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Employment as a macroeconomic factor that impacts tax revenues

Abstract

Labour market indicators, such as employment rate, unemployment rate, labour force structure, wages or amount of paid wages, are important factors that can directly impact the tax revenues and therefore are often used in relation to tax revenues estimates. However, in addition to these factors, there are also other macroeconomic indicators that are significantly involved in the amount of tax revenues. This thesis analyses the employment as a decisive macroeconomic indicator of tax revenues in EU member countries. The aim of the thesis is to confirm the significance of the labour market indicator as the decisive factor in tax revenue monitoring by using three models of regression analysis (pooling model, fixed effects model and random effects model). The analysis shows that the employment rate represents the indicator with the greatest impact on the tax revenues, where an increase of the employment rate by 1% led to an increase of tax revenues by € 11,555 million. Other important macroeconomic indicators were gross domestic product and foreign direct investments.

Keywords: employment; labour market indicators; macroeconomic indicators; tax burden; tax revenues.

JEL CODE: H20, H21, H25.

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Zatrudnienie jako czynnik makroekonomiczny wpływający na dochody z podatków

Abstrakt

Wskaźniki dotyczące rynku pracy, takie jak stopa zatrudnienia, stopa bezrobocia, struktura siły roboczej i płace są ważnymi czynnikami, które mogą bezpośrednio wpływać na dochody podatkowe, a zatem często są wykorzystywane do szacowania dochodów podatkowych. Oprócz tych czynników istnieją również inne wskaźniki makroekonomiczne, które znacząco

wpływają na wysokość wpływów podatkowych. Niniejszy artykuł analizuje zatrudnienie jako decydujący makroekonomiczny czynnik wpływający na dochody podatkowe w krajach UE. Celem pracy jest potwierdzenie istotności rynku pracy jako decydującego czynnika w monitorowaniu dochodów podatkowych za pomocą trzech modeli analizy regresji (model łączenia, model efektów stałych i model efektów losowych). Analiza pokazuje, że wskaźnik zatrudnienia stanowi czynnik o największym wpływie na dochody podatkowe: wzrost wartości wskaźnika zatrudnienia o 1% prowadzi do wzrostu wpływów z podatków o 11 555 mln euro. Innymi ważnymi wskaźnikami makroekonomicznymi są produkt krajowy brutto i bezpośrednio inwestycje zagraniczne.

Słowa klucze: zatrudnienie; wskaźniki rynku pracy; wskaźniki makroekonomiczne; obciążenie podatkowe; przychody podatkowe.

Introduction

We understand an employment as a proportion of the total number of people employed and the total number of working-age people. Tosun tested employment as an explanatory variable that potentially affects tax revenues (Tosun 2006). He considered this variable particularly suitable for controlling changes in the tax base of personal pension tax.

In general, demographic factors represent variables that are relatively often monitored in the context of tax revenues, particularly due to the current rising trend of aging population in the world. The aging population phenomenon is negatively reflected in the tax revenues income and, ultimately, in fiscal imbalances of the countries. Currently, it is well known that there is a decline in the economically active population in the EU (people from 15 to 64 years old). State budgets lose incomes from selected types of taxes (wages and consumption), and simultaneously, the total amount of paid transfers increases, which creates a pressure on these public budgets.

However, it needs to be reminded that the impact of aging population on tax revenues is only one of the factors that politicians take into account in fiscal policy negotiations. The research results further show that demographic changes alone will reduce individual income taxes and turnover taxes in almost every direction. In most of the countries, total revenues will eventually increase with the overall population growth. According to Goudswaard and Van de Kar, tax revenues will increase with population growth, and also with an increase of the relatively older workforce. However, their forecasts point out that after year 2030 revenues

will start to decline as a result of the declining population and the rapid aging population (Goudswaard, Van de Kar 1994, pp. 52-60).

The aim of the paper is to confirm the significance of the labor market indicator – employment as the decisive indicator in the monitoring of tax revenues. With the use of three models regression analysis (pooling model, fixed effects model and random effects model) an analysis was carried out which quantified the impact of selected macroeconomic indicators on the total amount of tax revenues for the 28 EU member states. In the contribution, the hypothesis was established: Employment is a decisive factor affecting the level of tax revenue. The data was structured as panel data from the Eurostat database (2015) and the analysis was conducted in the statistical program R. The indicators were selected according to the theoretical origins of authors Guziejewska, Grabowski and Bryndziaka, Swankaand Steinmo, Gupta and Kubátová and Říhová, who monitored a large number of determinants that influence the volume of tax revenues flowing into budgets (Guziejewska, Grabowski, Bryndziak 2014, pp. 253-271; Swank, Steinmo 2002, p. 642; Gupta 2007; Kubátová, Říhová 2009, pp. 451-470). The level of influence of these factors varied depending on the intensity of the relationship between variables. In this paper, the analysis was examined through panel regression, which was also used in theses of (Hsiao et al. 2006, pp. 1082-1106; Boubtane et al. 2013, pp. 261-269), where:

- a) explained (dependent) variable was represented by DP – total tax revenues from direct and indirect taxes at current prices in millions of €),
- b) explained (independent) variable was represented by:
 - STR – nominal (statutory) tax income rate of legal entities in %,
 - ETR – effective tax income rate of legal entities in %,
 - HDP – gross domestic product at current prices in millions of €,
 - MZ – employment rate as a proportion of employed people from 15 to 64 years old,
 - MI – the rate of inflation measured on the basis of the harmonized index of consumer prices,
 - PZI – direct foreign investments as the direct foreign investments inflow and outflow at current prices in millions of €.

The general panel model was defined as:

$$y_{it} = \alpha + \beta_{it}^T x_{it} + u_{it} \quad (1)$$

where y_{it} is a dependent variable (total tax revenues), x_{it} is a vector of explanatory variables (GDP, employment rate, inflation rate, foreign direct investments, statutory and effective tax

rate), $I = 1, \dots, n$ is the index of the country concerned, $t = 1, \dots, T$ is the time index and u_{it} is the model error with a mean value equal to 0. In the analysis, there were three models used: a pooling model (PM), a fixed effects model (FEM), and a random effects model (REM). The pooling model provided an undistorted and effective estimate in the case of statistically insignificant individual errors. If the individual errors were correlated with one of the explanatory variables, estimates of pooling and random effects were distorted, and it was required to use a fixed effect model. The statistical significance of the individual components was tested by using the poolability of F test. To test the statistical significance of individual and time effects was tested by Lagrange multiplier test and F test, based on comparison of pooling and fixed effects models. To compare the suitability of using two different model specifications and two different estimators, the Universal Hausman test was used in the analysis.

Literature review

Labour market indicators such as employment, unemployment rate, labour force structure, wages, and amount of wage payments are important factors that can directly affect tax revenues, which is the reason they are often used in a relation to estimate tax revenues. As Kubátová et al. (2012) states, total employment data and nominal wage growth are the main variables that enter into the models for calculating the expected income from physical entities income taxes, legal entities income taxes, and social security contributions. The researches of Blundell, Dolenc, and Laporšek, Bocconi, Geciková in the labour market focus particularly on the study of the impact of taxation on wages and employment (Blundell 1995, pp. 333-344; Dolenc, Laporšek 2010, pp. 344-358; Bocconi 2011, pp. 330-337; Gecikova et al. 2014, pp. 38-41). Kennedy, McMillen, Simmons point to the positive relationship between employment growth and amount of income tax revenues (Kennedy, McMillen, Simmons 2015). At the same time, they point out that the high unemployment rate is in a negative correlation with the tax rate, suggesting that governments with lower tax rates must stimulate the economy at a time of economic downturn. Al-Mamun, et al. state that on a long-term basis, factors such as real per capita income and the unemployment rate have a marginal impact (Al-Mamun et al. 2014, pp. 109).

However, recent evidence suggests that the level of transfer of corporate tax burden on employees depends on the level of skills that directly affect wage bargaining power. In particular, Abbas, Klemm find an example in the German case, where low-qualified

employees are most affected by tax transfers, suggesting that the corporate tax burden includes distributional effects between different categories of employees (Abbas, Klemm 2013, pp. 596-617). Dolls also provides proofs that low-qualified employees bear a relatively higher tax burden on corporate income tax (Dolls et al. 2012, pp. 279-294).

However, it should be noted that in addition to employment as one of the decisive indicators, there are other determinants that significantly affect the flow of tax revenues to national budgets. The liberalization of capital flows has increased over the last period, resulting in an increased impact of corporate taxes on foreign direct investments. Heinemann et al. state that in order to attract direct foreign investments in addition to corporate tax rates, there is also a determinant of the size of the country, which offers the investor greater market potential to offset the higher tax burden (Heinemann et al. 2010, pp. 498-518). Country governments devote sufficient attention to foreign direct investment because on one hand, they are the source of future capital, and on the other hand, they represent new, innovative, and technological security that increases overall economic performance. Feenberg, Poterba, Schwellnuss, Arnold assess the effect of negative dependence between domestic and foreign investments and corporate tax rate (Feenberg, Poterba 1993, pp. 145-177; Schwellnuss, Arnold, 2008). This negative dependence was also confirmed at the level of the industrial sectors, where a particular level of tax rate for corporations had an important role. The higher the corporate tax rate, the more negative impact there was on the future growth of the investment.

Similarly, Abbas, Klemm, find that the excessive tax increase, which is linked to the increase in tax revenues, reduces the inflow of foreign investments, and vice versa, the lower the rates, the higher the inflow of foreign investments (Abbas, Klemm 2012, pp. 596-617). Among other tasks and studies that have monitored the impact of corporate taxation on tax revenue, we can include the analyses of Haufler and Stähler, which were focused on the transfer of income between physical and legal entities (Haufler and Stähler 2013, pp. 665-692). Alstadsæter and Fjærli (2009) analysed the volatility of corporate profitability and the size of corporate tax base, and Clausing (2007) identified the parabolic relationship between tax rates and tax revenues (Alstadsæter, Fjærli 2009, pp. 571-604; Clausing 2007, pp. 155-133). The ratio of taxes to GDP is higher in countries with a higher share of the corporate sector in economy, and a higher rate of corporate profits. Osterloh and Heinemann in their research concluded that in addition to macroeconomic determinants, which form the support of minimum corporate tax at the level of member states, there are also some other socio-

economic and geographical factors, including their political affiliation, individual characteristics, and the level of education, as well as national interests (Osterloh, Heinemann, 2013, pp. 18-37).

Employment determinant through the regression analysis

In the first step of the analysis, there were 336 values monitored for each variable. Countries had average values of effective (26.65%) and statutory (28.55%) rates above the European average (23%), and also above the Eurozone average (25.7%). The inflation rate ranged from -0.60% (deflation) to 4.5%. The amount of tax revenues (on average € 579,130 million) and foreign direct investments (on average € 344,168 million) were above the European average. When monitoring the relationship between input variables, it was found that the gross domestic product ($r = 0.90$) displayed a strong direct dependence in relationship to tax revenues. Statistically significant correlations displayed the employment rates ($r = 0.78$) and direct foreign investments ($r = 0.71$). A positive dependence is shown in all mentioned cases, so the value of the output variable increases with the increase of the input variable. Very strong indirect dependence was reported by the inflation rate ($r = -0.28$) and the effective tax rate ($r = -0.18$). Growth of input variables has fallen in tax revenues (Table 1).

Table 1. Correlation coefficients of variables

	GDP	Em	HICP	FDI	TR	ETR	STR
TR	1						
Em	0.78	1					
HICP	-0.28	-0.12	1				
FDI	0.39	0.36	0.71	1			
GDP	0.25	0.20	-0.16	0.90	1		
ETR	0.38	0.08	-0.18	0.56	0.40	1	
STR	0.40	0.08	-0.17	0.49	0.54	0.45	1

Legend: TR – Tax receipts, Em – Employment, HICP – Harmonised Indices of Consumer Prices, FDI – Foreign Direct Investment, GDP – Gross domestic product, ETR – Effective tax rates, STR – Statutory tax rates.

Source: Authors' own elaboration.

In all observations, the random effect model was preferred based on the p-value of the Hausman test. The most significant impact on tax revenues was the employment rate, gross domestic product, and foreign direct investment. If these determinants increased by € 1 million (with increase of employment by 1%), the tax revenues would increase by € 11,555 million for the employment, by € 1,292 million for gross domestic product and by € 712 thousand for foreign direct investments. Gupta, Tanzi emphasize that there is a positive

correlation between tax revenues and gross domestic income, and a negative correlation between tax revenues and inflation (Gupta 2007; Tanzi 1989, p. 633; Table 2).

Table 2. Evaluation of input variables modelling

Determinant	Random effects	Fixed effects
Em	11,555 ***	6,555***
HICP	0.0071***	-0.0018**
FDI	712***	1.667***
GDP	1,292***	42.8026***
ETR	1.1359	0.2801
STR	0.3139**	0.0846**

Legend: Em – Employment, HICP – Harmonised Indices of Consumer Prices, FDI – Foreign Direct Investment, GDP – gross domestic product, ETR – Effective tax rates, STR – Statutory tax rates.

Source: Authors' own elaboration.

It was discovered by the regression analysis that all macroeconomic determinants positively affect tax revenues. The lowest impact has been shown by the effective rate along with the statutory rate, and the inflation rate. Crucial for tax purposes, but unimportant for our analysis was the statutory rate, where increase by 1% led to an increase of the total tax revenues by € 3,239 thousand. When increasing the inflation rate by 1%, tax revenues increase by € 71 thousand. Similar finding provide Bartelsman and Beetsma; Ferreira and Hitchcock, who monitored 16 countries in the form of panel regression for the period from 1979 to 1997, and they found that 1% increase in rate would reduce tax revenues by 1.5 percentage point (Bartelsman, Beetsma 2003, pp. 2225-2252; Ferreira, Hitchcock 2009, p. 1925-1949). Regression analysis was used in research of Garretta, Mooij and Ederveen, Bretschger and Hettich, Swank and Steinmo, Slemrod and Winner, with a purpose to explain the impact of tax rates and other country-specific factors including capital mobility (Garrett et al. 2001, p. 177; Mooij, Ederveen 2008, pp. 680-697; Bretschger, Hettich 2002, pp. 695-716; Swank, Steinmo 2002, p. 642; Slemrod 2004, pp. 877-899; Winner 2005, pp. 667-687). While observing the dependence of macroeconomic variables, it cannot be forgotten that many other quantitative indicators influence the development of corporate tax and the total amount of tax revenues (Tanzi 1989, p. 633; Mintz 1990, pp. 81-102). Such factors, according to the authors, include the geographic location of a state that affects a number of tax-law elements of corporate tax construction, as there is a continental and Anglo-American legal system coexisting within the EU, with several significant differences.

Conclusions

In general, the taxes are an indispensable tool for development of quantitative applications in theory and practice, and they help to transform the theory into a tax policy. Our analysis confirms the established hypothesis that employment is a decisive determinant affecting the amount of tax revenue. Our analysis revealed that despite efforts to harmonize tax systems of individual member states, significant differences still persist among the selected countries. The differences are particularly important at the level of nominal and effective corporate taxation that aggregates diversity, also in the area of economic development of the countries, and their fiscal economy. The impact of other macroeconomic determinants on tax revenues was strongly correlated with the: gross domestic product and foreign direct investments. Consequently, we can assume that all analysed variables play an important role in the corporate income tax ratio but it should be noted that different determinants mean different effects. Although the results of the analysis are consistent with theoretical knowledge, we assume that in the future it would be necessary to extend the current analysis to other determinants that could potentially better explain the income from corporate taxes.

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