

The impact of taxation on growth: the case of Greece

Athanasios ANASTASIOU

University of Peloponnese, Greece
athanastas@uop.gr

Vasiliki KREMASTIOTI

University of Peloponnese, Greece
vkremastioti@uop.gr

Abstract. *Several empirical papers have studied the negative effects of taxation on economic activities and especially on economic growth. There are several ways to estimate the negative effects of several kinds of taxation. The majority of authors analyses how tax on income influences economic growth and how taxes on corporate income affect economic growth. Other articles examine how to design an effective tax policy for economic recovery and growth. The analysis focuses on the impact of tax structures to long- run growth. This article examines how distortionary taxation and non-distortionary taxation influence growth. Specifically, in the empirical analysis, this paper uses different kinds of taxes such as taxes on income. All fiscal variables are expressed as percentage of GDP and were extracted from IMF database. Empirical analysis used time series for Greece from 1973 until 2018.*

Keywords: taxation, economic growth, time series.

JEL Classification: O11, O40, H20.

1. Introduction

Several empirical papers have studied the changes in the taxation mix and in the fiscal policy in a sample of many countries on economic growth. These reviews refer to lots of countries such as OECD countries, European Union countries, countries with low income, countries with high income, United States of America, Canada etc. In order to extract results it is highly important to choose the best group of countries. For example, in a panel analysis in order to extract results, the countries that participate must have common characteristics. This sort of characteristics can be culture, geographical criteria, income criteria and each country's fiscal policy in general. Most times, bibliography examines taxation effects on growth in a sample of specific countries with tax differentiation between direct and indirect, with expenditure differentiation between productive and non-productive. These studies measure the effect of government size, government expenditures, tax policy and the kind of the taxation on economic growth. The majority of papers analyze the above in a sample of many countries such as OECD countries, Canada, USA and European Union countries by using panel data. Margareta Dackehag and Asa Hansson (2012) analyze in their paper how taxation of income influences economic growth and they use 25 rich OECD countries. In order to exclude results in this paper, we use a specific group of countries such as Margareta Dackehag and Asa Hansson (2012), Christos Kollias and Stelios Makrydakis (2000), Athanasios Anastasiou et al. (2021), Athanasios Anastasiou et al. (2020), Athina Zervoyianni et al. (2013), Athanasios Anastasiou (2017) and Athanasios Anastasiou (2009).

This paper targets on extracting conclusions about taxation effects on growth and specifically every taxation's effects on growth. This review focuses on Greece due to the recent fiscal crisis. This paper includes a literature review which shows many analysts opinions referring to taxation, the effects on growth and expenditures alongside with their effects on growth. Afterwards, there is an empirical analysis with variables that will be used in the model. Finally, the results of the regression are analyzed in order to reach to the conclusions of this review.

Davide Furceri & Georgios Karras (2014) analyze how many taxes such as tax on income, tax on goods and services, tax on profit, tax on property, tax on social security contributions and other direct and indirect taxes affect the economic growth. They use data from 1965 to 2007 for 26 countries with Var-analysis from OECD database. They conclude that an increase of the tax rate by 1% affects negatively GDP by 0.5%.

Mehmet Serkan Tosum & Sohrab Abizadeh (2005) study the changes in the taxation mix of 24 OECD countries from 1980 to 1999 using panel data with 485 observations. In their sample the dependent variable is tax revenues and the independent variables are several taxes. They conclude that other taxes affect positively and other taxes negatively the economic growth.

Margareta Dackehag and Asa Hansson (2012) use 18 European countries from 1990 to 2008 with panel data. They support that bibliography appears different views of the aspect concerning taxation and companies consequences. Their results show that consequences on corporate taxes differ between countries, which is also pointed from Lee & Gordon (2005).

Lee & Gordon (2005) found a difference between the corporate taxation in the OECD countries comparing to developing countries. Specifically, according to regression results, in which 70 countries participated, a 10% decrease of corporate tax rate leads to a 0,64% increase of GDP per capita annual economic growth rate. Jens Matthias Arnold, Bert Brys, Christopher Heady, Asa Johansson, Cyrille Schweltnus and Laura Vartia (2009) conclude the same as previous reviews. They examine the question of how to design tax policy that both speeds recovery from the current economic crisis and contributes to long run growth. In their model they used panel data from 21 OECD countries from 1971 until 2004 with the logarithm of GDP per capita as the dependent variable. The target is how different kinds of taxes affect GDP.

Margareta Dackehag and Asa Hansson (2015) examine the results of corporate taxation and the way that dividends affect growth. In order to examine this, they used panel data with five year average on the examined period. They used 18 European countries from 1990 until 2008 with GDP per capita as the dependent variable and different kind of taxes, investments, government spending and others as independent variables. They concluded that dividends tax rate affects negatively on growth.

Robert Reed (2008) focuses on the United States of America and examines the relationship between taxes and income. He supports that taxes have negative effects on citizens income. He uses panel data for 48 states of USA from 1970 until 1999.

Ferede E. and Dahlby B. (2012) examine the effects of taxation on the economic growth, using panel data from 1977 until 2006 with five year average. In contradiction to other researchers, they used only Canada in their review because they support that the best way to extract results about the way that taxation affects growth is the restriction of the review in one and only country. They conclude that a decrease of one percentage unit of corporate tax results the increase of annual growth rate of 0,2% in Canada regions.

Jing Xing (2011), does not categorize taxes like previous reviews. His target is to conclude how tax affects personal income, corporate profits, consumption, personal property and population growth. This review used panel data for 17 OECD countries from 1970 until 2004. Jing Xing does not present clear results such as Jens Matthias Arnold, Bert Brys, Christopher Heady, Asa Johansson, Cyrille Schweltnus and Laura Vartia (2009) which present results about taxes that affect growth positively, such as corporate tax. This review does not use empirical data about which taxes affect growth and how they affect it. Jing Xing supports the creation of a tax policy with growth promotion as a target through successful fiscal reform.

According to Arnold J. (2008), taxes on income affect negatively on growth comparing to taxes on property and taxes on consumption. The panel data that was used in this review come from OECD and refer to 21 OECD countries from 1971 until 2004. Production per capita of active population is the dependent variable and investment rate, human capita fund, inflation, the sum of imports and exports as percentage of GDP, tax structure and others are the independent variables. In the analysis, the first regression line includes growth regressions which includes taxes. The second category includes tax progressiveness about tax on income. The third category includes extra results with tax indexes use. Arnold

J. concluded that taxes on income connect to low growth rates compared to tax on consumption and tax on property. Therefore, Arnold J. supports that the effects of different taxes on growth are not the only way to examine the subject of tax policy structure.

Christina D. Romer and David H. Romer (2010), examine total taxation in the United States of America and the effects on GDP. The analysis begins in World War II in order to include all tax changes that had happened during the years and the USA effort to maintain long term growth. GDP logarithm was used as the dependent variable and government spending, investments, taxation etc. were used as independent variables. They concluded that investment is the key to economic growth and that an 1% tax increase, decreases the real GDP after two years by 3%. Investment decrease percentages are exceptionally larger compared to consumption percentages. An 1% tax increase, decreases consumption by 2,55% and the investments by 11,19%.

Desislava Stoilova and Nikolay Patonov (2012) examine the effects of taxation in the European Union countries from 1995 until 2010. The review focuses on different tax policies from European Union countries which are calculated by the mathematic type TAX/GDP. The multiple linear regression sample uses GDP growth rate as the dependent variable and total budget spending, tax on land, tax on buildings, tax on income as a GDP percentage, tax on imports and finally total tax revenue and social contributions as GDP percentage as the independent variables. They concludes that fiscal spending affect negatively on growth. Also, through the empirical analysis R-square number is 0,18. This means that there are not reliable results about how growth is affected by tax revenue that comes from general taxation. Taxation structure is a timely problem due to significant differences on tax types, such as direct types and indirect types, that affect growth either positively or negatively.

Frida Wildmalm (1999), gathered data from 23 OECD countries from 1965 until 1999. This analysis used panel data with GDP per capita growth rate as the dependent variable and different tax types such as previous reviews as the independent variables. Tax revenues that come from tax on income affect negatively on growth rate. After regression analysis, this review supports that tax progressiveness, which is calculated with long term income elasticity, leads to low economic growth rate.

Another review about tax policies and tax rates which are adopted by governments uses 7 OECD countries from 1965 until 1988. Mendoza, Assaf Razin and Linda L. Tesa (1994), used a method to calculate consumption tax rates and personal and corporate income tax rates, with data from OECD. In their empirical analysis they used time series data for three different tax rates which were mentioned above and they created a fraction index which is (tax revenues from every country/tax base). They concluded that countries with high tax rates percentages on companies create low growth percentages compared to countries with low tax rates percentages. Also, savings and investments in countries with high taxation are at low levels.

2. Data and descriptive statistics of the dependent variable – explanatory variable

The table below shows the descriptive statistics of the sample. Specifically, the dependent variable, which is GDP logarithm, has mean 0,87 and median 1,60. General government final consumption expenditure has mean 18,10 and maximum 23,30 and the distribution has narrow kurtosis with negative skewness. Tax revenue is shown as x2 independent variable and has mean 18,12 and minimum 12,32 and the distribution has wide kurtosis with positive skewness. Taxes on goods and services (x3) has mean 11,12 and median 11,63 and the distribution has wide kurtosis with negative skewness. Social contributions (x4) has mean 9,07 and minimum 0,08 and the distribution has wide kurtosis with negative skewness. Taxes on property (x5) has mean 0,55 and maximum 1,92 and the distribution has narrow kurtosis with positive skewness. Revenue from sales of goods and services (x6) has median 1,12 and minimum 0,05 and the distribution has wide kurtosis with positive skewness. Property income revenue (x7) has median 0,78 and maximum 1,77 and the distribution has wide kurtosis with negative skewness. Taxes on income, profits and capital gains (x8) has minimum 2,43 and maximum 8,96 and the distribution has wide kurtosis with negative skewness. All variables follow normal distribution besides x5 as it is obvious from Jarque-Bera test.

Table 1. Descriptive statistics

	LGDP	X1	X2	X3	X4	X5	X6	X7	X8
Mean	0.876898	18.10858	18.12104	11.12573	9.075514	0.551183	1.154172	0.894581	5.970372
Median	1.604128	18.12710	17.49571	11.63258	10.37080	0.319884	1.124356	0.781144	5.757485
Maximum	7.327470	23.30901	26.31510	15.39198	14.40644	1.922510	3.135002	1.770433	8.964438
Minimum	-9.428821	11.06790	12.32332	6.613805	0.083489	0.203886	0.051555	-0.400827	2.438862
Std. Dev.	3.640179	2.402343	4.214713	2.389342	4.162638	0.518016	0.999997	0.524965	2.000455
Skewness	-0.848061	-0.355322	0.385914	-0.273156	-0.658206	1.821098	0.096930	-0.082769	-0.114886
Kurtosis	3.483459	3.391076	1.946433	2.284284	2.490437	4.727256	1.273047	2.902828	1.655492
Jarque-Bera	5.961917	1.261079	3.269298	1.553854	3.819146	31.14393	5.788234	0.070620	3.565953
Probability	0.050744	0.532305	0.195021	0.459817	0.148144	0.000000	0.055348	0.965306	0.168137
Sum	40.33729	832.9947	833.5679	511.7834	417.4736	25.35442	53.09190	41.15073	274.6371
Sum Sq. Dev.	596.2906	259.7064	799.3714	256.9031	779.7398	12.07531	44.99970	12.40147	180.0820
Observations	46	46	46	46	46	46	46	46	46

Source: own calculation from e-views.

3. Empirical method

This paper used a lot of different fiscal indexes and the estimation model is the follow:

$$LGDP = a + a_1X1 + a_2X2 + a_3X3 + a_4X4 + a_5X5 + a_6X6 + a_7X7 + a_8X8 + u_t$$

Specifically LGDP is the dependent variable in the estimation model, x1 is tax revenue as GDP percentage, x2 is general government final consumption expenditure as GDP percentage, x3 is taxes on goods and services as GDP percentage, x4 is social contributions as GDP percentage, x5 is taxes on property as GDP percentage, x6 is revenue from sales of goods and services as GDP percentage, x7 is property income revenue, x8 is taxes on income, profits and capital gains. U_t is the error of the regression. All indexes are from IMF database.

This paper estimates the effect of taxation on economic growth using time series data for Greece from 1972 to 2018. This review focuses on Greece influenced by the review from

Ferede E. and Dahlby B. (2012), “The impact of tax cuts in Economic growth: Evidence from the Canadian provinces” which supported that the best way to track results caused by tax structure on economic growth is by examining them inside one and only country. This paper uses ordinary list square as estimate method with time series for Greece.

This review’s target is to extract conclusions about which taxes affect positively growth. According to international bibliography taxation is divided in distortionary taxation and non-distortionary taxation. Distortionary taxation includes tax on income, social security contributions, tax on payroll and tax on property and non-distortionary taxation includes tax on goods and services. Categorization of taxes and the way that each kind of tax separately affects growth are significant subjects to examine in international bibliography.

Another great subject of international bibliography is differentiation between distortionary and non-distortionary taxation. This paper answers the question how each kind of tax, independently if this tax is direct or indirect, affects on growth.

Table 2. Regressions 1-6

Dep. Var:LGDP	R1	R2	R3	R4	R5	R6
constant	26.30 (7.838)***	16.71 (4.773)***	15.72 (5.803)***	22.82 (5.112)***	16.26 (6.524)***	16.54 (4.828)***
X1	-1.99 (0.374)***	-1.549 (0.332)***	-1.507 (0.329)***	-1.607 (0.335)***	-1.33 (0.310)***	-1.453 (0.328)***
X2	-0.9194 (0.770)		-0.036 (0.602)	-0.759 (0.411)*	0.214 (0.598)	
X3	1.207 (0.646)***	0.586 (0.587)	-0.036 (0.615)	0.776 (0.627)	0.0094 (0.490)	0.170 (0.512)
X4	0.568 (0.265)***					
X5	-1.125 (2.304)	-2.191 (1.267)	-2.148 (1.987)		-2.565 (0.222)	-2.050 (1.278)
X6	1.387 (1.335)	1.417 (1.014)	2.033 (1.360)	2.272 (1.141)*		
X7	1.476 (1.218)	1.716 (1.210)	1.847 (1.253)	1.994 (1.224)		1.161 (1.156)
X8	1.075 (1.057)	0.626 (0.844)		1.319 (0.903)	1.034 (0.361)	1.481 (0.588)***
R-squared	0.465	0.391	0.383	0.397	0.347	0.361
White test(p-value)	0.4265	0.3062	0.3318	0.2348	0.6930	0.1988
Breusch-Godfrey(p-value)	0.3310	0.2207	0.1642	0.1645	0.2194	0.2769
Chow Breakpoint(p-value)	0.1462	0.0593	0.0466	0.076	0.0887	0.1472
Chow Forecast(p-value)	0.1462	0.1043	0.0892	0.1125	0.1789	0.3138
Normality test -residuals(p-value)	0.000	0.000	0.0010	0.0000	0.0001	0.0052

Notes: The estimation method is ordinary least squares (OLS), ***,** and * indicate significance at 1%,5% and 10%, level respectively, the number in parenthesis are the standard errors, in White’s, Breusch – Godfrey’s, Chow’s Breakpoint and Forecast and Normality tests p-values present to decide if we accept or not the null hypothesis for the heteroskedasticity, autocorrelation etc. tests, Chow’s breakpoint test uses 2010 as control date.

Source: own calculation from e-views

4. Regression result

Theory predicts that the impact of fiscal policy depends on tax policy and the relationship between taxes and expenditures. The level of taxation is very important for the economic growth. Michael Bleaney, Norman Gemmill and Richard Kneller supports that endogenous

growth models predict that expenditures and taxation will have both temporary effects on growth. Many reviews present their results about tax on growth while using different methods. Most researchers conclude that there is not a clear result about the way that taxes affect growth. Specifically, each kind of tax affects differently on growth..

Young Lee & Roger H. Gordon (2004) noted that a 10% decrease on taxes leads to a 2% increase on growth. In their sample, they divided the countries according to their tax rate.

This paper deals only with how the various taxes affect growth. Using IMF data for Greece from 1972 to 2018 this paper agrees with Jing Xing (2011) who supports that using a sample of many countries in order to understand the effects of taxes on growth is not the only way to extract results. In the contrary, the conclusions will be better if the countries are included individually in the sample. For example, countries with similar characteristics, such as GDP.

In this paper there were used different kinds of taxes. This analysis used time series with different combinations of independent variables in the regressions and it concerned Greece alone in order to extract more reliable results.

Theory supports that attention should be paid on the consequences of fiscal changes on growth. Fiscal changes concern taxation on the one hand and expenditures on the other. Many researchers divide taxation in distortionary and non-distortionary and expenditures in productive and non-productive. For example, taxation on income and profit is classified as distortionary taxation which affects growth slightly positively in the current review. Taxation on property, which is also classified as distortionary taxation, affects growth negatively. This review concludes that income from tax on property is related with a high level growth, an opinion which is also supported by Jing Xing (2011). On the same level, income from taxation on goods and services is connected with high growth rate, almost as high as income from taxation on property. From the analysis of the above regressions, it is concluded that there cannot be reliable results about which taxes or which income from taxation outmatch the others concerning long term income levels. Fiscal changes concern both taxation and expenditure combined. In this paper, government expenditure affect negatively on growth, which is supported by the literature review.

5. Conclusions

As bibliography supports, drawing a tax policy demands the knowledge about taxes and if they are distortionary or non-distortionary. Many researchers study the effects of social security contributions on growth. Taxes, whether they are distortionary or non-distortionary, can decrease growth. The question is if there are any taxes that convert to income and boost up the economy in two samples of countries with similar financial situation. In order to find an answer to this question, Margareta Dackehag and Asa Hansson (2012) used 25 rich countries with OECD data. In this paper, Greece was the only country used while a future research will use all European Union countries.

Taxation effects on growth is a subject that interests greatly international bibliography. Theory predicts that This article examines taxation effects in Greece and specifically most of the variables that were used in the empirical analysis were taxes as a percentage of GDP.

This review shows both positive and negative effects of different types of taxes on growth such as similar reviews which are mentioned in literature review. A future review could focus in the categorization of taxes in distributional and non-distributional in a sample of countries with common characteristics such as countries with memorandum. Another important review could be the relationship between taxes and spending such as George M. von Furstenberg, R. Jeffrey Green and Jin-Ho Jeong (1986).

The sample was used for Greece only because literature review supports that taxation structure reforms are formulated better for individual countries. In a sample that concerns just one country, the researcher can export more reliable results because data are adjusted and explained according to the characteristics of the specific country. The target should be finding a suitable combination based on the characteristics of each country which affects positively on growth, whether it comes from distortionary or non-distortionary taxation, whether from productive or non-productive expenditure. This paper used tax revenues as an independent variable. Both this paper and the literature review support through the empirical analysis that tax revenues amplify growth. In order to ensure a good fiscal policy, tax revenues should become productive expenditures such as expenditures on health and education.

References

- Athanasios, Anastasiou, 2009. Central bank independence and economic performance, Cyprus Economic Policy Review 3 (1), pp. 123-156.
- Athanasios, Anastasiou, Eleni, Kalamara and Charalampos, Kalligosfyris, 2020. Estimation of the size of tax evasion in Greece, Bulletin of Applied Economics, 7 (2), pp. 97-107.
- Athanasios, Anastasiou, Eleni, Kalamara and Charalampos, Kalligosfyris, 2021. An Analysis of the Efficiency of Tax Administrations of 26 European Countries in 2017, Bulletin for International Taxation, 25 (2), pp. 67-83.
- Athina, Zervoyianni, Athanasios Anastasiou and Andreas, G. Anastasiou, 2013. Does Central Bank Independence Really Matter? A Re-Assessing the Role of the Independence of Monetary Policymakers in Macroeconomic Outcomes, *The Rimini Centre for Economic Analysis*, WP 13-03, pp. 1-20.
- Athanasios Anastasiou, 2017. Convergence of Tax Shocks and Macroeconomic Performance in the Enlarged European Union in Thomakos, D. & Nikolopoulos, K. (Eds) *Taxation in Crisis: Tax Policy and the Quest for Economic Growth*, Springer International Publishing.
- Davide, Furceri and Georgios, Karras, 2014. Tax changes and economic growth: Empirical evidence for a panel of OECD countries.
- Mehmet, Serkan Tosum and Sohrab, Abizadeh, 2005. Economic growth and tax components: an analysis of tax changes in OECD.
- Margareta, Dackehag and Asa, Hansson, 2012. Taxation of income and economic growth: An empirical analysis of 25 rich OECD countries.
- Margareta, Dackehag and Asa Hansson, 2015. Taxation of dividend income and economic growth: the case of Europe.
- Young, Lee, Roger, H. Gordon, 2005. Tax structure and economic growth.
- Jens, Matthias Arnold, Bert, Brys, Christopher Heady, Asa Johansson, Cyrille Schwellnus and Laura Vartia, 2009. Tax Policy for Economic recovery and growth.

- Robert, Reed, 2008. The robust relationship between taxes and U.S. state income growth.
- Ferede, E. and Dahlby, B., 2012. The impact of tax cuts in Economic growth: Evidence from the Canadian provinces.
- Jing, Xing, 2011. Does tax structure affect economic growth? Empirical evidence from OECD countries.
- Arnold, J., 2008. Do Tax Structures Affect Aggregate Economic Growth?: Empirical Evidence from a Panel of OECD countries.
- Christina, D. Romer and David, H. Romer, 2010. The macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks.
- Desislava, Stoilova and Nikolay, Patonov, 2012. An Empirical Evidence for the impact of Taxation on Economy growth in the European Union.
- Frida, Wildmalm, 1999, Tax structure and growth: Are some taxes better than others?
- Christos Kollias and Stelios, Makrydakis, 2000. Tax and spend or spend and tax? Empirical evidence from Greece, Spain, Portugal and Ireland.