is excluded from the analysis due to its specificities. Altogether, all 13 regions are included in time series from 2001 to 2015, creating a balanced data panel<sup>\*</sup>. While a similar size of panels (time series of 15 years and 13 cross-sections) are frequently used for fiscal reaction function at the international level, the case of Czech regional governments is specific due to the fact, that there is no budgetary history of regions before the year 2001. Fiscal data are collected from the Monitor, ARIS and UFIS databases of Czech Ministry of Finance, whereas data for explanatory variables originate in Czech Statistical Office regional databases.

The first step in the analysis is to test for the stationarity of the debt and of the primary balances series. Two hypotheses are tested. First, the null hypothesis assumes a common unit root process for cross sections, second null hypothesis assumes individual unit root processes. If the null hypothesis of non-stationarity is rejected, the variable is I(0). This might have important economic interpretation, especially in case of debt ratio. Stationary time series of debt ratio can be interpreted as mean reverting and therefore sustainable.

The second component of the analysis uses the principles of the already mentioned model of Bohn (1998), posing question whether and how governments react to the accumulation of debt by taking corrective measures. In principle, the suggested empirical model assumes the causal relationship between the lagged debt (d) and the primary balance (pb) of regional government i, while controlling for additional economic, political and demographic variables (vector X). Because dynamic panel data model is used, the lagged dependent variable is included. The hypothesis tested is that the government reacts to the increase of debt by increasing the primary balance, therefore the value of regression coefficient is positive.

$pb_{i,t} = \gamma pb_{i,t-1} + \beta d_{i,t-1} + AX_{i,t} +$	$\alpha_{i+}\lambda_t + \lambda_t$	E <sub>i,t</sub>	(1)
for $i = 1,, N$ and $t = 1,, T$ where	$pb_{i,t}$		primary balance,
	$\alpha_i$		unobserved individual effect,
	$\lambda_t$		unobserved time effect,
	$d_{i,t-1}$		debt
	$X_{i,t}$		vector of economic, political and demographic variables
	ε <sub>i,t</sub>		error (idiosyncratic) term with $E(\varepsilon_{i,t} = 0)$ , and
			$E(\varepsilon_{i,t}\varepsilon_{j,s}) = \sigma_{\varepsilon}^2$ , if $j = i$ and $t = s$ , and $E(\varepsilon_{i,t}\varepsilon_{j,s}) = 0$
			otherwise.

The variables in the model are described and economically justified in the Table 1.

Primary balance of regional government	pb <sub>it</sub>	Dependent variable, indicator of budgetary
<i>i</i> at time <i>t</i>	r oje	performance and of sustainability of budgetary
(% of gross regional product)		policy.
Debt of regional government <i>i</i> at time <i>t</i>	$d_{i,t-1}$	Explanatory variable. Based on Bohn (1998), a
(% of gross regional product)	-,	positive regression coefficient is necessary for
		the fiscal sustainability. Because there have been
		no regional government bond emissions, the debt
		is defined as medium and long term bank loans.
Unemployment rate	$ur_{i,t-1}$	The unemployment rate is used to control for
(% of total population)		cyclical component of government balance. Data
		on gross regional product gap are not available.
		Positive coefficient indicates a pro-cyclical
		behavior.
Population	$POP_t$	Higher populated regions might use scale
(natural log)		economies compared to lower populated regions.
-		In that case, a positive coefficient is expected.

Table 10: Dependent and explanatory variables in the model

<sup>\*</sup> Jihomoravský kraj, Jihočeský kraj, Karlovarský kraj, Kraj Vysočina, Královehradecký kraj, Liberecký kraj, Moravskoslezský kraj, Olomoucký kraj, Pardubický kraj, Plzeňský kraj, Středočeský kraj, Zlínský kraj, Ústecký kraj

Share of urban population	$urb_t$	The share of urban population can in principle
(percent of total population)		influence both, the revenue and the expenditure
		side of budget. In the case of Czech regional
		governments, however, due to the prevalence of
		transfer revenue, one can expect more impact on
		expenditure side. The expected sign of
		coefficient is questionable, depending on
		prevailing economies of scope resulting from
		concentrating the urban population, or prevailing
		of agglomeration cost.
Pre-election year	PRE	Controls for a political budgetary cycle of an
(1 for pre-election year, 0 otherwise)		opportunistic nature.
Election year	ELEC	Controls for a political budgetary cycle of an
(1 for election year, 0 otherwise)		opportunistic nature.

#### Source: author.

Two step Panel Generalized Method of Moments estimator is used in order to correct for endogeneity of explanatory variables and region-specific heterogeneity (Arellano & Bover, 1995; Blundell & Bond, 1998). The two-step estimation uses orthogonal deviations transformation and one lag with robust standard errors consistent to panel specific heteroscedasticity and autocorrelation. J-test for over-identifying restrictions provides the probability value for null hypothesis of joint validity of the instruments. Higher probability value suggests that the instruments are exogenous and not correlated with the error term.

The model is estimated in several specifications. The baseline specification (1) includes lagged dependent variable (primary balance, pb), lagged debt (d) and lagged unemployment rate. Later, the specification it is extended by including pre-election or election year dummy variable (*PRE, ELEC*), size of population (*POP*) and share of urban population (*urb*).

#### 4 **Results**

The table 2 reviews the results of a range of the panel stationarity tests with two basic specifications of the estimations, one with an individual intercept, and second with both, an intercept and a trend. The results of the panel unit root tests show mixed result for the debt ratio and stationarity of the primary balance ratio. For the debt ratio unit root test with an intercept, the null hypothesis of non-stationarity cannot be rejected (all tests). The same applies for the PP-Fisher Chi-square test and the Breitung t-stat with an intercept and with a trend. Therefore, the non-stationarity of the debt ratio cannot be ruled out. The primary balance ratio tends to be stationary and thus mean reverting, since it is possible to reject the null hypothesis of non-stationarity with most test (p<0,01), with the exception of Breitung t-stat with an intercept and a trend. The mean value of primary balance to gross regional product was -0,005 %, or -23,9 mil. CZK in total.

Variable	(	1 <sub>i,t</sub>	pb	i,t
Equation:	intercept	intercept	intercept	intercept
		and trend		and trend
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t	0.686	-2.739***	-7.17397***	-7.432***
Breitung t-stat		0.022		-3.235
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	3.442	-1.341**	-5.350***	-4.266***
ADF - Fisher Chi-square	6.838	35.588**	76.571***	63.707***
PP - Fisher Chi-square	5.653	27.790	97.833***	93.139***
Source: author's calculation. P-value: *** p<0.01, ** p<0.05, * p<0.1.				

Table 11: Panel unit root tests in levels of regional government debt and primary balance

Source. aution scaleuration. 1 -value. 1 - p<0.01, 1 - p<0.05, 1 - p<0.1.

The table 3 summarizes results of estimation of dynamic panel regression for primary balances of regional governments. The coefficient for lagged debt ratio has negative sign and is statistically significant in two specifications. In two specifications the coefficient is consistently negative, but not statistically significant. This results suggest, that the Bohn condition for sustainability are not likely to be met. The coefficient for the unemployment rate is statistically significant in three specifications and it has the positive sign as expected in all specifications, suggesting a pro-cyclicality of the budgetary behavior of regional governments. The pre-election

year dummy variable is significant with, surprisingly, positive coefficients. Thus in years prior to regional government elections the regional governments tend to run higher budget balances.

Specification	(1)	(2)	(3)	(4)
pb <sub>t-1</sub>	-0.063	-0,109	-0,077	-0,463
	(-0,923)	(-0,903)	(-0,506)	(-0,631)
d <sub>t-1</sub>	-0.067*	-0.096*	-0.039	-0.202
	(-1.944)	(-1.755)	(-0.779)	(-0.938)
ur <sub>t-1</sub>	0.077***	0.064***	0.106***	0.044
	(5.311)	(3.082)	(4.544)	(0.624)
PRE		0.024***		0.029
		(2.714)		(0.847)
urbt			0.062	-0.071
			(1.343)	(-0.391)
J-stat p-value	0.251	0.217	0.276	0.507

 Table 12: Estimation results for primary balance

Source: author's calculation. Estimation method: Panel Generalized Method of Moments, Transformation: Orthogonal Deviations, sample (adjusted): 2003 2014, periods included: 12, cross-sections included: 13, total panel (balanced) observations: 156, white period instrument weighting matrix, white period standard errors & covariance (d.f. corrected), instrumented for lagged primary balance, t-statistics in brackets. P-value: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Specifications with POP and ELEC not reported (insignificant coefficients)

## **5** Conclusions

The aim of the paper was to test the sustainability of regional government debt in Czech Republic. The analysis have found that the level of debt ratio is low, however rapidly rising. The unit root tests suggest that the non-stationarity cannot be ruled out for debt ratio of regional governments and that the debt variable cannot be considered as mean reverting. This conclusion in further supported by the estimation results of the dynamic panel data regression model, where the lagged debt ratio coefficient has the negative sign and is statistically significant in two specifications. Even though the estimation results might suffer from short length of data panel, it is unlikely that the debt sustainability condition postulated by Bohn (1998) is met by Czech regional government budgetary behavior.

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# Value at Risk calculated with a-stable distribution for Czech stock market index PX

#### Jiří Málek\*, Quang Van Tran\*\*

Abstract. In this paper we calculate two value at risk measures VaR and CVaR (conditional VaR) for returns of a hypothetical portfolio mimicking behavior of the Czech stock market index PX. We assume that the logarithmic returns of daily Czech stock index PX from January 2000 to March 2017 follow an  $\alpha$ - stable distribution whose parameters need to be estimated from data. They are used to calculate VaR and CVaR of the returns of index PX. These calculated VaR and CVaR values are then compared to the corresponding values computed when the distributions are assumed to be normal and empirical. The results shown that the VaR when returns are alpha stable distributed is always the smallest one and these differences increase with the decreasing probability levels of p and above all the results are particularly essential in the case of calculated CVaR values.

**Keywords:** stable distribution, VaR, CVaR, parameter estimation, fat tails **JEL Classification**: G10, G120 **AMS Classification**: 91B82, 91B28

## **1** Introduction

It is well known that the unconditional distribution of losses on equities and many other assets returns displays, relative to the normal distribution fat tails, a high peak and often it is skewed. As the normal distribution is unable to capture these facts, many alternatives have been proposed. The  $\alpha$ -stable distribution is thought to be a generalization of the normal distribution where this generalization allows a greater concentration of returns close to the mean as well as the existence of more extreme values and possible skewness. The distribution depends on four parameters with clear financial interpretation. These properties of alpha stable distribution have a direct impact on value at risk measures and can substantially change their magnitudes compared to those calculated with alternative distributions. In this article we want to quantify these differences and for this purpose we use the Czech stock market index PX as an asset portfolio whose returns are alpha stably distributed. The data of index PX for this task is its daily values from January 2000 to March 2017. We use the data to compute parameters of alpha stable distribution and subsequently determine values at risk quantities for the case when returns are theoretically distributed in that way as well as for empirical and normal distribution. The paper is organized as follows: after the introductory section, Section 2 recalls the main definitions and properties of the  $\alpha$ - stable distribution and the interpretation of parameters. In section 3, we briefly show the basics of Maximum Likelihood Estimation method for estimating α- stable distribution parameters. Section 4 presents VaR and CVaR definition with discussion on their coherence as a risk measure. The results are given in section 5 and their interpretation and conclusions are presented in the final section 6.

## **2** Definition of the α-stable distribution

Let  $X, X_1, X_2, X_3, ..., X_n$ ... are independent and identically distributed (i.i.d) random variables. A random variable X is said to have the  $\alpha$ -stable distributions if there is for any  $n \ge 2$  a positive number  $c_n$  and a real number  $d_n$  such that

$$X_1 + X_2 + \dots + X_n \stackrel{d}{=} c_n X + d_n \tag{1}$$

This expression means that any sum of i.i.d. random variables have the same distribution except for the "mean" and "variance". There is no general form of the probability density function (pdf), we know only the general form of the characteristic function:

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$$\Phi(t) = \exp\left\{-\sigma^{\alpha} |t|^{\alpha} \left(1 - i\beta \operatorname{sgn}(t) \tan \frac{\pi \alpha}{2}\right) + i\mu t\right\} \quad \text{for } \alpha \neq 1$$
  
$$\Phi(t) = \exp\left\{-\sigma^{\alpha} |t| \left(1 - i\beta \frac{2}{\pi} \operatorname{sgn}(t) \log |t|\right) + i\mu t\right\} \quad \text{for } \alpha = 1$$
(2)

where

- $\alpha$  ...tail power (tail index), as  $\alpha$  decreases tail thickness increases,
- $\beta$ ...skewness parameter, determines asymmetry, a positive  $\beta$  indicates that right tail is further than left one and vice versa,  $\beta = 0$  corresponding to a symmetric distribution,
- $\mu$ ...location parameter, corresponding to mean value for  $\alpha > 0$ ,
- $\sigma$ ...scale parameter, generalized standard deviation, for  $\alpha = 2$  corresponding to a standard deviation of normal distribution.

## **3** Maximum Likelihood Estimation of parameters

According to Borak, Hardle and Weron (2005), after substitution  $\zeta = -\beta \tan \frac{\pi \alpha}{2}$  the density of standard  $\alpha$  – stable random variable ( $\mu$ =0,  $\sigma$ =1) for  $\alpha \neq 1$  can be expressed as: for  $x > \zeta$ :

$$f(x;\alpha,\beta) = \frac{\alpha(x-\zeta)^{\frac{1}{\alpha-1}}}{\pi|\alpha-1|} \int_{-\xi}^{\frac{\pi}{2}} V(\theta;\alpha,\beta) \exp\left(-(x-\zeta)^{\alpha/\alpha-1} V(\theta;\alpha,\beta)\right) d\theta,$$

for  $x = \zeta$ :

$$f(x;\alpha,\beta) = \frac{\Gamma\left(1+\frac{1}{\alpha}\right)\cos\xi}{\pi(1+\zeta^2)^{\frac{1}{2\alpha}}}$$

and for  $x < \zeta$ :

$$f(x;\alpha,\beta) = f(-x;\alpha,-\beta)$$

where

$$V(\theta; \alpha, \beta) = (\cos \alpha \xi)^{\frac{1}{\alpha - 1}} \left(\frac{\cos \theta}{\sin \alpha (\xi + \theta)}\right)^{\alpha/\alpha - 1} \frac{\cos[\alpha \xi (\alpha - 1)\theta]}{\cos \theta}$$
$$\xi = \frac{1}{\alpha} \arctan(-\zeta)$$

In MLE we have to find from observation data  $x_i$  a maximum of the likelihood function

$$\ln \mathbf{L} = \sum_{i=1}^{n} \log f(z_i; \alpha, \beta, \delta, \mu),$$

with respect to parameters  $\alpha, \beta, \delta, \mu$ , where  $z_i = \frac{x_i - \mu}{\delta}$ . These parameters are then obtained through some numerical algorithm. Though there are several alternatives that allows to estimate parameters of alpha stable distribution computationally less extensively (Borak et al., 2005, Málek and Tran, 2015), this computational simplicity is achieved at the expense of the precision of estimates. Therefore, MLE technique is always the method of choice for this purpose.

## **4** Value at Risk and Conditional Value at Risk

Value at Risk (VaR) is a simple risk measure issued by financial institutions to evaluate the market risk exposure of their trading portfolios. The main characteristic of VaR is that it synthesizes possible losses which could occur with a given probability in a given time horizon into a single value. We can simply and intuitively define VaR at p% level as follows:

#### Probability[Loss $\geq$ VaR]=*p*.

This feature allows a non-expert investor to figure out how risky his position is and allow him to correct his investment strategies. The problem is that the normal distribution is often used as an approximation of the empirical one. However, many empirical studies show that the empirical distributions diverge from the normal one. In particular, it has been observed that the profit/loss distributions tend to be asymmetric and display fat tails. So the VaR calculated under the normal assumption underestimates the actual risk since the distribution of the observed financial series are leptokurtic compared to those exhibited according to a normal distribution.

But Var is not a comprehensive risk measure. Artzner et al. (1999) showed that in general VaR does not have all the desirable coherent properties for a risk measure and in particular it may not have the sub-additive property in some applications<sup>\*</sup>. Having the sub-additive property is essential to showing benefit from diversification which is fundamental to capital and risk management in finance.

Coherence for a risk measure can be defined by the following four axioms. Given a risk measure  $\rho$  and loss random variables X the risk measure is coherent if it satisfies the following axioms

1. Translational invariance: for a loss variable *X* and all real *a*,  $\rho(X + a) = \rho(X) + a$ 

2. Positive homogeneity: for  $\lambda \ge 0$ ,  $\rho(\lambda X) = \lambda \rho(X)$ 

3. Monotonicity: for a loss variables  $X_1 > X_2$  (loss variable  $X_1$  is always greater then  $X_2$ )  $\Rightarrow \rho(X_1) > (X_2)$ 

4. Subaditivity:  $\rho(X_1 + X_2) \le \rho(X_1) + \rho(X_2)$ 

It is true that for years the class of coherent risk measures were unnoticed and VaR advantages as its simplicity, wide applicability, universality, led many practitioners to think that coherence might be some sort of optional property that a risk measure can or cannot display. It seemed that coherent measures belonged to some ideal world which real world practical risk measures can only dream of. (according Emmer et al. 2013).

On the other hand, it is well-known that the VaR risk measure is coherent for the independent normal random variables and in particular it is sub-additive for this class of distribution. The same applies for  $\alpha$ -stable distributions with  $1 \le \alpha \le 2$ ...

Whether VaR is subadditive it depends on the properties of the joint loss distribution. Emmers at al. (2013) present three standard cases:

1. The random variables are independent and identically distributed (iid) as well as positively regularly varying.

- 2. The random variables have an elliptical distribution.
- 3. The random variables have an Archimedean survival dependence structure<sup>†</sup>

But no corresponding definitive resolution can be made about a generalization of the sub-additive property in the case when the dependences are included. Nevertheless we mention two recent studies: a new numerical algorithm introduced by Embrechts and co-authors (2013) that provides bounds of VaR of aggregated risks, and a study by Kratz (2013) on the evaluation of VaR of aggregated heavy tailed risks.

Conditional VaR (CVaR) or also called Expected shortfall is defined as the expected loss given that the VaR threshold has been exceeded

$$E\{L|L \le VaR\}.$$

CVaR is the coherent risk measure and has been widely accepted as a measure that is conceptually superior to Value-at-Risk. The Basel Committee on Banking Supervision also recommends replacing VaR by CVaR in internal market risk models. At the same time, however, it has been criticised for issues relating to backtesting.

<sup>\*</sup> In general, nonexistence sub-additive property could lead to the fact that banks will distribute a large portfolio for smaller ones in order to save the economic and regulatory capital

<sup>&</sup>lt;sup>†</sup>See Emmer et al. (2013) for definitions.

In particular, CVaR has been found not to be elicitable which means that backtesting for CVaR is less straightforward than backtesting for VaR.

## 5 Results

The data used for this analysis are the daily Czech stock market index PX from 1.1 2000 to 24. 2. 2017. The original data series has been transformed into logarithmic differences series and they are the so called logarithmic returns of index PX. The descriptive statistics of the original series and the return series are shown in Table 1.

	Original index	Index returns
Mean	982,21	0,000159
Median	1443,9	0,009866
Modus	407,7	0
Minimum	320,1	-0,16185
Maximum	1936,1	0,12364
Standard Deviation	371,4	0,014076
Skewness	0,34267	-0,46632
Kurtosis	2,6504	15,424
Observation	4305	4304

Tab 1. Descriptive Statistics of original and transformed data

First we use the data to estimate the values of four parameters of alpha stable distribution by MLE method described shortly in section 3 above. The estimation results are displayed in Table 2. The estimated values of alpha stable distribution are used to generate the probability density function of the corresponding distribution. In Figure 1 the pdf of alpha stable distribution as well as the empirical pdf and the pdf of the normal distribution with the mean and the standard deviation listed in Table 1 are plotted in the left panel. In the right panel of Figure 1, the left tail of these distributions are zoomed out to show how they differ.

	Alpha	Beta	Sigma	Mu
Value	1,6842	-0,17415	0,0075	6,76E-05
S.E.	0,0181	0,5071	0,0011	0,0764
z-stat	92,9614	-0,3434	6,6010	0,0009
p-value	0	0,7313	0	0,9993

Tab 2: Estimated values of parameters of alpha stable distribution of index PX returns

The estimated values of alpha stable distribution are also used to generate its theoretical cumulative distribution function. Then VaR and CVaR at 5%, 1%, 0.1% level for the empirical (historical), normal and stable distributions. The results are shown in Tables 3 and 4.

Tab 3: Calculated Values at Risk
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2	Distribution		
р	Historical	Normal	Alpha Stable
0,05	-0,0212	-0,0230	-0,0204
0,01	-0,0405	-0,0326	-0,0427
0,001	-0.0840	-0,0433	-0,1000

#### Tab 4: Calculated Conditional Values at Risk

n	Distribution		
р	Historical	Normal	Alpha Stable
0,05	-0,0334	-0,0289	-0,0407
0,01	-0,0580	-0,0374	-0,0954
0,001	-0,1207	-0,0472	-0,4800

#### Figure 1: Comparison of the three pdf



#### 6 Conclusion

The results show that the distribution of returns PX index differs significantly from the normal distribution. The value of parameter  $\alpha = 1.68$  with small standard error which is remarkably (and statistically significant) lower than 2 confirming the fat tail character of index PX return distribution. The value of parameter  $\beta = -0.17$  which indicates a slight negative skewness (though statistically insignificant). In Figure 1 a significant kurtosis comparison with a normal distribution can be observed. The VaR at 5% extracted from the normal, stable and empirical distribution assumption are very close to each other. However, VaR at 5% of returns stably distributed is the smallest one. Differences, however, increase at VaR coresponding to 1% and 0.1% level. For p = 0.1%, the VaR more than doubled in comparison with the normal distribution. For CVaR we can already observe significant differences at 5%. CVaR of the stable distribution is nearly twice smaller than the normal distribution. This difference gradually increases, and for p = 0.1% CVaR for stable distribution is about ten times smaller than in the empirical distribution. It is expected that the differences would be increased with decreasing *p*.

The comparison of VaR and CVaR is very interesting. They are very close for all levels (5%, 1%, 0.1%) for the empirical and the normal distributions. For the stable distribution distribution, CVaR is roughly two times smaller at 5% and 1%, and it is almost five times smaller at 0.1%. This means that if the recommendation of BIS accepting CVaR as a risk measure is adopted, it could lead to a substantial increase in the need for economic and regulatory capital if the stable distribution is used as an aproximatio for the distribution of return.

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# Prepaid Schemes in Czech Health Care System

#### Jan Mertl\*

**Abstract.** We see that no single recommendation for the private health financing schemes' configuration can be given based on comparative review of recent literature. The aim of this paper is to show the possibilities of using prepaid schemes of health financing as an extension of universal health care system. It is based on the approach that those schemes should provide voluntary extension and increase individual utility while not discriminating by initial health status of a client. They are not viewed as a total replacement for other schemes of private expenditure (co-payments, private insurance, etc.), rather as a significant option useful for a number of scenarios that are not currently resolved well in Czechia. It works with a hypothesis that the absence of such scheme's recognition in health policy is one of the factors that limits the possible increase of private health expenditure in Czechia that is macroeconomically feasible. **Keywords:** health insurance, universal health care system, prepaid schemes **JEL Classification:** I13, H20, H51

#### **1** Introduction

Since the transition to market economy in 1990s, there has been extensive discussion about the public and private health expenditure level in Czechia. This is strongly connected with the comparison of the universal (compulsory) part and individual (voluntary) part of the system and health care that is available in each of them (Durdisová & Mertl, 2013). There has been repeatedly stated, that health care system should undergo a more fundamental reform in sense of bigger individual responsibility and satisfying individual utility through private expenditure, but the results have been very limited (Kotherová, Malý, Nemec, & Pavlík, 2015). Moreover in health care, those trends have their systemic limitation (Arrow, 1963), (Mooney, 1992) and with the exception of the United States, Korea and Israel there is no developed country in OECD that allocates for health care less than 2/3 of health expenditure publicly; the majority of them has more than 3/4 of health expenditure publicly financed (see also Figure 1 further).

Simultaneously a number of fragmented voluntary private health expenditure schemes exist in OECD (Sagan & Thomson, 2016). Some of them utilize a principle of private health insurance (usually long-term or even lifelong like in Germany), utilize non-profit principle (like in France "mutuelles") and their role in the system is determined also by historic, institutional and cultural preferences in a nation. A principle of health savings account or medical savings account has been tried in a number of health systems worldwide as a part or option in the universal part of the system, e.g. in USA (Baicker, Dow, & Wolfson, 2006) or Singapore (Medisave). The issues with these schemes in universal part include limited options for patient and public policy when the individual account gets empty for some reason, problems when people get older and the health expenditure curve goes up and the situation of sick and poor people who cannot accumulate enough resources for the needed care at all (Hanvoravongchai, 2002).

We see that no single valid recommendation for the private schemes' configuration can be given based on comparative review of recent literature. So it makes sense to research further possibilities or adjustments of private health expenditure schemes, built on the experience we got from different countries and trying to minimize their disadvantages within the Czech environment.

The aim of this paper is to show the possibilities of using prepaid schemes of health financing as an extension of universal health care system. It is based on the approach that those schemes should provide voluntary extension and increase individual utility while not discriminating by initial health status of a client. We do not see them as a total replacement for other schemes of private expenditure (co-payments, private insurance, etc.), rather as a significant option useful for a number of scenarios that are not currently resolved well in Czechia. We also work with a hypothesis that the absence of such scheme's recognition in health policy is one of the factors that limits the possible slight increase of private health expenditure in Czechia that is macroeconomically feasible.

The scientific methods used include macroeconomic analysis of health financing, SWOT analysis of prepaid health financing schemes, comparative approach about the universal and voluntary part of healthcare and synthesis of the position of prepaid schemes in the health system.

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### 2 Public and private financing of health care systems

The following Figure 1 shows the level of public (compulsory) and inversely the level of private (voluntary) expenditures in selected OECD countries. Figure 1 shows that over 15 years, with the exception of the Netherlands, Switzerland, and Turkey, this share remained relatively stable and the fluctuations were within 10 percentage points, e.g. one tenth of the health budget. In addition, it shows that Czechia 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 year 2000 being nearly 90 percent, so the trend can be characterized as slightly decreasing the role of public (compulsory and solidarity-based) financing.





■2000 ■2005 ■2010 ■2015



Source: (OECD, 2016). 2015 OECD Estimation.

■2000 ■2005 ■2010 **■**2015

If we compare the overall expenditure for health care relatively to the GDP (Figure 2), Czechia ranks within the countries to those with smaller share of total health expenditure to the general economic performance measured by GDP -7.7 % GDP in 2014 (OECD, 2016).\*

By the way, the significant differences between countries (e.g. Czechia vs the Netherlands -10,9 % vs USA -16,6 % in 2014) support the statement about multifactorial causes of the health expenditure (and system effectiveness) level. Health spending growth has been markedly slower since the global financial crisis, but overall in last 15 years, we can still see moderate growth of them. Despite the recent slowdown in health spending, concerns about the fiscal sustainability of health system remain large (OECD, 2015). 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 more 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 (Hrstková, 2015), which is often cited as a reason to limit public expenditure, statistical data (OECD, 2016) 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 has been 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").

## 3 Relationships of health system's universal and individual part

The universal coverage in Czechia is compulsory and solid. Scientifically, that is one reason why we can discuss private financing schemes on a conference about public finance, because the universal system financed from public resources is in this view a prerequisite for effective private schemes' existence. Actually, this robust universal coverage can be seen as an advantage of Czech health care system rather that its limitation. In the environment where the medicine is rapidly advancing, majority of medical branches can offer treatments that provide additional subjective or comfort benefit to the patient, while keeping elementary "lege artis" principle intact.

Generally we can say, that the more solid and complex is the universal part of the system, the more specific or voluntarily supplemental role have the additional (private) schemes. On the other hand in history a number of charity, non-profit or government subsidized systems tried to, in a very fragmented way, cover the population health needs. But the results have been weaker than the (near) universal approach that it usually finally resulted in (see e.g. the establishment of NHS in Great Britain after World War II). We can thus say, that if we already have well developed universal system (like in Czechia), it is not wise to weaken it significantly, but rather to supplement it where we need to expand it for selected social groups preferences or individual utility satisfaction. It is also not wise to try to cover with private expenditure price inelastic and objectively needed health expenditure of a citizen. Governments should define what services need to be accessible to every citizen without financial barrier (such as all essential "lege artis" care). The boundaries between public and private spending on health are another important factor affecting the fiscal sustainability of health systems. The best way to consider the role of private financing, whilst maintaining universality of population coverage, is to be more specific and selective in defining the basket of services covered by public payment systems (OECD, 2015).

Standard financing tool for private expenditure in health care is the private health insurance, which is based on risk-adjusted premiums and uses common principles of insurance, e.g. reimburses the expenditure that has been paid for the treatment in specified health conditions that are covered by the insurance policy. It is for sure suitable for some scenarios and it is not a purpose of this research paper to criticize its existence or mechanisms. However it has its weaknesses, which highly limit its usage in the universal part of the system, but also to some extent limit its usage in private part of the system. The main problem with private health insurance is the medical underwriting principle, which not only discriminates people according to their current health status, but also requires a principle of pre-existing conditions to be applied, which actually drives out many people according to their or even their family's health history. Also, unlike in other types of insurance (house, injury), the health risk usually changes rapidly, unpredictably and unintentionally while the insurance plan lasts, which can highly limit the possibilities of market choice when a client decides to change the policy later.

From this experience and also previous socioeconomic analysis (Mertl, 2011) thus arises, that private expenditure plays mainly supplemental or complemental role to the public (universal) pillar of health care system and private health insurance is not suitable for a lot of potential clients and real-life scenarios. In Czechia, the

<sup>\*</sup> In the text we use year 2014 data, since for year 2015 (used in graph) only OECD estimation is available.

adoption of the private schemes is limited by a number of factors (low wages level, large universal coverage, and citizen's behavioural strategies) that we cannot attribute directly to health policy. But still there is a room for private schemes that will not have the weaknesses of private health insurance, such as prepaid health schemes.

## **4** Prepaid schemes' characteristics

The principle of prepaid health schemes is pretty simple in pure economic point of view. For a given amount at given period, client receives services of certain value. Their significance for health policy lies in the incentives they provide and position in health system they have. At first, they support free choice of patient, since he can decide how much money he can (backed by universal coverage) annually allocate for his health services. This of course depends on his income, if he is working or retired, etc. Secondly, they overcome the problem of health risk selection by providing the benefits of value equal to the annual payment that the patient has decided.

We can give an example how the prepaid scheme can look like.

Assume that a patient is able to allocate 1 000 CZK for his health services monthly, e.g. 12 000 CZK annually (can be lower amount in practice according to the individual budget limitation or willingness to pay). Therefore he can buy a prepaid scheme for this price.

He then is offered, according to his preference and/or health status, a package of health services that he can consume for that money during a year. It can be offered purely according to his demonstrated preference, or he can get advice from a doctor according to his health status which services he would the most benefit from. When he is still healthy, he will mainly utilize prevention and better lifestyle benefits, such as:

2 000 CZK for services of nutrition advisor

- 4 000 CZK for lifestyle activities and programs (exercise, relaxation)
- 2 000 CZK for better services at general practitioner (email/callback/SMS), additional preventative consultations/screening
- 4 000 CZK for vitamins, vaccination and reimbursement of regulation expenditures if introduced/expanded in universal part of the system

When he is already sick, e.g. has cardiovascular disease, the structure of benefits can change:

3 000 CZK for better services at cardiologist, lower copayments for advanced drugs that he takes regularly 1 000 CZK for vitamins and dietary supplements

2 000 CZK contribution for a home cardio monitoring device

2 000 CZK for better services at general practitioner (email/callback/SMS), regular monitoring of health status 4 000 CZK for lifestyle activities and programs (exercise, relaxation)

It is clear, that the structure of benefits can differ according to the status of the patient and is highly dependent on the creativity of the scheme providers. Thus, it can serve also as the factor of market differentiation and market choice. Theoretically, special prepaid schemes can be created for e.g. dental and eye care.

We can summarize a SWOT analysis of those prepaid schemes in the following table.

Strengths	Opportunities
Synergic effect with universal health coverage, while keeping public and private resources separated	Possibilities of truly voluntary allocation of private resources for health care
Non-discriminatory approach according to the health status of a client	Possibility of individual or group aiming of those schemes, e.g. at young people, employees of certain branches the elderly people
Patient has choice about the character and volume of provided services Lowering transactional costs and increasing economies of scale compared to situation when the patient buys the services individually – creating "health packages"	Options for health providers and health insurance companies to be creative about the content of those packages Transparency for client about the allocation of his resources

#### Table 13: SWOT analysis of prepaid schemes
Weaknesses	Threats		
Construction and consumption of the package might be perceived as not necessary for healthy and not	Those who can utilize it the most (sick/poor) could not afford to buy it		
enough for sick	Some medical branches can offer more into packages		
The amount of resources that individual can allocate	than the others		
might be too low for scheme to be useful	Character of competition and regulation on the market		
Does not cover bigger expenditures nor provides full coverage for listed situations (as insurance does)	Unclear influence on the overall health system effectiveness		
Requires to be backed up by universal system (not			
weakness in Czechia)			

#### Source: own reasoning

From this table it is clear which position those prepaid schemes have. Of course, if they were introduced in the universal part of the system, they would quickly fail, because large social groups would not get suitable coverage and treatment within them.

The role of health insurance companies and health providers is crucial for those prepaid schemes to work. It depends on their creativity and professional level what they can offer to the clients. When they also provide advisory services when choosing those programs, they can tailor the schemes' content to individual needs if desired. Or a client can compare different general offers that he is able to buy for a given amount of money.

Because one of the disadvantages of health savings accounts is the "pressure to save" (Avera, 2017) – e.g. not to consume too much services in order to save money put there – suggested prepaid schemes are not intended to provide saving capabilities. When a person cannot consume all the services that he/she paid for in a given period, he/she can take their money back or can buy a scheme for the next period for those money. Of course, the content of package can differ between periods in case that the client's health status or preferences change.

We can imagine, that existence of these prepaid schemes can in the long run stimulate the development of services that can be included in them as they can mobilize resources for additional health services. This can be a factor of regional development, since the people usually consume those services within their home location, and therefore support employment and overall economic growth.

### **5** Conclusions

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 we can introduce additional more equivalent financial schemes while 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 still be able to cover the necessary care without diminishing its quality or accessibility. Therefore the hypothesis, that slight increase of total health expenditure through introduction of additional private financing schemes is macroeconomically feasible, is true. Maybe we can even suggest, that currently available private schemes do not provide good enough incentives for citizens to spend money for additional health utility, but other factors like the dimensions of universal coverage, wage level and population behaviour regarding health care also play an important role here. Generally we should motivate for additional health expenditure positively by providing better and more individualized health services, not by purposely cutting down the universal standard so that people will feel embarrassed or wrong while utilizing it.

Considering the private expenditure which implies "solidarity and equity 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 (this includes private health insurance and prepaid schemes discussed in this paper). 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. Therefore we always have to be careful with health policy design and always imagine, what care will be available to (a lot of) people, who will not be able to afford any additional health utility and have to rely on what is covered within the universal system.

As a possible alternative to private health insurance, which has strong limitations caused by individual health risk evaluation necessity (medical underwriting), prepaid schemes can be considered. Systemically in the form of health savings accounts they also have disadvantages that become highly prominent if they are not supported by solid universal system – then they quickly fail with poorer or sicker population, or when the clients get older and demand more expensive care. Also it is debatable if the clients should make separate savings for health care and try to economize on their health consumption within their budget limit. But in this paper, we introduced the prepaid schemes as an extension to well-covering universal health care system and without special incentives to save money there, overcoming those disadvantages largely.

Thus, they serve more as market tools for allocating private resources for packages of health services that are then consumed by a client. As seen from SWOT analysis, they have some unique properties that are lower transaction costs and high economies of scale, non-discriminatory approach to the health status of clients and voluntary allocation of money for concrete health services chosen individually with possible medical advice. The content of the packages is crucial, and it could be an indirect proof of whether can the market work in this specified space, which is for sure more suitable for its application than the objectively necessary health care. These prepaid schemes are also more suitable for "health investor" than "health consumer" human behaviour as defined by recent analyses (Chytil, Klesla, & Kosička, 2015).

We have to admit that some attempts to provide such prepaid schemes have been occasionally spotted in Czech health care system already, but they are highly selective, sometimes temporary and usually they are provided by larger hospitals or network of ambulances, thus they are available only to selected patients. Moreover, in the past they were in "quiet conflict" with the legislation preventing the health providers that have a contract with public health insurance companies to offer more paid services for the client (called "Fischerové" paragraph 11/1d of the law No. 48/1997 Col.). So if they should be utilized systemically, it would require their recognition in health policy, by health providers and health insurance company – health provider – patient infrastructure triangle, synergic effects for all the three parties can be expected, while public and private resources can stay separated.

We do not want to pretend that prepaid schemes are a miracle that can resolve the issues of lower private health expenditure share in Czechia. The analysis shows also their weaknesses and threats and for some scenarios other financing schemes can be more appropriate. But we suggest that they should be seriously considered as an option especially in the form of voluntary extension of universal system for specific health packages consumption and financing. There they could help to obtain individual utility in health better than simple fee-for-service or private health insurance approach.

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# Determinants of Fiscal Consolidation Success using Structural Models

# Lucia Mihóková\* – Radovan Dráb\*\* – Monika Harčariková\*\*\*

**Abstract.** The real development show that the number of fiscal consolidations is comprehensive and that performed fiscal adjustments differ among countries. Despite the differences, all consolidations are focused on the fiscal sustainability ensurement. In this context the important issue of consolidation process is its success. The objective of this paper is based on research review in accordance of the EBHC methodology to identify successful consolidation episodes in EU member countries and using a probit and bivariate Heckman selection model to analyse determinants of consolidation's success. Based on the review, carried out in order to identify the successful fiscal episodes, according to two selected criteria, analysis has proven that from altogether 35 successful consolidations were a one-year adjustments preferred and were more successful than gradual consolidation episodes. Using the Heckman bivariate two step selection model the selection bias could be controlled. The paper was developed within the project VEGA 1/0967/15.

**Keywords:** successful fiscal consolidation, consolidation determinants, structural model, bivariate Heckman probit selection model, EU member countries. **JEL Classification: H30, H61, H87** 

### **1** Introduction

The fiscal consolidation, that according to OECD (2011), could be defined as a specific policy focused on the public finance deficit reduction with the goal to stabilize the public debt, has been present in EU countries since 70<sup>th</sup> of 20<sup>th</sup> century. The real development as well as the results of empiric research (Mihóková, Harčariková and Martinková, 2016; Yang, Fidrmuc and Ghosh, 2015; Mirdala, 2013; Hernandez de Cos and Moral-Benito, 2012; Alesina and Ardagna, 2010; etc.) point out that the number of consolidation episodes is comprehensive and that the performed consolidations differ among countries. Despite the differences, in the type and composition of fiscal consolidation, in its size, duration and the determination of the individual components, can be concluded that all consolidations were focused only on one main objective - to reduce the fiscal imbalance in the country and to ensure the fiscal sustainability. In the context of fiscal stability, can be each of the performed consolidations assessed in terms of its success. The success can be assessed by the changes in the level of deficit or debt, changes in indicators that are linked to GDP or it can be connected to the achievement of an economic growth values set (Alesina and Ardagna, 2010). Based on that, the question is, how many of performed fiscal consolidation could be considered as successful and what factors can determine their success. To evaluate fiscal consolidation strategies various approaches can be used. One of those represent the structural models as described by Alesina and Ardagna (2010) or Alesina, Favero, and Giavazzi (2012) analysing post hoc the effects of fiscal adjustments. These are used for policy evaluation and are looking for patterns and composition of fiscal consolidation using regressions to assess their impact. On the other hand, are dynamic general equilibrium models that enable to control for mid and long-term effects of fiscal adjustments using ex ante simulations for example proposed by Smets and Wouters (2003). In this paper's research is focused on the first described structural models approach.

# 2 Research objective, data and methodology

The main objective of the paper is based on the theoretical knowledge and empirical research on the fiscal consolidation success to identify successful consolidation periods in EU member countries and using a probit and bivariate Heckman selection model to analyse relations between selected determinants and the success of consolidation.

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In line with the main objective was the paper divided into two main parts. The first part of the paper was focused on identification and comparison of successful fiscal consolidation. The theoretical aspects of fiscal consolidation success are presented using the review of research performed in accordance EBHC methodology. The empirical approach of the first part concentrates on identification of successful fiscal episodes. The second part of the paper was focused on the analysis of relations between selected determinants and consolidation success using probit and bivariate Heckman probit selection model in EU member countries. Based on the theoretical assumptions about selected determinants' effects was the second part focused to analysis of the statistically significant variables a quantification of the polarity of their impact.

The purpose of the research was to verify, how many of performed fiscal consolidation in EU member countries can be consider as successful and what factors do determine the fiscal consolidation success. In the context of theoretical implication can be the systemization of knowledge from current research in the successful fiscal consolidation determination area considered as an added value of the presented paper and so can serve as an information base for defining, measuring and evaluating the success of fiscal consolidation. In the context of practical implication is the main purpose of the research the identification of statistically significant regressors affecting the success of consolidation using a specific modeling approach.

The main research method used in the paper is analytic-synthetic method. The methodology of the paper's first part is divided into three steps: (i) the collection of secondary scientific resources, processing and systemization, (ii) the creation of research review using EBHS approach and (iii) identification of successful fiscal consolidation episodes. Methodology of the second part consisted from two steps: (j) the summarization of theoretical knowledge about expected effects of selected determinants using scientific research as source and (jj) performance of econometric analysis: model specification, quantification of model's parameters and model verification. In line with the mentioned methodology following general methods were used: in-depth research, analysis, comparison, induction and synthesis. Also mathematical and statistical methods, including graphical and numerical data description were used. As a specific econometric method was the probit and bivariate Heckman probit model used. The source for theoretical knowledge was in the form of scientific articles and research derived from the available full-text scientific databases. Resources for the analytical part of the paper where obtained as the secondary data from the annual data database Ameco, in accordance with the methodology of the ESA 2010.

# 3 Fiscal consolidation success: theoretical aspects and empirical approach

The fiscal consolidation represents a process that is characterized within the theoretical concepts as well as within the empirical research. In line with the theoretical concept many authors and organisations (e.g. Yang, Fidrmuc and Ghosh, 2015; OECD, 2011; European Commission, 2007; Kumar et al., 2007; etc.) define the fiscal consolidation as a specific policy focused on the public finance stabilization through the reduction of initial public finance deficit and accumulated debt, and thus without the negative effects for the economic development growth. Alesina and Ardagna (2010, 2012) identify the fiscal consolidation as a set of fiscal adjustments whose effect is reflected in the medium-term stabilization, respectively reducement in the level of debt to GDP ratio and decrease in the costs associated with high levels of debt in the economy.

The empirical concept of the fiscal consolidation within the structural models concept is justified as characteristics and determination of the so called "fiscal episodes" or "fiscal adjustments". Empirical researches (e.g. Alesina a Ardagna, 2010, 2012; Afonso, 2010; Rother et al., 2010; Barrios et al., 2010; Guichard, 2007; etc.) dealing with the fiscal adjustment characterize the fiscal consolidation as the time-limited episode characterized by a measurable change in the selected indicator. As Mihóková, Harčariková and Martinková (2016) state that differences in fiscal episodes determination between individual researches are present. Differences are mainly in the form of: thresholds (thresholds range from very small improvements to large improvements in the selected indicator), duration of fiscal period (range from one year to three or more years) and measurement units (percentage points, standard deviations or cumulative change or the average value). Based on the research can be concluded that the main reason for the consolidation process is the public finance recovery. The main issue in relation to consolidation is its success. Can be any of the performed consolidation regarded as a successful one? What indicators can be used to determine its "success" and how to set the "success threshold values" of these indicators?

### 3.1 The review of research: successful fiscal consolidation

Similarly, as in the fiscal consolidation definition, the "successful fiscal consolidation" definition can distinguish between the concept of successful consolidation in the theoretical and empirical perspective. While the definition of a fiscal consolidation episode is quite homogenous across existing studies, the successful fiscal consolidation can be gauged in different ways (Alesina and Ardagna, 2010). In accordance with the view of many foreign authors (e.g. Afonso and Jalles, 2011; Alesina and Ardagna 2009, 2010; Barrios et al., 2010; Guichard et al., 2007; etc.)

can be the successful fiscal consolidation considered as those, leading to a reduction in the short-term and longterm fiscal imbalance indicator expressed as GDP ratio to a specified level within the defined time period from the beginning of the consolidation process. As the European Commission (2007) states, the definition of consolidation as a successful one includes three different elements: measurements of fiscal consolidation, reference period of consolidation implementation identification and the criteria for determination of its success or failure.

Based on the theoretical definition can be concluded that the fiscal adjustment can be considered in the context of its success in terms of the achieved deficit or debt level reduction, changes in indicators linked to GDP or in terms of the achievements in a set of economic growth values. The success of consolidation process in terms of the values expression (using the percentage values of nominal thresholds) and time intervals differs among various researches. In order to find the fiscal consolidation success measurement, a systematic review of current theoretical and empirical research in accordance EBHC methodology, specifically in five basic steps (Klugar, 2015), was performed.

The objective of the research review was to identify those researches related to fiscal episodes' determination representing a successful fiscal consolidation period. The overview of the relevant researches was obtained (for the purpose of this paper) by screening the available full-text databases as ScienceDirect database and Google Scholar database. The search was entered with the search criteria: "fiscal consolidation" OR "fiscal episodes" OR "consolidation episodes" OR "fiscal adjustment" OR AND "success" OR "successful consolidation" OR "successful fiscal adjustment" OR "success measurement" OR "measurement of success", included in the title, abstract or as a keyword in the article. Reference list of search studies has furthermore met other specified (inclusion criteria), namely: (1) access to full-text research without payment; (2) studies in English; (3) research content matched the type: article, working paper, chapter or book and (4) the time span of publication 1990-2016. Based on this search strategy were 360 results found in ScienceDirect database and 315 results found in Google Scholar database. Subsequently, any duplicates were removed. Given the diversity of acquired research three research conditions under which it was possible to gradually eliminate individual studies was established: (1) the studies have to deal with the successful fiscal adjustments measurement; and (2) one of the research aim has to be the estimation of a successful periods in countries. Taking into account the conditions relevant studies within structural approach were analysed in three steps: (i) screening the title and abstracts (ii) screening the fulltexts and (iii) critical assessment of research based on the range of theoretical basis, the level of generalization and the origin of research.

The review of the researches has proven that in recent time there were several empirical studies focused on the successful fiscal episodes identification using structural models published. Review of researches pointed out that the basis of many current research represent authors Alesina and Perotti (1995, 1997) and Alesina et al. (1998). These researches consider as successful period of fiscal consolidation, in which the debt-to-GDP ratio in year t+3 is at least 5 percentage points of GDP lower than in year t. Later, other different criteria for successful fiscal consolidation determination were defined. Differences in classification of the fiscal success episodes measurements are presented in Table 1.

Research	Criteria for revealing
	of the successful fiscal episodes
McDermott and Wescott (1996)	(i) a reduction of at least 3 percentage points in the ratio of gross public debt
	to GDP by the second year after the end of the two-year fiscal tightening, (ii)
	the same as (i) except that GDP is replaced by potential GDP, and (iii) a
	reduction of at least 5 percentage points in the debt ratio by the third year after
	the end of the two-year fiscal tightening
von Hagen and Strauch (2001)	a two years after the initial adjustment, the government budget balance stands
	at no less than 75% of the balance in the first year of the consolidation episode
Darby, Muscatelli and Roy (2004)	
Kumar, Leigh and Plekhanov	a year t such the gross debt to GDP ratio in year t+3 is at least 5 % of GDP
(2007)	lower than the level observed immediately prior to fiscal consolidation in year
Guichard et al. (2007)	t
Barrios et al. (2010)	
European Commission (2007)	a year in the three years after the end of the consolidation episode the CAPB
Larch and Turrini (2008)	does not deteriorate by more than 0.75 % of GDP in cumulated terms
	compared to the level recorded in the last year of the consolidation period
Alesina and Ardagna (2009,	if the cumulative reduction of the debt-to-GDP ratio 3 years after the
2010)	beginning of a fiscal adjustment is greater than 4.5 percentage points

Table	14:	Research	dealing	with t	he deter	mination	of succ	essful f	ïscal a	adjustmer	ıt
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Brasoveanu and Brasoveanu (2012)	a year t after the adjustment the deficit remains below 3% of GDP		
Alesina and Ardagna (2012)	if the debt to GDP ratio two years after the end of a fiscal adjustment is lower		
	than the debt to GDP ratio in the last year of the adjustment.		
Arin et a (2011)	(i) in the three years after the attempt, the ratio of the cyclically adjusted		
Kaplanoglu, Rapanos, Bardakas	primary deficit to GDP is on average at least 2 percent of GDP below the		
(2014)	attempt year, (ii) three years after the attempt, the debt-to-GDP ratio is at least		
	5 percent of GDP below the level of the attempt year.		
Agnello, Castro, Jalles and Sousa	a period of fiscal stimulus followed by the cumulative reduction of the debt to		
(2016)	GDP ratio greater (smaller) than 4.5 percentage points over two consecutive		
	years after the beginning of a fiscal stimulus.		
Source: Authors.			

Note: CAPB represents the cyclically adjusted primary balance

#### 3.2 Successful fiscal consolidation episodes: the empirical approach

Successful fiscal episodes were identified during the period of 1995-2015 using annual data according to ESA 2010 from AMECO database. Based on the review, carried out in order to identify the successful fiscal episodes, two rules were applied. The successful fiscal episodes represent a year or time period where two of the following conditions are met:

a year in the three years after the end of the consolidation episode the CAPB does not deteriorate by more than 0.75 % of GDP in cumulated terms compared to the level recorded in the last year of the consolidation period,

a year t where the gross debt to GDP ratio in year t+3 is at least 5 % of GDP lower than the level observed immediately prior to fiscal consolidation in year t.

These criteria were used for the gradual consolidation episodes (GC). In case of, so called, cold shower consolidation (CS) were both of conditions modified to one year intervals. Episodes of gradual consolidation and cold shower consolidation were determined in Mihóková, Harčariková and Martinková (2016), in line with the methodology of European Commission (2007) and Alesina and Ardagna (2010). The results of successful fiscal consolidation episodes' identification are illustrated in Table 2. Countries marked bold represent successful consolidations in specified years.

Year	SCS	SGC	Year	SCS	SGC
1995	-	-	2006	ВЕ, <b>РТ</b>	DE, ES
1996	BG, DE, ES, FR, NL, AT, FI, SE	BE, IE	2007	IE, <b>IT</b> , CY, HU	DE
1997	IT, AT, RO, <b>UK</b>	BE, IE	2008	HU	LV
1998	LT, SK, <b>FI</b> , UK	BE, IE	2009	<b>EE</b> , HU, <b>MT</b>	CZ, LV
1999	LT, <b>HU</b> , MT	-	2010	EL, ES, LT, RO	CZ, LV
2000	DE, IE, FI	-	2011	DE, IE, EL, LV, PL, PT, RO, SK, UK	CZ, AT
2001	BG, AT, SK	-	2012	BG, IE, HR, IT, CY, LT, HU, PL, PT, RO, SI	AT
2002	РТ	-	2013	CZ, <b>DK</b> , IE, ES, CY, <b>NL</b> , <b>SK</b> , UK	HR, AT
2003	IE, HU, SK	DE, NL	2014	DK, EL, SI	HR
2004	CZ, MT	DE, ES, NL	2015	<b>BG</b> , CY, AT, <b>PT</b>	HR, UK
2005	DK, EL, LU, AT	DE, ES, NL	2016	EL	UK

Table 15: Successful fiscal consolidation episodes in EU Member Countries

Source: Authors' calculations according to AMECO.

As Table 2 shows, according to selected criteria, altogether 35 out of all performed consolidations were considered as successful. From the total number of performed cold shower consolidations (84) were 33 identified as successful episodes. And from the total number of the gradual consolidation (12) were the only 2 consolidations identified as the successful. These values have proven that the most of European countries preferred a one-year consolidation or adjustments and that cold shower consolidations were more successful than gradual episodes. The successful consolidations were concentrated in the pre-crisis period 1996-1999, which confirms that strong fiscal efforts have characterised the second half of the 1990s, during the years 2003 and 2004 (in the context of countries' effort for entering the EU) and during the crisis period 2009/2010-2014. All these successful consolidations

contributed to reduction in primary deficit ratio in the EU. In general, these consolidations suggest a trend of strengthening of efforts to increase the fiscal discipline in EU member countries. As the number of consolidations and number of successful episodes suggest, not all of performed consolidation efforts have led to stabilisation of the public finances through the reduction of deficit and public debt. The main question of analysis results is, what factors determined the success of performed consolidations.

### **4** Determinants of fiscal consolidation success

The second part of paper focuses on the analysis of relations between selected determinants and success of consolidation using probit and bivariate Heckman probit selection model within EU member countries. The second part of paper analyses the statistically significant variables and quantifies the polarity of their impact. The endogenous variable of the analysis is a dummy variable – success of consolidation (SoC), which represents the success (1) or failure (0) of a consolidation as defined above. According to Yang, Fidrmuc and Ghosh, (2015) all the years where the successful consolidation took place does the dependent variable take the value of one for each year during an episode of fiscal adjustment not only the starting year of consolidation.

As the first step an application of probit model was carried out with all the proposed exogenous variables, to identify those with the most significant effect on the consolidation success probability. Second step was the Heckman probit two step model used in line with the assumption that factors that determinate the consolidation success determinate the start of consolidation process in the country as well.

The success of the consolidation process is affecting by many determinants, starting with the initial conditions at the start of consolidation, factors that contribute to the duration of consolidation or its intensity. Based on the theoretical and empirical researches (e.g. Yang, Fidrmuc, Ghosh, 2015; Agnello, Castro and Sousa, 2013; Hernandez de Cos and Moral-Benito, 2012; Barrios et al., 2010 or European Commission, 2007; etc.) dealing with the issue of fiscal consolidation and its determinants, were as the object of the paper analysis included several determinants: the initial macroeconomic and fiscal conditions and politic environment in the country.

The first group of determinants represent macroeconomic initial conditions. In this group were factors included that were based on the conducted research considered to be the important measures of fiscal responsiveness: annual percentage growth of GDP (GDPGROWTH) and output gap (GDPGAP). Taking into account the level of economic uncertainty, which can affect the fiscal volatility, the determinant inflation (INFL) was included. As the Guichard et al. (2007) stated, if an episode of consolidation starts under weak economic activity conditions it may have a higher probability of success in the sense of reaching debt sustainability. Hamann a Prati (2002) point out that higher level of inflation before the stabilization leads to higher probability of consolidation success. The impact of the inflation on fiscal consolidation success is according to research results such as Molnar (2012) positive, which means that the inflation appears to increase the probability of success of a consolidation.

The second group of determinants represents a fiscal initial conditions. As researches (e.g. Alesina and Ardagna, 1998 or European Commision, 2007; etc.) state, the initial fiscal conditions measured either as the initial level of the deficit and debt ratio are statistically significant determinants of consolidation success. The group includes variables as: Primary balance in % of GDP (PB) and Gross Public debt in % of GDP (DEBT), Expenditure and Revenue Ratio in % of GDP (EXPEN and REVEN). As Guichard et al. (2007) states, a larger initial budget debt level motivates governments to consolidate, which justifies the inclusion of initial public debt as a potential regressor. The results of European Commission (2007) pointed out, that the worse the public finance situation is the higher the probability of lasting fiscal correction implementation, in other words, a more successful fiscal correction. The indicators Expenditure Ratio and Revenue Ratio expressed the composition of consolidation. Turning to the consolidation composition, many research (e.g. Alesina and Perotti, 1995; European Commission, 2007 or Alesina and Ardagna, 2010; etc.) state, that a greater weight on cuts in social spending tended to an increase in the chances of success. Consolidations based on government spending corrections are more successful than consolidation based on the increase of budget revenues.

The group of political environment contains two dummy variables: Election (general election) and Electionbefore a dummy controlling for an election that was prior to or in the year of consolidation start. Kumar, Leigh and Plekhanov (2007) state that about three quarters of the fiscal adjustments were initiated by newly-elected governments. As Alesina et al. (In Arin et al., 2012) state, a successful consolidation is more likely to occur directly after an election, when governments enjoy the trust of the voters and when new elections are in the far future.

To capture the effect of several macroeconomic factors as the preconditions for the success were these variables used also in their lagged form (with the time period of -1).

In the first step a binary probit model for panel data was applied to the data and evaluated. As the dependent variable the *SoC* success of consolidation was used. All the independent variables were included in this model.

Several intercorrelated variables were omitted. The probit model results with coefficients are presented in the first three columns of the Table 3.

To control for the possible bias through omitted factors and due to consideration of only cases where a consolidation was effectively implemented a Heckman two-stage procedure was applied. This type of model may result in a higher sample selection bias compared to the estimations reported in the probit model. A Heckman's selection model enables to control for the correlation between the decision to consolidate and the likelihood to achieve successful consolidation. In the first step, the selection equation, as the dependent variable was the dummy variable controlling for fiscal consolidation implementation selected. When applying Heckman's probit model at least one additional variable has to be used in the first step to explain the decision to undertake a fiscal consolidation. In this case a dummy indicating whether a general election took place in a country. This variable can have an effect on the decision to consolidate, but its direct effect on the consolidation outcome is not clear. This variable with the consolidation dummy variable was excluded from the second step of the Heckman's model where the dependent variable is the success of a fiscal consolidation.

	Binary Probit model			Heckman	selection 2st	ep model
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
PB	0.502682	0.087806	0.0000	0.031358	0.029835	0.2937
PBLAG	-0.258667	0.044640	0.0000			
DEBT	-0.099165	0.027507	0.0003	-0.040735	0.010900	0.0002
DEBTLAG	0.087729	0.026605	0.0010	0.038775	0.011094	0.0005
GAPGDP	-0.158647	0.062246	0.0108			
GAPGDPLAG	0.100826	0.062049	0.1042			
INFL	-0.024821	0.076032	0.7441	-0.023461	0.026414	0.3748
INFLLAG	0.037876	0.073527	0.6065	0.026096	0.025686	0.3101
EXPEN	0.258178	0.069982	0.0002	0.077317	0.027685	0.0054
REVENLAG	-0.251292	0.069096	0.0003	-0.071556	0.028905	0.0136
ELECTIONBEFORE	0.397793	0.280133	0.1556			
C	-3.284557	1.090679	0.0026	-0.080003	0.473020	0.8658

Table 3: Determinants of the fisca	consolidation success	in EU Member	Countries
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Notes: The exogenous variable is a dummy - success of consolidation.

Probit model uses Newton-Raphson optimisation and Marquardt steps. The second regression uses the bivariate Heckman selection model with the same dependent variable. The first step of the model is due to page limitations ommited and are upon request, the selection bias was present in most cases. As the dependent variable for the selection step the dummy for consolidation period was used. Reported coefficients are the marginal effects (*i.e.* the change in probability of the left-hand side variable if the explanatory variable increases by one unit).

#### Source: Authors' calculations according to AMECO.

Results of the two models (binary probit and Heckman's 2 step) are in some variables very different. This can be due to the selection bias which is according the rho estimator in the Heckman's model negative and significant, indicating that the unobservables due to bias in the selection model are negatively correlated with those in the second stage model. Differences are in the *PB*, *DEBT* variables where the probit estimators are double the value of those from Heckman's model. In general no change in the marginal effects sign between those models is present.

The primary balance has a positive effect on the consolidation success in the current period at the 1% significance level in the case of the probit model. Surprisingly the lagged value of the balance has a negative effect on the consolidation success. So the 1 pp increase in the PB surplus before the fiscal consolidation start decreases the likelihood of the consolidation success by 25%. From these values can be suggested that the worse the PB (short term fiscal imbalance) before the fiscal consolidation start is the higher the consolidation success probability. This is supported also in Yang, Fidrmuc and Ghosh (2015). Additionally, both the probit and Heckman model have identified a positive impact of the current PB value on the consolidation success, however in the Heckman's model not a significant one. This could be due to PB surplus boosting the stabilization of debt.

Debt level, both in the adjustments year and prior to it, played a significant role in both models. The lagged debt value supports the findings of Barrios et al. (2010) where an initial greater debt value fosters the likelihood of fiscal consolidation success, because a higher debt usually allows the countries to implement stronger and more lasting measures. Debt level of the same time period as the fiscal adjustment had in both models a negative effect on the consolidation success, that can be explained due to increase in debt servicing costs, and so worsening of the PB.

From the probit model can be concluded that widening of GDP gap during the fiscal adjustment periods are associated with consolidation failures (Guichard et al., 2007). On the other hand, a smaller initial GDP gap could help the consolidation success however this variable resulted as not significant in the models.

The assumptions about the inflation significance wasn't proved in neither of the models. According to significance levels is the inflation not connected to consolidation success. Regardless the significance level of the inflation its effects are in line with the assumptions. Higher levels of inflation prior to the fiscal adjustment period has a positive impact on the consolidation success. This confirms what Hamann and Prati (2002) a Molnar (2012) state, that higher level of inflation before the stabilization leads to higher probability of consolidation success. In this case a 1 pp increase in inflation leads to a 3.78% increase in the success probability. On the other hand the models suggest a negative impact of inflation on the consolidation success (-2.48%) what is an interesting model result because the increase in inflation should favor the debtor and in this case should help the government to decrease the debt servicing cost and to repay the debt.

Variables EXPEN and REVENLAG expressed from the theoretical point of view the composition of consolidation and their effects on the success of consolidation. The results for these two variables are identical. Both are significant and their effect is almost the same but with opposite sign. Differences are in the time lag of the two variables. Revenues are meant as their level prior to fiscal adjustment period but expenditures are those from the adjustment year. A 1 pp expenditure on GDP increases the probability of consolidation success by 25.8% in case of probit and by 7.73% in case of Heckman. For the expenditures a negative relation in both models was identified. Both of the results are in line with the empirical researches (e.g. European Commission, 2007; Alesina and Ardagna, 2010 or Kumar et al., 2007) which state that revenue-based consolidation has a lower likelihood to be successful as the expenditure ones. From the empirical point of view, it would be necessary to add dummy variables that would directly control for the consolidation composition.

General elections (electionbefore) as a factor should control for the cases where the elections were prior to or in the year of fiscal adjustment. According to Guichard et al. (2007) the probability of undertaking consolidation is rising after a general election where the governments have plenty of time left to ease the unpopular decisions of a fiscal consolidation. Although the election variable is not significant the positive marginal effect of the election is present but only in the full probit model.

### **5** Conclusions

Issues regarding the fiscal consolidations and their success are after the financial crisis and periods of intense fiscal imbalances in the spot lights of many researchers. Numbers of consolidations during the last 40 years are increasing. Countries around the world are trying to solve their fiscal imbalance and achieve its sustainability mostly by taking their individual consolidation steps. Many of performed fiscal consolidation reached the main goal of consolidation in the form of reducing public finance deficit and through consolidation effort contributed to ensuring the fiscal sustainability from the long-term fiscal point of view. These consolidations can be described from the theoretical and empirical fiscal context as the successful consolidation episodes. How many of performed fiscal consolidation could be considered as successful and what factors can determine their success were the main research questions of presented paper. The main objective of this paper was to identify periods of consolidation success and failures and the factors that can affect the success of fiscal consolidation. Information about measures and fiscal adjustment periods were identified using rules and mechanisms based on comprehensive literature research. Periods of consolidation success and failures in both, cold shower and gradual consolidation efforts among the 28 EU countries during the period of 1995-2016 were identified.

A combination and enhancement of the success consolidation periods identifications measures was applied. Altogether 35 successful consolidation periods out of 84 fiscal adjustment periods were identified. Only two success periods were of the gradual type. The two econometric models for consolidation success factors determination were applied. Both the binary probit and Heckman 2 step selection model have identified significant factors among the groups of macroeconomic, fiscal and political variables, that had an impact on the consolidation success. Several of the results could be supported by the relevant research carried out on a similar basis. Success consolidation episodes are connected to higher level of initial debt, initial small GDP gaps, higher initial inflation rate, worse short term fiscal imbalance and a general election prior to the fiscal adjustment period. The model in this paper proposed also interesting impact on the consolidation success rate by the unlagged macroeconomic and fiscal variables. Further research that would include also the macroeconomic cycles as the precondition consolidation success factor could be proposed and analyzed.

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# **Civic Participation to Fight Corruption**

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Abstract. Corruption is an omnipresent problem in all countries, especially connected with public sector and public finance. The goal of this paper is to analyze a selected case of civic participation aimed at fighting the corruption in the Slovak Republic. When fulfilling the goal, we also present preliminary research information collected within the frames of SOLIDUS project - Solidarity in European societies: empowerment, social justice and citizenship. The study uses a qualitative approach to investigate the research question and analyses the original collected survey data from own research as a part of SOLIDUS project. One of important factors greatly influencing the existence of corruption is a high tolerance of citizens for abuse of power and lack of transparency. Research results suggest as a possible solution mobilization and education of citizens in fighting corruption through activities of independent non-governmental organizations.

Keywords: corruption, public finance, civic participation, solidarity

JEL Classification: H39, D73

#### **1** Introduction

The legal definition of corruption for Slovakia is found in the Criminal Code. By law, corruption is defined through its forms, whereby the criminal offense of corruption consists of accepting a bribe, bribery, indirect corruption and electoral corruption. The criterion approach to the definition of corruption is based on a purely legalistic point of view, and thus perceives corruption as conduct that violates applicable laws (a positive approach to the definition of corruption – Staroňová, Sičáková-Beblavá, 2009, p. 12). In the case of violation of laws by persons in public offices, we are discussing deviant action, "which is not in accordance with the standards set for holding public office because of the preference for private benefit (relating to individual persons, families and kindred groups, political or other organizations) in the form of financial (material) position or profit "(Vörös, 2011, p. 2). The prescriptive approach to the definition of corruption declares a breach of ethical standards in order to give priority to one's own interests above the public interest (Staroňová, Sičáková-Beblavá, 2009). Public interest can be seen as an economic concept according authors Apgar, Brown, 1987; Bower, 1974; Buchanan, 1996; Hayek, 1994; Nemec, 1998) and Vörös (2011), Beblavý (2007), Hegemann, Berumen (2011), who see corrupt action as an economic activity that can be described according to the basic rules of the market economy (individuality of actions, conscious of the benefits and costs of such actions in order to maximize one's own advantage).

The corruption should not be viewed in isolation, but as part of the broader issue of governance and public management. Every aspect of public administration, and public finance, can be a source of corruption. Various factors of public finance management contribute to corruption. Some of these factors have a direct impact while others only an indirect impact. According Schaeffer (2002) the public finance factors which have a direct impact include: regulations and authorizations; complex tax systems; government spending decisions; public provision of goods and services; and situations in which public employees have discretionary power over economic decisions. Among the indirect causes of corruption must be included: the professionalism of the civil service, the level of public wages, institutional controls, and the transparency of rules, laws, and process, and the severity of the penalty system if caught.

As already said, there are cases when the society is active and can apply pressure on the responsible behaviour of political institutions. There are several well-known non-governmental organizations that are fighting corruption in various ways, e.g. Transparency International.

Recently, in the focus of many researchers globally solidarity issues have arisen (Lynch et al., 2007; Bjorn, 2010; Fineman, 2010; Cureton, 2012). The recent economic and fiscal crises as well as post-crisis policies of

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austerity have increased socio-economic inequality and spatial differences between and within the EU member states. The central argument and justification for the solidarity acts is that, while the economic crisis has generated new spatial inequalities, there are policies and practices that have been successful in tightening these inequalities and divisions based on solidarity. Solidarity actions are identified at different spatial levels. They can be broken down into actions set out by public institutions and by civic organizations. In this paper we focus on the latter, how civic organizations (e.g. NGOs) help to increase civic participation and thus decrease the level of corruption.

# 2 Methodology

The goal of this paper is to analyze a selected act of solidarity aimed at fighting the corruption in the Slovak Republic. When fulfilling the goal, we also present preliminary research information collected within the frames of SOLIDUS project - Solidarity in European societies: empowerment, social justice and citizenship.

The methodology is fully consistent to the methodology of SOLIDUS research project. The selection of case studies followed these criteria:

- There is a clear evidence regarding success (social and/or political impact).
- There is balance between top-down and bottom-up cases selected (i.e. there are cases with citizens, end-users or NGO stakeholders involved, cases with governmental institutions involved and cases with both involvements).
- There is balance among the different policy areas (i.e. housing, employment, health, education and civic engagement).
- At least half of the case studies conducted will be oriented to the fight against poverty and social exclusion.

A main requirement, in relation to the objectives of the SOLIDUS project, is that the cases selected have achieved significant impacts in their particular field of action. With the criteria in mind, we identified 16 cases in Slovakia. We used content analysis of databases, webpages and other relevant documents as well as snow-ball method (approached initiatives were asked to point out another initiative that fulfils the criteria of solidarity acts defined above). Out of these 16 cases, 5 were chosen by the project leader in Spain for in-depth analysis using a structured interview. We have followed an interview protocol where all types of involved stakeholders were interviewed (two NGO's representatives and two citizens). In this paper, we present analysis of one of the analyzed cases that focuses on civic engagement fighting the corruption.

The analysis consists of 6 areas that show the outcomes and imply possible policy developments: Democracy, Pluralism, Transparency, Social and political impact, Recognition, Scalability.

- Democracy the participation of all members of an organization in governance and decision-making processes is considered as organizational democracy (Cloke and Goldsmith, 2002; Manville and Ober, 2003). Democracy is a relevant variable because it influences in economic development and social improvements. Thus, citizens can express their voice (Hirschman, 1970), increasing the successful of their organizations, governments and States. So deliberative democracy is the best practice to manage societies and also current citizens demand.
- Pluralism diversity and pluralism in our societies is continuously increasing, which means that cultural, ideological, religious, and other identity diversities are more and more frequent in a real heterogeneous society (Touraine, 2007). In terms of members' composition of an organization, this diversity is a considered as a competitive advantage. Actually, diversity together with democratic decision-making processes enriches the organization, accumulating more social capital and, consequently more effective and successful actions (Putnam, 1993).
- Transparency transparency and accountability is now a citizen's claim as a result of public's lost confidence in the institutions, also affecting to NGOs and other third sector organizations. In this regard, the transparency of NGOs has acquired a prominent role in recent years, especially after the economic crisis and specifically for NGOs which are working for reducing inequalities and to respond to social needs (García-Mainar & Marcuello 2007, Baur & Schmitz, 2012).
- Social and political impact social impact is understood as the social improvements achieved as a consequence of implementing a particular project or action (Sorde-Marti, 2016) and political impact as the institutional repercussions of this project or action.
- Recognition the social recognition of an NGO, such as having received any award, allows them to still have greater social visibility and provides powerful incentives to continue their work (Osborne & Plastrik, 1997), being able to generate political impact remarkable.
- Scalability in order to address the spatial dimension, we will look at the reach of the organization analysed, as well as the reach of the solidarity action. Many organizations start local, through a targeted community based action, and later grow to different territories. The relationship between success (in terms of social improvements of peoples' lives) and scalability should be addressed.

# 3 Analysis

The reason for the creation of and activity of the civic association Against Corruption is the absence of any systematic measures to address the problem of corruption on the part of the state, as evidenced by the low number of corruption cases solved in Slovakia. The current structure of society does not fully respect the rights of the citizen, and the problem of corruption is deepening. In the words of the founder of this NGO, there are several origins of persistent problems of corruption in Slovakia:

A - formal rules:

- There are no clearly defined management and decision-making processes in public administration (in most cases, no standard procedures exist).
- Current legislation and law enforcement leads to the fact that the risk of bearing the consequences of corrupt behavior is less or negligible compared to the profits of such behavior; influenced by the effectiveness of control mechanisms.

B - informal rules:

- The absence of a code of ethics for every employee in public authorities (there are only special provisions for civic service employees).
- A high tolerance of abuse of power and lack of transparency shown by members of the public.

In response to the problem of corruption and the abovementioned reasons the civic association Against Corruption has implemented its activities to involve members of the public in fighting corruption in order to increase the transparency in the management of public funds and the effectiveness of the control mechanisms in public administration.

The association's activities are concentrated on two key areas: 1) educational activities in a wider range (anticorruption festival, literary competition for secondary school pupils on the theme "Life without Corruption") and 2) address specific corruption cases on the basis of complaints from members of the public.

The civic association in the terms of **democracy** fulfills a democratic way of management, e.g. the educational activities described above are planned and coordinated by mutual discussion of all the members of the association who are also their implementers. Resolving specific corruption cases are not scheduled, but implemented by members of the association on the basis of suggestions from members of the public ("bottom-to-the top").

**Pluralism** is reflected in implementation of the activities of the association: the key persons for Against Corruption's activities are the four members who coordinate all the activities regarding the fulfilment of the objectives set. They are university educated, socially active people with personal experience in relation to the existence of corruption – a journalist, a local council member, a lawyer and an agent cooperating with the police. When dealing with educational activities on a larger scale (anti-corruption festival, workshops, discussions) volunteers join in. Pluralism can be also seen in the nature of the target group of the association's activities:

- The public in general (increase the sensitivity limit to corruption by education).
- Members of the public with personal experience of corrupt behavior (detection of corruption cases and their solution).
- Public institutions (control of the management of public resources, pressure on the transparency of how they are used, monitor their progress in addressing specific corruption cases).

In terms of **transparency**, the public is informed about the association's activities and results at the NGO's webpage www.protikorupcii.sk where the association's annual report is made public. Unfortunately, a particular methodology for evaluating the results of operations of the association has not been created. The process of controlling management of funds is set out by the statutes of the association.

**Social and political impacts** of the association's activities are in two key areas:

- 5. Education activities of a wider range: anti-corruption festival and literary competition for secondary school pupils on the theme "Life without Corruption". The anti-corruption festival was created with the support of the project Guardian of transparency and democracy in the management of public funds. The project was supported by the NGO Fund which is financed by the EEA Financial Mechanism in 2009 2014. The fund manager is the Nadácia otvorenej spoločnosti Open Society Foundation. The project aims of Guardian of democracy and transparency in the management of public resources is the development of advocacy and watch-dog activities. Against Corruption organized the second annual festival with 500 visitors
- 6. Address specific corruption cases on the basis of complaints from members of the public. Eleven specific corruption cases based on complaints from citizens were resolved within the activities of the association.

Case #1: The decision of the Planning and Development Office in Žilina in favor of the construction of a selfservice carwash on the outskirts of Žilina which was contrary to the town's planning scheme. As a result of the activities of Against Corruption in this case the signing of the final building approval was stopped on an already existing carwash construction. One respondent expressed this about the affair: "I think highly of OZPK (civic association Against Corruption) because it was and still is an organization that acted on and promoted compliance with the law in the contested decisions of Žilina - SÚMŽ (the Planning and Development Office in Žilina). I learned about their project after talking on the phone with the Against Corruption president, Vanda Tuchyňová; the telephone number is clearly and publicly listed on the association's website. Following that at a personal meeting she immediately verified my tip, created the scope for personal meetings and to date OZPK have worked for the benefit of the public, fighting for the respect of laws both verbally and in writing and the personal involvement of employees from the association. In this particular case I participated in decisions about the content which was very current seeing as the association functions very transparently; concerning every step taken in the case I was made aware of and informed about." The respondent then states: "The benefit of resolving our problem is primarily psychological. Every citizen in this country unfortunately knows how small the percentage of the enforcement of their rights still is, especially when they must stand up to the bureaucratic machinery of government. The second benefit is well-founded, without emotion, to begin to solve the problem. In our case, arrange meetings, be it with the Mayor, members of the public or city officials, and promote and describe the situation to the point that the issue (carwash in Strážov) was published on the Internet and in several newspapers and magazines thanks to the addressed journalists. All this thanks only to the civic association. I regard these benefits as being of great importance.

Case #2: A robbery of the Social Insurance Agency in Žilina was paid for by the public, despite the fact that employees of the office flagrantly breached the rules – the money was transported from one place to another in breach of the insurance contract. As a result of the activities of Against Corruption in this case the director of the Social Insurance Agency in Žilina was removed from office.

Case #3: The case: A significant failure in the diversion of public resources in the reconstruction of the square in Liptovský Ján – as a result of the activities of Against Corruption in this case the Director of the Department for Regional Operational Programme Žilina Region was dismissed.

Case #4: A contract about mutual legal assistance between the village of Rosina and a law firm with close ties to the mayor of Rosina was awarded without any tender. Based on this contract the village was bound to pay the law firm  $22,500 \in$  over the following 30 months. Due to the intervention of Against Corruption in this case the contract was cancelled by the municipal council of the village.

Case #5: The construction company Váhostav failed to pay more than 100 million € to more than a thousand companies for their work. The company consciously guided itself into restructuring which meant the non-payment of 80% of its receivables in its then condition.

About this affair one respondent expressed the following: "At the time of the outbreak of the Váhostav scandal we were glad to find such an ally as Against Corruption. We were contacted by a specific person from the organization. With the approach of the project organizers I am very happy although at first I found these people to be more good-hearted than active, though of course there are exceptions. In this particular case, we also participated in decisions about the content and progress of the case. In terms of benefits, we found allies for a good and just cause, and within the range of possibilities and of mutual cooperation we participated in practical solutions to issues. Without such assistance it would have been much harder to promote these values, which in this affair was extremely difficult. The prospect of success would have been harder without their participation, and thus also lower. I value the benefits of collaboration with Against Corruption as very significant. The problem, however, was certainly funding which we tried to ensure through our own means from the aggrieved creditors. The project was a success mainly because of the conviction and determination of the people of this project, of course without "our" initiative it would not have worked. The ration expressed was 60/40, i.e. own initiative / project initiatives. The project did not increase my participation in similar activities, but, in the past and at present I am busy with every day cares so that any previous achievement score I value as both forced evil and heroic performance at one and the same time for which an ordinary working man does not have time. I do not know whether the project motivated any increased feelings of solidarity in a particular place or social group, but it certainly earned my respect, although from my point of view this was not just about a "Spartan army"; but together we withstood a much stronger opponent from the "Top" of the private sector. If the project continues, I will certainly recommend it in cases such as ours, which means that matters won't be without any chance of success, but, as in this case, at least get a draw. For me, besides enthusiasts, a project mainly needs sufficient funding so that in order to resolve any case the necessary dynamics won't be slowed down by lack of funds. Such activity should, in my view, be full-time, and should be an alternative as well as an audit institution for common sense and justice; institutionally transparent in our establishment - a corrupt system.

Case #6: The historic landmark Raden house in Čičmany has a reconstructed wooden roof (done in 2010). The wooden shingle used is of very poor quality that does not match the project and has no financial value which the Považské Museum in Žilina paid for. The result of Against Corruption stepping into this case: The Monuments Inspectorate of the Ministry of Culture has ordered the management of Žilina Považské Museum without delay to demand the replacement of the low-quality by the roofing contractor – the company MPM.

Case #7: The director of the regional department of the Slovak Land Fund in the execution of a basic application demanded a  $1,000 \in$  bribe. The result of activity by Against Corruption in this case was the sentencing of the director to a 3-year unconditional prison sentence for corruption.

Case #8: Against Corruption implemented an analysis of conducted public procurements in road salt for winter road maintenance in eight regions. It drew attention to the fact that in each autonomous region and for many years a concurrent company (with the occasional exception) has won public procurement and has operated there whereby the number of tenders submitted does not change the fact that it is won again by the same company. It displays the well-tested conditions of participation, linking procurement for three years or more, and thus the chance of success is always to the disadvantage of small businesses that cannot succeed with against the conditions set. It mainly concerns financial turnover for the last three years, where they must demonstrate that they have supplied 30,000 – 60,000 tons of a particular type of road salt; likewise, the amount of security to be proven in advance also spells the death knell for smaller companies.

Case #9: Municipal elections 2014. The publication of campaign funding in elections is a direct means of fighting corruption and cronyism. For this reason, Against Corruption implemented VOLBY OPEN (Open Election) in which we called on candidates for the post of mayors, council leaders and councilors to publish an overview of their election campaign finances. We created a system of data collection so the public could quite easily assess the willingness and level of transparency of individual candidates in the election campaign.

Case #10: A request for the publication of contracts between Žilina Regional Government and selected private companies close to the President of the Slovak Railways (ŽSR); ŽSR (Railways of the Slovak Republic) hired attorneys to negotiate the terms of the publication of said contracts with the chairperson from Against Corruption.

Case #11: In the 2013 autonomous region elections two officials ran for the office of governor in the Žilina Region: Juraj Blanár SMER (the presiding governor) and Miroslav Mikolášik for KDH (MEP). Against Corruption requested both candidates for publication of the details about their campaign financing. One of the candidates, who won the election, refused to disclose the information.

As for the **recognition**, the association has not received any official awards. More areas of the media regularly give positive information about its activities: Markíza, STV, TA3, Žilinský večerník, Nový čas. Association is positively perceived by the public on the association's blog.

In terms of **scalability**, the educational activities of the association in two areas are of a nationwide nature, addressing particular cases is focused on the Žilina region. This issue was described in detail in point on social and political impact.

The corruptive behavior is contrary to the rule of law, democracy and human rights since it is humiliating the good governance, fair approach and social justice, destroys the competitiveness, economic development and stability of the democratic institutions and undermines the moral bases of the society.

One of the manners for fight against corruption is transparency and accountability of the policy makers as well as increased involvement of the citizens in the decision making process. Therefore, in order to suppress the conditions incentivizing the corruption, the process needs to be both inclusive (meaning to equally involve the citizens concerned by a particular decision) and transparent (meaning it has to provide mechanisms for financial control, publicity and monitoring of the policy implementation, especially with regards to the public budget and public procurements). Presented research shows the good practices but also the gaps in the process of citizen involvement, and the possibility for financial control, by the citizens. We expect the research will provoke interest and open a discussion about the mechanisms and manner of improving of transparency od public finance.

#### **4** Conclusions

According to the most cited world ranking of perceived corruption from Transparency International, the Slovak Republic ended at the 54th place in 2016. It retained last year's score of 51 out of maximum 100 points. It is also a decrease of four places compared to 2015, while increasing the number of countries rated from 168 to 176 countries. This is the seventh worst place in the EU, when worse than Slovakia were Croatia, Hungary, Romania, Italy, Greece and Bulgaria as the last. The causes of the persistence and even deepening the problem of corruption can be seen at two levels: 1) level of formal rules (legislation, regulation) and 2) the level of informal rules (behavior patterns, customs, traditions).

At the level of formal rules ambiguity and non-transparency of laws or norms creates room for subjective interpretation and decision-making freedom, which increases the risk of corruption. The risk of corruption in this regard is increased by several factors: management and decision-making processes are not clearly defined, criteria and standards are missing or are not clearly defined, current legislation and law enforcement lead to the fact that the risk of bearing the consequences of corrupt behavior is smaller respectively negligible compared to the profits of such behavior. It is influenced by the low efficiency of control mechanisms and low transparency of public

funds handling. In this area in the conditions of Slovakia, the executive power is crucial, not a change of laws. Political situation in Slovakia suggests that the fight against corruption will continue in declarative rather than the real level. In 2016 no politician or businessman was convicted of corruption. A disturbing fact is also the indifferent approach of the government to its own anti-corruption measures. For example, the Slovak government has not fulfilled its intention to review the effectiveness of major government spending with system "value for money."

At the level of informal rules, there is a factor of citizens' high tolerance for abuse of power and lack of transparency that significantly influences the existence of corruption. For officials in public procurement there is no code of ethics or other special rules implemented, there are only rules applicable to civil servants. Property of officials in public procurement is not monitored. There are no "black lists" of companies, which in the past were proved to bribe in the procurement process. Positive is the preparation of the amendment on information law, which has the ambition to enhance the right of citizens to information, which would significantly contribute to the activation of citizen participation in the fight against corruption. An example of civic activism in this area is a civic organization "Against corruption", whose activities were analyzed as an example of good practice to fight corruption at the level of informal rules through mobilization and education of citizens.

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# Application of the criterion of the number of pupils in the budgetary allocation of taxes for municipalities

### Petr Tománek<sup>\*</sup>

**Abstract.** The paper is focused on the evaluation of the impact of one of the criteria in the budgetary allocation of taxes to municipalities in the Czech Republic, namely the criterion of sharing taxes per pupil. By means of this criterion are the municipalities receiving the funds to finance the operating costs of schools. Besides the sources of the budget tax allocation the municipalities receive e.g. the financial resources in the form of individual grants for investments in education. In the paper is evaluated, how corresponds the existing criterion of tax sharing per pupil of 7% of total shared taxes to the costs of education in municipalities and there are also proposed changes that would objectified the financing of education in municipalities.

Keywords: tax, municipal budgets, tax sharing, student, education

JEL Classification: H71, H72, I21

# **1** Introduction

The financial sources of municipal budgets - as decentralized budgets in the Czech Republic, consist mainly of tax revenues. Tax revenues are then defined in particular by shared taxes. On characteristics that should meet specified revenues in decentralized budgets have been previously identified a number of requirements (e.g. Musgrave, 1994, p. 423). Current conditions for economic development then complement these findings for the individual country and its system and its regional budgets. These conditions of implementation should be further elaborated, respectively developed (Tománek, 2015).

Linked to this is the issue of the use of fiscal autonomy within federal states (Blöchliger, 2011), or questions to the issue of equalization of tax capacity with the aim to use similar tax burden, which is given in close connection with balancing of financial resources in fiscal federalism (Blöchliger, 2007).

The existence of shared taxes for decentralized budgets let's assume great stability in tax revenues for individual budgets. Shared taxes also reduce the large disparities in tax revenues among various budgets and allow the spreading of the risk of non-performance of tax revenue between the state and local government (Peková, 2011, p. 120), (Tománek, 2016).

In terms of the existing rules of tax sharing is necessary to monitor whether these rules are not deviating from applied intentions, to which is focused the attention in this paper.

The aim of this paper is to evaluate the extent to which the criterion of tax sharing per pupil covers the costs of municipalities on education.

# 2 Methodology and Data

The paper is focused on the issue of education funding ensured by municipalities. Financing of the operation of schools founded by municipalities is ensured from two main sources.

The first range of sources is provided by funds for direct costs of education, especially the funds for teachers' salaries and school supplies. These funds fall in the framework of the state administration, they are provided from the state budget and are offered in the form of per pupil amount (this part of the resource is not the subject of the paper).

The second range of financial resources for the operation of municipal schools is provided by municipalities from their budgets. Since the 90s is in the budgets of municipalities considered the fact of funding for education. In the first phase it was the providing of contribution to education, which was intended to partially cover of basic operating expenses of basic schools, kindergartens, special schools and etc. The calculated indicator was a pupil and this subsidy reached in 2012 (the last year, when it was applied) the amount of CZK 1,401 per pupil. However the volume of the funds provided per pupil could not cover the costs of municipalities for education, therefore the

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rules were obligated the municipalities that does not establish the appropriate school and the schooling is provided by other municipality to participate on school costs according to the number of students by the place of residence.

From 2013was the current way of subsidizing of municipalities replaced by the subsidies per pupil and by the applying of the criterion of the number of pupils in the system of budgetary allocation of taxes (RUD) by the sharing of selected tax revenue. For these purposes is from shared taxes allocated a share of 7% of the collected volume. This criterion is applied for children attending kindergarten (pre-school age) and primary school pupils (in the text bellow is used only the term pupils, including children and students). This criterion of number of pupils is one of the four criteria applied for the tax sharing within the RUD<sup>\*</sup>.

As a part of RUD are to municipalities entrusted selected tax revenues, respectively the shares of taxes are provided to them (shared taxes). These shared taxes for the municipalities consist of taxes for which is specified the proportion from the national revenue, on that the municipalities participate (percentages correspond to the values of year 2017):

- 23.58% tax on personal income from employment,
- 23.58% tax on personal income from business (60%),
- 23.58% tax on personal income withholding,
- 23.58% tax on corporate income,
- 21.40% value added tax.

This volume of shared taxes is distributed to all municipalities on the basis of 4 criteria. From the total amount of collected taxes is 10% distributed to all municipalities in the same amount per capita - according to the number of inhabitants; 80% is distributed to municipalities in relation to the number of inhabitants, but into account is taken also the size of the municipality by applying of size coefficients; 3% are allocated to municipalities based on their area of cadastral area. And for allocating of 7% of the total volume of shared taxes is applied the aspect of number of pupils. The value of the relevant share of tax revenues per pupil is provided according to the number of pupils only to municipalities that establish the respective schools. The values of the number of pupils, which are the basis for revenue sharing for individual municipalities and are published annually in the Decree of Ministry of Finance, which validity is one year and is always applied from the September 1st of the year.

Mentioned criterion of shared taxes of 7% based on the number of pupils does not determine for the certain year in advance certain amount of fiscal resources that accrue per child / pupil and thus depends on the actual revenues of shared taxes in the relevant year. Further, the revenue per pupil affects the total number of pupils in the reporting period in the country. The actual revenues per pupil depend on several factors. Other compensation of costs for education among municipalities that does not establish the school is generally not performed.

Funds provided to municipalities on the pupil by criterion of 7% from RUD (data from MoF) reached these values:

- in 2013: 7.78 thousand CZK per pupil,
- in 2014: 8.02 thousand CZK per pupil,
- in 2015: 8.246 thousand CZK per pupil.

These funds per pupil represent the resources that receive municipalities through RUD per pupil. On the other hand, however are the real costs that municipalities have with their schools. For allocating of resources to schools, the municipalities cannot be limited to resources from RUD, but they must provide sufficient resources for education.

The aim of this paper is to evaluate the extent to which the criterion of 7% of shared taxes covers the costs of municipalities on education.

Determination of costs that the municipalities spend on education can be done based on the statement FIN 2-12 M, respectively on the data from Monitor system. However, from the methodological point of view, these data need to be cleaned because the funds on education of municipalities are not constituted only from the sources of RUD. Overall are defined these types of resources of the municipalities on education (incl. funds from RUD):

The list of financial sources used to finance municipal education:

<sup>\*</sup> Zákon č. 243/2000 Sb. o rozpočtovém určení výnosů některých daní územním samosprávným celkům a některým státním fondům (zákon o rozpočtovém určení daní).

- within the budgetary allocation of taxes exists the criterion of number of pupils that attend schools established by municipalities. These funds for education from RUD are not specifically assigned and the individual municipalities does not specifically see in their tax revenues specific amount that is received from RUD based on this criterion,
- additional own resources of municipalities beyond income on education from RUD; if funds on education from RUD do not cover costs of municipalities on education, the municipality is forced to cover them from other resources provided to municipalities from RUD,
- grants from other municipalities for pupils perform schooling in the specific municipality (after changing of RUD are this payments since 2013 mostly not applied municipalities can arrange individually),
- grant funds (non-claimable subsidies), e.g. on investments provided to municipalities from subsidy programs to reconstruction of schools (from EU, state budget, state funds, etc.),
- received contributions of established organizations (from governmental organizations, school legal entities, if they are imposed to these organizations by the municipality).

These resources are then used in the context of municipal expenditure on education (section 31 Education and school services), or in other spending areas of the budget as follows:

- funds are transferred to schools in the form of grants or contributions,
- funds are used directly by municipalities on education, e.g. in the form of reconstruction of schools,
- to the education activities can be related other expenses, e.g. transport of pupils to school.

The analysis of spending on education in the Czech Republic was performed based on the values for all municipalities of the Czech Republic except Capital City of Prague, because data for Prague are distorted by the fact that through its budget are given to schools also funds as normative per pupil from the state budget.

Paragraph	current expenditure	capital expenditures	total	share
	CZK mil.	CZK mil.	CZK mil.	%
3111 kindergartens	2,970.2	2,563.7	5,533.9	25.1
3112 kindergarten with special needs	9.1	0.9	10.0	0.0
3113 elementary schools	9,293.9	5,659.6	14,953.5	67.8
3114 elementary schools with special needs	71.6	39.8	111.4	0.5
3115 other matters of preschool education	4.9	0.4	5.3	0.0
3117 primary schools	272.6	118.7	391.3	1.8
3118 upper primary schools	-11.0	-2.6	1.0	0.0
3119 other matters of basic education	494.6	215.0	695.0	3.2
3141 school catering	257.8	67.7	325.5	1.5
3142 other school catering	0.6	0.0	0.6	0.0
3143 school clubs and other clubs	4.6	5.9	10.4	0.0
3144 schools in nature	1.4	0.8	2.2	0.0
3145 boarding schools	0.1	0.0	0.1	0.0
Total	13,370.4	8,669.8	22,040.3	100.0

#### Table 16 Municipal expenditure on education (excluding Prague), the average for the years 2014 and 2015

Source: Own processing based on data from MONITOR for the years 2014 and 2015.

In Table 1 are demonstrated the municipal expenditures for the Czech Republic. However, for the purpose of assessment of suitability of criteria of 7% in the RUD would be necessary to reduce these expenses by funds from other sources (see above). Analytical materials do not objectively disclose these resources from financial records of municipalities due to the fact that grant funds are not monitored according to sector classification and therefore cannot by identified those subsidies that the municipality received on education.

In addition there is entering related with EU funding also an aspect of the time shift between expenditures and subsidies received as a result of pre-financing of projects. The only solution there would be a multi-year analysis of the financial management of all municipalities in the Czech Republic individually, which is realistic to process only for a sample of municipalities (as indicated below).

Detectable are e.g. only funds of organizations in the education sector, which represented during the monitored period 386.6 mil. CZK.

From the structure of expenditure for municipalities (excluding Prague) is evident that on average the largest portion of the funds are directed by municipalities on primary school, specifically 67.8%, than in kindergarten 25.1%, and from other sections of the monitored paragraphs is the share higher than one percent only in case of municipal expenditures on other matters of basic education, specifically 3.2%, primary schools (1.8%) and for school catering (1.5%). This allocation between preschool and elementary school is not accurate due to the fact that many schools fulfil the function of both the parent and elementary schools, but funds are generally observed only for primary school.

Expenditure on education can be evaluated in terms of total expenditures of municipalities. Expenditure on education achieved on average the share of 10.7% of the total municipal expenditure in the monitored years while on the total operating expenditures of municipalities the education contributed by 10.0% and on the total capital expenditures of municipalities it was 12.0%.

After the elimination of municipal expenditure and the number of pupils in the Czech Republic by Prague, due to different methodological position of Prague, where in the years 2014 - 2015 the average number of pupils in the Czech Republic (exclusive Prague) was 1,045,823 pupils, the total average expenditure of municipalities per pupil accounted 21.1 thousand CZK. This value reflects the real costs of municipalities in the Czech Republic on education on average per pupil, however the source of these funds are in addition to sources from RUD per pupil also various subsidies.

The aforementioned amount cannot be automatically used for comparison with the values of revenues of RUD per pupil, because of the influence of other possible sources of municipalities on education.

# **3** Conclusions and Discussion

In the analysis was found that the sources of municipal expenditures on education, by shifting from providing a subsidy per pupil to tax sharing per pupil, better reflect funding needs of education in the municipalities. For the period 2014 - 2015 were the revenues of municipalities from RUD per pupil 8.1 thousand CZK on average annually. However, despite the increase in the share of the resources per pupil (through separate criteria within the RUD) this criterion does not address the complex issues of education funding by municipalities.

Above mentioned can be traced from total expenditures of municipalities spent on education in the Czech Republic (with some inaccuracies, the inability to identify the exact sources of subsidies received by municipalities for education) as well as from the analysis of the sample of municipalities in the study SMS ČR (Tománek, P. et al. 2017).

To determine the second group of values were used data given in this study, which examined the net expenditures of municipalities for education in addition that except of municipal expenditures on education were monitored also all other resources, except of sources from RUD (in particular subsidies from other public budgets) by which were reduced expenditures of individual municipalities on education. The results of the survey conducted in about 130 municipalities revealed that municipalities allocate on average 16.2 thousand CZK per pupil (adjusted for sources outside RUD). The results of this survey correspond to expectations based on total municipal expenditures on education and specify this by cleaning up by sources beyond RUD.

It turns out that criterion of 7% applied in the tax sharing per pupil does not match the real costs of municipalities on the operation of schools. The survey further showed that the costs per pupil in the municipalities vary significantly. In individual years can play affect the implementation of investments, etc., so it would be advisable to follow a longer period.

In the reported period, one percentage point of this criterion of the number of pupils was presented by amount of 1.11 thousand CZK per pupil per year, which would cover the average costs of municipalities for education in case that the proportion of shared taxes would increase from 7% to approximately double, i.e. 14%.

However, in this context it is appropriate to discuss other relations of these changes.

The existing system of providing funds for education to municipalities is based only on the number of pupils. In connection with the provision of resources from RUD per pupil, can then be considered other ways of allocating financial resources. It turns out that part of the expenditure of municipal schools is primarily not affected by the number of pupils, but rather the costs that are influenced by the number of classes at school (without affecting availability of class by pupils), respectively size of school. The discussion could be about the issue of tax sharing with application exclusive the criterion of pupils in addition also the criterion for the number of classes or schools as separate units. This should better reflect the cost structure of schools in the municipalities than just the number of pupils. On the need for education financing by municipalities in case of the provision funds per pupil, has influence actual number of pupils and therefore the position of municipalities that have at schools low occupancy in classes is disadvantageous. In this sense, then adding the criterion of number of pupils by other criteria of providing resources, would allow funding for education in smaller municipalities (schools with smaller classes fullness) without any negative impact on municipal budget.

Changing of the method of funding education to municipalities can be put into relation with the changes that were prepared by the state for education financing from its own resources (first range of resources, see sec. 2); There is ready the system that allows changing the setting of norms (and not just per pupil) improving the conditions for granting funds to schools for teachers' salaries, etc. and thereby improving the conditions of school's functioning in small municipalities.

The current system of funding education by municipalities shows that in the case of providing resources of RUD are not covered the total costs of individual municipalities, which is then disadvantageous mainly for the municipalities, which school catchment area extends beyond the respective municipality (school attendance is performed by pupils from other municipalities).

In the monitored period showed 53.6% municipalities from the total number of municipalities in the Czech Republic some type of school. A large part of the municipalities has not its own school, and given that the actual expenditures per pupil are higher than what provides RUD should occur to offset expenses for pupils among municipalities to ensure an objective method of financing (municipalities without schools should pay the difference between RUD revenues per pupil and costs per pupil to other municipality from its own resources).

From another perspective on RUD of municipalities, however, there is also to be noted that the change (increase of the percentage for education) would reduce the revenues of municipalities by the same amount of shared tax based on other criteria, respectively would affect mainly the municipalities that do not have their own school. These changes could then be sensible for small municipalities, so for the change would be appropriate to increase the amount of resources provided to municipalities in the form of shared taxes.

Overall, it can be concluded that the replacement of an earlier financial contribution to municipalities per pupil by share on RUD improves the conditions for financing education in municipalities that set up the school, but in its current form 7% of RUD are these resources by about half lower than the average costs of municipalities on education which evokes the need to make changes of the rules of tax sharing.

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# Contribution made by innovative actors in R & D in the regions of Slovakia and spending policies supporting innovation

### Martin Varga\* -Peter Pisár\*\*

Abstract. Effective government spending policies in the field of innovation support positively affect the growth performance of the landscape and its regions. In the context of the growing importance of the existence and the promotion of innovation, the ratio of expenditure on R&D of main innovation actors has changed in recent years. The aim of this paper is to examine the extent of investment of innovative actors in R&D of Slovak regions compared to EU countries, as well as the impact of the EU structural funds in this area. The contribution analyzes the ratio of expenditure spent on R&D in the regions of the SR as a percentage of GDP in terms of the main innovation actors in the country. This ratio is then compared between 2007 and 2014 and analyzed due to significant changes in the status of major innovation actors in Slovakia. We summarize secondary data available in national and international databases for analysis, and we analyze the following data using comparison method to identify changes of innovative actors in terms of their expenditures. We note a significant change in the proportion of analyzed expenditures and the strong public sector impact in education due to the high allocation of EU funding resources to R&D. With regard to the implementation of effective public policies, the development of opportunities in this direction is the implementation of programs and instruments of innovation policy supported from national sources from a sustainability point of view also in the future.

**Keywords:** Innovation, Innovation processes, R & D, Public spending, Innovation actors, Operational programs **JEL Classification:** B22

### **1** Introduction

The aim of the paper is to examine the extent of investment of innovative actors in R&D of Slovak regions compared to EU countries, as well as the impact of the EU structural funds in this area. To achieve the goal, we build on basic theoretical knowledge. Innovations help any subject to achieve qualitative and quantitative higher level and develop their competitiveness. Innovation is one of the main preconditions for economic growth. JA Schumpeter (1987) as first introduced the concept of innovations in economic theory in his work Theory of Economic Development. Groosman and Helpman (1991) followed the Schumpeter's knowledge and explored the relationship between industrial innovation and economic growth at the macro level and dependency rates of innovation on market conditions at the micro level. They confirmed the need to create innovation in relation to long-term economic growth and, moreover, introduced the need of commercialization of new knowledge and its subsequent placing on the market. Creating and placing innovations on the market are an essential source of innovation performance of countries and their long-term growth. The innovation performance of a country also depends on its innovation potential and success of the innovation processes and placing them on the market. Innovation process is due to Verloop (2005), business process to create new ideas and successfully bringing them to the market." Several authors point to the importance of filling the innovation process (Fagerberg, 2006; Mothe - Paquet, 2013; Lingelbach, 2015). Fagerberg (2006) shows a wide orientation of economists to generate innovations and new ideas, while innovative process is known as a "black box" which functioning is not very clear to anyone. Moth - Paquet (2013) attributed important place to the innovation process and notes that innovation is irrelevant to the economy if they are not part of an interactive mechanism with the environment in which they arise. Eliminating barriers in the innovation process is possible through greater concentration processes, as well as holders of innovation at lower regional levels. Concentration of innovative processes at the regional level can save transaction costs, due to the location of innovation actors in one region and simpler supply of products, services, labor and the information itself (Hudec et al., 2009). Lingelbach (2015) identifies the innovation process similar to Sabadka - Lešková (2002) in the context of three main parts – creation of invention, creation of innovation and difusion of innovation. Lingelbach (2015) also notes similar to Hudec et al. (2009) higher concentration of innovation processes at lower regional levels due to complexity of the process and the complexity of different

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cultural conditions. As part of the implementation of innovations on the market, there are still some weaknesses and new knowledge are not placed in companies what leads to information barriers between research organizations or universities and businesses.

Interaction of the innovations is taking place in the middle of innovative systems that are made of the different innovation actors in the country. Innovation systems can be characterized in several ways and in sequence of recent years economists settled the main dimensions of innovation systems. Freeman (1987) has defined an innovative system as a network of institutions in the public and private sectors whose activities and interactions are aimed to promoting import and distractions of new technologies. Lundvall (1992) considers their production structure and institutional arrangements of the country as main dimension of the innovation system. The speed of technological innovations, their volume, composition and subsequent generation on the market depends on the national institutions and the incentive structure in the country (Patel - Pavitt, 1994). According to Edquist (2005) has a system of innovation a central role in the development, dissemination and exploitation of innovation. The innovative system consists of a structural point of view of several interconnected subsystems (Čapková, 2011) specifically education and research subsystem (universities, R & D centers); economic and sectoral subsystem (companies), political subsystems and network subsystem.

The universities provide businesses a basis for R & D, which are subsequently transformed in the economy in the form of innovation. Among the companies attached Demjanová (2010) leading role, especially SMEs, which have motivation to allocate new products in form of new technologies, products or services on the market depending on profit maximization and market share. Political innovative system consists of public sector institutions, which creates a legislative apparatus and implement development policies. Network, represents grouping of the main elements and actors of the innovation system. Methodology of innovation systems in terms of their sector by the EU consists of four main actors (EC, 2015): business sector; public and state sector; higher education sector and private non-profit organizations.

The region has very important position in terms of developing innovative systems. Much of the literature emphasizes the role of regional innovation systems in terms of growth competitiveness and performance of regions. The analysis of innovation actors is focused on the analysis of the innovation potential in relation to the implementation of expenditure on R & D, their ratio in the individual actors and their subsequent change in the time of last year.

### 2 Data, methodology and results

Several national and international databases were used to analyze the impact of innovative actors in the form of spending on R&D and even their individual structure. In identifying the volume and expenditure ratio we used data from the available Eurostat databases. The analysis of data from the Structural Funds was carried out on the basis of the database created by the published contracts of subsidies granted, namely on the Central Register of Slovak Treaties. In order to achieve the goal and examine the scope of investments of innovative actors in R&D, we carried out a summary and comparison of processed data and results are shown in graphs for better illustration. In order to process the ratio of expenditures of innovative actors to R & D in the regions of the SR, we chose the ratio of expenditures in GDP in the monitored period of 2007 and 2014. We analyzed the years in the significance of changes of innovative actors in the Slovak Republic and we compared the results with the EU28 and the Euro area 19 average results.

As we pointed out in the first chapter of the work, the innovative systems are made of several actors which affect the development of innovation potential and final innovation performance of regions. However each group of actors develops different value of expenses on R & D and approach the different development of innovative performance. Within the EU, we can say the greatest impact of the business sector, which in cooperation with universities and with the support of the public sector acts as major innovation actors. The following Figures 1 and 2 show the proportion of spending on R & D at EU level in the Slovak Republic as well as in individual Slovak regions at NUTS 2 level for 2007 and the 2014.



Figure 14 Proportion of expenditures of innovation actors in R & D in regions of Slovakia 2007 (% of GDP)

Source: Processed according to Eurostat data





Source: Processed according to Eurostat data

Based on the data chart, we can say the biggest increase in expenditure on R & D in the private business sector and higher education sector. The public sector recorded only a slight increase in expenditure in the analyzed period. The Slovak Republic innovation systems are therefore formed significantly by those three main actors, the private business sector, public sector and universities. The business sector spent most expenditure on R & D in the all regions NUTS 2. However we can analyze growing impact due to expenditure on R & D of higher education sector and universities during the last few years. A very significant increase is visible mainly in underdeveloped regions NUTS 2 in the Slovak Republic especially Eastern, Middle and Western Slovakia. A higher proportion of spending of universities on science and research is the result of transformation of previously traditionally functioning universities focused mainly on educational activities to modern type of university with a greater

emphasis on R & D in the regions. Universities should cooperate with other innovation actors and create space for private as well as public sector for the development and creating innovation and their diffusion and commercialization in the market.

We can also observe the participation of the private non-profit sector as part of expenditure on R & D in the EU. In Slovakia, as well as in all regions of SR we note the very low, even zero expenditure of the institutions, and therefore its impact on the innovation performance of regions is minimal. The private sector and higher education sector are therefore key innovation stakeholders from the EU perspective and in the context of the circumstances, the EU has created space and opportunities for the growth of innovative potential of the enterprise in the form of structural funds to promote the creation of new knowledge and its transfer to the economy. We can conclude that with the exception of private non-profit sector, the innovation actors have growing trend of their expenditures in R & D (figure 3).





Source: Processed according to Eurostat data

In proportion to the total expenditure had business sector the greatest amount of spending on R & D during the entire period. According to the regional analysis of the costs of businesses operating in underdeveloped regions NUTS 2, we note the greatest amount of expenditures on R & D in the Western Slovakia and long-lowest level of expenditure on R & D in the Eastern Slovakia. We presume that regions and sectors with better innovation potential are more successful in promoting innovation from the Structural Funds and greater amount will be allocated to the region of Western Slovakia. We also observed a significant increase of R & D expenditures of higher education sector and universities since 2009, suggesting a greater orientation to knowledge-oriented universities and research activities, not just education. Universities had opportunities to receive resources from the Structural Funds within the operational Programmes to promote science and research in the education. The EU funds contributed to the high increase in expenditure on R & D in all sectors. Supported entities from the Structural Funds received first subsidies for R & D activities in 2009, which explains the large increase in spending from the reference year. We analyze the largest increase in higher education sector, due to high allocation of EU funds for R & D activities.

According to the aim of this paper we analyze significant impact of higher education sector in R & D activities, due to the high allocation of financial resources from EU funds to support science and research and increase the significance of entering the higher education sector in R & D and the creation of new knowledge. Structural Fund support is done through pre-approved Operational Programmes. Table 1 and Table 2 show specific Operational Programmes and their priorities which the universities used for applying for the R & D support from EU funds in the 2007-2013 period. The basis for the allocation of structural funds is a decision referring to the average GDP per capita for the period 2007 to 2009. The statistics were made on the basis of regional accounts at NUTS 2. In the context of the objective with the exception of the Bratislava region, fell all the regions of the NUTS 2 below

the EU average, so they could apply for the EU support. For more advanced Bratislava region were created its own priority axis within which the sectors in this region could apply for the EU support.

Priority axis	Arrangement	Contracted amount (EUR)	Co-financing of universities (EUR)
1. R & D Infrastructure	1.1 Modernization and building technical infrastructure for research and development	31 306 119,04	1 647 690,48
2. Supporting research and development	2.1 Support for networks of excellence in research and development as pillars of regional development and interregional cooperation	106 240 976,55	5 594 995,44
2. Supporting research and development	2.2 Transfer of knowledge and technology from research and development into practice	290 204 501,46	17 154 730,09
4. Supporting research and development in the Bratislava region	4.1 Support for networks of excellence in research and development as pillars of regional development in the Bratislava region	29 788 099,20	1 395 811,28
4. Supporting research and development in the Bratislava region	4.2 Transfer of knowledge and technology from research and development into practice in the Bratislava region	96 444 296,38	5 024 200,35
5. University Infrastructure	5.1 Building infrastructure of higher education institutions and modernization of their interior equipment to improve the conditions of the education process	253 660 025,49	253 660 025,49

 Table 17 Operational Programme Research and Development

Source: Processed using data by crz.gov.sk

#### **Table 18 Operational Programme Education**

Priority axis	Arrangement	Contracted amount (EUR)	Co-financing of universities (EUR)
1. Reform of the system of education and training	1.2 Universities and research and development as engines of development of the knowledge society	85 984 043,48	4 525 476,05
2. Further education as a tool for human resource development	2.1 Support for further education	1 281 495,61	67 447,15
4. Modern education for a knowledge-based society in the Bratislava region	4.2 Increasing the competitiveness of the Bratislava region through the development of higher and further education	15 392 057,23	1 821 629,96

Source: Processed using data by crz.gov.sk

Based on the previous tables, we can conclude relatively high orientation of the higher education sector on priority axis 2. Supporting research and development through Measure 2.2 Transfer of knowledge and technology from research and development into practice and priority axis 5. Infrastructure of higher education through measures 5.1 Building the infrastructure of universities and modernization of their interior equipment to improve the conditions of the education process. Arrangement 2.2 Transfer of knowledge and technology from research and development into practice is the realization of one of the basic steps in custody of innovation processes (see Chapter 1), namely the diffusion of innovation. Building the infrastructure of the universities will lead to increasing

the innovation potential in innovative links leading to the growth of innovation performance. Based on these findings, we can conclude a high orientation of the higher education sector to create an environment and infrastructure to improve educational processes and increase innovation potential and consequent orientation on the diffusion of knowledge and innovation to the specific market.

Contracted Operational programs R & D and Education in absolute values are shown in the following chart. Based on data from the chart and Tables 1 and 2 can be concluded relatively high orientation to support infrastructure projects, the so-called "hard" projects, and a lack of support for "soft" projects in the field of education.



Figure 17 Contracted Operational programs R & D and Education (EUR)

Source: Processed using data by crz.gov.sk

The high allocation of funding from the Structural Funds affected the increase in the higher education sector expenditures on R & D, especially since 2009, which was a reference year in the use of resources from EU funds. Universities represented in the reference period 2005-2014 the largest increase in spending on science and research, which has implications for the effective use of structural funds. Sourcing from the EU also affected private spending, but their growth were slower. We report the relatively low increase in expenditures of the public sector. As reason for this may be the fact that the allocation of resources from the structural funds was oriented more to support the private sector and higher education sector. Public sector fulfills the innovation function supports using common services for the other sectors.

# **3** Conclusion

Effective expenditure policy should stimulate the growth of the business environment in order to increase investments in R & D, as well as other actors in the innovation systems (especially the public sector, universities and educational institutions, private non-profit sector). Their aim is to produce new knowledge and their effective transfer to specific forms of innovation like products, services, technologies and so on. To ensure the production and commercialization of innovations, the innovation actors implement expenditures on R & D in order to increase their innovation performance. Within the EU average, we can note the highest proportion of private-sector due to spending on R & D. According to the aim of this paper we note the most significant impact on innovation performance due to R & D expenditures by private sector even in 2007 and 2014. Private spending were dominant in all regions. However we analyzed a significant increase in the impact on R & D, indicating the transformation of traditionally-oriented universities to scientific research institutions with a significant impact on the innovation performance of regions SR. Among the important factor of innovation expenditure growth we consider the impact of the Structural Funds provided subsidies. Received subsidies from EU funds were reflected in the increase in expenditure in innovation activities, which should ultimately lead to the growth of the innovation performance of regions and countries.

In terms of implementation of the expenditure policy in promoting innovation, the Structural Funds have brought Slovak Innovation Policy the large amount of funding, but at the same time a heavy administrative burden. Development opportunities are applications of the programs and innovation policy supported by national public funds. In terms of sustainability of the resources expended on R & D in the context of structural funds, should be weighed against the positives and negatives of projects promoting private sector (e.g. support for major infrastructure investment in R & D, cluster grouping of businesses, establishment of joint research centers, universities, training and support for building regional innovation centers, etc.). Encouraging innovation in the private sector from EU funds seems necessary to consider a stronger application of indirect support schemes in the future (through tax credits and guarantee programs). The general support provides less room for corruption and the distortion of the market environment.

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# PART C – PUBLIC FINANCE AND FINANCE

# The financing of culture in the Czech Republic

## Jiří Bečica<sup>\*</sup>

Abstract. The paper assesses the cultural sector in the Czech Republic from the point of view of provision, structure and financing of the collective public goods. The aim is to evaluate the number and operation of organizations in the cultural sector, whose promoter is the State and the self-governing regions in the territory of the Czech Republic. The main objective is the evaluation of State spending and then of each self-governing region in the Czech Republic, which financially provide for the functioning of the organizations in its territory. Spending undertaken from regional budgets is assessed per one permanently living inhabitant of the region in the years 2010-2014, and in the percentage terms of total spending made in individual regions within that period. The result is a finding that State spending in the cultural sector is gradually growing in those years, on the other hand particularly in the case of financing churches and religious societies and spending on science and research in culture. In terms of the self-governing regions, diametrical differences were detected in spending undertaken to support organizations in culture in percentage terms compared to the total spending of individual regions, but also per capita. The highest percentage of spending on culture is undertaken in the Zlín Region and Pilsen Region. Per capita, then it is the capital city of Prague, followed by the Zlín Region. The least funds in culture, both in percentage terms, and per capita are implemented in the South Moravian Region and Moravian-Silesian Region. These regions are below half the average observed for all the regions in the Czech Republic and the annual value of spending is around the boundary of one percent of total spending in the region, and two hundred Czech crowns per capita.

**Keywords:** contributory organization, culture, spending, budget, region, population **JEL Classification:** H 39, H 76, L 31, L 83, P 35, Z 18

### **1** Introduction

Culture is the spiritual foundation of society, a measure of its maturity; it creates a national wealth, and at the same time contributes to scholarship. Průcha (2004, p. 45) states that culture is an acquisition process of specific culture by the individual from birth to adulthood, that is transmitted from generation to generation and forms an integral part of advanced society. In recent years, the culture sector gets into forefront of interest, especially because of economic reasons (Colombo, 2006, van der Pol, 2008 nebo European Commision, 2006, Zedkova 2016), because the culture sector is characterized by high GDP growth rate. Organisations working in the cultural sector draw closer integral aspects of the past, the present and the future and act on the creativity, confidence and pride of the individuals in the regional, national and trans-national cultural heritage (Towse, 2011).

According UNESCO (2009) can be described the cultural sector a growing segment of the economy with high rates of GDP growth, gross value added and dynamic development of employment. According to the cultural policy of the Czech Republic (Ministry of Culture of the Czech Republic, 2001, p. 4), culture in a public area leads to the improvement of the quality of life of the population, development and the stability of society.

In economic terms, then it can be concluded that the functioning of the organizations in culture contributes to job creation opportunities and the development of tourism (Ginsburgh, 2006). The Czech Government by the resolution No. 266 of 15.04.2015 adopted a proposal of a State cultural policy of the Czech Republic for the years 2015-2020 (with an outlook by 2025) and completed the objectives and priorities of the State cultural policy of the Czech Republic. According to this policy, culture is intended for research, scientific, educational, recreational and aesthetic purposes, and as such deserves public funding. Funding for the cultural sector is also one of the primary goals of the European Communities (European Commission, 2006), as is in accordance with European legislation and other key EU documents in Culture sector. Craik (2005) states the cultural policy as not justifiable policy of government in terms of essentiality and unavoidability with other public good policy domains as prisons, defence or infrastructure. Craik also says, that the area of culture is just one small component of the public agenda that governments are obliged to support.

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Peková (2011, p. 39-48) notes that in the Czech Republic organisations are generally financed, governed and owned by the public entity and have a character of a Government (public) non-profit sector, or non-governmental non-profit (non-governmental) sector or private profit (market) sector. Cultural goods provided are most commonly defined as the public mixed goods of local nature. Škarabelová (2007, p. 67) then divides culture in the Czech republic according to the traditional classification into art, the protection of cultural values, the mass media, churches, cultural and educational activities and professional management of the sector. Thus, cultural services in the Czech Republic are provided, first, by the organizations of the private sector for specifically profit purposes (the organizers of festivals, cultural performances, private theatres); moreover, by contributory organizations (Vrabková, Bečica, 2017) set up by the State and territorial self-governments (castles, galleries, theatres, museums and libraries) and other non-profit organisations, for example, foundations or public benefit companies on a non-profit principle basis.

## 2 Data and methods

In the Czech Republic, the right to have access to cultural wealth is anchored in the Charter of Fundamental Rights and Freedoms, which is part of the constitutional order of the Czech Republic. Article 34 of the Charter sets out the rights to the results of creative intellectual activities, which are protected by law. The right of citizens to have access to cultural wealth is also anchored, which is guaranteed under the conditions laid down by other laws. As mentioned above, most of the goods in the cultural sector are provided, in particular, by NGOs, which are set up by public entities (the State, regions, and municipalities) in the legal form of contributory organizations.

**The partial objective** of the paper is an evaluation of the number of contributory organizations in the cultural sector, while the promoter is the State and the self-governing regions in the territory of the Czech Republic. Each organization will be structured according to its promoter and the focus. **The main objective** is the evaluation of culture spending made by the budget of the Ministry of Culture of the Czech Republic and spending as a percentage of total spending on culture from the budget of the self-governing regions and as the equivalent of one permanently living inhabitant of the region in the years 2010-2014.

There will be verified two hypotheses within the research in following wording:

H1: "Expenditure of the state budget of the Czech Republic in the sector of culture increases in time."

**H2:** " Expenditure of Higher territorial self-governing units are the same per capita and they are about 10 % of average per capita in the Czech Republic."

There are listed total expenditure of capitol 334 - Ministry of Culture of the Czech Republic in the years 2010-2014 and expenditure of individual items funding by Ministry of Culture of the Czech Republic below to verify first hypotheses. Given numbers are evaluated in proportion to total expenditure of the Czech Republic budget, number of population and volume of ground domestic product of the Czech Republic in relevant years according to statistics of the Czech Statistical Office.

It was worked with public budgets of higher territorial self-governing units to verify second hypotheses. Total values of culture expenditure of individual self-governing units, which it was continued to work with, were gained from information portal of Ministry of Finance of the Czech Republic – IISSP Monitor. Among valuated expenditure of culture, there were included all expenditure of section 33 – sectoral classification of the budget composition. Into this sector expenditure, we rank expenditure on culture itself (subsection 331), expenditure related to the protection of monuments and cultural heritage and national and historical awareness (subsection 332), expenditures given to mass media (subsection 334) and expenditures of subsection 339 which includes other activities in the field of culture, churches and mass media.

The most significant § in the area of culture expenditure at all regions were detected descending expenditure connected to § 3315 (activities of museums and galleries), § 3311 (theatre activities), § 3314 (library activities) and § 3319 (other culture affairs). Only little financially supported activities are § 3312 (musical activities) and § 3313 (filmmaking, distribution, cinemas and collection of audiovisual archival material), further expenditure § 3316 (publishing activities) and § 3317 that includes expenditure on exhibition activities in culture.

Services, which are generally funded, in whole or in part from public sources, including the above mentioned cultural services, can be described as public services (Mitwallyová, 2014). The main character of the public service is that this activity is not profitable and it has to be subsidized by the promoter. In the case of institutions in culture, we are dealing here with the contribution from the budget of the promoter, who covers normal operating expenses, which include labour costs. In the event that it is necessary to invest in the assets of the institution, by which they are managed or has been entrusted with them, the promoter decides on the allocation of the special- grants to a specific investment activity. The number of organizations listed below were taken from the pages of each region, of the Ministry of Finance-IISSP – Monitor and the Czech Statistical Office.

It was continued to work with data on current expenditure on culture found out in individual budgets in years 2010-2014. There are percentage expenditures on cultural to total expenditure of individual years in the relevant regional budget in bellow table no.2. For the purposes of the paper only actually undertaken spending made by the cultural sector is analysed. The absolute values of the spending of self-governing regions were subsequently converted into permanently living residents in the region (table no 3) because of their mutual comparability, since each region in terms of population is different and the differences are up to four times. The population figures are based on the Czech Statistical Office as of 31.12. of the relevant calendar year. In each table the minimum observed values are colour-listed, highlighted in light grey along with the maximum values highlighted dark grey. The value of average was found out for individual regions and individual reviewed period 010-2014 and for all five years period in average. There are done conclusions and evaluated given hypotheses from these recalculated values.

### **3** Results and Discussion

The Ministry of Culture administers the State contributory organizations in the Czech Republic, which has established and manages 29 contributory organizations ensuring national interests in the field of culture. Out of the indicated number, 13 organizations have been established for the purpose of protecting the nature of museums (the National Museum, the National Technical Museum, the Moravian Provincial Museum, the Museum of Art Olomouc, the Museum of Decorative Arts in Prague, the Technical Museum in Brno, the Silesian Provincial Museum, the Hussite Museum in Tábor, the Museum of Roma Culture in Brno, the Wallachian Open-Air Museum in Rožnov pod Radhoštěm, the Jan Amos Comenius Museum in Uherský Brod, the Museum of Glass and Jewellery in Jablonec nad Nisou, the Museum of Puppet Cultures in Chrudim), further it is the promoter of 2 galleries (the National Gallery in Prague and the Moravian Gallery in Brno), 3 libraries (the National Library of the Czech Republic, the Memorial of National Library in Brno, the K.E. Macan Library and Printing House for the Blind), 3 memorials (the Memorial of National Literature, a Monument of Lidice and Memorial Terezín), it promotes the National Theatre, the Czech Philharmonic Orchestra, and the Prague Philharmonic Choir and 5 other specific institutions (the National Film Archive, The National Heritage Institute, the National Institute of Folk Culture, the National Information and Advisory Centre for Culture and Art Institute-Theatre Institute).

Figure no.1 shows the number of contributory organizations established at the level of individual regions and their cultural focus.



Figure 1: Contributory organisations in the field of culture according to its focus established in the region of the Czech Republic

Source: Own processing from: Web pages of individual regions. [online]. 2017 [cit. 2017-02-21].

Note: JČ- South Bohemian Region, JM- South-Moravian Region, KA – Karlovy Vary Region, KH – Hradec Králové Region, LI – Liberec Region, MSK – Moravian-Silesian Region, OL – Olomouc Region, PA – Pardubice Region, PL – Pilsen Region, Praha – Capital City of Prague, SČ – Central Bohemian Region, ÚT – Ústí nad Labem Region, VY – Vysočina Region, ZL – Zlín Region

From Figure no.1 it is evident that among regions, the Central Bohemian Region and the Capital City of Prague have established most contributory organizations in the cultural sector; the latter thus being a promoter in the culture of the diverse and specifically oriented theatres e.g. the Theatre of Spejbl and Hurvínek, the Studio Ypsilon, the Musical Theatre in Karlín, the Theatre pod Palmovkou, the Vinohrady Theatre and more. The rest of the regions are the promoter of the theatre rather exceptionally, here in particular contributory organisations in the form of museums and galleries predominate. The Central Bohemian Region has the largest number of museums, a total of 13, including 11 of local and regional nature, 2 museums are focused on the mining of silver and lead in a given region (the Mining Museum Příbram, c. o. and the Czech Museum of Silver, c. o.). Even the smallest number, a total of five contributory organizations in the cultural sector, has been set up by the Liberec Region. In the area of other contributory organizations e.g. the Prague ZOO, Prague the Botanical Garden Prague, the Institute of
Archaeological Conservation of Monuments in Brno, the Imperial Spa in Karlovy Vary, the Baťa's Institute in Zlín, etc. are included.

From the financial data obtained from the budget of individual contributory organizations, it was found that the promoters from their own budgets provide for the funds for the operation (the so-called operation costs). The management of each organization is governed by its own budget, which is compiled for a calendar year, and includes in particular an overview of expenses and revenues, the investment and depreciation plan. The management of these organizations is generally balanced, while the balance is achieved by means of a non-investment contribution from the promoter of the organization provided by the promoter in the amount of the difference of their own revenues of the organisation and actual planned expenses in a given year. Apart from these funds then the promoter (the State, regions and municipalities) provides additional funds at his/her discretion in the form of a contribution to the investment activities of the organization.

Spending on culture flowing through the chapters of the Czech Ministry of Culture in the years 2010-2014, is depicted in Table no.1. The budget of the Ministry of Culture covers the operation costs and activities of the above State contributory organizations in culture. Part of the funds is spent on the conservation and protection of monuments and also in the form of grants given to cultural activities and activities in different areas of the local culture, for example, a regional library. Considerable financial resources are intended for the financing of churches and religious societies.

In thousands CZK	2010	2011	2012	2013	2014
MC-revenue in th. CZK	712 283	881 616	880 778	611 679	1 657 047
MC-spending in th. CZK	7 706 359	7 863 232	8 499 459	10 481 670	10 930 249
The security of the State and the legal	4	45	0	50	50
protection	4	43	0	50	50
Services to the population	7 706 355	7 863 188	8 499 459	10 481 670	10 930 199
The activity of registered churches and religious societies	1 439 008	1 444 753	1 440 815	3 403 824	3 468 474
Culture	3 936 795	3 661 463	4 159 515	4 011 249	4 508 474
Protection of monuments and the care of the cultural heritage and national and historical awareness	1 885 358	2 161 841	2 166 130	2 285 891	2 130 946
Other activities and matters of culture, churches and the media	87 789	109 503	86 933	58 584	101 341
Management in the field of culture, the churches and the media	258 818	277 269	269 952	250 693	242 977
Research and development in the field of culture, the churches and the media	98 587	208 359	376 113	471 429	477 987
State budget (SB) - spending in bil. CZK	1 156 793	1 155 526	1 152 386	1 173 127	1 211 608
MC/SB in %	0,67	0,68	0,74	0,89	0,90
Population in the Czech Republic	10 517 247	10 496 672	10 509 286	10 510 719	10 524 783
Expenditure on Culture from SB in CZK per capita	733	749	809	997	1 039
GDP of the Czech Republic in bil. CZK	3 953 651	4 033 755	4 059 912	4 098 128	4 313 789
MC/GDP in %	0,194	0,194	0,209	0,255	0,253

Table 1: Spending of the Ministry of Culture of the Czech Republic in the years 2010-2014

Source: Own processing from: MFČR. Monitor. Available at z:http://monitor.statnipokladna.cz/2010/statnirozpocet/kapitola/334#tabId [cit. 2016-12-15]

From Table no.1 it is evident that spending in the budget of the Ministry of Culture of the Czech Republic is growing every year. Growing trend was noted in both culture expenditure per capita and percentage share of expenditure of Ministry of Culture of the Czech Republic to total volume of expenditure of state budget and ground domestic product of the Czech Republic. The first given hypothesis was fully confirmed. The biggest financial gains were recorded in the section "Activities of registered churches and religious societies" and "Research and development".

Spending on culture of the budget of the self-governing regions in the Czech republic, is indicated in Table 2. From the table it is evident that the lowest percentage of spending on culture is made by the South Moravian Region in all reporting years reaching a value of only just over one percent of the total budget. In 2013, the biggest differences were noted among the individual regions, and in the case of the South Moravian Region, the value

obtained was up to eight times lower than the highest measured value of actually undertaken spending from the budget of the Zlín Region. The second lowest reported value was noted in the Moravian-Silesian Region with the exception of 2013, whereas the lower spending was recorded in the Central Bohemian Region.

Within the monitored years 2010-2014, the Zlín Region realised the highest average percentage of spending on culture from its own budget in comparison with the other regions of the Czech Republic with a value of 4.45%. It is followed by the Pilsen Region with the average percentage of spending on culture of 3.12 % and the South Bohemian Region with spending in the cultural sector of 2.55%. The average value of expenditure on culture from budgets of higher self-governing units was calculated as the value 2.24 % in the whole reviewed period. Five regions report above-average expenditures in long term, in particular region Zlin, Plzen, South Bohemian, Olomouc and Karlovy Vary. There are lower values than calculated average in the rest of regions, in South Moravia region even twice.

	_					-				_					
In %	JČ	JM	KA	КН	LI	MSK	OL	PA	PL	Praha	SČ	ÚΤ	VY	ZL	Average
2010	2,65	1,22	2,48	1,93	2,00	1,49	2,30	1,83	3,58	2,24	2,45	1,75	1,61	2,16	2,12
2011	2,81	1,26	2,08	1,98	1,74	1,41	2,87	1,62	3,31	2,14	1,85	1,59	1,79	3,09	2,11
2012	2,44	1,19	2,08	2,07	1,93	1,40	2,67	1,99	3,37	2,14	2,22	1,78	2,07	5,69	2,36
2013	2,39	1,11	2,22	2,26	2,36	1,63	2,23	2,23	2,88	2,10	1,57	1,85	2,98	9,18	2,64
2014	2,44	1,24	2,67	2,67	1,90	1,38	2,00	1,68	2,48	2,07	1,49	1,65	1,97	2,15	1,99
Average	2.55	1.20	2.31	2.18	1.99	1.46	2.41	1.87	3.12	2.14	1.92	1.72	2.08	4.45	2,24

Table 2: Spending on culture undertaken by regions in % for the period 2010 - 2014

Source: Own processing from: Monitor State Treasury. [online]. 2016 [cit. 2016-12-10] Available from: http://monitor.statnipokladna.cz/2010-2014/ [cit. 2016-12-17]

From Table no.3, it is seen that the values found in the cultural sector are uneven in terms of the conversion of spending per capita of the respective region. Each region divides its money on culture at its sole discretion. On average, the Capital City of Prague sets aside most of the funds on culture per inhabitant and year from its budget in the amount of 1,113 CZK. The volume of financial resources corresponds to the number of cultural monuments in the Czech Republic and large tourist activities. After Prague, lined up in descending order the Zlín Region appears with its average spending per capita of 665 CZK, the Pilsen Region with an amount of 504 CZK, followed by the Karlovy Vary Region with a value of 416 CZK of the average costs of culture per capita per year.

Spending on culture of each region calculated according to the number of permanent residents in the region that year, averaged according to actual spending in CZK per capita per year indicated in Table no.3.

			_				_	_	_		-				
In CZK	JČ	JM	KA	КН	LI	MSK	OL	PA	PL	Praha	SČ	ÚΤ	VY	ZL	Average
2010	410	163	462	314	293	200	369	278	547	1 257	322	275	315	329	395
2011	446	163	399	211	264	192	451	237	513	1 1 3 6	252	254	315	449	377
2012	414	161	388	330	309	191	432	285	562	1 055	318	278	351	840	423
2013	362	149	368	359	371	225	347	317	486	992	219	288	502	1 380	455
2014	420	178	461	446	304	198	322	269	413	1 124	209	254	362	327	378
Average	411	163	416	332	308	201	384	277	504	1 113	264	270	369	665	406

Table 3: Spending on culture in CZK per capita per year in the years 2010-2014

Source: Own processing from: Monitor State Treasury. [online]. 2016 [cit. 2016-12-17] Available from: http://monitor.statnipokladna.cz/2010-2014/

The South Moravian Region has reported the lowest value per capita in all years, with the average amount of 163 CZK per capita. It was followed by the Moravian-Silesian Region that contributes financially to culture on average 201 CZK per capita per year. This amount was exceeded only in 2013, when the region invested in the redevelopment of the humidity of the House of Art in Ostrava with the amount of 12,897 th. CZK, which influenced the percentage increase in spending in the cultural sector of the MSR by 0.23 % compared to the previous year.

Hypothesis number two in wording: " Expenditure of Higher territorial self-governing units are the same per capita and they are about 10 % of average per capita in the Czech Republic. ", was not confirmed. To confirm the hypothesis the values per capita in regions would have to be in the range between 365-447 CZK, which was not confirmed in ten out of fourteen regions. Over Set value 447 CZK per capita, there were found out values in

regions Prague (2.5 times), Zlin (1.5 times) and Plzen. Results in regions Hradec Kralove, Liberec, Pardubice, Usti nad Labem, Central Bohemian, Moravian-Silesian and South Bohemian were below set value.

From the observed result, it is obvious that value of expenditures on sector of culture is within individual regions of the Czech Republic non-uniform, this is also confirmed by Tomanek (2015) in other parts of public sectors in regional budgets. The evaluation and performance measuring play an important role in public policy and they are applied in various economic fields. The meaning of this activity is to justify public spending in relevant areas. The evaluation and comparison of the socio-economic benefit of the cultural sector with other industry fields belong also to the current trends (Throsby, 2004). However the assessing of the economic importance of culture can be done in different ways, contexts and approaches (UNESCO, 2009 and Chiaravalloti, 2014).

Many authors for example state (Mittwallyova, 2014, Varadzin 2016) that public services should be available to inhabitants across regions, provided in comparable quality and structure which has an impact on the efficiency of provided financial funds (Blochliger, 2006, Ochrana, 2007). Skarabelova (2007) has been engaged in non-profit sector and its organization in the Czech Republic for a long time, she resolves among others, sustainability of allowance organization providing public services. Loach, Rowley a Griffiths (2017) focus for example on cultural sustainability as strategy for survival of museums and libraries, because museums and libraries have an irreplaceable role in the context of preservation of cultural heritage.

Other domestic authors (Vrabková, 2017; Ardielli, Vavrek, 2015; Varadzin, Bečica, 2016) and foreign authors (Pareto, 1927; Samuelson, 1954; Musgrave, 1959; Arrow, 1963; Buchanan, 1998; Stiglitz, 2015), state in this context that the provision of collective and individual public services is often associated with externalities, yet inefficiencies in public spending leads to a lack of resources for securing public services to a sufficient extent, and the required level of quality.

#### 4 Conclusions

The level of the provision of cultural services may vary, and the point of this paper was to shown the differences in the structure and the number of established organisations in the cultural sector and the expenditure of funds in the field of culture between higher territorial self-governing units in the Czech Republic.

Culture is one of Europe's greatest strengths: it is a source of values and identity and gives the Europe a sense of belonging. It also contributes to people's well-being, to social cohesion and inclusion. The cultural and creative sectors are a driver of economic growth, job creation and external trade (Eurostat, 2016; European Commission, 2006). However, at the EU-level does not exist the harmonization of the laws and regulations of the EU Member States in the field of culture. The responsibility for this field is uniquely given to individual member states (Klamer, Petrova and Mignosa, 2006). The funding of culture is primary based on national resources from the central level of the state budget of the Czech Republic and individual public budgets of self-governing units.

From the above, it is evident that the majority of organisations working in the cultural sector are among the organizations based on a non-profit principle and are thus in the non-market sector. Due to the difficult possibilities in the cultural sector the profit is, in particular, at the regional level and in self-governing regions used for the provision of services in the culture of the legal form by contributory organizations. The dominant promoter is the Ministry of Culture of the Czech Republic at the national level in the field of culture; at the regional level, these are then individual self-governing regions, while each of the self-governing regions bears the costs associated with the operation of organisations established by them.

Based on the analysis of spending, it was found that the spending of the Ministry of Culture is gradually increasing in the years 2010-2014, on the other hand, the main increased spending items are linked to the financing of churches and religious societies and spending directed to research and development in culture. At the level of the self-governing regions, huge differences were detected in the values of spending on culture expressed per one permanently living resident in the region. In the case of the relation of the percentages of spending on culture to the total volume of the budget of the regions the differences were not so striking, even though there were triple differences in the monitored years.

Each of the above compared self-governing regions shows distinct values, both as to the number of established contributory organizations, and the volume of funds spent from its budget on the cultural sector. Financing of individual organisations active in culture is influenced by different historical contexts, but also the amount of assets managed (the number and character of buildings), the number of employees, and the nature of the activities implemented (museums, galleries, theatres, libraries). The activities of the various organisations providing services in culture are almost always subsidized in the form of the contribution from the promoter of the public budget, covering normal operation and labour costs; moreover it is calculated as the difference between the organisation's actual returns and actual spending made by the organisation on the organisation's operation in a given year in compliance with the promoter of a predetermined set of mandatory indicators.

In general, then it can be concluded that the public promoters (the State, the region, the municipality), place a great emphasis on increasing self-sufficiency in terms of own funds of the organisations and the reduction of the contributions of the promoter, while expanding the range of services for residents (visitors) and enhancing the quality of the services provided in the field of culture. There are primarily economic and sometimes political reasons along with a tremendous pressure being developed on the management of contributory organizations, but also all other non-profit organizations in the public ownership aimed at improving the effectiveness of spending funds from the budget of their promoter.

Individual industries of the public service sector with collective consumption (including culture) tend to resort to inefficiency in terms of the financial resources consumed. This inefficiency is usually the result of excess supply in the market and an (insufficient) number of demanders on the demand side. In particular, in the sector of culture this imbalance on the market cannot be simply solved e.g. by reducing the capacity of the auditorium in the theatres, concert halls, exhibition spaces or an area exhibited and items held in the deposit. If we want to preserve the historical identity and spatial availability of cultural services for current and future populations, we need to find a compromise between an economic and cultural-historical perspective. However, it is vital to compare and measure individual organizations among one another, such as in culture by the number of visitors, the number of managed objects or exhibits and adapt the distribution of funds from public budgets. The above stated, however, has to be seen also in the context of the provided quality of public services, where it is also important to find a match at the level and number of exhibits, the retention of the books, records and other exhibits as there are specifics (on the basis of applicable law) of libraries, museums, galleries and archives, which includes spending considerable funds from the budget of the promoters of these organizations.

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# Hospital Effectiveness in the Czech Republic: Strengths and Weaknesses of DEA Approach

#### Eva Gajdošová\*

**Abstract.** The paper deals with strengths and weaknesses of using DEA (data envelopment analysis) method for hospital effectiveness measurement. One of the main conditions for achieving proper results is the homogeneity of analysed decision making units, so the main research question is: how this might change results? It is concluded, that fundamentals of results are the same, but sometimes different results might appear and so on possible other final conclusions. Using DEA method is not recommended due to this problem. **Keywords:** Effectiveness, DEA, Hospital, Healthcare

JEL Classification: I10, H51

#### **1** Introduction

The effectiveness in the healthcare sector is nowadays very current topic due to many various reasons (political, social, psychological dimensions) and of course its macroeconomical importance in whole economy - the share of healthcare expenditures on gross domestic product reached between the years 2000 - 2015 in the OECD member states on average about 8.4 %, OECD (2017). The main financial resources are mostly spent in the sector of inpatient facilities (especially in hospitals), the share of them was during the same period on average about 3.7 %, OECD (2017).

Monitoring of the effectiveness is in the Czech Republic commanded by the legislative, because the major part of all healthcare expenditures belongs to the public resources, so 3E (economy, efficiency, effectiveness) criteria should be monitored.

Obviously, hospital effectiveness is affected by many various factors - case mix, profitability, ownership (public, private, non-profit), output quality, bed fund structure and size, market structure and location, population structure and factors affecting patient's health, type of inpatient facility and other medical facilities, Gajdošová, (2016). These topics are often discussed in the scientific papers. For instance, American authors focus on the role of profit incentives and hospital ownership, but financing of American healthcare is quite unique, so the application of their findings in other countries is inappropriate. These studies are also necessary for choosing suitable input and output variables and analysed factors.

There are many methods for cost-effectiveness analysis in healthcare, but some of them (e.i. cost-benefit analysis) are eliminated because of the problem of output quantification in monetary units. This analysis is mostly done by WTP (willingness to pay) method McIntosh (2010). The cost-effectiveness analysis (CEA) method is preferred Ganiats at al (2017) and Gray (2011). Similar conclusions about the usefulness of methods can be obtained based on Ochrana (2011), Maaytová (2012), Garber (2000) and Drummond (2015).

It is necessary to have homogeneous hospital input, so at first all hospitals should be divided into groups with similar features as returns to scale, size of hospital and (non)profitability as mention Burgess, Wilson (1996). However, there are other factors affecting hospital effectiveness – especially closer output definition is very useful – its complexity and quality, the market structure and location Ozcan, Luke (1996). Homogeneity of input sample can be attained by choosing hospitals just from the same region with similar bed structure and having related specialization Register and Bruning (1987).

Scientific sources focusing on effectiveness analysis in healthcare sector too, but rather by summarising of used methods, inputs, outputs and conclusions. These papers are very useful especially at the time of decision making, how to do own research. Brilliant example of this kind is paper describing findings of 38 chosen scientific papers Worthington (2004) and in more complex way by Hollingworth, Peacock (2008) and Jablonský, Dlouhý (2015). Special econometric methods (DEA, FDH, SFA) are being used very often for these purposes in the healthcare sector, especially DEA method as mentioned Dlouhý (2009). DEA (Data Envelopment Analysis) method is chosen for technical effectiveness analysis of homogenous production units (e.i. hospitals, schools) performing the same or similar activity due to its ability to work with multiple inputs and outputs without the valuation in monetary units.

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The homogeneity of analysed output sample is the matter of this paper, especially whether the average rate of effectiveness will be significantly higher while adding closer specification of analysed output sample in comparison with general specification (i.e. at the first model results are computed with whole sample (model 1) and later (models 2 and 3) the analysis is done again, but the sample is divided into smaller groups with similar characteristics (hospital size).

#### **2** Data and Methods

The paper is based on the Institute of Health Information and Statistics of the Czech Republic datasets, namely on the publications "Health Care in Statistical Data" and "Inpatient care" for the years 2004 and 2013, UZIS (2004 - 2013a, 2004 - 2013b). More recent data has not been published yet, but for this kind of paper and used presumption, it is not very important. There are the number of beds to 31 December of a given year and the average recalculated number of doctors and nurses used as an input values and the number of hospitalized persons as an output value.

DEA models can be output oriented, where outputs are maximized with given inputs, or input oriented, where inputs are minimized to product required output. These models can be also divided based on the type of returns to the scale of analysed production function. Model CCR (by Charnes, Cooper, Rhodes) assumes production function with constant returns to scale (CRS), Charnes, Cooper, Rhodes, (1978) and model BCC (by Banker, Charnes, Cooper) variable returns to scale (VRS). The model with variable returns to scale indicates more units as an efficient in comparison with previous one, Banker, Charnes, Cooper (1984).

This analysis has to be done for the period 2004 to 2013 for getting the greatest possible unit homogeneity and sufficient number of input sample of hospitals, so it is necessary to apply simplifying assumption of the same technology level in the whole time period. All results were calculated using the Efficiency Measurement System (EMS). The model is specified with a convex structure, the radial distance and it is not a superefficiency model. The effective unit gets value of 1 (100 %), inefficient unit less than 1 (100 %) while having a model focusing on inputs. When the model is output oriented, the acquired value is bigger than 1, but it is mostly recalculated into the same scale as in the previous specification.

Analysis in this paper is done by sorting Czech hospitals into specified groups of hospitals with similar characteristics and calculating their average rate of hospital effectiveness based on this equation:

$$AV_{DEA} = \frac{\sum DEA_{Hospital}}{n},\tag{1}$$

where  $AV_{DEA}$  = average DEA coefficient for analysed group,  $DEA_{Hospital}$  = DEA value for each hospital (then summed up for whole analysed group), n = number of hospitals in analysed group.

Hospitals were at first divided into smaller groups based on type (university, acute care, subsequent care), and the size of bed fund - the number of beds (under 100, 100 - 299, 300 - 499, 500-999, 1000 +).

Туре	Number of Beds		
University hospitals	108	Under 100	366
Acute care hospitals	1281	100 - 299	667
Hospitals of Subsequent Care	285	300 - 499	313
		500 - 999	215
		1000 +	113
Total	1674	Total	1674

Table 19: Input Data Sample (model 1)

#### Source: author.

The total number of 1674 hospitals represents 88 % of total theoretical sum (1913) during the whole period 2004 to 2013. The sample covers 100 % of university hospitals, 84 % acute care hospitals and 100 % of subsequent care hospitals. The variance is caused by closing hospitals during monitored period and hospital management disagreements with public data presentation. The sample is equally distributed between analysed years, but not equally in the Czech regions.

As we can see in the previous table there is big difference in the number of analysed hospitals. The question is, whether they are homogenous and how the results change, if we use more distributing criteria than just type and in a case of hospital size smaller intervals. It is reasonable to assume, that homogeneity will be higher and so achieved effectiveness coefficients too.

Туре	Total	Number of Beds	Total
University hospitals	108	-	108
		Under 100	200
		100 - 199	323
Acute care hospitals	1281	200 - 299	225
		300 - 499	313
		500 +	220
Hospitals of Subsequent	285	Under 100	166
Care	203	100 +	119
Total	1674	Total	1674

Source: author.

Table 2 shows that if we use also number of beds criterion differences in quantity remain, so there is question whether it is sufficient or specified sample more. We now also know fact about hospitals of subsequent care, because the majority of them belongs to very small inpatient facilities, on the other hand acute care hospitals have mostly between 100 and 299 beds. This further specification is important for acute care hospitals with more than 500 beds These hospitals have frequently similar role in the healthcare system as university hospitals, but without special status and teaching activities.

Table 21: Data Summary for More Specified Sample based on Hospital Size (model 3)

Number of Beds (model 1)	Total	Number of Beds (model 3)	Total
Under 100	266	Under 50	171
Under 100	500	50 - 99	195
		100 - 149	225
100 - 299	667	150 - 199	217
		200 - 299	225
200 400	212	300 - 399	184
500 - 499	515	400 - 499	129
500 000	215	500 - 699	136
500 - 999	213	700 - 999	79
1000 +	113	1000 +	113
Total	1674	Total	1674

Source: author.

Table 3 focuses in more detail on size distribution. In comparison with previous table, there are intervals containing mostly about 200 analysed hospitals with exceptions of bigger hospitals. It is caused by less hospitals in input samples (300 - 499 and 500 - 999), but additional distribution is necessary because of the research problem.

#### **3** Results and Discussion

Results section has similar structure in both subchapters. At first achieved values for primary model are commended and it is concluded, which hospitals are the most effective and conversely. Than follows a description of the results obtained in more specified inpatient facilities. Achieved values for BBC and CCR models are almost the same in a case of changing model orientation.

#### 3.1 Influence of Adding Closer Specification of Bed Fund Size into Type Model on Average Effectiveness Rate (Comparison of Models 1 and 2)

Model 1 marks as the most efficient ones university hospitals in all possible model modification. This conclusion is lot more interesting, if we mention specifics of university hospitals - medical students teaching and their internships at the department of the hospital for practical training and provided special medical treatment procedures.

The opposite situation is in the sector of subsequent care hospitals. The reason for that can be selected output variable – the number of hospitalized persons. This variable is not suitable for long-term medical facilities because of longer treatment time of each patient. It might be eliminated in the future by inclusion of more output variables or changing output value, but there is a lack of appropriate data sources.

	Model 1			Mode	el 2
	CCR	BCC		CCR	BCC
	Input orie	nted model		Input orient	ted model
University hospitals	83.3743	87.9419	-	83.3743	87.9419
			Under 100	28.2993	41.4611
<b>A</b>			100 - 199	60.3987	77.3147
Acute care	22.9774	61.4690	200 - 299	73.4465	87.7760
nospitais			300 - 499	75.2514	75.2512
			500 +	79.2590	87.6438
Hospitals of	24 6922	15 2606	Under 100	39.3893	54.6981
Subsequent Care	34.0822	43.2090	100 +	44.4004	84.9471
	Mo	del 1		Mode	el 2
	CCR	BCC		CCR	BCC
	Output ori	ented model		Output orier	ted model
University hospitals	83.3749	88.4462	-	83.3749	88.4462
			Under 100	28.2996	50.2312
<b>A</b> (			100 - 199	60.1777	66.4418
Acute care	22.9916	67.4951	100 - 199 200 - 299	60.1777 73.4464	66.4418 76.9195
Acute care hospitals	22.9916	67.4951	100 - 199 200 - 299 300 - 499	60.1777 73.4464 85.7936	66.4418 76.9195 80.9643
Acute care hospitals	22.9916	67.4951	100 - 199 200 - 299 300 - 499 500 +	60.1777 73.4464 85.7936 79.2591	66.4418 76.9195 80.9643 84.6651
Acute care hospitals Hospitals of	22.9916	67.4951	100 - 199 200 - 299 300 - 499 500 + Under 100	60.1777 73.4464 85.7936 79.2591 39.3896	66.4418 76.9195 80.9643 84.6651 48.6873

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Source: author.

While using more specified input sample (model 2) we can clearly conclude higher average rate of hospital effectiveness in almost all possibilities except acute care hospitals with number of beds under 100 (in comparison with model 1). Acquired results are nearly the same, if we compare university hospitals and acute care hospitals with more than 500 beds. This may indicate similar activities.

# **3.2 Influence of Closer Specification of Bed Fund Size on Average Effectiveness Rate** (Comparison of Models 1 and 3)

Is the production of healthcare services associated with returns to scale theory - concretely mentioned with decreasing marginal costs? It is rational thought, because production in greater scale can cause better cost utilization and based on that savings. Bed size analysis can be approximated as one of the indicator of hospital case mix. It is highly probable, that smaller hospitals focus just only on basic health services and conversely main regional or university hospitals have very specific departments (i.e. burn department).

Model 1 proved the highest effectiveness of the biggest hospitals, but there are not observed big differences between hospitals having bed fund with 300 and more beds. Discussion about centralization possibilities of chosen medical interventions might be helpful for reaching higher health care system effectiveness, but it is not

so imaginable and further professional dialogues are necessary because of possible negative impact on patient health status.

	Model 1			Mod	el 3
	CCR	BCC		CCR	BCC
	Input orient	ted model		Input orien	ted model
Under 100	20 5062	27 6806	Under 50	29.1920	48.9253
Under 100	20.3962	57.0800	50 - 99	41.0424	77.7597
			100 - 149	42.0265	86.2536
100 - 299	54.6850	75.2504	150 - 199	64.0692	90.4086
			200 - 299	73.4465	87.7760
200 400	75 2514	95 7026	300 - 399	74.7966	90.3007
300 - 499	75.2514	85.7936	400 - 499	83.5400	92.6612
500 000	500 – 999 78.4501 86.	96 2290	500 - 699	81.9118	91.2724
500 - 999		80.2380	700 - 999	84.1441	90.3992
1000 +	84.5721	89.4591	1000 +	84.5721	89.4591
	Mode	el 1		Mod	el 3
	CCR	BCC		CCR	BCC
	CCR Output orier	BCC nted model		CCR Output orie	BCC nted model
Under 100	CCR Output orier	BCC nted model	Under 50	CCR Output orie 29.1923	<b>BCC</b> nted model 44.5691
Under 100	CCR Output orier 20.5964	BCC nted model 36.7048	Under 50 50 - 99	CCR Output orie 29.1923 41.0425	BCC nted model 44.5691 50.5767
Under 100	CCR Output orier 20.5964	BCC nted model 36.7048	Under 50 50 - 99 100 - 149	CCR Output orie 29.1923 41.0425 42.0266	BCC nted model 44.5691 50.5767 51.4246
Under 100 100 - 299	CCR Output orier 20.5964 54.6850	BCC nted model 36.7048 62.4360	Under 50 50 - 99 100 - 149 150 - 199	CCR Output orie 29.1923 41.0425 42.0266 64.0693	BCC nted model 44.5691 50.5767 51.4246 72.2118
Under 100 100 - 299	CCR Output orier 20.5964 54.6850	BCC nted model 36.7048 62.4360	Under 50 50 - 99 100 - 149 150 - 199 200 - 299	CCR Output orie 29.1923 41.0425 42.0266 64.0693 73.4464	BCC nted model 44.5691 50.5767 51.4246 72.2118 76.9195
Under 100 100 - 299	CCR Output orier 20.5964 54.6850	BCC nted model 36.7048 62.4360	Under 50 50 - 99 100 - 149 150 - 199 200 - 299 300 - 399	CCR Output orie 29.1923 41.0425 42.0266 64.0693 73.4464 74.7967	BCC nted model 44.5691 50.5767 51.4246 72.2118 76.9195 81.4675
Under 100 100 - 299 300 - 499	CCR Output orier 20.5964 54.6850 75.2512	BCC nted model 36.7048 62.4360 80.9643	Under 50 50 - 99 100 - 149 150 - 199 200 - 299 300 - 399 400 - 499	CCR Output orie 29.1923 41.0425 42.0266 64.0693 73.4464 74.7967 83.5399	BCC nted model 44.5691 50.5767 51.4246 72.2118 76.9195 81.4675 86.4807
Under 100 100 - 299 300 - 499	CCR Output orier 20.5964 54.6850 75.2512	BCC nted model 36.7048 62.4360 80.9643	Under 50 50 - 99 100 - 149 150 - 199 200 - 299 300 - 399 400 - 499 500 - 699	CCR Output orie 29.1923 41.0425 42.0266 64.0693 73.4464 74.7967 83.5399 81.9116	BCC nted model 44.5691 50.5767 51.4246 72.2118 76.9195 81.4675 86.4807 85.6969
Under 100 100 - 299 300 - 499 500 - 999	CCR           Output orier           20.5964           54.6850           75.2512           78.4502	BCC nted model 36.7048 62.4360 80.9643 83.7409	Under 50 50 - 99 100 - 149 150 - 199 200 - 299 300 - 399 400 - 499 500 - 699 700 - 999	CCR Output orie 29.1923 41.0425 42.0266 64.0693 73.4464 74.7967 83.5399 81.9116 84.1443	BCC nted model 44.5691 50.5767 51.4246 72.2118 76.9195 81.4675 86.4807 85.6969 87.6906

Table 23: The Average Rate of Hospital Effectiveness in the Distribution by Number of Beds (in %)

#### Source: author.

In case of using more specified input sample (model 3) we get the same conclusion about the lowest effectiveness of very small hospitals. Results are not so clear if focusing on the highest average effectiveness rate (particularly if we analyse results of BCC input oriented model).

#### **4** Conclusions

The paper mostly proved the hypothesis about achieving higher effectiveness coefficients, when having more specifics in analysis, but not in all possibilities (compare input, output oriented BCC model for acute care hospitals and some cases from the model 3). This might generate problems of conclusions credibility, because no one knows, whether the homogeneity is sufficient. To conclude, hospital effectiveness is evidently affected by both variables – hospital type and size (bed fund).

Extension model with hospital location (regional) indicators or more detailed bed fund specification might be interesting in the future publications for closer specification and thus more homogenous input sample.

The crucial question of all these analyses still persists – how to detect that the input data file is sufficiently homogeneous?

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# Effect of the Continual Annual Increase in Environment Protection Expenditure on Some Components of the Environment

#### Pavla Kubová\* – Miroslav Hájek\*\*

Abstract. Environment protection expenditure represents one of relatively widespread and frequently used indicators of care for the environment. Continual statistic records of capital expenditure on environment conservation show that annual investment costs are significantly increasing. This favourable trend is caused by the action of laws enacted to protect the environment and particularly by normative instruments contained in the legislation. The main objective of the paper is to evaluate whether the increasing capital expenditure on environment conservation has a favourable influence on some environment constituents (specifically air, water and waste production). The data were analyzed by using the elementary statistical analysis, correlation analysis and the calculation of Pearson's correlation coefficient combined with the regression analysis and index of determination. The elementary statistical analysis was also used to capture the trend of capital expenditure for environment protection in the Czech Republic. A correlation between the trend of investment costs for environment protection and emissions of carbon dioxide and other glasshouse gases was not proved by contrast to the dependence of waste production on the development of investment costs for environment protection. As to the area of wastewater, an indirect correlation was found (anti-correlation).

Keywords: climate change, environment conservation, environment protection expenditure, sustainable development

JEL Classification: Q50, Q56, H23

#### **1** Introduction

Environment protection expenditure includes expenditure for the acquisition of tangible fixed assets for environment conservation and non-investment costs for environment protection related to activities for environment protection (technologies, processes, equipment or their parts), whose main purpose is recording, removal, monitoring, control, mitigation, prevention or elimination of pollutants and pollution or any other impairment to the environment occurring due to industrial operations (CZSO, 2017). Environmental regulation is measured as total current expenditures on environment protection, and revenue from environmental taxation (Leiter, 2011). This paper puts emphasis particularly on the analysis of investment costs on environment conservation. According to Hegerl (2007) changes in various aspects of the climate system, such as the size of ice sheets, the type and distribution of vegetation etc. will influence the large-scale circulation features of the atmosphere and oceans. Garnaut (2008) emphasizes that expenditure on the research, development and commercialisation of for example low emissions technologies have international public good characteristics. Garnaut (2008) notes that it can benefit all nations and its rewards cannot be fully captured by private investors.

Pursuant to the Eurostat methodology (2017), environment protection expenditure (EPE) is the money spent on all purposeful activities aimed at the prevention, reduction and elimination of pollution or any other degradation of the environment. EPE includes environmental investments, environmental current expenditure and environmental subsidies/transfers.

The significance of EPE has two aspects. One of these is the fact that it contributes to the solution of environmental problems. On the other hand, however, EPE efficiency has to be taken into consideration too because it represents a considerable amount of funds spent from public budgets as well as from private sources. In this context, we speak of a so-called internalization of externalities. Van de Bergh (2010) concludes that sustainability does not imply zero externalities. Bithas (2011) asserts that in the real world where externalities prevail, their internalization or neutralization in the traditional way cannot lead to sustainability. Natural endowments, climatic conditions, physiological constitution of the population influence the society's willingness to tolerate externalities (Lucas, Wheeler, Hettige, 1992; Low, 1992; Summers, 1992). Souček et al. (2002) state that the need for monitoring the strategy of "sustainable development" is given by the utmost importance of the concept with respect to the future of the humankind and the planet of Earth. When analyzing the methods of

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funding measures to protect the environment, these can be found within different support systems including cofinancing from available financial resources. Nevertheless, the rules for using the funds from various public budgets are quite precisely determined (Hájek, 2003). According to Stanciu, Brezeanu (2012), useful for predicting long-term trends in spending are statistical methods.

There are some studies (Leiter et al., 2011), which document that environment protection evokes activities supporting economic growth and creating new jobs. These studies declare that increasing the expenditure from public budgets for environment conservation is one of possible methods by which the economic policy of the government can actively promote economic growth. At the same time, a low level of environment protection expenditure does not necessarily indicate that governments pay no attention to environment protection (Mandalová, 2012). Porter (1991) and Porter and van der Linde (1995) note that if a country imposes stricter environmental regulations than its commercial competitors do, these restrictions will stimulate innovative behaviour (it improves productivity and enhances domestic industries' competitiveness) (Chatzistamoulou, 2017). Environmental investment promotes economic growth in the following three ways (Lin, 2012): "ordinary investment effect", "environment improvement effect", and "spill-over effect". Lin (2012) brings an example, when the government expenditure is higher and the spill-over effect becomes more pronounced.

The main objective of the paper is to evaluate whether the increasing environment protection expenditure has a favourable influence on some environment constituents (specifically air, water and waste production).

#### **1.1** Material and methods

Collection of data and their reporting are enacted by Council Regulation no. 97/58 of 20 December 1996 (Structural Business Statistics) and by the agreement between Eurostat and national statistical offices. In terms of the methodology of environment protection expenditure statistics, Eurostat builds on a long-term objective to integrate into the conventional system of national accounts also the data quantifying total environmental expenditure (Souček et al., 2002). Czech Statistical Office (CZSO) processes data on environment protection expenditure annually (CZSO, 2017). These include expenditure of both investment and non-investment character, and the subject of monitoring are also economic benefits following out from environment protection. The first data in this area exist at CZSO from 1986 thanks to the incorporation of a section concerning environment protection investments. The environment protection expenditure is classified according to nine areas, so-called domains, the content of which is specified in the CEPA 2000 classification. The domains are as follows: air and climate protection, wastewater management, waste management, protection and remediation of soil, groundwater and surface waters, abatement of noise and vibrations, biodiversity conservation and landscape protection, radiation protection, research and development, and other activities to protect the environment. It can be summed up in general that the priority areas in environment protection continue to be waste management, wastewater management, ambient air and climate protection – see Figure 1, which rank over a long time with the most financially supported domains in respect of their programme focus. Figure 1 presents the environment protection expenditure in the Czech Republic.



Figure 18: Investment costs for environment protection in 1986–2015

Source: CZSO (2017) – Data processed by the authors.

In 1995–1998, investments into the area of air and climate protection represented over 50% from the total amount of environment-focused investments. The trend ended in the late 1990s. The year 1998 was a deadline for the implementation of environmental enactments required by law (Act no. 309/1991 Sb. of 9 July 1991 on air protection against pollutants). In the period from 2000 to 2002, the amount of investments on environment protection stabilized at about 20 billion CZK per year. From 2005, the Czech Republic gained a possibility to finance environmental projects by means of EU structural funds, which significantly increased the amount of resources going into projects focused on environment protection. It can be stated that the share of public

expenditure in GNP exhibited a growing trend in the period from 2000–2014 in spite of some minor oscillations. This favourable fact indicates that the public support to environment protection was growing proportionally with the growth of economy and did not show any critical drop even in the case of economy downturn (Ritschelová, 2016).

In order to meet the paper objectives, we first conducted the elementary static analysis of investment costs on environment protection in the Czech Republic in 1986–2015. Median is a set of values divided into two equal parts, it being understood that at least 50% of the values are larger than the median and 50% of values are greater than the median (Budíková et al., 2010). Variance (1) by itself is not interpretable quantity because the result is given in squares of measuring units. This is why the square root of variance (so-called standard deviation) is preferred in the variability assessment.

$$s^{2} = \frac{\sum_{i=1}^{n} (x_{i} - \bar{x})^{2}}{n}$$
(1)

The measurement of concentration closely relates to the measurement of skewness. Skewness (2) is equal to the average of the cubes of variable deviations from their arithmetic mean divided by the cube of standard deviation:

$$\delta = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^3}{ns^3}$$
(2)

The positive value of skewness points to the positively skewed distribution. Excess (3) is equal to the average of the biquadrates of variable deviations from their arithmetic mean divided by the biquadrate of standard deviation, all this minus 3:

$$\tau = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^4}{ns^4} - 3 \tag{3}$$

The average coefficient of growth is calculated as a geometrical mean of individual values of the coefficient of growth (4):

$$\bar{k} = \sqrt[n-1]{\frac{x_n}{x_1}} \tag{4}$$

The average absolute gain (5) specifies by how much on average the time series value increased/decreased during the reported period:

$$\bar{\Delta} = \frac{x_n - x_1}{n - 1} \tag{5}$$

The elementary statistical analysis of investment expenditure for environment protection in the Czech Republic in the period from 1986–2015 is presented in the below Table 1.

# Table 24: Elementary statistical analysis of investment expenditure for environment protection in the Czech Republic in the period 1986–2015

Median	4,747.52
Standard deviation	6,394.50
Variance	40,889,690.30
Excess	0.30
Skewness	1.16
Minimum	562
Maximum	22,323
Average absolute gain	1,306.19
Average coefficient of growth	1.10

Source: Data processed by the authors.

The development of investments into environment protection relates to legislative measures. The reason to the trend of increased investments in the mid—1990s was Act no. 309/1991 Sb. of 9 July 1991 on the protection of air against pollutants. The investment expenditures in the area of air and climate protection increase again now, this time in connection with stringent emission limits enacted by Decree no. 415/2012 Sb. Since the beginning of the 1990s and following the new legislation concerning the protection of air and climate, resources invested into this domain significantly increased and represented more than 50% of the total amount of investments focused on

the environment. In 2009, the investment expenditure on air and climate protection amounted to 3.6 billion CZK (decrease by 5% as compared with the previous year). Investment on waste management represents one of the three most important domains of expenditure on environment protection and the growing trend was clearly dominant in the last years. Figure 1 show that the amount of expenditure into waste management currently ranges between 4–5.6 billion CZK per year and its proportion in total capital expenditure on environment protection is ca. 20%. A similar increase in investments was shown in the area of wastewater management in the period from 2007 to 2015, the trend being in line with the requirements of the Accession Treaty of the Czech Republic to the European Union concerning urban wastewater treatment. The investments went mainly into the construction of urban wastewater treatment plants and into sewerage systems with the secured connection to wastewater treatment plants. Some money went also to the acquisition of equipment to monitor the cleanliness of water, tankers and cisterns for wastewater transport and storage. Nearly 40% from the item of other investments on environment protection went on the protection and remediation of soil, groundwater and surface waters. Average absolute gain for the reported period amounted to 1,306.19 and average growth coefficient was 1.1.

The main objectives of this paper were met by the correlation analysis being used to demonstrate the statistic dependence of two quantitative variables. This statistic dependence was measured by using Pearson's correlation coefficient (6):

$$r = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}}$$
(6)

The random variables X and Y are quantitative random variables with a common two-dimensional normal distribution.

Coefficient of determination  $R^2$  (7) specifies what percentage of total data variability can be explained by the regression model. The coefficient of determination ranges from 0 to 1, and the higher the coefficient is, the better the model explains the given data. In the case of linear regression coefficient,  $R^2$  is equal to the square of Pearson's correlation coefficient (6).

$$R^{2} = \frac{\sum_{i=1}^{n} (y_{i} - \bar{y})^{2}}{\sum_{i=1}^{n} (y_{i} - \bar{y})^{2}}$$
(7)

The principle of time series equalization by moving averages is to replace the sequence of empirical observations with a number of averages calculated from these observations (Hindls, 2007). Each of these diameters therefore represents a particular group of observations (Litschmannová, 2010). The moving part cannot be determined by exact statistical procedures. In practice, a majority of smaller lengths are chosen, for example p=3 will be considered. The estimate of  $b_{0t}$  is as follows (Hindls, 2007):

$$b_{0t} = \overline{y_t} = \frac{1}{m} \sum_{i=-p}^{p} y_{t,i} = \frac{y_{t-p} + y_{t-p+1} + \dots + y_{t+p}}{2p+1}$$
(8)

The moving average method is adaptive, which means that it is capable of working with such time series, the trend of which is subject to time changes (Křivý, 2006; Cipra, 2008).

#### 2 Conclusions

The correlation between the development of capital expenditure on environment protection and the emissions of carbon dioxide and other glasshouse gases was not demonstrated. The procedure is based on the principle of three-year moving intervals for adjustment the time series. Pearson's correlation coefficient came out as -0.2603. The fact that the dependence was not demonstrated is further documented also by the low index of determination, which is close to 0 (0.0678) – see Figure 2. We adopted zero hypothesis  $H_0$  about unsuitability of the model in the conducted *F*-test at a level of significance 95% (0.3904>0.05).

Figure 2: Dependence of the development of capital expenditure on environment protection on the emissions of CO<sub>2</sub> and other glasshouse gases (as compared with the reference year, 1990, 1995, 2000–2014)





The dependence of the production of wastes according to their categories on the amount of investments into environment protection in the period from 2009–2015 was confirmed (this time series being chosen because of unified reporting methodology) – see Figure 3. The procedure is based on the principle of three-year moving intervals for adjustment the time series. Pearson's correlation coefficient of 0.5626 shows a medium dependence. Thus, the model explains for only 56.26% of changes in the investments by the influence of total waste production. In the conducted *F*-test, we adopted the zero hypothesis about the model unsuitability at a level of significance 95% (0.0903>0.05). The modified index of determination came out as generally low, nearly 0.32, see below.





Source: Figure elaborated by the authors.

A correlation was further calculated between the amount of capital expenditure and the total volume of wastewater discharged into surface waters in the period from 2008–2015. The procedure is based on the principle of three-year moving intervals for adjustment the time series. Pearson's correlation coefficient came out as -0.9273, which indicates a perfectly indirect dependence (anti-correlation).





Source: Figure elaborated by the authors.

Thus, the greater is the increase of investments on environment protection, the greater is the decrease in the volumes of wastewater discharged into surface waters. The index of determination came out as nearly 0.86, which indicates a good quality of the regression model.

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# Military Spending and the End-Of-Year Spend-Out Rush

#### **Bohuslav Pernica**\*

Abstract. In order to spend public money in accord with the 3E-concept, the government should avoid any end-of-year spend-out rush; if possible, the budget execution should be smooth during each Fiscal Year (FY). From a specific point of view, a really good governing Chief Funds Manager should ensure spending of 1/12 of FY appropriations per a month ideally. Otherwise, the budget execution would generate wasting of public money, e.g., due to need of issuing of extra treasury bills. As a case study, the paper deals with defence budget execution in Czech Republic within 1996-2016. Besides, the ability of four Chiefs Funds Managers (ChFM) at Ministry of Defence (MoD) to prevent from the end-of-year spend-out rush is scrutinized. The situation of spending more than 1/3 of FY's appropriations in the last quarter of a FY is considered as a benchmark for the indication of the end-of-yearspend-out-rush phenomenon. The paper ascertains that no one of the ChFM was able to prevent the budget execution from the scrutinized phenomenon. The MoD usually spent 1/3 its run cost during the last FY quarter ordinary; moreover, 1/2 of the capital budget was often spent in the last three months of FY without any link to volume of capital budget. In addition, incapability of the ChFM to coordinate and control planning, budgeting, and budget execution has generated a lot of unexpected balances so far. In particular, the portion of unexpected balances was increasing whenever government made effort to raise the defence spending up in order to meet its 2-pct-GDP commitment to NATO; hence, MoD is not able to spend public money in accord with the 3E-concept as usual in the West countries.

**Keywords:** defense spending, budget execution, the end-of-year spend-out rush, budget rules.

JEL Classification: P21, H56, H6

### **1** Introduction

According to Wildawsky (2006c) there are lot of budget rules which ought to be followed by public sector managers in order to ensure Economy, Efficiency and Effectiveness (3E) of public money spending. Although countries differ each from other in both number and explicit utterances of such rules because of national budget law, some rules of budget execution might by consider as universal budget execution patterns. Ergo, they comprise a fundamental budgeting framework. For instance, no one is allowed to spend more cash in the Fiscal Year (FY) than his/her budget ceiling is, all appropriations should be effective in a particular FY because there is no sense of saving public money in the case of budget deficit. In such situation, cash is covered by issuing of bonds extending the public debt and such money saved for the next FY is losing its value due to inflation, etc. (Jones–McCaffery, 2008: 327-332) Regarding such patterns, we can speak on either international or national culture of budgeting based on rules and patterns keeping in mind by bureaucracy during the planning, budgeting and budget execution. (Wildawsky 2006c)

Dealing with the American defence spending, Planning, Programming, Budgeting and Execution System (PPBS-E), execution of defence budget, acquisition of defence materiel, and suchlike, Jones and McCaffery (2008: 358-369) defined five both formal and informal essential rules affecting the 3E of public money using in the U.S. Department of Defence: 1. Spend it all (Spend it or Lose it), 2. Do not overspend, 3. Spend it on the right stuff, 4. Keep it legal, 5. Do not become confused by complexity. According to Jones and McCaffery (2008: 369-377), there are other factors as well, e.g., flexibility, timelines, ceilings, floors, and fences, management information system, etc., which can influence the proper budget execution in accord with the 3E-concept. However, in principle, the budget execution is a complex and complicated process which accomplishment is conditioned and determined by human factor predominantly. In particular, the quality of budget managers responsible for planning, budgeting, and budget execution in accord with the 3E-concept should be considered as the crucial factor in budgeting.

As a substantial offence against 3E-concept of using of public money might be believed the end-of-year spendout rush, a situation when either 1/3 or more of FY's appropriations is spent in the last three months of a FY rashly or a deal of unexpected balances are generated as a consequence of poor management in the first nine months of a FY. In essence, such state of affairs when a state institution is run smoothly for 2/3 its outlays ceiling for 3/4 of

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the FY year by year insanities a natural potential of savings. Also, the cyclic end-of-year spend-out rush can manifest disorganization in public funds management even raise suspicion of corruption. Certainly, such kind of behaviour perils the reputation of governmental offices to deliver the good governance to tax payer. (Rothstein, 2014)

After all, the Czech Governments have undergone a deal of reforms in defence and security sector and public money management since 1993 when the security and economic integration of the Czech Republic started in order to deliver much more better good governance than governments prior to 1989. In particular, the budget law was changed significantly in favour of the 3E-concept of spending of public funds. That was a consequence of modernization effort made in connection with the integration of the Czech Republic into EU. The first significant modernization in budgeting happened in 2002 when a new budget law come in force, e.g., a flexibization of using of funds was introduced, the budget cycle got hard and fast rules, and the mid-term financial planning was introduced. The other vital innovation was adopted after 2010 when the Fiscal Framework Reform (Czech Government 2011: 27-28) was introduced in order to settle and cut down the growing public debt. Besides, the Ministry of Defence (MoD) introduced PPBS-E in 1993 in order to bring more transparency, Economy, Efficiency and Effectiveness into defence spending. The PPBS-E was scheduled as fully operating in 1996. (Ochrana 1995)

By coincidence, the public debt started growing sharply after 1996 when the Czech Republic aspiring to be a part of NATO was forced to adopt the NATO-2-pct-GDP-commitment; therefore, the issue of proper planning and proper budget execution gained substantial importance. MoD permanently whimpering for more money in order to meet all NATO requirements could not tolerate wasting of money in feverish end-of-year spend-out rush which was rather common behaviour in the Czechoslovak People's Army. Nonetheless, such habits die hard; in particular, when they became a piece of budget execution patterns. Also, the aim of the paper is to analyse the phenomenon of the end-of-year spend-out rush in the defence spending in the Czech Republic in comparison with the United States where such a budget execution is considered as detrimental. (Jones–McCaffery, 2008: 361)

This end-of-year spend-out rush habit ought to be considered as serious factor undermining not only the effort of the Ministry of Finance to administrate the public money in accord to the 3E-concept but the phenomenon is destroying the effort to get more national security by raising defence spending up in accord with the NATO-2-pct-GDP-commitment as well. The detrimental budget execution behaviour intended to execute 100% appropriations at all costs, most of them in the last months of a FY without regard to any Economy, Efficiency and Effectiveness of public money, is demonstrated on the Czech defence budget. The data analysed was provided by the Czech Ministry of Defence (MoD) in its Final State Budget Document. (MoD 1997–2017) Data covers period of FYs from 1996 to 2016. The quality of defence budget execution in the Czech Republic is explained in connection with performance of the Chief Funds Manager at MoD (ChFM), a high official in charge of budgeting, adoption of budget bill and budget execution in accord with budget law and the 3E-concept who is accountable to a political leader at the defence ministry.

# 2 Problem statement and methodology

The budgeting is a part of (good) governance, because according to Wildavsky (2006a) "control over public money and accountability to public authority were among the earliest purposes of budgeting". – It is a tool of public policy which "is supposed to contribute to continuity (for planning), to change (for policy evaluation), to flexibility (for the economy), and to provide rigidity (for limiting spending)." (Wildavsky 2006b) Nevertheless, the limitation is usually made upon the future projection made by funds managers. Also, appropriations for a FY are always calculated in link with events expected for the upcoming FYs. Nonetheless, the budget execution is usually affected by not predictable contingencies although it should be a routine from point of view any ChFM. Also, "budget execution is of this nature–highly complex, complicated, and always changing." (Jones–McCaffery, 2008: 358)

Despite the fact of emerging contingencies upsetting the financial planes elaborated carefully by ChFM, the budget execution should by rather rigid due to limitation of spending. You cannot spend for a FY more than your obligations are (set by the Ministry of Finance). So, Jones and McCaffery (2008) analyse the funds management of Operational and Maintenance Account (running cost) of the U.S. Department of Defence during the FYs 1977–1990 and presented steady monthly obligation rates. They proved that "apportionments are an effective tool for preventing too rapid an obligation of total funds at any point in the FY." (Jones–McCaffery, 2008: 347) Although the first (September) and last (August) months of the FY were highest spending months, the monthly obligation rates oscillated close about 1/12 of the FY appropriations ceiling. "As a meter of practice, the budget execution box (limits) in which the budget fund administrator is forced to work is bounded by appropriation life, appropriation size, and the penalties associated with either over or underspending." (Jones–McCaffery, 2008: 348) Hence, such a smooth and proportional budget execution is to prevent from the behaviour known as the end-of-year spend-out rush (Jones–McCaffery, 2008: 361) emerging during the FY closeout when "funds not obligated are lost". (Jones–McCaffery, 2008: 335)

In dependence on the national budget law, some such funds might get unexpended balances sometimes; however their purchasing power in the next FYs is decreasing slowly due to inflation. Besides, such savings are senseless whenever there is a budget deficit covered by public debt because the interest rates paid by the government from bonds and treasury bills are usually higher than the interest rates paid for cash depositing. From such point of view, the Economy, Efficiency and Effectiveness of public money spending are determined by the professionality and ability of ministerial bureaucracy to plan and manage the funds properly. Not to do in such a manner might be seen as decaying of system of budgetary control, or better, corruption defined by the World Bank (WB, 1997: 19-20) as "the abuse of public office for private gain."

In order to ensure the continuity and coordination of budget management across the state executive, there is ChFM at each ministry, a high official accountable for budgeting, adoption of budget bill, budget execution and so on in accord with the national budget law, who is subordinated close to a political leader, the minister. So such a powerful authority has the power to shape the internal financial system by specifying internal rules and to force the other participants to behave in accord with the 3E-concept. In that opinion, the ChFM is accountable for the regular budget execution: spending of 1/12 of FYs appropriations per a month, 1/4 of FYs appropriations per a FY quarter ideally in order to limit the extension of the public debt due to unexpected need of selling of extra treasury bills by the Ministry of Finance. Whenever the budget is executed irregularly then there is an excellent probability that the end-of-year spend-out rush will emerge in the last months of the FY.

As a private gain might be seen the remuneration of the ChFM independently from his/her success to control planning, programing and executing the defense spending in accord with the 3E-concept of public money spending; in other words, ChFM are obligated to prevent from any emerging of the phenomenon of the end-of-year spend-out rush which violates the 3E of public money. On the other hand; that phenomenon might be beneficial for any ChFM who tends to moral hazard. For instance, his/her passivity would be motivated by expectation to profiting from not spent funds intended for remuneration. Such funds are usually spent at the end of the FY as premium bonuses in order not to lose such money. The ChFM is usually the first and the closest person to the defence minister who advises his/her immediate superior about such unemployed financial resources which could be utilized for extending the minister's approval in the ministry.

The capability of the ChFM at MoD to prevent the budget execution from the end-of-year spend-out rush in the last 20 FYs can be analysed with data provided by the MoD in the Final State Budget Document. (MoD 1997–2017) There is a table in the document presenting the budget execution in four quarters of the FY divided into capital outlays (Investment Budget) and running cost (Operation and Maintenance and Personnel Cost). In line with the explanation provided above, as the end-of-year spend-out rush is considered the situation when more than 1/3 FY appropriations is spent in the last FY quarter, including any generation of unexpended balances. In order to study the quality of management performed by ChFM at MoD, we will set a pattern of investment and run cost budget execution for each ChFM who were changed within 1996–2016 and we will portray a shape of budget execution in a specific FY.

In order to explain the end-of-year spend-out rush phenomenon in the defence budget execution, we are not going to use some special methods. The problem is just demonstrated in charts. First of all, the FY ceilings for run cost (Run Cost Budget) and investment budget (Investment Budget) are divided into quarters, so we have an ideal budget execution per a FY. Then, a shape of budget execution is portrayed for each FY. The shape shows deviations from the ideal budget execution in each quarter. Finally, the budged execution in the last quarter (Q4) as percentage of the FY ceilings is plotted on a graph compared with the benchmark of 33 pct. The benchmark indicates the consumption of 1/3 budget ceiling in the last quarter of a FY. The shape of budget execution indicates style of consumption. For instance, the budget execution accelerates from quarter to quarter, so we have an oblique line; the budget execution gets into difficulties in Q2 and Q3, so we have a V-shaped line, and so on. The closer to the line of ideal budget execution is the budget execution in each quarter the better management style of a ChFM.

Both the shape-line and the budget execution in the last quarter are used for an evaluation of each Chief Funds Managers at MoD within the scrutinized time period of 20 FY. According to the Ministry of Defence Almanac, (MoD, 1994–2016) four Chief Funds Managers and more than ten ministers of defence have changed since 1996. (Pernica, 2016) Those Chief Funds Managers were a different background how we can see from **table 1**. Due to fact that we are dealing with cultural patterns of budgeting and budget execution, the background is significant. Only experienced and skilled managers are usually able to control the budget execution in accord with 3E-concept in such a complex system as the MoD is.

The Chief Funds			Experience prior to his/her
Manager	In Office	Education	appointment in office
	01/01/1994-04/11/2004	University of	Ministry of Defense, conscript
1. J. Dzvoník		Economics,	
(colonel)		Bratislava	
2. T. Perutka	01/01/2005-22/07/2010	military college,	Ministry of Defense, official
(colonel)		Vyskov	
			Chief of managing board at General
			Health Insurance Comeny, Chief Funds
			Manager at the Ministry of
		University of	Transportation, financial director at a
3. L. Tejnil	09/08/2010-30/06/2012	Economics, Prague	private college
4. R. Vítek		military college,	
(colonel)	01/07/2012-	Vyskov	Ministry of Defence, official

Table 1: The Chief Funds Managers at the Czech Ministry of Defense and their Background, 2006-2016

#### Source: MoD (1994-2015)

Excluding L. Tejnil, the Chief Funds Managers usually started their career at the Ministry of Defence where spent bulk of their life. So they had a time enough to adapt themselves on internal culture of budgeting which patterns could be passed down on their successors coming often from the same institution. Maybe, they cannot be conscious of doing their job badly (contrary to the 3E-concept of public spending) because of lack of a good example and incompetent defence ministers. So, we might develop the hypothesis that all *Chiefs Funds Managers at the Ministry of Defence, as graduated economists, followed in their jog the 3E-concept of public money spending also there is no sign of the end-of-year spend-out rush in the budget execution during their term of reign.* 

# 3 The end-of-year spend-out rush phenomena in defense spending

Issued by theory, data, methodology, and hypothesis, we can present the analyses. The results are summarized in the **figure 1** containing information on: (i) government changes (white/grey stripes), (ii) changes on the post of the Chief Funds Manager at the Ministry of Defence, (iii) volume of capital outlays and run cost in budget of the Ministry of Defence approved in budget law for FYs 1996–2016 decomposed regularly among all FY quarters, (iv) course of executing of the investment budget and run cost budget (a profile-curve for each FY), (v) the threshold of the end-of-year spend-out rush (1/3 FY appropriation spent in the last FY quarter), (vi) percentage of appropriations spent in the last FY quarter. The execution of budget includes unexpected balances too.

Unfortunately, there was not enough space for information on effort to meet the 2-pct-GDP-NATO commitment due to complexity of the problem; however, the trend is visible: the more appropriations in a FY the more significant the end-of-year spend-out rush; and vice versa, the more austerity in defence spending the more responsibility is to seen in effort done by the Chief Funds Manager without any reference to his professional background. *Also, the hypothesis is false.* The Chief Funds Managers at MoD were usually not obeying the 3E-concept of public money spending during their time in the office. It seems they did not struggle with reform in budgeting and budget execution during their time in their office, also they have alternative objectives.

Although being so poor managers, the significance of the Chief Funds Manager office and the social status officials appointed into this office were rising proportionally to increasing of defence spending. According to the Almanacs (MoD, 1994-2016), J. Dzvoník started his career of the Chief Funds Manager as a departmental director in 1993 and eleven year later he became the ministry deputy for financial management. His accessor, T. Perutka, was forced to start his career of the Chief Funds Manager as a departmental director in 2005 due to reengineering the Ministry of Defence after the Dzvoníks dismissal; nonetheless, he became the post of the Chief Funds Manager – the Deputy Minister for Economy Matters in 2009. It seems that the Chief Funds Managers with their military background strived for any ennoblement of their social and organizational status than for their professionality.

Although there was not any sign of good governance at the Ministry of Defence provided by the top-brass financial management, the government keep ensuring the influx of money in order to meet the commitments to NATO. (Pernica, 2016) In addition, the changing defence ministers provided to cunning administrative officials higher social status than they needed for their rather poor performance in the office of Chief Funds Manager. As deputy ministers, they got the status of a political person. Unlike other deputy ministers nominated by political parties in government, they were chosen from ministerial officialdom by politicians and they constituted a pseudo caste *per se*. From such a point of view, we can only guess what circumstances of such "dirty political deals" were; however, the Chief Funds Managers not able to spent increasing appropriations on genuine military needs such

soldiers, tanks, ammunition and suchlike, as NATO would wish, usually used the superfluity of cash for another purposes.







Considering apart from the fact that the military chorus line Ondráš was considered as a military capability in the defence budget, (Pernica 2015) public money approved by the Parliament for Guns in good faith was spent on Butter in the end. For instance, the Chief Funds Managers kept sending the military money as financial injections to four medical facilities (The Central Military Hospital in Prague/renamed to Military University Hospital in 2011, The Military Hospital in Brno, The Military Hospital in Olomouc, The Institute of Aviation Medicine in Prague) in order to rehabilitate their poor economic performance indicated for a long time. But those facilities provided health care to civil population in most cases. According to the Final State Budget Documents (MoD 1997–2017), the inceptive dotation claimed from the MoD almost doubled each FY in order to get the medical facilities in the black in the last 20 FYs. Funds allotted to national defence (Guns) initially were spent on other purpose finally (Butter) due to disability of the Chief Funds Managers to execute the defence budget in line with the 3E-concept of public money management.

Although all ChFM continued with the established practice of "conversion Guns into Butter" in defiance of tax payers, the most experienced ChFM with the ample background, L. Tejnil, was the only one who did not met the 33 pct benchmark for the Q4 in 2012. That situation should be understand in a close link with the austerity enforced by the former the Deputy Minister for Economy Matters at MoD from 1993 to 1998 and the finance minister at that time, M. Kalousek. Conscious of situation still remaining at MoD from his term of reign, he was reducing the prospect of military budget ceilings. The MoD budget ceilings were scheduled from 44,000 million in 2011 to 35,000 million in 2014. In order to prevent from such a scenario, L. Tejnil, as a newcomer at MoD, was working as a crisis manager. Nonetheless, he was not able to break the old cultural patterns coming from the pre-Kalousekian period.

# 4 Conclusions

As a NATO member country, the Czech Republic ought to spend 2% GDP as defense spending in order to shown its concern in common security under the Alliance umbrella. Therefore, the governments keep issuing resolutions on increasing of military expenditures at not less 2% GDP. Yet the Ministry of Defense has not been able to spend such a portion of money in accord with the 3E-concept of public money spending due to poor managerial performance of the Chief Funds Managers. As tangible evidence such a performance, the end-of-year spend-out rush should be considered. Moreover, the end-of-year spend-out rush is a bad culture pattern of budget execution from communism time.

Giving evidence by the analyses of defense budget execution within FYs 1996–2016, the MoD usually spent more 1/3 of its appropriations for Run Cost Budget and 1/2 of appropriations for Investment Budget in the last FY quarter. Due to such harmful habit supported by all Chief Funds Managers administering the defense budget in the last 20 years, the 3Es of military spending are rather low. In order to retrieve bulk of cash, approved by the Parliament for military purposes, from getting unexpected balance, the Chief Funds Managers, not being able to control the military spending in accord with the 3E-concept of public money spending, kept sending the cash to civilian purposes, for instance, to military medical facilities. That means MoD lacks good governance.

Such a bad habit of budget execution might be considered as a trace of corruption too. In particular, if politician let promote Chief Funds Managers to higher organizational and social status than they needed for a proper performance of their office. The comparison with the quality of financial management performance at the U.S. Department of Defense provided by Jones and McCaffery (2008) indicates that the Czech Republic is still emerging market economy which needs some support by the West countries in order to enhance its quality of financial management. Otherwise, any raising defence expenditures to the 2-pct-GDP-commitment to NATO would support misusing of public money allotted to national security, i.e., the money might be spent rather on non-defence than defence purpose. That could be seen as corruption behaviour.

In that opinion, we cannot agree with Z. Kriz's (2010) opinion that Defence and Security Sector Transformation in the Czech Republic was rather a success. Evidence given by this paper outlined that the Ministry of Defence is still in the phase of transformation anomy described for the Czech post-communist society by Burianek (1994) and discussed by Rabusic and Mares (1996) later on. According Rabusic and Mares (1996) the transformation anomy emerges if there cultural values conflict with social reality and that situation generates normlessness, anomy. I that case, the 3E-concept of public money spending was declared for a value of institutional culture, but behaviour of majority of actors is different. In such kind of situation, the predictability of desirable outcomes (set by planning and programing) is on the decline and any final result is generates rather by chance, for instance, by an intervention a powerful figures in the system. Such figure might be considered the finance minister, a former businessmen, striving to control the state as his chain of firms, or a Chief Funds Manager eligible to spend a deal of money allotted on a specific purpose by the Parliament on completely different purposes in order to save such money from losing it. However, such expenditures are registered as the national contribution to NATO at the end of day.

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