University of Cyprus

Department of Economics

Master in Monetary and Financial Economics

Master Thesis Proposal

Fiscal policy as a measure of improving the economy: Government expenditures, taxation and public debt.

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Executive Summary

The study aims to explore the impact of fiscal policies on the growth rate of GDP and the ratio of public debt to GDP. Specifically, it analyses how changes in public spending and expenses affect the economy. The study examines data from EU member states between 2000 and 2022. It suggests that tax cuts are more likely to stimulate growth compared to increases in spending. Furthermore, during periods of fiscal adjustment, government spending cuts and stable taxes are found to be more effective in reducing deficits and debt to GDP than tax increases. Additionally, the study highlights the positive impact of public investment, which helps limit public debt and promote economic development. The role of the EU in the development of member countries is also taken into consideration. The study assesses whether the policies proposed by EU institutions contribute to achieving economic growth and reducing public debt, which are the ultimate goals.

Introduction

 The fiscal policy of each country plays a catalytic role in the functioning of its wider economy, in the performance of businesses but also in the survival of households. In recent years, the quality of fiscal policy also determines the quality of the government that exercises this policy. Undoubtedly, the accumulation of public debt and clearly the high levels of fiscal deficits represent the greatest threat to the EU member countries. Therefore, the governments of the member states must take appropriate measures and decisions, so that mitigate these figures and at the same time win the trust of the citizens. But how can these goals be headed in the same direction? Can the necessary measures to improve public finances leave unnoticed the possible effects on the finances of the wider society?

Undeniably, to answer the above questions, the size of the country's GDP must be considered. After the implementation of some specific measures to improve public debt and fiscal deficits (e.g., changes in levels of public spending and taxation), observing the change in the GDP growth rate we conclude whether the measures taken were correct. However, the correctness of government decisions is not only based on the improvement of economic and social welfare. But, mainly in achieving the main goal, which is none other than the reduction of the public debt.

The effect of a fiscal policy on the development of a country through its fiscal multipliers (that is, the multiple effect it brings to various sizes of the economy), is not a criterion for the implementation of a policy by itself. The issue is politically charged, as it is argued that right-wing politicians support tax cuts, while their left-of-centre opponents believe in spending increases (Alesina and Ardagna, 2009). The efforts of the factions to promote their own imports with the goal of growth and the limitation of

public debt, creates a paradoxical event in which two excellent, in their opposition, but opposite direction of alternative policies are presented. What, after all, are the optimal levels of government spending and taxation that improve public debt and deficit figures? What is their effect on the GDP of the country?

The study analyses the impact of fiscal policies on GDP growth and public debt to GDP. In detail, it focuses on the effects caused by fluctuations in tax revenues and public expenditures, on the size of public debt and growth. Finally, the main objective of the work is the interpretation of the results that give clear arguments for the correct adoption of fiscal policies and decisions with the ultimate aim of weakening the public debt and developing, at the same time, the economy.

This research will use data collected by Eurostat using the 27 countries of the European Union. The chosen timeframe, encompassing the years 2000 to 2022, was meticulously selected to encapsulate the era preceding the catastrophic global financial crisis, the tumultuous period during the crisis, and the subsequent years leading up to the unprecedented corona era. The variables under scrutiny in this investigation mirrors employed by esteemed scholars Alesina and Ardagna (2009). The study delves into the relationship between GDP growth, which serves as the dependent variable, and the one period lag of the public debt to GDP ratio. Additionally, it explores the interplay between alterations in fiscal variables, government expenditures, and their influence on GDP ratio with further elucidation to follow. Likewise, the realm of public debt unveils similar dynamics. Notably, the price of previous years' public debt assumes a pivotal role when assessing its impact on GDP, as policies aiming to reduce public debt draw inspiration from macroeconomic conditions, chiefly the state of GDP.

Historical Review

A country's debt is created through the accumulation of fiscal deficits. So, the creation of public debt presupposes some economic deficit periods and is not a phenomenon from the very first period of an economic activity. Debt can be due to various and sundry reasons. Over the decades, the needs, aspirations and demands of each country change direction according to the current situations. The Encyclopaedia Britannica cites the case of England, whose national debt was first noted as a size in its finances when it had to finance its participation in the war of the Grand Alliance against France in the period 1689-1697. In the USA, a century later, the country's public finances did not allow the unprecedented public debt to be avoided during the American Revolution. The same source states that the first cities that resorted to borrowing in world financial history were Genoa and Venice. The cities borrowed on a commercial basis from the then newly developed banks of their countries.

Reinhart and Rogoff (2010) argue that debts that are one aspect of the aftermath of a war may be less problematic for future growth, in part, because high government spending on war ceases as peace returns. Conversely, bursts of debt during peaceful periods may persist for longer periods of time. As the European Commission's report on the sustainability of countries in 2009 states, many eurozone and EU countries (8 eurozone countries and 13 EU countries) are at high risk in terms of the sustainability of their public finances. Recent EU figures state that Eurozone countries, during 2007, recorded budget deficits of an average of 0.6% of GDP and public debt of 64.9%, while these percentages reached 1.5% and 89.1%, respectively, in 2016. This fact, reflects the large current fiscal deficits, high debt levels, the outlook for possibly subdued GDP

growth, as well as the projected fiscal effects of demographic aging, which are significant in some countries. Also noteworthy is the fact that several countries lost a huge part of their public revenues and ran high budget deficits to bail out their financial institutions. Examples are Ireland and the US with astronomical 30% and 12% fiscal deficits of GDP, respectively.

Over the years, expansionary fiscal policies of countries are also due to factors other than defence support. The US incurred significant amounts of debt from the beginning of the 19th century, mainly to improve the work of the public sector. Also, in 1878, France increasing spending to increase public wages and also for its colonial expansion, noted a high public debt. More generally, France is characterized as the country with the most violent disruption of its national debt (Hamilton, 1947).

Modern economic history testifies to the need to review any type of policy with the aim of avoiding previous adverse situations but also to adopt proven effective policies. Optimistic are the cases where large public debt-to-GDP ratios were rapidly reduced through increased growth. Such situations existed during World War II. The need of belligerent countries for public expenditure for defense and the development of technology, significantly strengthened the economies of the countries. Specifically in the USA, the productivity and efficiency of both the state economy and the labor market increased. Therefore, a significant increase in growth was achieved despite the size of the public debt which was aggravated by the exigencies of the war. At the same time, the United Kingdom's debt-to-GDP ratio, during the same period, was over 200%. However, this fact did not adversely affect the country as its reliable fiscal position allowed the gradual reduction of the public debt. Historians point out that in modern history, England is considered the leader in terms of the solvency of its public debt and the management techniques it adopts. More recently, during the 1990s, the

US succeeded in turning a large deficit into a corresponding surplus without imposing policies such as increasing tax revenues or reducing public spending. However, these events are special cases and require important criteria for the country.

The global economic crisis has affected many societies from all over the planet to a huge and threatening extent. Starting, again, with the USA, the international financial crisis of 2007-2009 was the trigger for an uncontrolled increase in fiscal deficits and debt. Unfortunately, these figures have spread globally. OECD countries also experienced similar situations. After the large reduction of their fiscal deficits, during the 90s, they have returned back to the red figures of their public finances. At the same time, the consequences at the European level cannot go unnoticed. Central Banks, upon the outbreak of the crisis, immediately exercised monetary policy to rescue financial institutions, instead of price stability, as they are traditionally required to do. At the same time, the ECB (European Central Bank) continuously imposed increases in the Euro interest rate to avoid inflationary pressures making it more painful to repay the public debts of the EU member states.

The ESM (European Stability Mechanism) program as well as the IMF (International Monetary Fund) made efforts to finance financial assistance to EU member countries such as Cyprus, Malta, Portugal, Ireland, Italy, Spain, Greece et al. Anticipating the achievement of growth and debt sustainability, countries implemented policies to maintain economic stability. However, these mechanisms have proven that stabilization policies and austerity measures in countries with economic difficulties, not only do not reduce the national debt-to-GDP ratio, but also shrink the country's economic activity as they increase unemployment levels at an extremely rapid rate. These consequences point to the need for a review of countries' economic prosperity policies. Each country individually scores different fiscal levels each year as it is

characterized by different strengths and weaknesses. As a result, measures appropriate and adapted to each type of country according to its characteristics should be applied, and not an identical package of policies for all countries, as wrongly imposed by the European institutions.
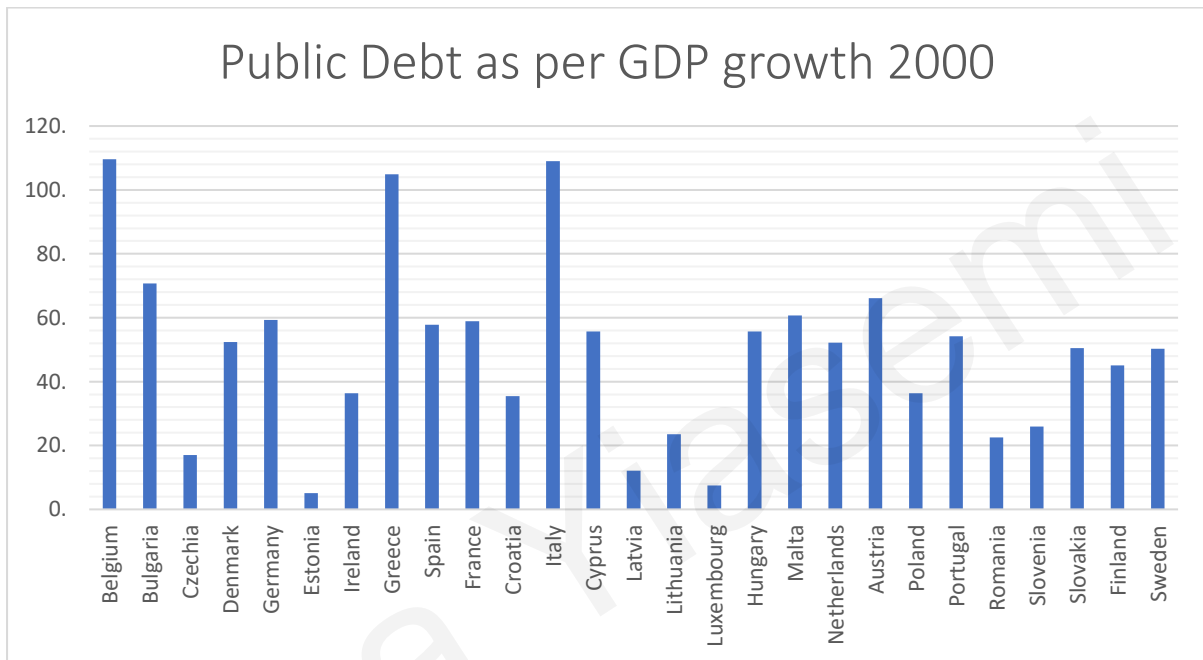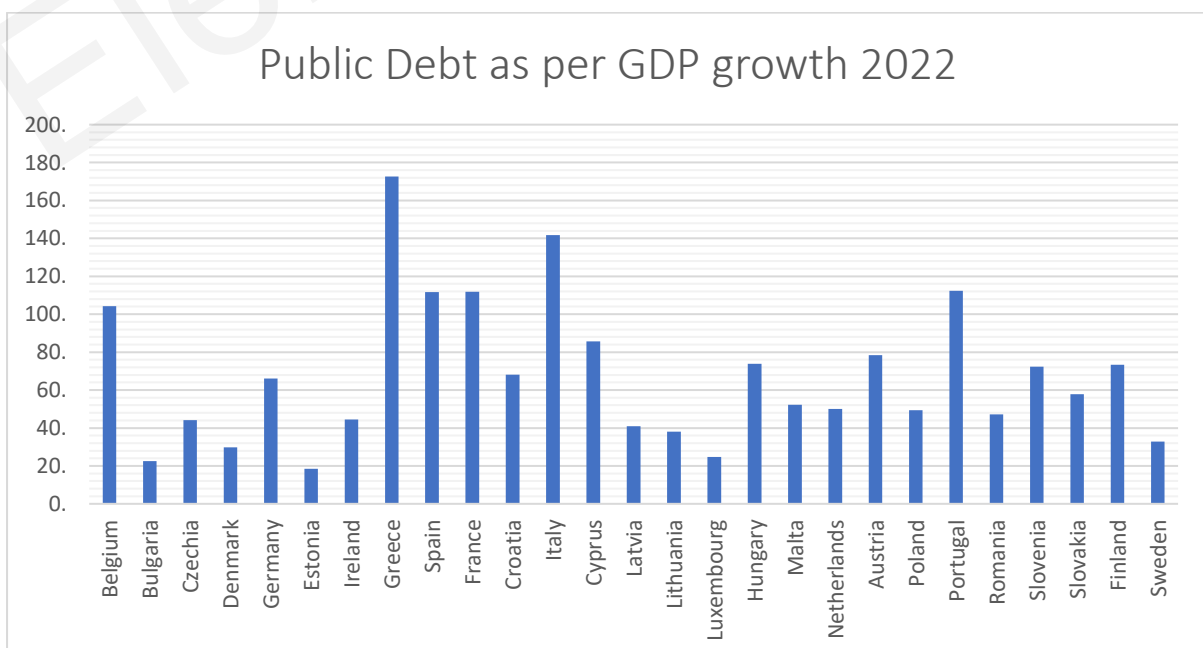
Figure 1

Public Debt as per GDP growth 2000

Figure 2

Public Debt as per GDP growth 2022

Literature review

In the cases of expansionary fiscal policies (increasing deficits, reducing surpluses), it is observed which of the two measures of such policies (increasing spending/reducing taxes) enhances growth. On the contrary, when cautious policies are implemented (reduction of deficits, increase of surpluses) we expect a reduction in the ratio of public debt to GDP but a downward trend for growth as well. Specifically, regarding the case of Cyprus, Pashourtidou, Savva and Syrichas (2014) using an econometric system of dynamic equations, estimated that after the adoption of austerity measures (through a reduction in public expenditure and an increase in government revenue by 1%), there was a decrease in GDP by 1% in the first year after implementation and 0.6% in the second year. In addition, they showed that similar fiscal consolidation policies with the ultimate goal of reducing public debt, again caused GDP to shrink by 1% after the first year and even more by 3% after the second year.

Changes in the fiscal figures of revenue and expenditure are achieved through a variety of parameters. For example, an austerity policy can be achieved through a reduction in civil servant salaries, pensions, social benefits, subsidies, public consumption, investment, etc., and on the revenue side through an increase in tax rates, contributions, revenues from the supply of services, etc. All these factors, through stabilization policies, lead to a contraction of the country's GDP through three channels, the reduction of employment, private consumption and private investment, Pashourtidou, Savva and Syrichas report. Finally, they point out that there is a reduction in the rate of inflation, as a result of the slowdown in economic activity.

However, there are studies that estimate different results regarding the effect of government spending and public revenue. Giavazzi and Pagano (1990) were the first to find that adaptive policies to reduce deficits by reducing public spending can be expansionary for the economy or at least not cause a negative impact. Examples are the cases of Denmark and Ireland during the 1980s, as when they implemented such policies, they achieved high economic growth. On the taxation side, a 1% increase in tax revenue significantly reduces the country's total output by about 3% over the next 3 years, according to Romer and Romer (2007).

What happens at the level where groups of countries share a common currency? Are the aforementioned effects of fiscal policies still valid? Erceg and Linde (2013) demonstrate that expenditure stabilization policies in monetary union countries, such as the Eurozone, weaken GDP during the first three years, to a greater extent than a corresponding tax policy. The public finances of countries that are members of a monetary union that adopt stabilization policies are more adversely affected compared to countries that practice an independent monetary policy. The former do not possess any power to offset the condensing effects of their policies through monetary policy. However, this fact may not be a weakness in some cases. That is, a country with an independent monetary policy could fight some of the real value of its public debt through an increase in inflation. At the same time, however, this change can result in unexpected and uncontrollable increases in the price level, and the medicine in this case can turn into a medicine!

Another view says that, on the demand side, a stabilizing policy could cause expansionary effects if the individuals involved believe that the policy raises hopes that it will "eliminate the need for larger, perhaps much more disruptive adjustments in the future" (Blanchard 1990, 111). When a government imposes increases in taxes and/or

reductions in government spending, then households perceive that these changes are most likely to be permanent. Thus, they reduce their expectations for further stabilization policies (tax increases) in the future. The result is that individuals expect an increase in their disposable income for the next period of their lives. Given such expectations, individuals decide to increase their current private consumption and thus aggregate demand. Nevertheless, this behaviour will depend on consumers' consumption and saving preferences.

Through the investment channel, opposing views can again be interpreted based on the expectations of the individuals involved. If the country's agents expect that stabilization will reduce public debt, then incentives are created to demand a reduction in the real interest rate on government bonds as the risk of default decreases. Lowering government bond rates simultaneously lowers the real interest rates faced by households and businesses. In addition, the stock and bond market are benefiting due to the increased demand caused by the reduction in interest rates. All these factors push on the one hand, consumers to increase their demand for products through low-cost borrowing, and on the other hand, investors to increase their financial wealth through increased demand for stocks and bonds.

A reduction in public spending can be followed by expansionary changes through the labour market as well. On the supply side, if the state, in its effort to reduce the public debt, decides to limit its spending, then the position of civil servants will inevitably become difficult, in the first stage. Cutting their wages, or even firing some, weakens the utility of their unions, and business associations demand lower wages for private sector workers, thereby increasing profits, savings, and competitiveness. But a restrictive fiscal policy is not limited to spending cuts. In the event that the government adopts policies that increase public revenue, such as increasing income

tax or increasing social security contributions, then the workers' net salary is automatically reduced again. However, this time employers are required to pay increased wages which include part of the tax or contributions. Thus, in contrast to the policy of government austerity, an increase in taxation and contributions reduces business profits, subsequently investment and finally, competitiveness. So, we conclude that policies that, although jointly aimed at reducing the fiscal deficit and debt, ultimately cause different effects on the macroeconomic factors of the economy. The state must carry out a thorough investigation of the consequences of any alternative policy it intends to implement, before adopting any measure concerning taxation and government expenditure.

The impact of positive changes, both taxation and spending, has been studied by several economists. Blanchard and Perotti (2002) used VAR (vector autoregressive) techniques to identify exogenous changes in fiscal policy and to estimate fiscal multipliers in terms of government spending and taxation. They found that positive public expenditure shocks cause an increase in output and consumption but a decrease in investment, while corresponding tax shocks have a negative effect on output, consumption and investment. Taking a different approach, Mountford and Uhlig (2008) also showed that increases in spending and taxation reduce private investment but added that spending increases do not increase consumption and that tax cuts are the most effective way to stimulate the economy.

Even though public debt is in itself one of the most important and threatening factors of a country's prosperity and development, policies that exacerbate it may prove to be expansionary for the size of GDP. The relationship between public debt and GDP is defined as non-linear. The inflection point of the curve was estimated to be set at 90–100% (Checherita and Rother 2010). The curve testifies that for a size of public debt

above 90% of GDP, the growth rate shows a downward course, while for a size below 90% there can be an increase in GDP. However, the tipping point has also been estimated at lower levels. Pattillo et al. (2002) using a large panel of data from 93 developing countries over the years 1969-1998, estimate that external debt (creditors based abroad) has a negative effect on the rate of change of GDP per capita from the point where the ratio of public debt to GDP reaches 35-40%. At the same time, Clements et al. (2003) using a panel of 55 low-income countries for the years 1970-1999, estimated the critical turning point of the net present value of external debt at around 20-25%. A possible explanation for the positive relationship between public debt and GDP can be interpreted when fiscal deficits are used to finance productive public investment that increases the efficiency and effectiveness of the economy.

Public debt has increased considerably in recent decades and this trend is accompanied by the expansion of the size of the public sector. During the 20th century, most developed countries experienced massive growth in general government government spending. This phenomenon is analysed in detail in the study by Tanzi and Schuknecht (1997), who using a sample of 13 developed countries showed that the average size of the public sector has grown from 12% of GDP in 1913 to 43% in 1990. The relationship size of the public sector and public debt is confirmed by public debt figures at the end of the century, at 79% of GDP for large governments, 60% for medium-sized governments and 53% for small ones.

Theoretical background

According to the Keynesian theory, economic activity depends on the level of aggregate demand. Consumption, public and private, investment, public and private, exports and imports make up aggregate demand. Therefore, components of fiscal policy are components of aggregate demand. An increase in government spending increases aggregate demand while a corresponding change in taxation directs aggregate demand in the opposite direction. Also, from the Keynesian theory it is known that the demand affects the production, and by extension the GDP of the country. So, a government by making fiscal policy affects the amount of economic activity because it spends, imposes taxes and other kinds of interventions that affect demand. The introduction of an innovative element, the multiplier, demonstrates the multiplier effect of an increase in public spending. That is, a change in government policy, for example an increase in spending on pensions or unemployment benefits, brings about an increase in aggregate demand as the unemployed and retired spend their additional income on food, clothing, furniture, etc. Then, the store owners in turn spend on a possible new investment or to buy other necessities. The same will characterize the behaviour of new shopkeepers who benefit from the increase in the second round of purchases. Gradually the production size will increase through the multiplier. However, the multiplier depends on the marginal propensity to consume of the individuals receiving the increases. The fact that the final change in aggregate demand is multiples of the initial is a strong feature of the public sector and the effectiveness of fiscal policy.

Regarding public debt, the theoretical literature shows that the relationship between public debt and economic growth is characterized by a negative relationship.

Growth models raised through policies that increase public debt to finance consumption or capital goods tend to show a negative relationship between public debt and economic growth, particularly in a neoclassical setting.

Diamond (1965) adds that the effect of taxes on capital is realized through external and internal public debt. He concludes that, through the effects of taxation required to finance the interest payments on the public debt, both types of public debt (domestic and foreign) reduce the propensity to consume and save of taxpayers throughout of their lives. Consequently, the country's capital stock is reduced.

Adam and Bevan (2005) in a simple theoretical model that integrates public budgeting and public debt financing, find that an increase in productive government spending, financed by an increase in the tax rate, enhances growth only if the amount of domestic public debt is quite low.

Descriptive Data Analysis

The study observes the changes induced by fiscal policy in public debt and GDP growth. Government spending and taxation policy decisions are thought to depend on political preferences and ideologies that are, in part, exogenous to the economy.

Below is a table (Table 3) showing the variables that will be considered in the model in this study as well as the unit of measurement of each variable. The data on the variables for all countries were collected by Eurostat as will be detailed below.

The study uses data from EU member states for the period from 2000 to 2022. All fiscal and macroeconomic data for each country and year have been collected from

the Eurostat database. Countries sampled are the 27 countries of E.U: Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland Portugal, Romania, Slovenia, Slovakia, Finland, Sweden.

The selection of this group of countries was based on the fact that, being EU member states, they implement a similar strategy to deal with their economic difficulties through the EU institutions. The institutions impose the same strategy and conditions for each country they monitor. These conditions include (a) a reduction in public expenditure, (b) an increase in public revenue through taxation, and (c) significant changes in the structure of the economy and the promotion of competitiveness. The third condition clearly favors any kind of economy since competitiveness is a powerful force in the efficiency of a market.

	Variables	Unit of Measure
Table 3	1) **GDP Growth Per Capita**	Percentage change on previous period, per capita
	2) **Public Debt (Government consolidated gross debt)**	Percentage of Gross Domestic Product (GDP)
	3) **Government Non Wage Expenditure→ Final Consumption expenditure of general government**	Percentage change on previous period, per capita
	4) **Total general government expenditure**	Million Euro
	5) **VAT → receivable**	Million Euro
	6) **Subsidies → payable**	Million Euro
	7) **Income Tax → Current taxes on income, wealth , e.t.c → receivable**	Million Euro
	8) **Social Contribution → Net social Contributions, receivable**	Million Euro
	9) **Investments → Investments grants, payable**	Million Euro
	10) **Capital Transfer → payable**	Million Euro
	11) **Wages and Salaries → payable**	Million Euro

[17]

A country by reducing its public sector reduces its obligations to the state budget since it now pays less for operating expenses and payroll. Then some economists argue that government intervention it makes it difficult for organizations to run smoothly and thus they propose privatization which increases the efficiency of the economy as incentives for improvement and efficiency through competitiveness increase.

Regarding the first two conditions, the institutions do not take into account the characteristics of each country, such as whether public spending is efficient and necessary for the economy or whether citizens can repay their tax obligations. The imposition of high taxation to cover the unavoidable public expenditure or to cover the repayment of the interest on the public debt, burdens the position of the natives of the country as the net income left to them after taxation is not sufficient to cover only the necessities. Thus, citizens do not activate the economy through private consumption, saving and investment and thus the economy stagnates. The same applies in terms of cutting public expenditure. The reduction of wages or even the dismissal of civil servants, the reduction of public investment and consumption, subsidies, and transfer payments, further complicate the position of the low-paid in society.

Table 4: Table of Descriptive Statistics

| Variable	Obs	Mean	St.Deviation	Min	Max
GDP Growth	620	2.280484	3.962517	-14.5	23.3
Public debt	621	59.83027	35.49889	3.8	207
Government Expenditure Growth	620	1.661613	2.819757	-12	12.4
Total Government Expenditure	621	203456.4	339784.8	1767.2	1.918143
Vat	621	29192.2	45969.05	250.5	285665
Subsidies	621	6592.854	12308.88	13.2	109230
Income tax	621	52871.12	86896.59	389	528837
Social Contribution	621	59777.03	114751.3	323.3	666750
Investments	604	3438.283	7875.459	0	81442
Capital transfers	621	5393.611	11265.31	6.9	92601
Wages	441	35968.34	53839.6	471.6	231944

Before applying the controls, using STATA statistical software, a descriptive table of the model data was retrieved (see Table 4) showing the number, mean, standard deviation, and minimum and maximum value of the observations. According to the results and considering a scatter diagram of the residuals of the model, outliers of the sample were detected. All of these values could be removed from the sample as they were abrupt momentary disturbances and likely to cause problems during hypothesis

testing. However, only those that significantly affected the estimates were removed, such as the value of Ireland's GDP growth in 2015, which was 25.56%. This particular value was far from the rest of the countries in the sample and also misleading the estimates.

The aim of this research, as mentioned above, is to observe to what extent the fiscal policy affects the economic development in the EU countries. The economic growth index, which is the percentage change in GDP, will be used as the dependent variable.

Below is a graph (see Table 5) that shows the course of the index for the time period we are considering (2000-2022) for each country. Although there are different fluctuations in the index for each EU country, the historical events that have characterized the last 20 years are clearly visible, which are the Global Financial Crisis that broke out in 2008-2009 as well as the pandemic that caused a decrease in economic growth due to restrictive measures and lockdown. For this reason, in the graphs below for each country, it is clearly seen that there is a drop in these 2 specific periods.

Table 5: Graph showing the Average of all the countries of the European Union according to the GDP Growth Rate

Graphs by cc
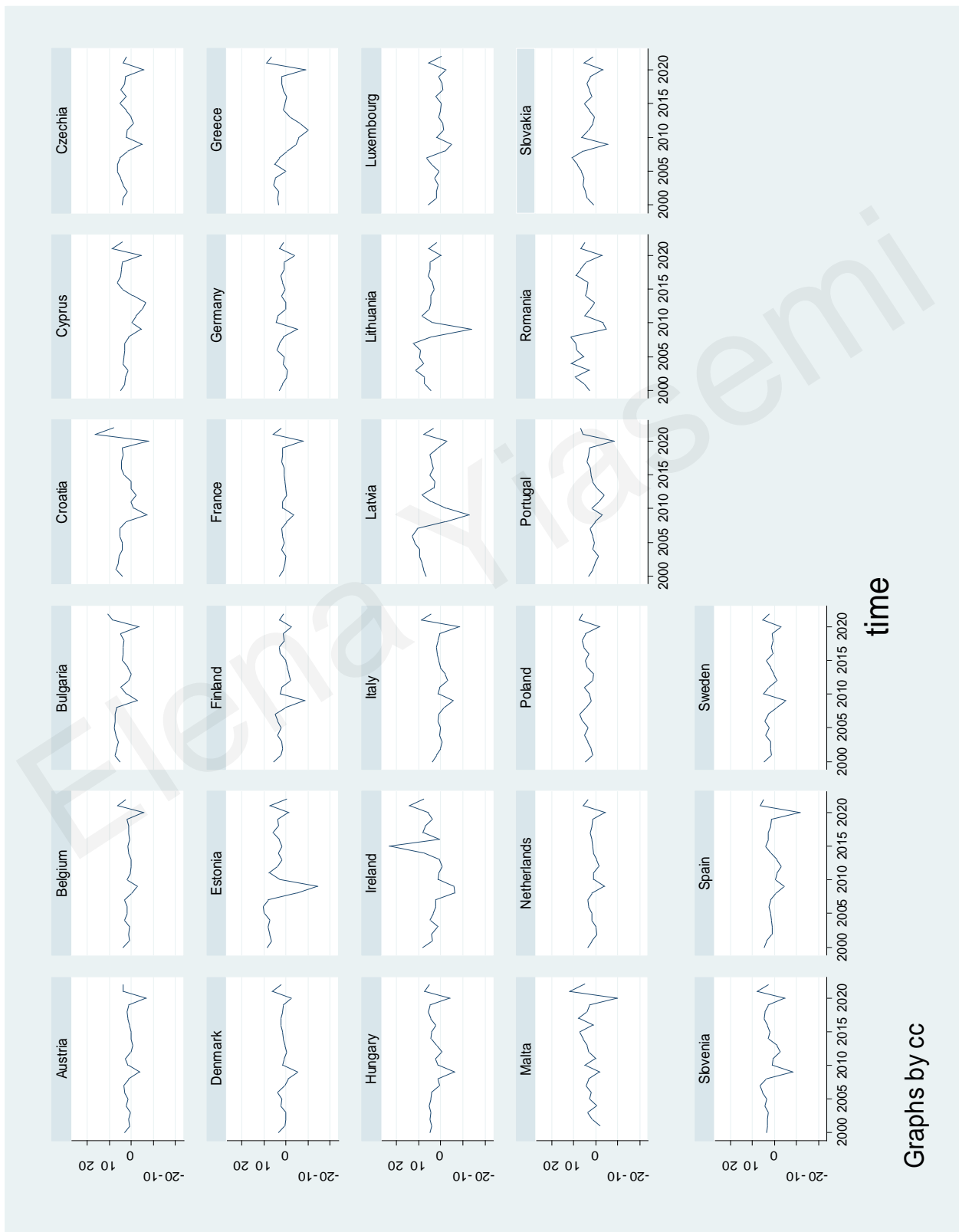
By summarizing all the above graphs, one was created that collectively shows the average for all years and all countries together (see Graph 6). As it mentioned above, time periods of the Global Financial Crisis and the pandemic of covid-19 played a vital role in the GDP percentage.

**Graph 6: Average of GDP Growth Rate for all years and countries together**
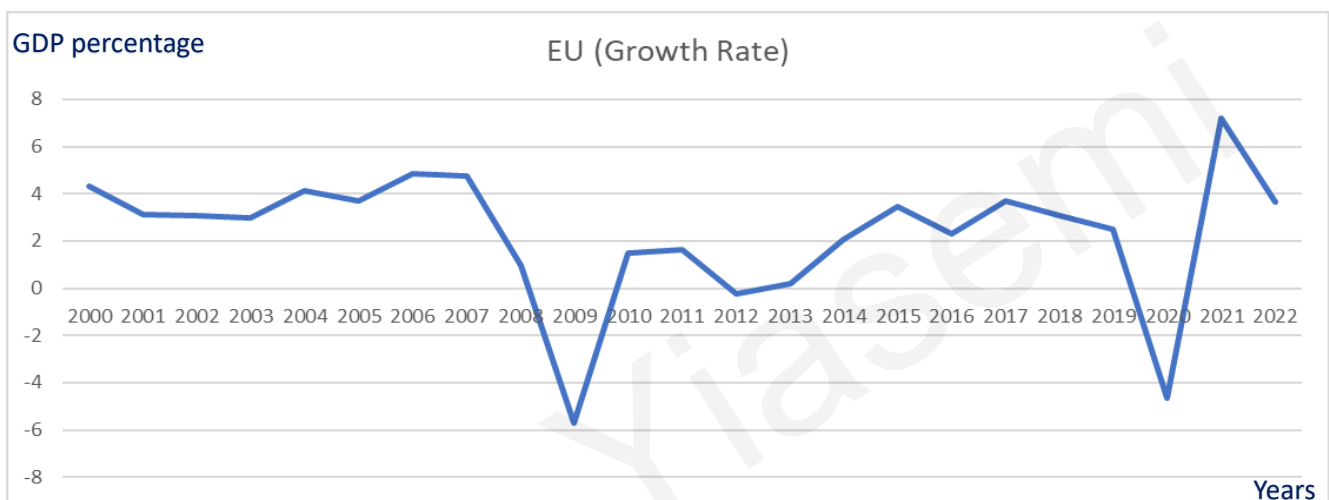
The estimation method of the study is based on the models applied by Alesina and Ardagna (2009). They used a panel sample of a group of OECD countries for the period 1970-2007. The countries in their sample are Australia, Belgium, Austria, Canada, Denmark, Finland, France, Norway, Germany, New Zealand, Portugal, Sweden, Spain, Switzerland, the United Kingdom, and the United States. All fiscal and macroeconomic data were taken from the OECD Economic Outlook Database number 84. In this article, the impact of major fiscal changes on GDP growth and public debt was estimated. They used a cyclically adjusted price of fiscal variables to leave out fluctuations in fiscal variables caused by business cycle fluctuations. However, as they state that the results are not particularly affected if this correction is not made, in the

present study the circular adjustment method is not used. To determine the effects of fiscal policies on GDP growth, they examined in separate models the effects of policies that improved and worsened the primary balance by 1.5% of GDP, as they observed large changes. The primary balance is defined as the difference between public expenditure, excluding interest payments on public debt, and total revenue. The variables observed in the study are the same as used by Alesina and Ardagna. For the group of observations showing an improvement in the primary balance relative to GDP, they regressed GDP growth (dependent variable) on the one- and second-period lags of GDP, the one-period lags of the government debt-to-GDP ratio, and the combination of changes of the fiscal variables, expenditure and expenditure to GDP described below. A corresponding model is estimated for the group of observations that note a contraction of the primary balance.

The figures of the previous years' GDP have a significant impact on the growth of the current year's figure. The size observed in previous years testifies to the trend that is expected to follow in the following years if and as long as no shock occurs in the economy. The same is true from the public debt side. When changes are observed that have an impact on GDP, the price of the previous year's public debt plays an important role as policies implemented to shrink public debt are based on macroeconomic conditions such as GDP.

Graph 7: Scatter Plot of Public Debt to GDP
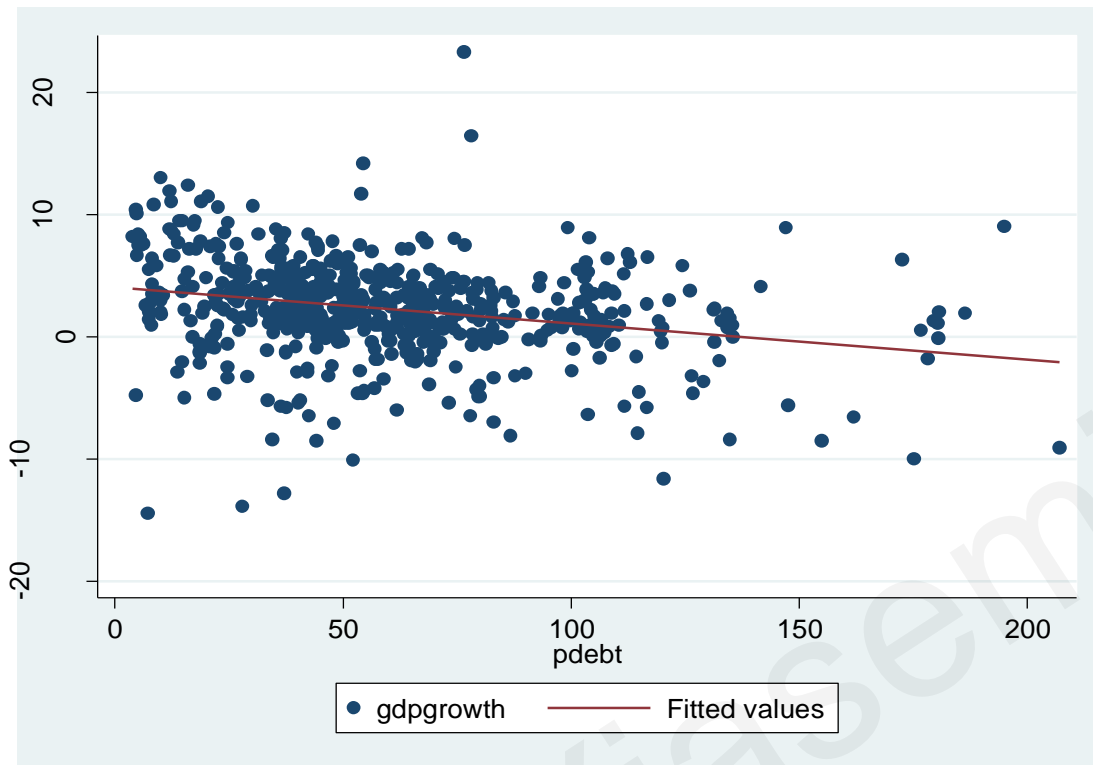
One of the most important factors, and one of the factors that has been much discussed in the existing literature, is public debt. It can be seen in the scatter plot above(Graph 7) that there is a negative relationship between growth and public debt which is supported by the existing literature since Pashourtidou, Savva and Syrichas (2014) showed that in the cited instance concerning Cyprus, aptly assert that the implementation of austere measures, undertaken to alleviate the burden of public debt, bore an intricate association with deleterious repercussions on the Gross Domestic Product (GDP).

Based on their analysis, the adoption of austerity measures, which involve cutting down public expenditures and increasing government income, resulted in a decrease of 1% in the gross domestic product in the first year. This was followed by an additional contraction of 0.6% in the following year. Moreover, similar measures implemented to

address the public debt issue seemed to worsen the economic decline, leading to a reduction of 1% after the initial year and an astounding 3% reduction after the second year. Based on this analysis, the negative consequences of implementing austerity measures and reducing the public debt had a detrimental effect on the economic growth, leading to a negative impact on the country's GDP. Specifically, in the case of Cyprus, the government's pursuit of reducing the public debt by implementing spending cuts and increasing taxes coincided with a decline in the overall economic output of the nation.

In order to comprehend the effects of fiscal policies on the economy and government debt, it is crucial to identify the specific areas impacted by these policies. When the government chooses to enforce measures that reduce public spending, it may implement changes to civil servant salaries, social contribution, operational expenses, subsidies, and public investment. In order to generate more income (increase public revenue), a government has the option of implementing higher direct taxes, indirect taxes, social contributions, and other forms of revenue.

The above groups of public expenditures and revenues consist of various sub-groups that specify their purpose in detail. Initially, the first group of expenses includes salaries, wages and pensions of civil servants. In more detail, it is the expenditure on public service personnel for the operation of state services, local government authorities, non-profit organizations and the pensions of former civil servants. This group of expenses is the most elastic of all, as during periods of economic crises, several countries cut back more on this type of expenses. Also, to minimize these costs, countries promoted early retirement.

Next, social transfers include government benefits to pensioners and the poor. They include social security for pensions, widow's pensions, unemployment benefits, sickness benefits, disability benefits, etc., and are generally aimed at the social welfare of the disabled, the elderly, etc. In some countries, such as Luxembourg, Italy, Sweden et al., this group is showing a swelling trend due to the increased life expectancy of people. However, a greater threat to the size of social transfers is the high unemployment rates observed in countries monitored by the European institutions. That is why, as stated above, the reduction of spending in countries facing economic difficulties further hampers the welfare of citizens as the unemployment benefits received by people who are out of work due to the economic contraction are reduced.

Current transfer expenditure includes funds relating to operational expenditure of all government departments, departments, non-profit organisations, etc., for purchases of goods and services such as rent, printing, paper, telephones, electricity, etc. Such expenditure may they become a bit difficult to limit as they depend on external factors (businesses). However, due to the need to save, many countries are largely reducing such spending.

Recently, agreements have been made between Member States and the EU on matters relating to subsidies. The EU has undertaken through its budget to support declining sectors of the economy, such as agriculture, fishing etc. That is why spending on subsidies is now limited by member countries and then EU rules limit such costs.

Finally, in terms of public expenditure, the group for public investment includes expenditure intended for infrastructure projects, such as the construction of roads, ports, airports, reforestation, the construction of government buildings, etc.. In the investment category, some projects are co-financed by the EU. It is an important group

spending on fiscal policy as infrastructure investment is an important element for the economy.

Government revenue can be secured through a variety of ways, most notably through taxation. Direct taxes that can be levied include taxes on personal income and business profits, real estate, capital gains, extraordinary defence levy and stamp duty. Depending on the characteristics of each country, the categories of direct taxes may differ. Income tax is an important source of revenue for every country as it is difficult and in special cases it can be avoided by individuals, especially public servants.

However, it is limited by the unemployment rate. Regarding corporate tax, following the recent policy implemented by Cyprus, imposing a corporate tax that is at low levels compared to the European level, it has attracted many companies to operate in the country. This fact testifies that although the economic theory claims that the increase in taxes increases revenues and by extension reduces the fiscal deficit and debt, this can also be achieved through policies that do not set high tax rates and thus at the same time promote economic activity and development in the country.

Indirect taxes account for most of the state budget's revenue. Such taxes are the value added tax (VAT) as well as the various taxes on the consumption of alcoholic beverages, soft drinks, cars, petroleum products, etc. and import duties. Member States have also made agreements on import duties with the EU, as a large part of this revenue is collected directly for the EU budget.

A third group of revenues is the social contributions that come from social insurance services. They have increased significantly in the recent period due to the efforts made by countries to increase gainful employment. According to the information provided by

the Eurostat website, social contributions are paid compulsorily or voluntarily by employers, employees and the self-employed and the self-employed.

Moreover, an important source of income for the member states are capital transfers from and to abroad and mainly from the EU. Specifically, Cyprus secured 125 million euros in 2014 and 92 million euros in 2015 for the implementation of co-financed projects (Source: Structural Funds website of EU funds for Cyprus).

Finally, various other types of income are a source of income, such as profits from the Central Banks of each country as well as airport management rights, dividends from semi-governmental organizations, income from offering services from driver's licenses, health services, issuing passports, identity cards, etc.

Methodology

Countries sampled are the 27 countries of E.U. Study uses data from EU member states for 22 years total for a period from 2000 to 2022. All fiscal and macroeconomic data for each country and year have been collected from the Eurostat database.

The data are in panel format since for each variable there are observations for country i in time period t.

The general form of panel data regression is given below:

$$y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \ldots + \beta_k X_{kit} + \alpha_i + \varepsilon_i$$

where i = country and t = time

or it can also appear as:

$$y_{it} = X'_{it}\beta + \alpha_i + \varepsilon_{it} \; \acute{\eta} \; y_{it} = X'_{it}\beta + u_{it}$$

where $\alpha i + \varepsilon it = ui$

Therefore, the regression to be considered and the variables to be used can be expressed as follows:

$$Growth_{it} = b_0 + b_1 debt_{it} + b_2 govexp_{it} + b_3 vat_{it} + b_4 subsidies_{it} + b_5 inctax_{it} + b_5 socon_{it} + b_6 inv_{it} + b_7 captransf_{it} + b_7 wages_{it}$$

Where:

it	Observation for country (i) during time period (year) (t).	
$Growth_{it}$	**GDP growth**	GDP growth rate as percentage for country i and time period t.
$debt_{it}$	**Public Debt**	Public debt as a percentage of GDP for country i and time period t.
$govexp_{it}$	**Total Government Expenditure**	Government expenditure for country i and time period t.
vat_{it}	**VAT**	Government revenue from value added tax for country i and time period t.
$subsidies_{it}$	**Subsidies**	Expenditure on subsidies for country i and time period t.
$inctax_{it}$	**Income Tax**	Income tax Revenue for country i and time period t.
$socon_{it}$	**Social Contribution**	Income from social contributions for country i and time period t.
inv_{it}	**Investments**	Expenditure on public investment for country i and time period t.

$captransf_{it}$	**Capital Transfer**	Income from capital transfers for country I and time period t.
$wages_{it}$	**Wages and Salaries**	Expenditure on the payroll of civil servants for country i and period t

The fact that the study investigates panel data shows that economic units, countries, have different characteristics every year. Fiscal policies are decided and enforced by different governments and thus each country individually experiences different magnitudes of changes in its fiscal parameters. It is therefore necessary to determine whether the data can be grouped according to various observed factors.

In order to accurately run the econometric model, it is necessary to consider a range of factors that affect the sample's composition and properties. This is crucial in order to prevent any inaccurate or invalid outcomes. Additionally, the statistical adequacy of the model greatly influences the interpretation of the results. Therefore, several checks were conducted to identify any deviations from the assumptions of the regression model used in this study.

The fact that the study investigates panel data shows that economic units, countries, have different characteristics every year. Fiscal policies are decided and enforced by different governments and thus each country individually experiences different magnitudes of changes in its fiscal parameters. It is therefore necessary to determine whether the data can be grouped according to various observed factors. A major challenge in panel data is the existence of fixed effects or random effects. Using the criterion of Hausman (1978) it was examined whether the parameters of the models are fixed or random. The criterion estimated a zero probability of supporting the null

hypothesis only for the first model for the sample group. The null hypothesis of the control is to apply random effects. Thus, a fixed effects estimator was used for this case.

A fixed effects model is the error term that includes unobserved parameters in the model that do not change over time as the estimates are fixed effects. Random effects models are the error term representing the individual effect of each observed country. Meanwhile the error term representing the error of the classical model includes parameters related to the model but not included in it. (e.g. the effect of public debt interest rates is included in the value of it as the study does not examine the effect of monetary policy but only of fiscal policy).

In case there are fixed effects, it means that there are variations in the variables between different countries which come from factors that cannot be measured such as for example customs, culture, tradition etc. In order to see whether the data are characterized by fixed or random effects, the Hausman test should be carried out so that the appropriate estimation method is used.

The Hausman-test tests whether the individual characteristics are correlated with the regressors (see Green 2008 , Chapter 9). The null hypothesis implies that data are not affected by individual characteristics. In case, the null hypothesis is rejected then the prober way to estimate the regression is to use fixed effects. In case the data are fixed effects, country-specific dummy variables should be included in the model to account for unmeasured characteristics. In this way we avoid bias problem caused by omitted variables called omitted variables bias.

Based on the theory, the first essential assumption is that of linearity. However, it cannot be assumed that the models meet the linearity assumption because

economists have estimated that the relationship between GDP and public debt is not linear. Additionally, in this study, the hypothesis of the models having a non-linear form was confirmed by the Ramsey's Reset test, which rejected the null hypothesis of linearity. Therefore, even though the constant term is included in the models to ensure linearity, we cannot come to this conclusion.

Next, based on the regression of this study, it is important to check for the presence of heteroscedasticity. Normally, when using panel data models, there is always heteroscedasticity across countries and years. The test for the detection of heteroscedasticity was done with the method of White test (see Appendix 2), rejecting the null hypothesis that the model satisfies homoscedasticity. Since Ho is homoscedasticity, it is rejected since the p-value is very low (p-value > chi2= 0.000) so it ends up to heteroscedasticity. Consequently, we used standard errors to eliminate this issue. The heteroscedasticity problem affects the standard errors, not the estimators. So, since there is this problem, we have to use the strong ones homoscedastic errors i.e. the robust ones. Robust standard errors were used in model (see Appendix 4) estimation and problem solving as the form of heteroscedasticity is not known.

Furthermore, a stagnation test was conducted using the Dicky-Fuller test method. This specific test employed a regression model in which the first differences of the dependent variable were treated as the dependent variable, while the first time lag of the dependent variable served as the independent variable. In the Dickey-Fuller test, it was observed whether the coefficient of the first time lag is equal to 0 or different from 0 (H0: Δ=0, H1: Δ<0). The null hypothesis is rejected, indicating the presence of stagnation.

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In this way, the identification of the distortions of the cases accompanied by the methods of their resolution, ensure the appropriateness of the assessments. According to the theory, satisfying the above assumptions, the estimators can be judged as unbiased and efficient and based on them, important conclusions can be drawn about the effects of fiscal policies in an economy.

Results Estimation

This model is a stationary model without time lags. (see Appendix 1). We observe that public debt is statistically significant at 5% level of significance. Following the same way total government expenditures, VAT and wages and salaries are statistically significant at 1% level of significance. The rest of the variables are not statistically significant at any level of significance.

Holding everything else constant, an increase in public debt of one percentage point is associated with a decrease in economic growth of 0.2 percentage points on average. Ceteris paribus if government spending increases by one percentage point, economic growth increases by an average of 0.4 percentage points. Moreover, holding everything else constant an increase in government revenue from VAT is associated with an increase in economic growth by an average of 0.1 percentage points. Then, holding everything else constant an increase in government spending on subsidies is associated with a decrease in economic growth by an average of 0.005 percentage points. Then, holding everything else constant a 1% increase in income tax revenue is associated with an average 0.02 percentage point increase in economic growth. Also, a 1% increase in government social contribution is associated with an average

0.036 percentage point increase in economic growth, holding everything else constant. At the same time, a 1% increase in investment is associated with an average increase in GDP of 0.038 percentage points, ceteris paribus. Finally, a 1% increase in government wages and salaries is associated with a decrease in GDP of 0.107 percentage points on average, holding all else constant. Lastly, an increase of 1% in capital transfers, is associated with a decrease of the rate of change of GDP of 0.0009 percentage points on average, holding everything else constant.

The Dynamic Model (Appendix 2) was regressed with the time lags. It should be noted that as far as the government expenditure growth is concerned, there was no time lag because it is already the percentage change from the previous year.

Thus, the study model estimates the effect of fiscal changes on GDP growth. Our aim is to observe the impact on GDP growth if government decides to finance the spendings through an increase of public debt. Holding everything else constant, an increase in public debt of one percentage point is associated with a decrease in economic growth of 0.2 percentage points on average. It is better though to observe the dynamic impact of public debt on GDP growth. Therefore, an increase in public debt the previous year of 1 percentage point is associated with an increase in the GDP growth rate of 0.23 percentage points on average. Moreover, holding everything else constant, increasing government spending by one percentage point increases economic growth by an average of 0.22 percentage points.

A very important topic is to understand the impact on GDP when the government chooses to finance the spendings through an increase of the taxes. Holding everything else constant, an increase in government VAT revenue is associated with an increase in economic growth by an average of 0.143 percentage points. This is the direct

relationship between spendings financed by taxes and the GDP Growth. A better approach is to observed the first lag of the particular variable. Therefore, an increase in government VAT revenue the previous year is associated with a decrease in GDP growth rate of 0.145 percentage points. As a result, an important finding is that if the government chooses to finance its spendings through taxes it causes a negative impact on the GDP growth.

Furthermore, holding everything else constant, an increase in government spending on subsidies is associated with a decrease in economic growth of 0.009 percentage points. In opposite, an increase in government expenditure on subsidies positively affects the growth rate by 0.005 percentage points relative to the previous year.

Ceteris paribus, a 1% increase in income tax revenue is associated with an average 0.08 percentage point increase in economic growth. In comparison, as per the previous year a 1% increase in income tax, is associated with a decrease in GDP of 0.09 percentage points on average. Holding everything else constant, an increase of 1% in government social contribution is associated with an average 0.022 percentage point increase in economic growth. As for the previous year, a 1% increase in social contribution is associated with a decrease in GDP of 0.0505 percentage points on average.

Subsequently, holding everything else constant, a 1% increase in investment is associated with a decrease in GDP of 0.0024 percentage points on average. Regarding the previous year there is an increase in GDP of an average of 0.015 percentage points. Ceteris paribus a 1% increase in government wages and salaries is associated with a 0.0024 percentage point decrease in GDP growth. In contrast, as

far as the previous period is concerned, there is an increase in GDP of 0.015 percentage points.

Last, holding all else constant, a 1% increase in capital transfer is associated with an increase in the growth rate of 0.0017 percentage points. Contrariwise, an increase in capital transfer from the previous period is associated with a decrease in GDP of 0.00012 percentage points.

Regarding the explanatory variable, it was observed that the explanatory power of the model is about 69%. Specifically, the variables used in the model explain 69% of the variation in economic growth. With respect to the model including robust standard errors there is a noteworthy decrease in R^2 to an extremely high level, resulting in a reduction to 27% from its initial value of 69%.

Prior to demonstrating the presence of heteroscedasticity, study employed robust standard errors. Nonetheless, it is worth noting that this approach yields an excessivelt inflated R^2 value, which is entirely fictitious. Consequently, we addressed the issue of heteroskedasticity and rectified both the inaccurate standard errors and the misleading R^2 value. As a result, of implementing robust standards errors and resolving the heteroskedasticity problem, we discovered that the true R^2 in our model is 27%.

Deviations from expected results

The study was expected to draw similar conclusions to the Alesina and Ardagna (2009) study as it relied primarily on the same methodology. However, there are some differences that may not be particularly important as the researchers only observed large changes in fiscal sizes and also the sample of countries is partially different from the sample of the present study.

Similarly, to the authors Alesina and Ardagna (2009) the particular survey supports that decrease in taxes, especially VAT is associated with an increase of the GDP. In addition, spending of the governments is also associated with economic growth. Alesina and Ardagna (2009) found that, tax cuts have more impact on growth rather than government spendings, however this study suggests that the impact is similar.

As they report, the model using the group of observations that shrink the primary balance estimates that policies that increase public spending relative to GDP are accompanied by a contraction in growth. According to the estimates of the present study, these predictions were confirmed as changes in most expenditure categories during periods of expansionary policies are accompanied by a decrease in economic growth. Also, according to Alesina and Ardagna (2009), in periods of expansionary policies changes in direct and indirect taxes are more likely to boost growth compared to contractionary periods, a fact that was indeed confirmed by the results of the study.

Conclusions

The most important finding in this study is that when the government finances its spendings through an increase in taxes, there is a negative impact on the GDP Growth while when the government finances its spendings through an increase in public debt the previous period there is a positive impact on economic growth.

Understanding how debt is created is crucial in terms of its financial consequences and the subsequent approach to managing it. For this reason, research suggests that policies focused on tax reduction are more effective in stimulating economic growth compared to corresponding increases in spending. Additionally, policies aimed at improving the primary balance through public spending cuts are more successful in reducing deficits and debt to GDP ratio that those involving tax hikes.

Regarding the strategy proposed by the EU institutions, it appears that it may be beneficial to review the fiscal policy. The current increase in taxes seems to be impeding economic growth, despite its positive impact on reducing public debt. However, for policy packages to be truly effective, it is important to ensure that the changes in each category of the public budget are appropriately distributed. This way, the fiscal figures can work together harmoniously and offset any negative consequences.

In conclusion, the study highlights an important message for politicians of any government who shape policies regarding public debt. It is crucial for them to carefully consider the potential impact on both GDP growth and public debt to GDP ratio before making any decisions. Different categories of expenditure and income can have varying effects on these two aspects of an economy. The study suggests that public

investment can play a significant role in driving a country's economic growth and sustainability. However, it is important to note that the effectiveness of any policy can vary depending on the unique of a country and its citizens.

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Appendices

Appendix 1: Results Table

GDP GROWTH	COEF	T	P-VALUE
Pdebt	-0.0273374** {0.0128674}	-2.12	0.034
govexpgrowth	0.4102471*** {0.0625754}	6.56	0.000
Lnvat	10.8431*** {1.870655}	5.80	0.000
lnsubsidies	-0.5752219*** {0.305438}	-1.88	0.060
lninctax	0.120207 {1.411662}	1.50	0.134
lnsocialcon	-3.664283 {2.246878}	-1.63	0.104
Lninv	0.3820249 {0.2591004}	1.47	0.141
lnwages	-10.79473*** {1.923927}	-5.61	0.000
lncaptransfers	-0.091235 {0.3412185}	-0.27	0.789
Cons	21.58456*** {5.49983}	3.92	0.000
Robust Standard Errors in parentheses	*** p<0.1 **p<0.05 *p<0.01		
Number of Observations	439		
R-Squared	0.5016		

Appendix 2 : White Test for Heteroskedasticity

White's test for Ho: homoskedasticity			
Against Ha: unrestricted heteroskedasticity			
Chi2(54) = 133.76			
Prob > chi2 = 0.0000			
Source	**Chi2**	**Df**	**P**
Heteroskedasticity	133.76	54	0.0000
Skewness	18.91	9	0.0259
Kurtosis	6.35	1	0.0117
Total	159.02	64	0.0000

Appendix 3: Dynamic Model

GDP GROWTH	COEF
$Pdebt_t$	-0.2179723*** (0.02765)
$Pdebt_{t-1}$	0.2389089*** (0.0268791)
$Govexpgrowth_t$	0.22141*** (0.0482711)
$LnVAT_t$	14.37535*** (2.069427)
$LnVAT_{t-1}$	-14.52709*** (0.037591)
$Lnsubsidies_t$	-0.9996283* (0.3834642)
$Lnsubsidies_{t-1}$	0.5499357 (0.378979)
$Lninctax_t$	8.433816*** (1.670351)
$Lnincome_{t-1}$	-9.033817*** (1.608409)
$Lnsocialcon_t$	2.235386 (3.042573)
$Lnsocialcon_{t-1}$	-5.054907*** (2.831484)
$Lninv_t$	-0.0171222 (0.2066651)
$Lninv_{t-1}$	0.2174326 (0.2035341)
$Lnwages_t$	-0.2416237 (3.010918)
$Lnwages_{t-1}$	1.507859 (2.721976)
$Lncaptrans_t$	0.1728407 (0.237605)
$Lncaptrans_{t-1}$	-0.0123784 (0.2398021)

Cons	22.86259***
	(4.082583)
Robust Standard Errors in parentheses	*** p<0.1 **p<0.05 *p<0.01
Number of Observations	418
R-Squared	0.6925

22.86259***

Appendix 4 : Model with Robust Standard Errors

GDP GROWTH	COEF {Robust Standards Errors}
Pdebt	-0.0273374** {0.0119732}
govexpgrowth	0.4102471** {0.1133912}
lnvat	10.8431** {4.628851}
lnsubsidies	-0.5752219 {0.3356306}
lninctax	2.120207 {1.651738}
nsocialcon	-3.664283 {3.687789}
lninv	0.3820249 {0.2794575}
lnwages	-10.79473*** {3.260582}
lncaptransfers	-0.091235 {0.2726918}
cons	21.58456** {9.244681}
Robust Standard Errors in parentheses	*** p<0.1 **p<0.05 *p<0.01
Number of Observations	439
R-Squared	0.2717