

The Impact of Taxes on Economic Growth in OECD Countries

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Abstract: The research paper provides an empirical research of tax effects impact on economic growth in OECD countries from 2012 to 2016. The aim of the study is measure and evaluate its impact on the economy, where gross domestic product per capita is determined as a proxy for economic growth. In our model, we estimate tax revenues growth, personal income tax, corporate income tax, social security contributions, taxes on goods and services, and tax on property, as well as their impact on economic growth measured by gross domestic product per capita. Results manifest tax revenue growth, personal income tax and taxes on goods and services have a negative impact on gross domestic product per capita, while corporate income tax, social security contributions and tax on property positively affect the economic growth. Likewise, tax revenue growth, personal income tax and social security contributions have statistically significant impact on gross domestic product per capita. For example, 1% increase of personal income tax cause 0.04% decrease of gross domestic product per capita, while 1% growth of social security contributions enhances gross domestic product per capita for 0.05%.

Keywords: taxes, growth, OECD countries, panel model.

JEL classification codes: C5, H2, O11.

1. Introduction

Policy makers in every country consider taxes as a powerful tool that have an essential role in achieving economic growth. Importance of taxes is reflected in the need to increase funds in order to make conditions for financing the government expenditures. For example, Bernardi and Chandler (2005) determine the fundamental purpose of tax as the collection of funds for financing public spending, while Chigbu et al. (2012) defined taxes as an important instrument for generating revenues by the government. Besley and Persson (2014) define that low-income countries collect taxes of between 10% and 20% of GDP, while the average for high-income countries is around 40%. Ahmad and Sial (2016) argue tax system has a vital role in achieving equity and social and economic improvement in any country. Observing tax systems in the world, it can be concluded there is diversity in the structure and level of taxation. For example, OECD countries have various tax structures and it is noticeable that certain countries such as Austria, Belgium, Denmark, Finland, France, Italy, Norway and Sweden have tax revenues share over 40% of GDP, while on the other hand, in countries such as Chile and Mexico the share is twice smaller or under 20%. Namely, Johansson et al. (2008) argue that personal income tax, corporate income tax, social security contributions and taxes on goods and services are the main tax revenue sources. Also, they notice growth tendency of corporate income tax and their share of tax revenues compared to personal income tax share in last four decades. This paper consists four segments, where the first part is an introduction, second manifest theoretical background about taxes and their effect on economic growth.

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Further, third part describes methodology including an explanation of variables in the created model. Finally, results show which model is appropriate and how taxes effect on economic growth measured by gross domestic product per capita.

2. Literature review

Many studies have researched tax forms impact on economic growth (Myles, 2000; Folster and Henrekson, 2002; Lee and Gordon, 2005; Furceri and Karras, 2007; Reed, 2008; Romer and Romer, 2010; Gemmel et al. 2011; Arnold et al. 2011; Ferede and Dahlby, 2012; Saqib et al. 2014; Gale et al. 2015; Ojong et al. 2016). For example, Engen and Skinner (1996) found that 2.5% point increase in tax to GDP ratio declines GDP growth by 0.2-0.3%. Using annual data for the period 1965-2013, Furceri and Karras (2007) examined the impact of the tax change on gross domestic product per capita in 26 OECD countries. The result reflected the increase in tax forms has a negative effect on gross domestic product per capita. Namely, increasing the tax share of 1% in gross domestic product reduce gross domestic product per capita by 0.5%-1%. It has been confirmed the personal income tax, corporate income tax, property tax, social security contributions and taxes on goods and services have a negative impact on the observed variable. On the other hand, Macek (2014) researched that corporate income tax, personal income tax and social security contributions had the greatest damage to the economic growth. Further, Saqib et al. (2014) researched tax impact on macroeconomic variables such as gross domestic product, investment and consumption in Pakistan in the period 1973-2010. Using ARDL test, they manifested that an increase of tax's shares by 1% leads to a real gross domestic product reduction for 0.43%. Edame and Okoi (2014) examined the impact of taxes on economic growth and investment in Nigeria from 1980 to 2010. Results showed that personal income tax and corporate income tax have a significant impact on the gross domestic product and investment in Nigeria. Similarly, Ojong et al. (2016) used multiple regression models and reflected there is a positive and significant impact of taxes on economic growth in Nigeria. Likewise, Kalaš et al. (2017) confirmed a positive impact of personal income tax, corporate income tax and value-added tax on the gross domestic product.

3. Methodology

This chapter includes model definition and variable explanation, where authors have created panel model with six variables using OECD database. For the purpose of the paper and to get an answer how taxes effect on economic growth, we have determined gross domestic product per capita as a dependent variable while tax revenue growth, personal income tax, corporate income tax, social security contributions, tax on goods and services and tax property are determined as independent variables.

Table 1. Variable explanation

Variable	Notation	Calculation	Source
Gross domestic product per capita	GDPpc	U.S. dollars	International Monetary Fund
Tax revenue growth	TR	growth rate	OECD
Personal income tax	PIT	% of gross domestic product	OECD
Corporate income tax	CIT	% of gross domestic product	OECD
Social security contributions	SOC	% of gross domestic product	OECD
Taxes on goods and services	TOG	% of gross domestic product	OECD
Tax on property	TOP	% of gross domestic product	OECD

Source: Authors

Panel regression model is reflected (Brooks, 2008):

$$Y_{it} = \alpha + \beta x_{it} + \mu_{it} \quad (1)$$

Y_{it} = gross domestic product per capita (GDPpc)

α = constant

βx_{it} = coefficients of variables (TR, PIT, CIT, SOC, TOG, TOP)

i = 35 countries

t = 2012 - 2016

μ_{it} = residual

4. Data and Results

The paper examines selected countries: Australia, Austria, Belgium, Canada, Chile, Czech R, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States. Before empirical research, study analyses trends of gross domestic product per capita, tax revenues growth, personal income tax, corporate income tax, social security contributions, tax on goods and services and tax on property by OECD countries.

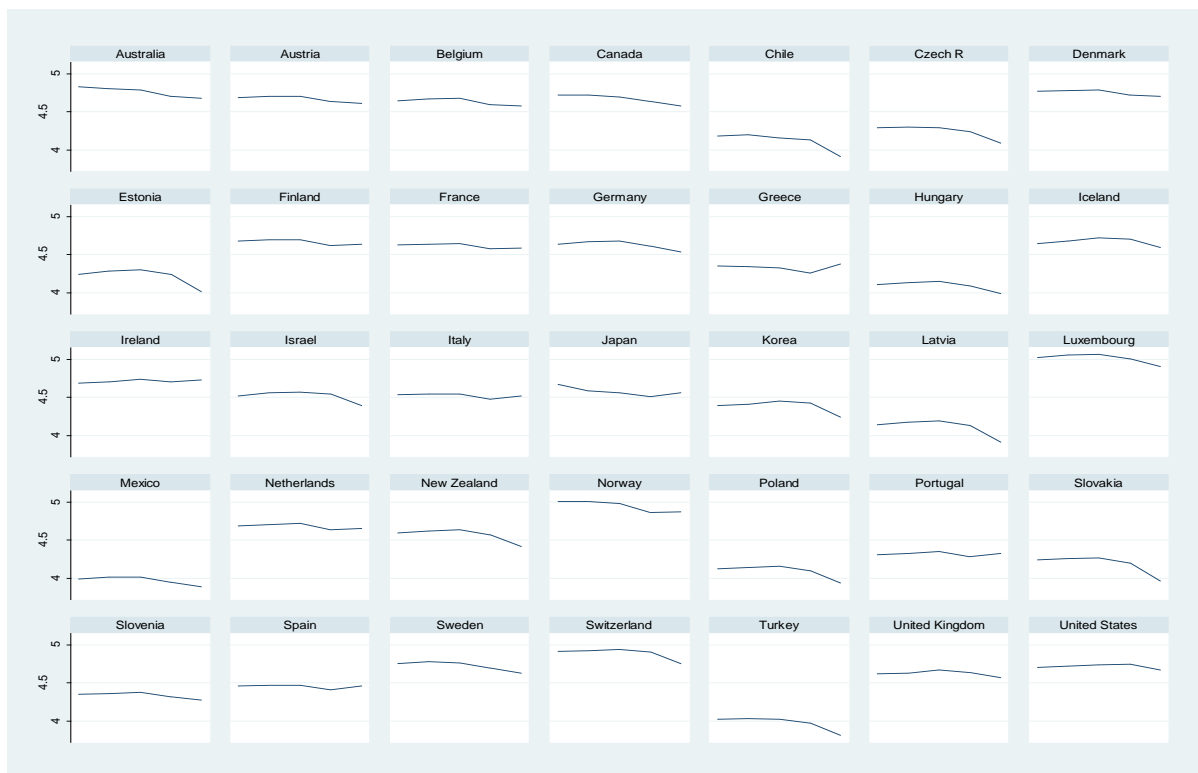


Figure 1. Gross domestic product per capita by OECD countries

Source: Authors based on <http://www.oecd.org/tax/tax-policy/tax-database.htm>

Figure 1 represents the logarithmic value of gross domestic product per capita in OECD countries in the period 2012-2016. The average GDP per capita is 39002 U.S. dollars in OECD countries in observed period, where Luxembourg have leading position with 109277 U.S. dollars, Norway 89068 U.S. dollars, and Switzerland 82777 U.S. dollars, On the other hand, countries with GDP per capita less than 15000 U.S. dollars are Hungary, Latvia and Mexico, Poland and Turkey where Mexico has the smallest average gross domestic product per capita 9539 U.S. dollars.

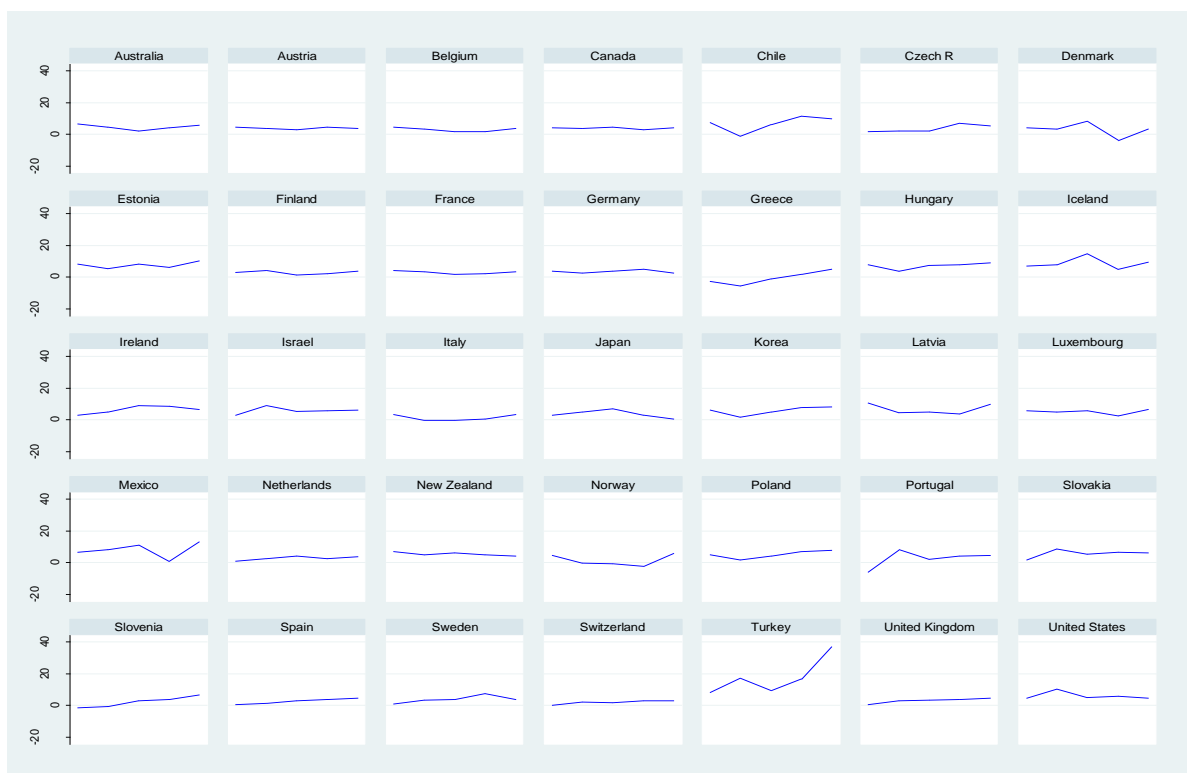


Figure 2. Tax revenues growth by OECD countries

Source: Authors based on <http://www.oecd.org/tax/tax-policy/tax-database.htm>

Based on Figure 2, we can see a stable trend of tax revenue growth in observed period 2012-2016. Turkey had the highest average tax revenue growth of 17.8% wherein 2016 this increase was even 37.3%. On the other hand, only Greece was an average decline in tax revenue compared to other countries, especially in 2013 when this variable decreased by 5.4%. The average tax revenue growth was in Australia 4.7%, Austria 3.9%, Belgium 3.1%, Canada 3.9%, Chile 6.9%, Czech R 3.7%, Denmark 3%, Estonia 7.6%, Finland 2.9%, France 2.9%, Germany 3.5%, Greece -0.4%, Hungary 7.2%, Iceland 8.7%, Ireland 6.6%, Israel 5.9%, Italy 1.3%, Japan 3.7%, Korea 5.8%, Latvia 6.7%, Luxembourg 5.1%, Mexico 8%, Netherlands 2.8%, New Zealand 5.4%, Norway 1.5%, Poland 5.2%, Portugal 2.7%, Slovakia 5.8%, Slovenia 2.3%, Spain 2.7%, Sweden 3.8%, Switzerland 1.9%, United Kingdom 3.2% and United States 6%.



Figure 3. Tax forms by OECD countries

Source: Authors based on <http://www.oecd.org/tax/tax-policy/tax-database.htm>

Figure 3 shows the trend of personal income tax, corporate income tax, social security contributions, taxes on goods and services and tax on property as a percentage share of gross domestic product in OECD countries from 2012 to 2016. The average value of observed tax components are next: personal income tax share 7.75% of GDP, corporate income tax 2.89% of GDP, social security contributions 9.03% of GDP, taxes on goods and services 10.85% of GDP and tax on property 1.82% of GDP. Countries which had the highest average share of observed variables are Denmark (PIT 25.1% and TOG 15%), Norway (CIT 7.8%), France (SOC 16.7%), and United Kingdom (TOP 4%).

Table 2. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Gross domestic product per capita	175	4.498	.2838609	3.81	5.07
Tax revenue growth	175	4.7292571	4.240395	-6	37.3
Personal income tax	175	7.755429	4.873051	0	26.8
Corporate income tax	175	2.897143	1.324804	1.1	10.3
Social security contributions	175	9.026857	4.73937	0	17
Taxes on goods and services	175	10.85526	2.82057	4.4	17.2
Tax on property	175	1.828	1.059475	.3	4.1

Source: Authors' calculation

Empirical research includes descriptive statistics of explanatory variables in OECD countries in the period 2012-2016. Table 2 shows average value, standard deviation as well as minimum and maximum value of 175 observation for 35 countries in the observed period.

Personal income tax, social security contributions and tax revenue growth have standard deviation more than 4 and compared to other variables, these variables have a wider range between minimum and maximum value.

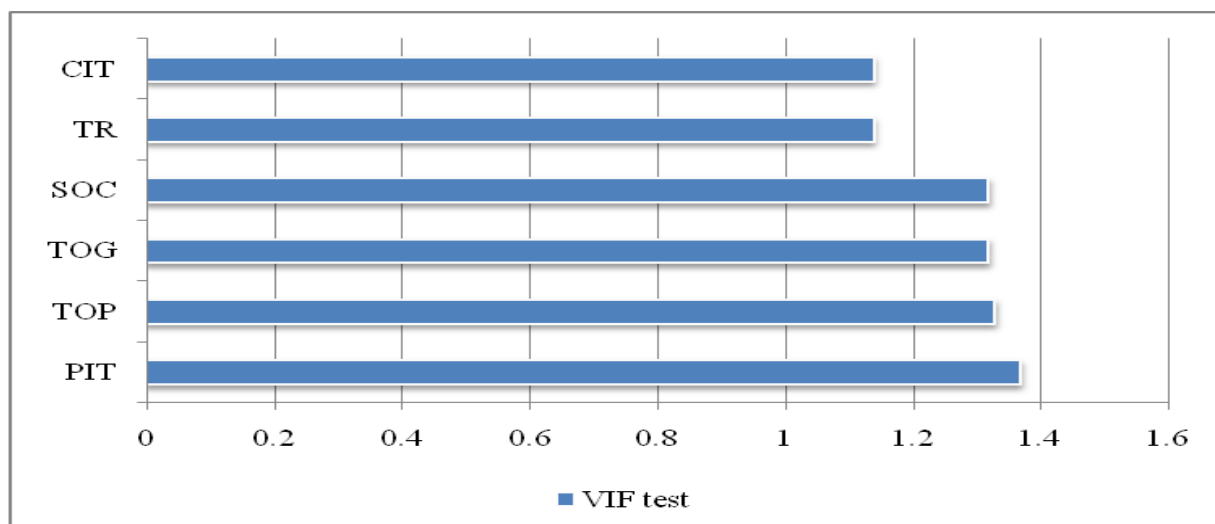


Figure 4. Variance Inflation Factor test

Source: Authors' calculation

Based on Figure 4, we can conclude there is no problem of multicollinearity between independent variables in the defined model. Namely, the value of these variables is less than 1.5 which is smaller compared to reference value of 10 determined by VIF test.

Table 3. Model estimation

Variable	Model	
	Random effect model	Fixed effect model
Tax revenue growth	-.0078526 (0.000)	-.0066816 (0.000)
Personal income tax	.025138 (0.000)	-.0439901 (0.001)
Corporate income tax	.0305256 (0.006)	.0088491 (0.435)
Social security contributions	.0072217 (0.213)	.045824 (0.004)
Taxes on goods and services	-.0177442 (0.027)	-.0053785 (0.611)
Tax on property	.0429518 (0.055)	.0246059 (0.421)
C	4.300657 (0.000)	4.444883 (0.000)
R-square	0.7018	0.1468
Prob F	0.0000	0.0001
Number of group	35	35
Observation	175	175

Source: Authors' calculation

Table 3 shows two model estimation effects of taxes on economic growth in OECD countries from 2012-2016. As we can see, both models are correctly specified where random effect model has higher R-square 0.7018 which is far more than fixed effect model (0.1468). When we analyze taxes effect, random effect model shows that tax revenue growth, personal income tax, corporate income tax, taxes on goods and services have a significant impact on gross domestic product per capita, while fixed effect model reflects that also social security contributions have a significant impact on economic growth measured by this variable.

Table 4. Hausman test

	Result	Conclusion
Random effect model vs fixed effect model	$\chi^2(3) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 91.68$	FE model is an appropriate
	$\text{Prob} > \chi^2 = 0.0000$	

Source: Authors' calculation

In order to select an appropriate, authors include Hausman test in the analysis and result manifests that we should choose fixed effect model because p-value is less than 0.05. This model reflects the negative impact of tax revenue growth, personal income tax and taxes on goods and services on gross domestic product per capita. On the other hand, there is the positive impact of corporate income tax, social security contributions and tax on property on gross domestic product per capita in OECD countries. Results show that 1% increase of personal income tax leads to decrease of economic growth by 0.04%, while contrary 1% increase in social security contributions enhances gross domestic product per capita for 0.05%. Also, it is necessary to confirm significant impact of tax revenues, personal income tax and social security contributions on economic growth measured by independent variable gross domestic product per capita.

5. Conclusion

Taxes are an important part of economic policy in every country and their structure and level have to be optimally designed. Governments use taxes as a powerful tool for achieving one of the fundamental macroeconomic goals reflected in stable public finance. Which tax forms are significant for economic growth is an essential topic which requires a detailed analysis of their impact and relationship between observed variables. In our study, we examined the impact of selected tax forms on economic growth in OECD countries from 2012 to 2016. Panel regression model is created for the purpose to determine how main tax components as tax revenues growth, personal income tax, corporate income tax, social security contributions, taxes on goods and services and tax on property, influence gross domestic product, which is a proxy for economic growth. Model showed that tax revenue growth, personal income tax and taxes on goods and services have a negative impact on gross domestic product per capita, while other taxes as corporate income tax, social security contributions and tax on property positively effect on economic growth. However, only tax revenues growth, personal income tax and social security contributions have a significant effect on the gross domestic product. The contribution is manifested in fact that results show which taxes are important for economic growth and how they affect, so it ensures information to policy maker which taxes are harmful or no for economic growth. Bearing in mind results from the model, we recommend higher share of corporate income tax, social security contributions and tax on property in tax structure, while on the other hand, it is important to reduce the share of personal income tax and taxes on goods and services because they are negatively related to economic growth. Future research should focus on determining short-run and long-run between these variables and other macroeconomic variables as unemployment, inflation and investment.

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