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Government Debts and Economic Growth: The Case for Selected European Union Countries

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ABSTRACT

This study examines the relationship between economic growth and government debts (GD) for 15 European Union countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Slovakia, Spain, Estonia, Slovenia) between 2000 and 2016. We have used the gross domestic product (GDP), global financial crisis. Labor and OECD data which we have obtained from the World Bank database. The econometric method used in this study was autoregressive distributed lag pooled mean group. According to the findings obtained from the study, the increase in GDP caused a decrease in GD in the short term and increased the GD in the long term.

Keywords: Government Debt, Economic Growth, Panel Analysis, European Union
JEL Classifications: H63, C33, C23

1. INTRODUCTION

Government debt (GD) s are used to finance of public goods and services such as taxes and other incomes (parafiscal revenues, money transactions, tax penalties etc.) or real incomes that can be allocated to private expenditures of individuals and normal/ordinary resources used to finance of public expenditure. It is observed that the governments has also borrowed as a public income in order to realize the country's development, especially wars, and to make investment programs to be created for this purpose. While developed countries provide their domestic resources through internal debts, less developed and developing countries use foreign debts due to insufficient domestic resources. The channels in which GD (level or change) have an impact on the rate of economic growth are: (i) Private savings; (ii) public investments; (iii) total factor productivity (TFP); and (iv) long-term nominal and real interest rates. For the first three channels - Private savings, public investment and TFP - Nonlinear (concave) relationship is also dominant in various models. In relation to the long-term government interest rates, a strong impact on nominal and real interest rates is due to the change in the debt ratio (first difference) and primary budget balance (Checherita and Rother, 2010. p. 5-6).

GDs have increased significantly in recent years, and this trend has often been accompanied by an expansion in the size of governments. As a result of the global economic and financial crises, the sharp increase in the debts of developed countries led to serious concerns about financial sustainability and their wider economic and financial market effects. A key issue is that large public debts have a negative impact on capital accumulation and productivity and reduce economic growth. This can be achieved through higher channels of interest, possibly with higher future tax distortion, higher inflation, and more uncertainty. If economic growth is negatively affected, fiscal sustainability issues will increase. This further increases the priority for early and decisive fiscal adjustment efforts to reduce debts to more sustainable levels. Despite the importance of the issue, there is little evidence that large debts are less likely to reduce potential growth (Kumar and Woo, 2010. p. 4).

The 2008–2009 crisis has put considerable pressure on public finance in the Euro area, especially in the GDs. Many Euro area and European Union (EU) countries are under high risk for fiscal sustainability. Against this background, an important question is the economic consequences of a permanent public debt regime, high and potentially. The ratio of economic growth to public debt to gross domestic product (GDP) is likely to have a linear impact. High public debt is also likely to be detrimental to growth, but is potentially likely after reaching a certain threshold. From a policy point of view, the negative impact of public debt on economic growth reinforces the arguments of ambitious debt reduction through fiscal consolidation (Checherita and Rother, 2010. p. 5-6).

The studies in the literature generally indicate that debt has a negative effect on economic growth with a standard exclusion effect. Lof and Malinen (2009) analyzed the relationship between GD and economic growth by means of a panel method for 20 developed countries and concluded that growth on debt has a negative effect (Puente-Ajovín and Sanso-Navarro, 2015). Analyzed the relationship between debt and growth for 16 OECD countries in their study. Granger causality test was used in the study. The findings do not provide evidence against the null hypothesis that GD does not cause real GDP growth. There is also causality from non-financial private debts, especially households, to growth (Reinhart and Rogoff, 2010). Central GD, the relationship between inflation and growth with data of two countries with the data analysis of panel data analyzed for 44 countries. The results show that high debt/GDP levels (90%<) in both developed countries and emerging markets are associated with particularly low growth outcomes, and that much lower levels of external debt/ GDP are associated with unfavorable results for emerging market growth. Gambling and Woo (2010) investigated the effect of high public debt on long-term economic growth. The analysis, based on a panel of developed and developing economies, has taken into account a broad spectrum of growth for almost four decades, and a variety of forecasting issues, including inverse causality and endogenity. Empirical results show an inverse relationship between debt and subsequent growth (Égert, 2013). In his study, Reinhart-Rogoffputs the dataset into an econometric test to see if the public debt has a negative nonlinear effect on growth if the public debt exceeds 90% of GDP. Data from 1960 to 2010 were analyzed for 13 OECD countries. The results showed that using non-linear models, the negative nonlinear relationship between debt and growth is very sensitive to modeling preferences. Baum et al. (2012) studied the relationship between public debt and economic growth between 1990 and 2010 with the panel data method for 12 EU countries were examined. The empirical results showed that the short-term effect of the debt stock on GDP growth was positive and highly statistically significant, but dropped to around zero and the ratio of public debt to GDP was around 67%. Kempa and Khan (2016) examined the direction of causality between growth and growth in the group of seven countries using quarterly data from 1980 to 2013. The results showed that growth led to debts rather than other means. The effect of magic on debt is definitively negative in all important causality cases (Presbitero and Panizza, 2013). Studied the theoretical and empirical literature on the relationship between public debt and economic growth in advanced economies. They have concluded that a causal effect extending from high debt to growth still needs to continue. In addition to their causality problems, they have shown that the evidence of a common debt threshold in which growth has collapsed is far from solid. Kourtellosi et al. (2013), in their study, a structural regression methodology was used to examine the heterogeneous effects of debts on growth as a threshold variable and many other variables. In the 1980–89, 1990–99 and 2000–2009 periods, a 10-year balance sheet including 82 countries was used. The results were found to be consistent with the presence of parameter heterogeneity in the inter-country growth process due to the main determinants of the economic growth proposed by new growth theories. Presbitero (2010) examined 1990–2007 period using a panel of low and middle-income countries for the public debt GDP. It was on a threshold of 90 percent of the output growth until the drain is an impact, and the impact that the show is trivial job.

Our study will reveal the link between the economic variables of GD. The aim of our study was to determine the relationship between economic growth and GDs by using the data of GDP, gross capital formation (GCF), labor, GD between the years 2000 and 2016 for 15 EU countries. Our study contributes to the literature in terms of the data set, method and country group we use.

In the second part of our study, medotology will be discussed. The relationship between the economic growth and the government debtors will be determined by the pool autoregressive distributed lag (ARDL), pool mean group (MG) method using the data of GDP, GCF, labor and GD between the years of 2000 and 2016 for the three and the latest 15 EU countries. In the third and last chapter, a general conclusion will be reached within the framework of our findings.

2. METHODOLOGY

2.1. Data Set

In our study, GDP, GCF, labor, GD data is used between 2000 and 2016 for the 15 EU countries. Only 15 of the 28 EU countries in the database for the period of 2000 to 2016 due to the fact that they have complete data only for these countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovakia, Spain, Estonia, Slovenia). We chose data related to the ratio of GD in 2000 from the previous year are not complete for some countries. Therefore, the period starts from 2000.

Dependent variable is GDP. Therefore, changes in real GDP indicate changes in the economic performance of countries. The independent variables are GDP/GCF, labor force (total labor) and GD. The economic model for the study is based on the neo-classical production function consisting of two inputs, labor and capital.

$Y=f(K, L)$

In our analysis, annual data was used for the period and the logarithm of these data was taken. The data used in the study were derived from World Bank. The GD is taken from the OECD database. In the analysis, panel ARDL, pooled MG (PMG). Method was used.

2.2. Panel Data Analysis and Unit Root Tests

Recently, panel data method has become widespread in econometric analysis. In these models, N units with there are T observations from each of these variables. The increase in the number of observations eliminate the multiple linear correlation problem and adds more variability to the relationship we measure (Hsiao, 2006. p. 7). In order to examine the panel data analysis method in more detail, if we take the general hypothesis with "k" variable:

$$y_{it}=\beta_{1it}+\beta_{2it}+\beta_{kit} X_{kit}+\varepsilon_{it}$$

In equation, t = 1, 2,….,n shows time and i = 1, 2.,G shows the units. Non-probabilistic error term mean of the variance ε is constant and it is considered to be zero. If $E(\varepsilon_{it}) = 0$, it means

$\mathrm{Var}(\varepsilon_{it}) = \sigma_{\varepsilon}^{2}$. Unknown coefficients are slope coefficients from β_{2it} to $\beta_{kit.}$ These coefficients they may vary for different time periods and different types. In addition to this, several assumptions are made related to the slope coefficients of the model, constant term and error term (Judge et al., 1985. p. 515).

The equation we will use in our analysis is based on the cobb-douglas production function as follows:

$$GDP_{i,t}=\beta_0+\beta_1 K_{i,t}+\beta_2 L_{i,t}+\beta_3 GD_{i,t}+\varepsilon_{i,t}$$

From β_1 to β_3 includes the coefficients given to the independent variables, β_0 is constant and i, t means that panel data analysis will be used. $\varepsilon_{i,t}$ shows the error term included in the model.

Panel unit root tests are divided into two groups by checking at whether the horizontal sections that form the panel are independent or not. The first group tests are as follows. Im et al. (2003), Levin et al. (2002), Breitung (2005), Choi (2001), Hadri (2000), and Maddala and Wu (1999). The second group tests are: PANKPSS (Silvestre et al., 2005), Bai and Ng (2004), MADF (Taylor and Sarno, 1998), CADF (Pesaran, 2006) and SURADF (Breuer et al., 2002).

Our sample period is 2000–2016. The maximum delay length is set to 3 according to the schwarz information criteria. Levin et al., ADF and Philips Perron unit root tests were applied to the variables according to Im, Pesaran and Shin test. According to unit root test results, dependent variable is stationary at GDP I (1) and independent variables are Lab, GCF, GD at I (0) level. Unit root test results are presented in Tables 1 and 2.

3. RESULTS

In our analysis, we used PMG estimator method. This method was developed by Pesaran et al. (1999). This method allows us to deal with an important problem that meets empirical growth studies: This is a significant problem parameter heterogeneity. Parameter heterogeneity requires extreme attention in the interpretation of parameter averages. The PMG estimator allows short-term coefficients and error variances to vary across countries, while at the same time assuming the homogeneity of long-term coefficients, it provides a way to at least partially eliminate this problem. Simões (2011:460) and Pesaran et al. (1999) suggest different estimators that are consistent when both T and N are large numbers. The difference between these two estimators is that the MG estimator appears more consistent under the assumption that both slope and intersection allow it to change from country to country. According to the combined MG estimator PMG, the homogeneity of the slope is consistent under the assumption of long-term. An alternative predictor established under the assumption of homogeneity slope is dynamic fixed effects in which the slopes are fixed and allow for intersections to vary by country. The MG estimator receives the long-term parameters for the panel from the average long-term parameters from the ARDL models for individual countries (Ndambendia, 2010. p. 11).

In the study, the model is formulated as follows:

$$gdp_{it} = \alpha_0 + \sum_{j=1}^{ki}\beta_{ij} lab_{i,t-j} + \sum_{j=0}^{fi}\omega_{ij} gcf_{i,t-j} + \sum_{j=0}^{hi}\vartheta_{ij} gd_{i,t-j}$$

According to the results of our analysis, the COINTEQ01 (−0.287339) coefficient is between 0 and −1, which means that the

Table 1: Unit root test results (level, trend-intercept)

Var	Levin et al. t*	Im et al. W-stat	ADF- FisherChi-square	PP - Fisher Chi-square
GDP	−2.56484 (0.0052)	−0.09649 (0.4616)	26.2143 (0.6642)	16.4925 (0.9782)
LAB	4.16397 (0.0000)	−1.01214 (0.1557)	37.6909 (0.1578)	24.3911 (0.7540)
GCF	−5.01717 (0.0000)	−3.38523 (0.0004)	58.5103 (0.0014)	57.2640 (0.0019)
GD	−0.36519 (0.3575)	−0.36519 (0.3575)	28.1072 (0.5648)	19.6340 (0.9257)

The values in the parentheses indicate probability values, GDP: Gross domestic product, GCF: Gross capital formation, GD: Government debt

Table 2: Unit root test results (1st difference, trend-intercept)

Var	Levin et al. t*	Im et al.W-stat	ADF- fisherChi-square	PP - Fisher Chi-square
GDP	−7.20666 (0.0000)	−3.59917 (0.0002)	61.3753 (0.0006)	77.0838 (0.000)
LAB	−9.30450 (0.0000)	−7.11631 (0.0000)	105.756 (0.0000)	159.435 (0.0000)
GCF	−6.07048 (0.0000)	−6.07048 (0.0000)	90.5349 (0.0000)	140.744 (0.0000)
GD	−7.22128 (0.0000)	−5.16966 (0.0000)	78.0635 (0.0000)	98.4875 (0.0000)

GDP: Gross domestic product, GCF: Gross capital formation, GD: Government debt, The values in the parentheses indicate probability values

Table 3: Short and long term analysis results

Variable	Coefficient	Standard error	Dependent variable: GDP	
			t-statistics	Probability
Long term parameters				
LOGGGD	0.0548892	0.020398	2.691122	0.0082
LOGLAB	−0.133688	0.130597	−1.023673	0.03081
LOGGCF	0.442072	0.033655	13.13544	0.0000
Short term parameters				
COINTEQ01	−0.287339	0.082140	−3.498182	0.0007
D (LOGGD)	−0.110289	0.019311	−5.711305	0.0000
D (LOGGD(-1))	−0.033648	0.018516	−1.817271	0.0717
D (LOGLAB)	0.314731	0.175859	1.789677	0.0761
D (LOGLAB(-1))	−0.328752	0.215483	−1525652	0.1298
D (LOGGCF)	0.078445	0.035467	2.211783	0.0289
D (LOGGCF(-1))	−00.011191	0.022390	−0.499815	0.6181
C	1.362905	0.400685	3.401439	0.0009

*Significance levels are at 10% GDP: Gross domestic product

Table 4: Granger causality test results

LOGGD does not granger cause LOGGDP	0.30133	0.7401
LOGGDP granger cause LOGGD	4.73622	0.0097
LOGLAB does not granger cause LOGGDP	1.70704	0.1838
LOGGDP does not granger cause LOGLAB	15.4927	5, E-07
LOGGCF does not granger cause LOGGDP	1.08527	0.3396
LOGGDP does not granger cause LOGGCF	17.8224	7, E-08
LOGLAB does not granger cause LOGGD	1.40751	0.2469
LOGGD granger cause LOGLAB	4.34005	0.0142
LOGCF granger cause LOGGGD	5.28398	0.0057
LOGGD granger cause LOGGCF	6.55609	0.0017
LOGCF granger cause LOGLAB	6.73911	0.0014
LOGLAB does not granger cause LOGCF	0.74402	0.4764

error correction model is running. Short-term parameters are given in Table 3, labor and capital variables are significant. According to the first differences, GD and capital are significant; labor d rationale is meaningless. In the short-term, 1% increase in GDP is dependent on the state debt causes 0.110289 units decreasing. 1% increase in the GDP causes 0.31473 units increasing in capital and 0.078445 units increase in labor.

If the long-term results are considered, it is understood that all variables (GDP, LAB, GCF, CD) are significant. According to these results, 1% increase in GDP per capita causes increase of the GD as 0.0548892 units, decrease of labor −0.133688 units and increase of capital as 0.442072 units.

3.2. Granger Causality

According to Granger (1969), causality is explained as follows. If x values are more successful than the previous values of x, the x variable y can be called. X ≥ Y. This test is not a method of estimation but it is a causal extraction, so the data must be pre-stabilized (Granger, 1989).

The lag length of the causality test in Table 4 was determined according to the causality test results, GD is not the reason for growth. Growth is the cause of GD. At 10% significance level, Ho hypotheses cannot be rejected. So the results of the Granger causality tests do not show causality from the GD to economic growth There is a causality from growth to GD.

4. CONCLUSION

Our study's findings has supported the available literature about the relationship between GD and economic growth. In the short run, it was found that GDP growth has a statistically significant negative effect on GDs. This suggests that the negative long-term correlation between the GD and GDP growth is mainly due to the negative impact of economic growth on the GD. In the data period there was positive relationship between these variables. Moreover, GD is not the reason for growth, but growth is the cause of GD.

In other words, the results obtained from this study, GD does not cause economic growth. Therefore, targeting a higher debt level to support growth is not a policy option. Any policy with such a goal will have a clearly negative impact on the debt burden and will reduce the interests of governments.

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