SCIENTIFIC REVIEW

The Modelling of Tax Influence on Macroeconomic Framework in Spain

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ABSTRACT

The study provides an empirical analysis of tax impact on selected macroeconomic aggregates in Spain from 1996 to 2016. The objective of this research is to determine how tax forms effect on macroeconomic framework of Spanish economy. The analysis includes the impact of direct taxes such as personal income tax, corporate income tax and tax on property as well as social contributions. On the other hand, gross domestic product per capita, unemployment, inflation, investment and government expenditures are selected as the main macroeconomic determinants and present dependent variables in defined models. Results of defined model show that tax revenue growth, personal income tax, tax on property and social security contributions significantly affects the gross domestic product per capita. Further, personal income tax and corporate income tax have a significant impact on unemployment, investment and government expenditures. Findings show that the intensity of personal income tax' effect is higher on investment and government expenditures compared to corporate income tax. In addition, present tax structure does not have a significant effect on inflation, which can be explained by fact that indirect taxes are more related to inflation than direct taxes.

Key words: *direct taxes; structure; macroeconomic aggregates; ordinary least squares model*

JEL Classification: B40, H20, H21

INTRODUCTION

Tax forms should take an important place in the economic policy of each country. The level and share of taxes in the economy must be adequately defined so that taxes would be in function of growth and enable optimum functioning of the economy. Any increase in taxes can potentially have a negative influence on the main macroeconomic indicators. However, tax cuts can result in lower revenues, which mean lower public funds, or resources needed to meet public expenditures there are numerous tax forms that are related to income, profits, ownership and value of assets, turnover, consumption, as well as to imports and exports in the course of performing economic activities. What type of tax is present in a particular country depends on the level of its economic development. Boadway and Pestieau (2002) state that personal income tax and consumption tax are classified as key tax forms in taxation systems around the world. When tax forms are used as a proxy for fiscal policy, Engen and Skinner (1999) listed several mechanisms of tax influence on economic growth. Namely, taxes can decline investments and slow down growth in labour supply by distorting labour-leisure choice in favour of leisure. In addition, it is necessary to mention that a higher level of tax burden can distort the effective use

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of human capital (Tosun and Abizadeh, 2005). Looking at the tax structure in Spain in past twenty years, tax on goods and services, personal income tax and social security contributions are the most generous taxes in this economy. Namely, these three taxes consists almost 30% gross domestic product at an average level and over 80% of tax revenues in Spain. This is similarly trend compared to other countries, especially OECD countries and these taxes are the basis of tax structure in Spain. The need for research is reflected in providing information support and giving guidance to economic policymakers in the observed country about the influence of direct taxes on macroeconomic aggregates such as gross domestic product per capita, unemployment, inflation, investments and government expenditures. In addition to determining the impact of tax forms on selected macroeconomic aggregates, as well as the nature of their relationship, there is a motive to show how the current tax structure influences on the macroeconomic framework in analyzed period.

LITERATURE REVIEW

There are many studies that have analyzed the impact of taxes on macroeconomic variables in order to dominant research is related to economic growth. When it comes to economic growth, Myles (2000) defined as the fundament for increasing prosperity of the economy. Petrov and Trivić (2018) determined sustainable income as a measure of growth and a trajectory to a developed state that can sustain over a very long period. Many papers are focused on relationship between tax forms and economic growth (Abizadeh, (1979); Helms, (1985); Chelliah, (1989); Barro, (1990); Bleaney et al. (2001); Lee and Gordon, (2005); Furceri and Karras, (2007); Arnold, (2008); Arnold et al. (2011); Ferede and Dahlby, (2012); Gale et al. 2015; Li and Lin, (2015); Grdinić et al. 2017; Andrašić et al. 2018; McNabb, 2018). Lee and Gordon (2005) analyzed seventy countries for the period 1970-1997 and found that corporate income tax is related to lower economic growth. Namely, their results showed that a cut in a corporate tax rate of 10% enhances annual gross domestic product growth per capita by 0.64%. Similarly, Furceri and Karras (2007) found that an increase of tax share in GDP leads to a decline of GDP per capita in twenty-six OECD countries in the period 1965-2007. However, tax on property is an only tax, which has a significant influence on gross domestic product per capita although other tax forms such as personal income tax, corporate income tax, social security contributions, and tax on goods and services negatively affect the gross domestic product per capita. In addition, Arnold (2008) confirmed the negative influence of taxes on economic growth in order to income taxes is generally related to lower economic growth than taxes on property and consumption. In an analysis of OECD countries, Macek (2014) pointed out personal income tax, corporate income tax and social security contributions cause the highest damage to the economic growth in these countries. Li and Lin (2015) analyzed the effect of sales tax on economic growth in the United States from 1960-2013 and estimated the long-run and short-run elastic coefficients of sales tax on growth. Their findings are that economic growth is negatively related to sales tax in the long-run, although this tax has positive effects in the short-run. In addition to relationship between taxes and economic growth, there are studies that examined their potential influence on unemployment, inflation, investments and government expenditures. The argument that higher labour taxes result in a higher unemployment rate is widely presented in public finances. Daveri and Tabellini (2000) researched the relationship between labour tax and unemployment in EU countries in the period 1965-1995. Their findings confirmed that an increase in labour tax of 14% leads to an increase in unemployment of 4%. Zimmermannova et al. (2016) found a negative correlation between personal income tax and unemployment in Czech Republic, which implies that higher revenues are related to the smaller level of unemployment. Poterba and Rotemberg (1990) researched tax rates and inflation rate in United States, United Kingdom, France, Germany and Japan in the period 1981-1986. Their findings confirmed a positive correlation in United States and Japan, and negative correlation in the other three countries. Value added tax is often related to inflation and price movements,

where Gabriel and Reiff (2010), as well as Benkovski and Fadejeva (2014), confirmed the significant effect of this tax form on inflation rate. It is an essential relationship between taxes and government expenditures where Taha and Logahtnan (2008) confirmed that the decrease in tax rates could lead to a decline of government expenditures. Similarly, Zortuk and Uzgoren (2008) found bidirectional causality between government expenditures and tax where 1% increases enhance tax by 0.8%.

METHODS AND MATERIALS

For the purpose of this study, authors used secondary data of OECD Revenue Statistics for the period 1996-2016. In order to determine the impact of direct taxes on selected macroeconomic aggregates such as gross domestic product per capita, unemployment, inflation, investment and government expenditures.

Table 1. Review of explanatory variables

Variable	Symbol	Calculation	Source
Tax revenue growth	TRgrowth	Annual growth rate	OECD
Personal income tax	PIT	% share of GDP	OECD
Corporate income tax	CIT	% share of GDP	OECD
Tax on property	TOP	% share of GDP	OECD
Social security contributions	SOC	% share of GDP	OECD
Gross domestic product per capita	GDPpc	U.S. dollars	OECD
Unemployment	UNM	Annual rate	IMF
Inflation	INF	Consumer price index	IMF
Investment	INV	% share of GDP	IMF
Government expenditures	GE	% share of GDP	IMF

Source: Authors' illustration

Models can be presented as:

$$GDPpc_t=\beta_0+\beta_1 TRgrowth_t+\beta_2 PIT_t+\beta_3 CIT_t+\beta_4 SOC_t + \beta_5 UNM_t + \beta_6 INF_t + \beta_7 INV_t + \beta_8 GE_t+ \ldots e_t$$

(1)

$$UNM_t=\beta_0+\beta_1 TRgrowth_t+\beta_2 PIT_t+\beta_3 CIT_t+\beta_4 SOC_t + \beta_5 GDPpc_t + \beta_6 INF_t + \beta_7 INV_t + \beta_8 GE_t+ \ldots e_t$$

(2)

$$INF_t=\beta_0+\beta_1 TRgrowth_t+\beta_2 PIT_t+\beta_3 CIT_t+\beta_4 SOC_t + \beta_5 GDPpc_t + \beta_6 UNM_t + \beta_7 INV_t + \beta_8 GE_t+ \ldots e_t$$

(3)

$$INV_t=\beta_0+\beta_1 TRgrowth_t+\beta_2 PIT_t+\beta_3 CIT_t+\beta_4 SOC_t + \beta_5 GDPpc_t + \beta_6 UNM_t + \beta_7 INF_t + \beta_8 GE_t+ \ldots e_t$$

(4)

$$GE_t=\beta_0+\beta_1 TRgrowth_t+\beta_2 PIT_t+\beta_3 CIT_t+\beta_4 SOC_t + \beta_5 GDPpc_t + \beta_6 UNM_t + \beta_7 INF_t + \beta_8 INV_t+ \ldots e_t$$

(5)

where are GDPpc - gross domestic product per capita, TRgrowth - tax revenue growth, PIT - personal income tax, CIT - corporate income tax, SOC - social security contributions, UNM - unemployment, INF - inflation, INV - investment, GE - government expenditures, β0 - the constant term, β - the coefficient of the independent variables and e - the error term of the equation.

EMPIRICAL RESULTS

This section provides descriptive information for explanatory variables, as well as trends of macroeconomic aggregates and direct taxes. In addition, correlation matrix is presented in order to identify the nexus between tax structure and macroeconomic framework in Spain.

Table 2. Descriptive statistics

| Variable	Mean	Std. Dev.	Min	Max
TRgrowth	4.9619	5.9678	-10.4	11.3
PIT	6.8857	0.4151	6.2	7.6
CIT	2.7428	0.7788	1.8	4.7
TOP	2.2952	0.3968	1.7	3.2
SOC	11.6476	0.2159	11.1	11.8
GDPpc	4.3719	0.1370	4.17	4.55
UNM	16.4714	5.8497	8.22	26.1
INF	2.3805	1.3441	-0.5	4.08
INV	24.7371	3.9217	19.14	31.33
GE	41.9833	3.2041	38.27	48.09

Source: Authors calculation
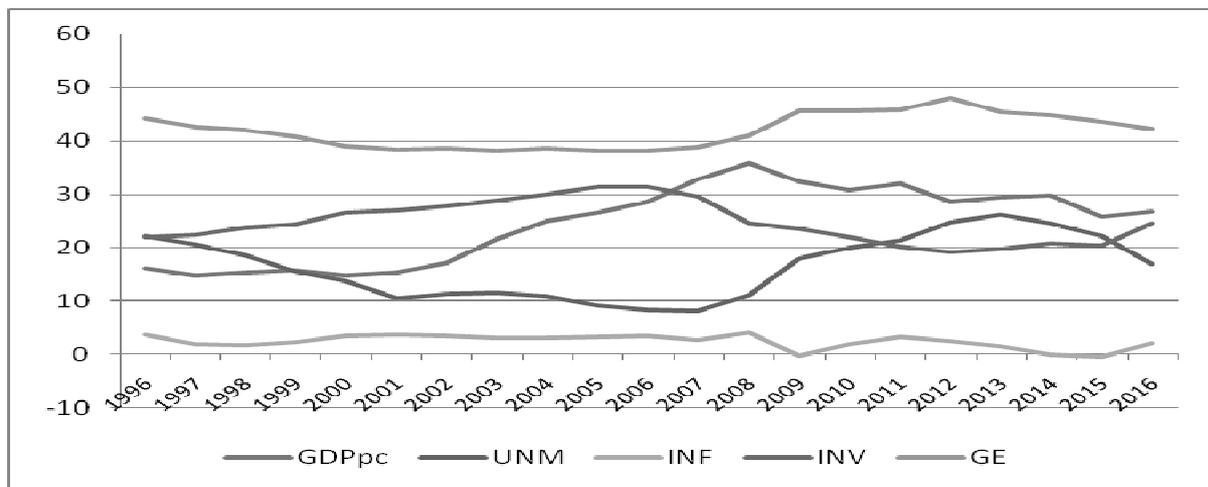
Figure 1. Trends of macroeconomic aggregates in Spain
Source: Authors based on IMF Database

The average GDP per capita is 24491 USD which is higher than EU average, but worrying is a decreased trend from 2008. Firstly, GDP per capita was 35725 USD in 2008 and in the next eight years felt for 9409 USD. Further, it can see that unemployment was growing trend from 2007 to 2016 where the highest rate of 26.1% was recorded in 2013. However, positive fact is unemployment is decreased in the last four years for more than 9% compared to 2013. Also, inflation is relatively stable where the greatest price level was 2008, which is positively correlated with economic growth in Spain (GDP growth rate was 1.12%). It is a recorded average inflation rate of 2.38% what is higher than most member countries in EU whose had null or zero price level. The average shares of investment and government expenditures are 24.74% and 41.98% of gross domestic product. It's indicative that when investment share increased the GDP growth rate was higher. On the other hand, when share of government expenditures exceeds 45% of GDP, economic growth was slower and smaller measured by annual GDP rate.
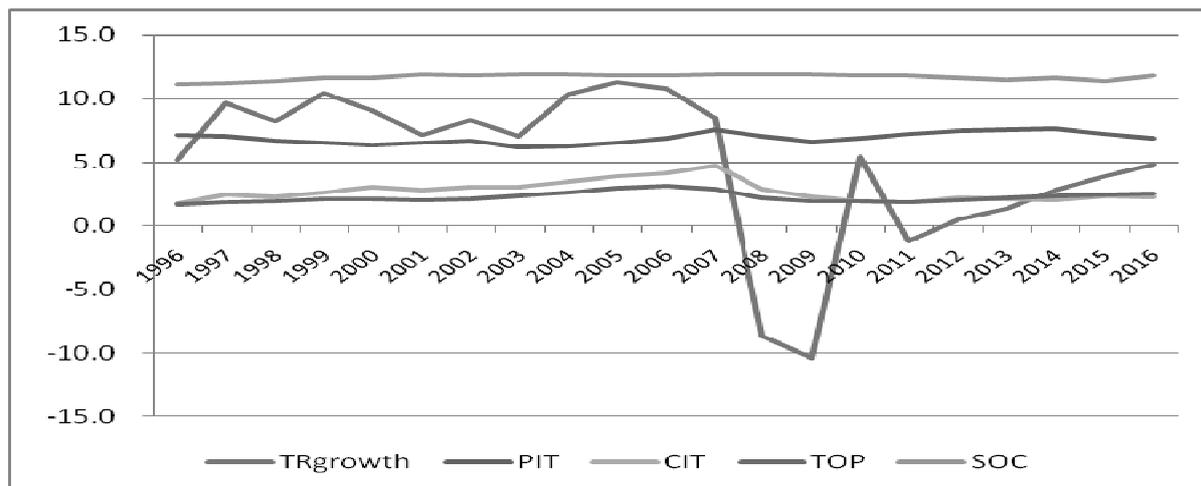
Figure 2. Trends of direct taxes in Spain

Source: Authors based on OECD Revenue Statistics

Figure 2 shows the movement of direct taxes in Spain in the observed period 1996-2016. Tax revenue had the highest growth in 2005 where it increased by 11.3%. After that, tax revenue had declined trend, especially in 2008 year, where they fell by 10.4%. This negative trend is a consequence of the global economic crisis that slowed down economic activity in the world. In past five years, average growth of tax revenue was 2.7%. Looking at the tax structure, personal income tax and social security contributions have the greatest share of gross domestic product in this country. The average share of personal income tax is 6.9% of GDP, while revenues collecting of social security contributions consists 11.7% of GDP.

On the other hand, corporate income tax and tax on property have an average percentage share behind 3% of GDP in the analyzed period.

Table 3. Correlation matrix

Variable	TRgrowth	PIT	CIT	TOP	SOC	GDPpc	UNM	INF	INV	GE
TRgrowth	1.00									
PIT	-0.32	1.00								
CIT	**0.45**	-0.25	1.00							
TOP	0.35	-0.05	**0.79**	1.00						
SOC	-0.13	-0.29	**0.45**	**0.49**	1.00					
GDPpc	**-0.55**	**0.47**	0.08	0.41	**0.51**	1.00				
UNM	-0.36	**0.59**	**-0.85**	**-0.60**	**-0.59**	0.07	1.00			
INF	0.31	-0.35	0.42	0.12	0.25	-0.23	**-0.60**	1.00		
INV	**0.52**	**-0.59**	**0.88**	**0.69**	**0.51**	-0.11	**-0.95**	0.54	1.00	
GE	**-0.60**	**0.62**	**-0.80**	**-0.57**	-0.36	0.34	**0.91**	**-0.57**	**-0.92**	1.00

Source: Authors calculation

Based on correlation test, it can see a negative relationship between tax revenue growth and gross domestic product per capita, as well as personal income tax and social security contributions are positively correlated with gross domestic product per capita. Results show that direct taxes are significantly correlated with unemployment, while on the other hand, these tax forms are not correlated with inflation at the significant level of 0.05. Also, tax revenue growth, corporate income tax, tax on property and social security contributions are positively correlated with investment. Finally, the nexus between taxes and government expenditures is significant, except social security contributions.

Table 4. Model validation and specification

Tests	Model I	Model II	Model III	Model IV	Model V
BP/CW test	0.7046	0.5222	0.0716	0.0669	0.2801
DW test	1.1644	1.8774	2.3257	1.9407	1.7755
RR test	0.2359	0.2280	0.0615	0.2256	0.1225

Source: Authors calculation

Based on results from Table, it can notice that model is adequately defined in terms of econometric preconditions such as heteroscedasticity, autocorrelation and misspecification of the model. Based on Breusch-Pagan/Cock Weinsburg test, models do not have a problem with heteroscedasticity (p-value > 0.05). Also, DW test show there is no autocorrelation in residuals as well as RR test reflects the model correction. After we examined the fundamental assumptions of the appropriate determined model, the analysis includes the impact of direct taxes on macroeconomic aggregates in Spain from 1996 to 2016.

Table 5. Model estimation

Model	I	II	III	IV	IV
Variable	GDPpc	UNM	INF	INV	GE
TRgrowth	-0.0112**	-0.0471	0.0551	0.0504	-0.102
	(0.0028)	(0.102)	(0.0625)	(0.0554)	(0.0726)
PIT	0.128**	4.957**	-0.134	-3.692***	3.112**
	(0.0369)	(1.323)	(0.810)	(0.718)	(0.942)
CIT	-0.0470	-6.102***	1.235	3.135***	-2.555**
	(0.0294)	(1.054)	(0.645)	(0.572)	(0.750)
TOP	0.219**	1.976	-2.299	1.191	0.0219
	(0.0585)	(2.098)	(1.284)	(1.138)	(1.492)
SOC	0.234*	-4.989	1.730	1.245	0.207
	(0.0819)	(2.938)	(1.798)	(1.594)	(2.090)
C	0.444	52.42	-15.23	24.07	25.60
	(1.038)	(37.24)	(22.79)	(20.21)	(26.49)
N	21	21	21	21	21
R-sq	0.876	0.913	0.381	0.943	0.853
Adj R-sq	0.835	0.884	0.174	0.924	0.804
RMSE	0.056	1.996	1.221	1.083	1.420

*Standard errors in parentheses * p<0.05, ** p<0.01, *** p<0.001*

Source: Authors calculation

As we can see, model I manifests significant impact of tax revenue growth, personal income tax, tax on property and social security contributions on gross domestic product per capita. Also, tax revenue growth and corporate income tax have a negative influence on gross domestic product capita, while personal income tax, tax on property and social security contributions positively affect the gross domestic product per capita. Results show that social security contributions and tax on property have the highest impact where their change of 1% raises gross domestic product per capita by 0.22% and 0.23%. Model III determines the impact of direct taxes on unemployment where personal income tax and corporate income tax have significant influence. Looking at the character of their impact, tax revenue growth, corporate income tax and social security contributions negatively affect the unemployment, while personal income tax and tax on property have a positive influence. Compared to the previous model, corporate income tax and social security contributions cause the highest change of the unemployment rate in these countries. An increase of 1% of these taxes declines unemployment

by 6.1% and 4.99%. Model III reflects the influence of direct taxes on inflation where tax revenue growth, corporate income and social security contributions positively affect the price level. On the other hand, personal income tax and tax on property have negative influence on inflation. As we can see, there is no significance of direct taxes impact on price level. In model IV, personal income tax and corporate income tax have a significant impact on investment compared to other tax forms. Simultaneously, these taxes cause the highest change of investment share in the gross domestic product, where a 1% increase of personal income tax declines investment by 3.69%. Likewise, corporate income tax raises investment by 3.13% at the significant level of 0.05. Finally, model V examines the impact of direct taxes on government expenditures and shows a significant influence of personal income tax and corporate income tax. Tax on property and social security contributions positively affect the government expenditures, but there is no statistical significance. On the other hand, personal income tax positively affects the government expenditures where 1% increase of this tax raises government expenditures by 3.11%. Corporate income tax has opposite influence where 1% increase declines government expenditures by 2.55%. Reliability and validation of these results are confirmed by the adequate defined model as well as fact that the value of R-squared is above 80% expect model III.

CONCLUSION

The study has researched the impact of direct taxes on the macroeconomic framework in Spain from 1996 to 2016. Empirical analysis has included OLS model which has estimated the influence of tax revenue growth, personal income tax, corporate income tax, tax on property and social security contributions on main macroeconomic aggregates such as gross domestic product per capita, unemployment, inflation, investment and government expenditures. Based on results of the OLS model, tax revenue growth, personal income tax, tax on property and social security contributions have a significant influence on gross domestic product per capita. In addition, personal income tax and corporate income tax have the greatest impact on unemployment, investment and government expenditures.

For example, personal income tax has a higher impact on investment and government expenditures compared to corporate income tax. Findings of these models show a significant influence of direct taxes on macroeconomic aggregates, except inflation where current tax structure does not have significant effect on inflation rate in this country. This is logical because indirect taxes are more related to inflation than direct taxes. The contribution of the study is reflected in the fact that we have ensured the quantitative measurement of tax forms and analysis has enabled informatical support for policy makers about which tax forms are important for macroeconomic framework in Spain. Also, the originality of paper is manifested in fact that there are no studies, which analyzes particular tax structure in Spain in terms of macro influences of direct taxes. The study has provided a better understanding of the relationship between direct taxes and macroeconomic aggregates, as well as the character and intensity of their influence. Results have given certain guidance to economic policy makers in defining tax policy in Spain, where profiling of tax policy should focus on creating the adequate tax structure and thus enable the improvement of macroeconomic framework.

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