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EVALUATION OF THE IMPACTS OF SELECTED TAX REFORMS INFLUENCING THE INCOME OF INDIVIDUALS IN THE CZECH REPUBLIC

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Abstract:

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Ability to predict the impacts of proposed tax changes is crucial for effective and transparent tax policy. The ex-ante impact evaluation of proposed changes is in the Czech Republic part of the Regulatory Impact Assessment process and assumed effects are published within the reasoning reports to the amendment laws. We use the top-down approach to calculate ex-post the impacts of the most significant changes in personal income tax and contribution on obligatory insurance on public revenues and compare the results with forecasted effects from reasoning reports. We use data for the period of 1994 to 2014 and create three models to quantify the impact on personal income tax revenue, social security contribution and health insurance contribution. The results show the tendency to underestimate real effects about a third to a half when calculating the projected impact on public revenues. For more accurate estimations we recommend higher transparency in presented methodology within the Regulatory Impact Assessment process and evaluation by independent institution for changes with significant impact.

Keywords: personal income tax, tax reforms, tax revenues, social security contribution, health insurance contribution

INTRODUCTION

Transparent fiscal policy depends among others on the ability of policy holders to forecast impacts of proposed changes on public revenues. These forecasts are usually presented within the reasoning reports of the proposed changes of the legal acts as well as in the documents prepared for the European Commission (e.g. Convergence Programme).

One of the measures taken to improve the quality of such forecasts is the process of RIA (ex-ante Regulatory Impact Assessment). In the Czech Republic, RIA was fully integrated into the legal process of proposing new legislation since the end of 2007. RIA's main goals are to systematically improve the legal environment, contribute to the transparency of the public sector and to higher awareness of planned legislation, as well as to eliminate unnecessary changes in the legislation. (Government of the CR, 2015a) Regulatory impact assessment, even though in specific forms, is considered to be important part of the regulation process within the European Union (EU) and OECD countries. (Staroňová, 2010, Vítek, 2012)

In some EU countries also the concept of independent fiscal institution (also called "fiscal council") is used as important part of regulatory impact assessment processes. Fiscal councils usually consist of independent economists. As non-partisan institution, it should monitor the processes and proposed changes in the public sector, and provide qualified evaluation of the governmental impact assessments as those can be influenced by the governmental intentions. Fiscal councils currently recorded by the European Commission are in 24

states of the EU; there is no such institution in the Czech Republic. (European Commission, 2015)

As an attempt to have similar fiscal institution in the Czech Republic can be considered foundation of National Economic Council (NERV) in 2009 and for the last time suspended in August 2013 (Government of the CR, 2015b). No similar independent body to serve as fiscal council has been introduced in the Czech Republic since then.

For further improvement of impact evaluation ex-post analysis of the accuracy of predicted impacts is important; however there is very small number of academic articles in the Czech Republic, which are dealing with this problem (e.g. Dušek et al., 2014). In most cases the papers are focused on the analysis of the impact of reforms on income distribution and the question of the impact on public revenue is not being solved.

Public revenues resulting from the income of individuals are mainly in the form of personal income tax and obligatory contribution on social security and health insurance in the Czech Republic. The legislation relevant for calculation of these payments has been subject to many changes since its introduction in last decade of 20th Century. The impacts of most significant changes had been calculated and stated in the reasoning reports.

The aim of this paper is to calculate ex-post the impacts of the most significant changes in personal income tax and contribution on obligatory insurance with the use of empirical analysis and compare the results with forecasted effects from relevant reasoning reports.

Structure of the paper is as follows. Firstly, we discuss theoretical possible approaches of evaluating impacts of reform changes, then we describe main changes in direct taxation of individuals in the Czech Republic during the period of 1994 to 2014. This reform changes are further used within the empirical analysis. Next part of the paper is structured in standard way. We describe the data and methods and follow up with presenting the results of empirical analysis and concluding remarks.

Evaluating the impacts of tax reforms

The *ex-post* evaluation of the impact of tax reform is from the methodological viewpoint very complicated issue. It is necessary to create an alternative scenario (so-called "based line scenario") which describes the situation without the implemented changes. Not only reform changes cause the change in public revenues; it is also influenced by the economic factors, such as GDP, unemployment rate and inflation. Considering the impact of the reforms, also the distinction between static and dynamic effects of reforms should be made. If, for example, the government will reduce the tax burden on labour, on the one hand, there is a drop in public revenues, but on the other hand this may also lead to increase of public revenues, because of the growth of the labour supply.

The dynamic effects are mostly long-term, and are not researched in most empirical studies. The reason is that for quantification of such long-term effects, it is necessary to know the value of the elasticities of tax bases on the changes in the tax burden, which is not easy to quantify due to absence of necessary quality data.

The static evaluation of the impact of reforms on tax revenues can be accessed from two methodological viewpoints – a bottom-up and top-down approach. The bottom-up approach is based on microsimulation. Using individual data from various statistical surveys (e.g. EU-SILC) the differences are calculated for each household in the tax payments between before and after the tax reform. Subsequently, the differences in the tax payments for various household types are multiplied by their numerical representation in the population. The advantage of this method of evaluation is the ability to analyse not only the change in public revenues, but the redistributive impacts as well. The disadvantage is that such approach is highly work and time demanding. Moreover, it is very difficult to take into account the effects of other factors, such as economic growth, inflation or others.

The second possibility for static evaluation of the impact of the reforms is a top-down approach, which is based on the data from national accounting and on time series analysis tools. Its advantage is the availability of data and the possibility in the context of the construction of individual regression models to take into account the effects of other external variables. The main disadvantage is often very short time series, which can negatively affect the quality of the created models. In this paper we used the top-down approach to quantify the impact of main changes in taxation of personal income on public revenues.

Major reforms influencing income of individuals in the Czech Republic

Personal income tax as well as legislation on obligatory insurance (social security and health insurance) is regularly subject to changes. Calculation of contribution on obligatory insurance and personal income tax is strongly interconnected in the Czech Republic. Tax base from employment is calculated as gross salary plus the contribution on obligatory insurance paid by the employer (the rate for this part of the obligatory contribution is 34 %; specific treatment must be respected such as minimum and maximum assessment bases etc.). Assessment base for the calculation of the contribution is derived from the tax base of employees and self-employed. Tax base of self-employed can be significantly influenced by the use of so called lump sum expense; these are considered to be high in the Czech Republic compared to other EU/OECD countries. (OECD, 2014, European Commission, 2014). Due to this strong interconnection, the change in personal income tax

can affect the contribution on obligatory insurance and vice versa.

In past twenty years, there have been several reforms in taxation (including contribution on obligatory insurance) of individuals with significant (in billions of CZK) impact on public budget. These changes were implemented mainly by following amendments: 545/2005 Coll., 261/2007 Coll., 221/2009 Coll., 500/2012 Coll.

Amendment of Income Tax Act number 545/2005 Coll. brought significant change in calculation of personal income tax as most of the tax deductions (for tax payer, spouse, children, students, disabled persons) were transformed to tax credits. With the same amendment the progressive tax rate was lowered within the first two brackets (from 15 % to 12 % and from 20 % to 19 %) and the lump sum expense rates were increased. The negative impact in the amount of CZK 14 bill. was assumed on personal income tax revenues in the reasoning report.

Most changes relevant for following analysis were effective since January 2008 (implemented by 261/2007 Coll.). Extensive reform incorporated among others flat tax rate of 15 % (replacing progressive tax rate) and significant increase of tax credits for individuals. Overall changes in personal income tax revenues assumed negative impact of CZK 19.4 bill. in the reasoning report. The same amendment introduced maximum assessment bases for the calculation of the contribution on both social security and health insurance in the amount of CZK 1,015,392 (calculated as 48 times average wage), which was expected to lower the contribution for 1.2 % of persons insured. The negative impact in the amount of CZK 4.4 bill. on contribution on social security and CZK 1.8 bill. on contribution on health insurance was assumed for 2008 in the reasoning report.

To support employment in the CR, as a part of the measures taken against the worldwide financial crises, extra credit on social security contribution was introduced by the amendment number 221/2009 Coll. The degressive credit was designed to support mainly employment of employees with lower wages, as they would greatly suffer by the loss of employment during the recession. The credit was planned as temporary support to employment just for the years 2009 and 2011, however was abolished after one year (by the amendment number 362/2009). The amount of credits provided in 2009 was assumed to be CZK 17 to 19 bill. in 2009; other cost such as software, forms and procedures adjustments were assumed in the amount of CZK 30 to 40 mill. according to reasoning report.

In 2010, the maximum assessment base for contribution on health insurance was increased from 48 times the average wage to 72 times the average wage. At the same time the maximum assessment base for contribution on social security insurance remained at 48 times the average wage.

Amendment number 500/2012 Coll., effective since January 2013, introduced so called solidarity surplus tax of 7 % paid from income from employment and business profit of self-employed exceeding the value of 48 times average wage. This limit for solidarity surplus tax equals to maximum assessment base for calculation of contribution on social security insurance. Meaning that when the income from employment or profit from self-employment exceeds the cap for contribution on social security insurance, the above part is subject to 7 % solidarity surplus tax. At the same time the maximum assessment base for contribution on health insurance has been abolished. This set of changes can be also considered as effort to have the social security (mainly pension) system as equivalent as possible and at the same time to get the obligatory payment from the richer to the public budget. Assumed impact of implementing the solidarity surplus tax in 2013 was CZK 1.5 bill., the same amount was assumed as resulting impact of abolishing the maximum assessment base for contribution on health insurance in the reasoning report.

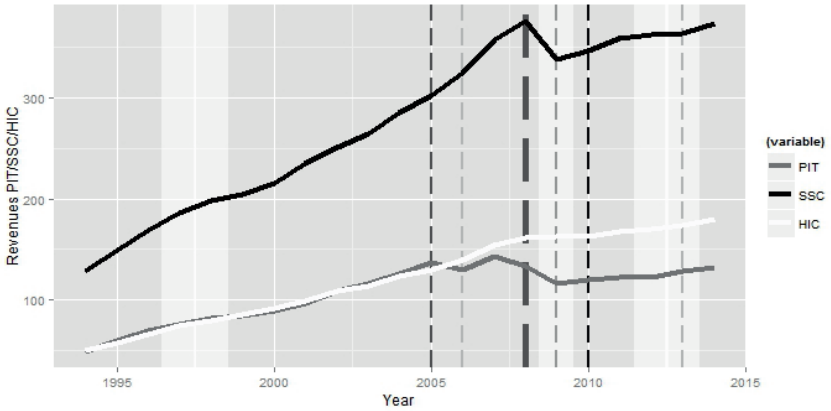
Data and methodology

We used publicly available data on personal income tax revenues (data on collection of taxes from Financial Administration, 2015), contribution on social security (Statistics on Social Security for years 1994 to 2014 from Czech Social Security Office, 2015) and contribution on health insurance (Health yearbook 1994 to 2014 issued by Institute of Health Information and Statistics of the Czech Republic, 2015), as well as on Compensation of

I: *Descriptive Statistics (in millions of CZK)*

Variable	Mean	Standard Dev.	Min	Max
Revenues of personal income tax (PIT)	106,927	27,553	49,279	143,391
Revenues of social security contribution (SSC)	275,450	81,866	128,745	375,368
Revenues of health insurance contribution (HIC)	121,596	42,499	50,000	179,802
Compensation of Employees (CE)	1,206,949	389,396	548,602	1,712,330
Wages and Salaries (WS)	915,529	296,173	414,593	1,297,505

Sources: Financial Administration, 2015, Czech Social Security Office, 2015, Institute of Health Information and Statistics of the Czech Republic, 2015, Czech Statistical Office, 2015a



1: *Developement in personal income tax revenue, social security contribution and health insurance contribution revenues for 1994–2014 (in billions of CZK)*
Notes: Vertical grey lines represent main reforms in taxation and obligatory insurance of individuals with major impact on public revenues. Transparent vertical areas point out the years with negative change in real GDP.
Sources: Financial Administration, 2015, Czech Social Security Office, 2015, Institute of Health Information and Statistics of the Czech Republic, 2015, Czech Statistical Office, 2015a, relevant legislation as described in section "Major reforms influencing income of individuals in the Czech Republic", data on GDP retrieved from Czech Statistical Office, 2015b. Processed in R (R Core Team, 2015)

employees and Wages and salaries (both available at GDP by the income approach from Czech Statistical Office, 2015a).

Data for personal income tax are calculated as sum of personal income tax from dependent activity and personal income tax of self-employed. Other variables are overtaken from cited sources without any need of aggregation or other manipulation. All data are for the period of 1994 to 2014. For evaluation of period selected tax reforms, we create dummy variables assigning value 1 to the year of the change and 0 to all other years. Each dummy variable represent one change separately.

Descriptive and exploratory analysis

First, we performed descriptive and exploratory analyses to see the development in relevant variables used later in regression. There are 21 observations for all presented variables, as we work with the time series data for the period of 1994 to 2014. There are no missing values in the time series data. The value for health insurance contribution in 1994, which is also the minimum value in this time series, was available only as approximate rounded number of CZK 50,000 mill. (Health Information and Statistics of the Czech Republic, 2015, Health yearbook for 1994). However, we are of the opinion that this does not limit the analysis.

Figure 1 presents the development in time series further used in regression as dependent variables (PIT, SSC and HIC) and independent variables (CE and WS). Vertical grey lines represent main changes in the legislation influencing tax and contribution on obligatory insurance and thus having impact on public revenues of personal income tax, social security contribution and health insurance contribution. Transparent vertical areas emphasize the recession periods in the CR, as the periods with negative growth of real GDP; there is mainly visible the impact of the worldwide economic crisis in 2009.

The econometric evaluation of the impacts of selected reforms

Further, we analyse the impact of selected tax reforms on personal income tax revenues and on contribution on social security insurance and on health insurance.

Thus we estimate three regression models, where dependent variable is represented by these three types of public revenues personal income tax (PIT), social security contribution (SSC) and health insurance contribution (HIC).

We use two main explanatory variables alternatively for model with PIT as dependent variable (Model I) and for two models with SSC as dependent variable (Model II) and HIC as dependent variable (Model III). The reason for this solution is the different construction of PIT tax base and assessment bases of SSC and HIC. While since 2008 in the case of PIT is the tax base for employees so called super-gross wage (it means gross wage plus social and health insurance contribution paid by employer), in the cases of SSC and HIC is the assessment base the gross wage. Given the problematic approximation of tax and assessment bases for self-employed persons and their relatively minor significance in the public revenues we do not work with any variable that would describe it. But it can be expected that the development of their bases will be strongly correlated with the development of employees' wages. We can therefore assume, that the variables "Compensation of Employees" and "Wages and Salaries" contain in themselves also the

II: *Factors affecting the revenue of personal income tax, social security and health insurance contributions*

	Model I	**Model II**	**Model III**	
Dependent variable	ΔPIT	ΔSSC	ΔHIC	Effect as predicted in reasoning reports (in bill. CZK)
Const.	-3.493*** (1086.97)	2,356.37** (1,733.14)	2,292.34*** (770.48)	
Δ Compensation of employees	0.162*** (0.016)			
Flat tax rate (15 %), super gross tax base	-23,748.1*** (2694.38)			-19.4
Solidarity surplus tax (7 %) + other changes	7,468.23** (2683.8)			3.5
Transfer of tax deductions to tax credits	-19,625.4*** (2658.12)			-14
Δ Wages and salaries		0.2698*** (0.033)	0.0991*** (0.0152)	
Maximum assessment base SSC		-7,421.88* (3,812.63)		-4.4
Credit on SSC		-33,361.6*** (4,267.79)		-19
Maximum assessment base HIC			-3.551.44 (2,047.7)	-1.8
Adj. R2	0.8941	0.9365	0.6816	
F test (p-value)	6.51e-08	2.18e-10	0.000023	

*** significant at the 1 % significance level; ** 5 % significance level; * 10 % significance level; standard deviations in brackets, number of observations 20.
Source: own calculation

information about the development of the tax and assessment bases of self-employed persons.

Because we work with the time series data, we have checked the stationarity problem. Unit root test showed a problem in most of the variables, and therefore we used the differentiation, bringing the number of observations fall to 20. To evaluate the effect of selected tax reforms, we create set of dummy variables setting 1 for the year when the change has been introduced and 0 for all other years.

We set up three regression models and due to a problem with the heteroskedasticity and autocorrelation we used consistent standard errors (HAC). Results of the regression models, as well as impacts assumed in reasoning reports of relevant legal acts are presented in Table 2.

Presented results of regression models identified statistically significant effects of the three reforms in the case of PIT and two in the case of SSC. In the Model I, the positive relationship between "Compensation of employees" and tax revenue was confirmed. The regression coefficient of 0.16 represents the average marginal tax rate on super-gross wage in the researched period. From the analysed reforms the major impact on public budgets had reform of 2008, which caused a loss of up to CZK 24 bill. in PIT revenue, while the Ministry of Finance predicted only less than CZK 20 bill. The second major intervention in PIT revenue was the transition from tax deductions for tax credit in 2006, which caused loss of CZK 19.6 bill., while the forecast was just CZK 14 bill. Finally, the introduction of the solidarity surplus tax and the abolition of the right to tax credit for working pensioners brought up additional revenue of CZK 7.5 bill., while the government presented an estimation of CZK 3.5 bill.

Model II identified the marginal rate of insurance in the amount of 27 % of "Wages and salaries". Two of analysed reforms had statistically significant effects on the SSC revenue. Firstly it was the extension of maximum assessment base on employment income in 2008, which caused a reduction of SSC revenue in the range of CZK 7.5 bill., while the prediction of public administration was only CZK 4.4 bill. Secondly, the introduction of temporary extra credit on SSC for low-income employees in 2009 resulted in revenue shortfalls in the range of CZK 33 bill., while the assumption of government was only CZK 19 bill.

Model III identified the marginal rate of 10 % and the analysed reforms did not show any statistically significant impact on the HIC revenue. Relatively close to 10 % level of significance is the regression coefficient for reforms introducing a maximum assessment base in 2008, with the revenue shortfall estimated at CZK 3.6 bill., while the assumption of public administration was about 50 % lower.

CONCLUSION

Presented results of ex-post evaluation of the impact of major reforms in PIT, SSC and HIC on public revenues suggest that the public administration has a tendency to underestimate real effect about a third to a half when calculating the projected impact on public revenues. It is true both for the reduction and increase of the tax/contribution burden.

It could very significantly influence the legislators in approving individual laws. In the case of reforms that decrease the tax/contribution burden, it seems that the impact on the public revenues will not be so important. On the other side, in the case of reforms that increase the tax/contribution burden, it may lead to underestimation of the restrictive impact on the demand side of the economy.

Based on the above, we recommend higher transparency of the methodology used in estimated impacts of proposed tax reforms on the public revenues. Detailed description of the methodology should be presented within RIA, especially whether the micro- or macro-economic approach was used. Furthermore, it seems appropriate in the case of more extensive reforms, e.g. with expected impact of more than CZK 5 bill., to include an independent body in the process of evaluation as well. Such independent role could be represented by the fiscal council like in some other EU countries.

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