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IMPACT OF PRODUCTIVITY, CORRUPTION, AND GROWTH ON DEBT: EVIDENCE FROM PANEL DATA ANALYSIS

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ABSTRACT

In a number of nations, the economic uncertainty that began several years ago has manifested its negative effects, and the COVID-19 crisis has exacerbated the situation. Many nations struggle to finance their social and economic public healthcare due to limited resources and fiscal space. In order to save their economies, this has pushed them towards high levels of debt. This study's objective is to examine the effect of government debt on productivity, GDP growth, tax revenue, and corruption. Panel data analysis was used to identify the significant factors that affect government debt in 16 Western European countries based on their severe subprime crisis in 2008 and sovereign debt in 2009, which fall between the timeframes of this study. The findings

revealed that government debt impacts productivity, GDP growth, and corruption. As a result, effective productivity control is critical when dealing with government debt. Efforts to develop world-class human capital, equipped with sophisticated skills or talent management, in order to increase a sector's income and competitiveness should be aligned with efficient and effective public spending. Public projects must be thoroughly evaluated and monitored in terms of feasibility, economic and social returns. As a consequence, this study suggests that a profound and comprehensive reformation across various sectors in the country is required, particularly through productivity, growth, and corruption, in order to control a country's debt.

Keywords: Government debt, productivity, economic growth, corruption, West European countries.

INTRODUCTION

One of the most critical indicators used by governments to influence national development is debt or borrowing. It is applied to raise productivity and stimulate economic expansion (Muhammad et al., 2017). In many nations, the ratio of public debt to national income has drastically increased in recent years. Government investment in the creation of human capital and the real interest rate are two areas where government debt has an effect on growth (Li & Lin, 2011). As a result, after a certain point, public debt has a negative effect on economic growth (Reinhart & Rogoff, 2010; Panizza & Presbitero, 2012).

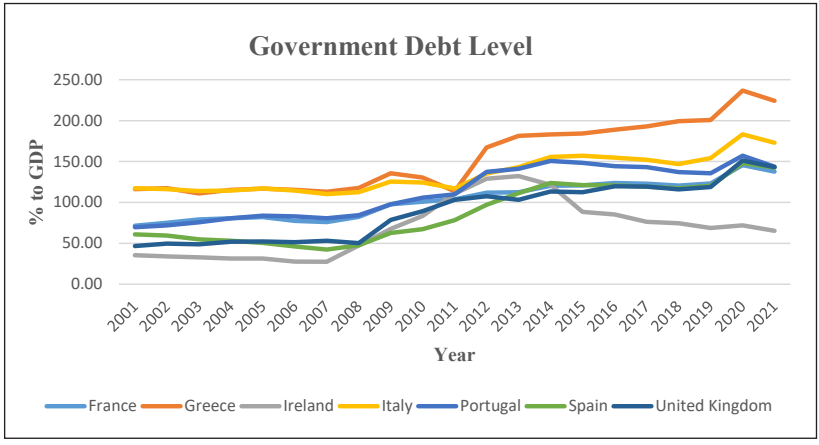
A budget deficit occurs when government spending surpasses the total amount of duty-accumulated revenue that can be obtained from both domestic and international sectors, according to Muhammad et al. (2017). Foreign debt and domestic debt are the two categories of governmental debt. When a government's holdings of securities are insufficient to cover past budget shortfalls, government debt can be predicted. Additionally, from a macroeconomic perspective, rising government debt would boost expenditure in the productive areas of the economy, which would help it expand.

When a government has a budget deficit, it has been usual practice to turn to sovereign debt financing, with the difference between

revenue and expenditure being supplied by debt borrowing (Murrja et al., 2014). In order to achieve higher economic and social well-being, debt must be incurred. Worldwide nations have benefited from the adoption of expansive fiscal policies that have led to robust economic performance, whether they are developed or emerging nations. However, the majority of nations are currently mired in a high-debt trap, particularly in the wake of the 2008 global financial crisis. The global financial crisis-related economic slowdown and rising unemployment have compelled the government to lay even more emphasis on expansionary fiscal measures to promote economic growth. Debt has drawn criticism for its part in sparking the ASEAN crisis, according to analysis of that crisis (Siti Nurazira, 2014). In actuality, substantial government debt issuances are taken advantage of. High debt levels can be bad for a country's health and could cause bankruptcy if they are not properly handled. In addition, it was stated that rather than productivity advances, economic growth in Asia is driven by the accumulation of inputs in the production process, which could lead to excessive government debt (Noor Aini et al., 2008).

Figure 1

Government Debt Level of Selected West Europe Countries from 2001 to 2021

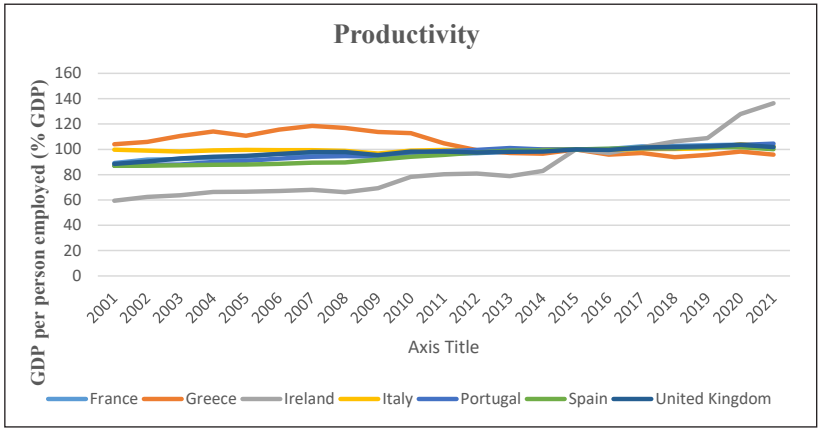


The largest amounts of public debt are in Greece, Italy, Spain, and Portugal, as shown in Figure 1. They frequently cross over the line

of a country's debt-to-GDP ratio exceeding 120 percent, which is thought to be extremely unhealthy. The year of 2012 saw the biggest government debt in the world, which was Greece. During the financial crisis and COVID-19 epidemic, the majority of Western European nations primarily rely on debt financing. This eventually results in exceptionally high amounts of government debt, which is a perilous condition. Greece's government is forced to borrow money from the international markets at higher interest rates as a result of its reduced credit rating brought on by an increase in government debt (Rady, 2012)

Figure 2

Productivity Level of Selected West European Countries from 2001 to 2021



On the other hand, macroeconomic variables might be to blame for the likelihood that Ireland and Spain will become indebted. Following the 2008 financial crisis, as the government's debt rose, the situation has gotten worse. Global markets are forced to lend to the Greek government at higher interest rates as a result of Greece's deteriorated credit rating as a result of a growth in public debt. The housing crisis has an impact on both nations, particularly on the building and real estate sectors. The country suffers when the development engine in the housing industry bursts due to the excessive and dangerous expansion of banking investment in the construction market (Ptak & Szymanska, 2016).

Additionally, the global financial crisis forced the Greek government to speed up borrowing on the international capital market, which led to an exponential and highly volatile increase in the nation's debt. Additionally, its high debt level has exceeded the European Monetary Union's ceiling of 60 percent of GDP (EMU). Greece has been struggling with its enormous debt for years, and eventually, it is compelled to ask the EU and IMF for help in order to implement structural economic reforms to reverse the impacts of debt abuse (Hope, 2017).

The term "productivity" is defined as output per unit of input, such as labour or capital, and is calculated for the economy as a ratio of gross domestic product (GDP). Its purpose is to assess both human and economic capabilities (Yilmazer & Cinar, 2015). Thus, productivity can be viewed as the foundation of economic growth because it assesses a nation's capacity to produce products. Any change in productivity has a big impact on GDP, tax receipts, and even corruption activities, in addition to debt levels. Figure 2 displays the productivity levels in a few Western European nations with the greatest levels of debt. Of all the Western European nations examined, Greece has the lowest productivity rate. Due to the Greek labour market's historical rigidities and the 2008 global financial crisis, which had a negative impact on young people and women's labour force participation, this situation developed.

Greece's productivity has been increasing at a moderate but steady rate since 2009, throughout the post-crisis period, and it is presently regarded as improving. On the other hand, the government debt in Greece is rising quickly. This suggests a favourable association between the two factors. Portugal is the member of the region with the lowest production, excluding Greece. It is bogged down by the problem of poor output. Despite significant capital inflows, the misallocation of resources in the banking industry channels money to a sector with poor levels of productivity. There is a consequent drop in productivity. This explains why other member countries' GDPs have grown rapidly throughout the same period while Portugal's GDP has stagnated. In short, a country's GDP stagnates as a result of low productivity, forcing the government to resort to more debt financing to stimulate the economy (Reis, 2013).

High debt ratios will result in slower GDP growth rates (Reinhart & Rogoff, 2010). In other words, the ratio of GDP growth rate to total debt is inverse. Among the West European nations examined, Ireland's GDP has the highest level of volatility. As a result of the recession, it dropped precipitously to a negative level during the subprime mortgage crisis (Sullivan & Kennedy, 2010). The government debt level rose from (30% to 130%), and then the GDP growth rate dropped from (5% to -5%). Further proof comes from Ireland's remarkable GDP in 2015. As a result, its public debt has decreased from (130% to 80%). Consequently, there is a negative correlation between GDP and public debt.

Cooray et al. (2017) claimed that as governmental debt rises, so does corruption. Greece and Italy both have lower corruption perception indices, which range from (30% to 55%), indicating that both nations have a high level of corruption. When the Corruption Perception Index (CPI) is low, both countries' government debt levels during financial crises increase (serious corruption). On the other hand, as the CPI rises (as a result of low levels of corruption), the government debt starts to stabilise and rise more gradually. This might be the case because while low levels of corruption contribute to a decrease in government debt, other factors may exceed the benefit, causing the debt to rise gradually. As a result, the correlation between the government debt level and the impression of the corruption index is negative.

When debt ratios are high, GDP growth rates will, therefore, slow (Reinhart & Rogoff, 2010). In other words, there is an inverse link between GDP growth and debt. The most peculiar GDP volatility among the selected Western European nations is that of Ireland. Due to the economic slump, it plunged precipitously to a negative level during the subprime crisis (Sullivan & Kennedy, 2010). The government debt level rose from (30% to 130%) as the GDP growth rate fell from (5% to -5%). Ireland's GDP in 2015 was extraordinarily high, which just goes to show. As a result, its public debt has decreased from (130% to 80%). As a result, the GDP and the level of government debt are inversely related.

Because any shortfall in tax revenue must be made up for by borrowing to cover public spending, tax revenue is one of the key factors

determining the level of government debt (Siddiqi & Ilyas, 2011). The economy can become more self-reliant and avoid significant foreign debt when there are more enhanced and long-lasting sources of tax collection. As a result, there is an inverse link between tax revenue and debt level. To further illustrate, starting in 2007, tax revenue fell in both Ireland and Spain. Spain's tax revenue decreased from 17 percent to almost 14 percent, while Ireland's tax revenue decreased from 27 percent to as low as 19 percent in 2016. In the meantime, the government debt levels in Spain and Ireland are getting close to 100 percent and 80 percent, respectively. Hence, there is a negative relationship between tax revenue and government debt.

This study's main objective is to determine the important variables that significantly impacted the debt levels of particular Western European nations between 2001 and 2016. This study gives the government pertinent information that could aid in the implementation of useful policies, such as an understanding of the connections between productivity, corruption, GDP, tax revenue, and debt level. In addition, this study contributes in a number of other ways. As a result of macroeconomic elements like GDP, productivity, and tax revenue, as well as political factors like corruption, the model would first be much more complete than earlier studies. Despite the fact that there has been much research on debt related subjects, productivity has tended to receive less attention.

This study, therefore, focuses on productivity, which reveals and signals a nation's economic performance and eventually establishes the quantity of public debt. Additional debt fiscal stimulus should be implemented if the economy worsens. Therefore, the practical implications drawn from the study would help the government better understand the causes of those countries' high debt levels.

LITERATURE REVIEW

According to the endogenous growth theory, openness, competitiveness, change, competition, and innovation are favourable for promoting growth. On the other hand, policies that favour or protect particular established industries or enterprises have the effect of delaying or inhibiting change, which is disadvantageous for the community's

gradual growth. It is anticipated that high productivity will result in high GDP growth and low debt (Izushi, 2008). It is assumed that the exogenous, constant saving rate in the simplest endogenous model, the AK model, is exogenous. It utilises a single parameter to calculate technical advancement. Additionally, it presupposes that there are no endogenous growth-causing decreasing returns to scale in the production function. Many of the presumptions, for instance, have led to increased economic growth as a result of capital investment or further advancement (Aghion et al., 1998).

However, a model that better allocates resources to research and development and influences technological processes supports the endogenous growth hypothesis by letting the most advantageous agents decide on saving and consuming (Fagan et al., 2016). According to endogenous growth theory, policies that encourage innovation, competition, openness, and change will lead to growth. On the other hand, policies that favour or protect particular current industries or firms have the effect of delaying or inhibiting change, which is bad for the community's sluggish growth. It is anticipated that high productivity will result in high GDP growth and low debt (Izushi, 2008).

In rising economies, productivity and government debt have been found to have a positive association, according to Levine and Warusawitharana (2014). Because the companies are publicly and privately traded in the United Kingdom, Italy, France, and Spain, and because the ratio of company debt to government debt was larger than 80 percent, the study looked at company productivity and debt levels and generalised them to government debt levels. In a similar vein, Haris and Mohammad (2015) discovered a positive correlation between Malaysia's government debt and productivity development. Additionally, productivity would have an impact on both established and emerging nations' economic growth (Yalcinkaya et al., 2017). As a result, the government's high spending to boost productivity would also result in high debt. Nakamura et al. (2018) argued that innovation in productivity encompasses a variety of new inventions and expenditures, which supports this study. Furthermore, a non-linear link between government debt and total factor productivity was shown by Checherita and Rother (2012) when they looked at the

average impact of government debt over a 40-year period in twelve euro states. This is in line with a prior study by Afonso and Jalles (2013) that looked at the connection between growth, productivity, and government debt and found a positive correlation between the rise of total factor productivity and the government debt ratio.

Malaysian macroeconomic indicators and external debt were compared, and the Johansen cointegration test demonstrated a long-term association between them (Lau et al., 2015). The study's conclusions indicate that efficient debt management will be needed in the future to reduce the debt burden and strengthen Malaysia's economy. Siti and Podivinsky (2015) made a discovery while researching Malaysia's government debt problem. They acted as a stand-in for economic growth using real GDP per capita. The results showed that economic growth will get better as public debt levels rise. However, government debt should be manageable; the challenge is maintaining it at a reasonable level (Draksaite, 2014). The study examined the features of small and open economies within the currency board system in Lithuania from 2004 to 2012 using government debt stabilisation tools such as monetary policy arrangement, transparency, and size of the economy.

In terms of debt-related variables, the cointegration test shows that GDP has a positive but negligible connection with government debt (Imimole et al., 2014). This is corroborated by Forslund et al. (2011), who found a positive link between GDP and government debt using a fixed effect model. Using the autoregressive model, Sinha et al. (2011) found a negative correlation between total public debt and GDP growth in middle-income nations. Government debt levels may also decline if GDP growth rates rise. Adopting the panel data analysis from 12 European nations from 2000 to 2014 has a negative influence on GDP growth and the reduction of government debt (Globan & Matosec, 2016).

Government debt and corruption have a positive and significant association, according to Cooray et al. (2017). They collected data from 126 nations between 1996 and 2012. To evaluate corruption, they employed the Transparency International Corruption Perceptions Index. For the Spanish Autonomous Communities' target regions, corruption has been linked positively to government debt, according to Fernández and Velasco's (2014) research. Additionally, Benfratello

et al. (2018) concluded that corruption is a result of government debt. This is comparable to Liu et al.'s (2017) finding that corruption increases as public debt levels rise.

In contrast, there may be a negative correlation between tax revenue and public debt. Coll et al. (2015) claimed that the financial crisis caused a dramatic decline in revenue, increasing the chance of rising costs. This is corroborated by Xu et al. (2016), who found that tax cuts significantly increase government debt since they reduce government revenue. From 2004 to 2013, Waheed (2017) also gathered information on the nations that export and import oil and gas. Li and Lin (2011) also looked into the quantity and composition of China's government debt. China's government debt is much higher than that of other developing nations or those at the same level of development. They found that the global financial crisis, which contributed to the buildup of debt, increasing enrollment and the number of institutions, among other factors, are to blame for the rise of these sorts of debt.

Despite the paucity of studies on the subject, this research advances the field by improving the understanding of government debt through the use of factors like tax income and productivity. This is because productivity and tax income are crucial determinants of a nation's economic performance and, consequently, the amount of public debt. If the economy worsens, further fiscal stimulus would be implemented through debt. As a result, the government is better equipped to comprehend the reasons behind the high level of debt thanks to the research of new factors.

METHODOLOGY

Data Collection

This study used secondary data from a variety of sources, including the World Development Indicator (WDI) for indicators like productivity, GDP, and tax revenue, and the Transparency International database for corruption, to examine the relationship between GDP, tax revenue, corruption, and government debt. Between 2001 and 2016, data were gathered annually for the 16 Western European nations with the highest debt levels: Austria, Belgium, Denmark, Finland, France,

Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Switzerland, and the United Kingdom (UK). Based on the severity of the subprime crisis in those nations in 2008 and the European sovereign debt crisis in 2009, the time frame was set. Therefore, considering these occurrences could enhance the research's conclusions, Table 1 describes the variables and sources used in this study.

Table 1

Description and Sources of the Variables

Variables	Description	Data Source
Government Debt (% to GDP)	Account payable, currency and deposits, and insurance technical reserves that reflect the budget deficits can all be used to obtain government debt.	OECD
Productivity (% of GDP)	In the economy, productivity is defined as the amount of output per unit of input, such as labour, expressed as a percentage of gross domestic product (GDP).	OECD
GDP (%)	GDP represents the growth rate of growing economy.	WDI
Tax revenue (% to GDP)	Tax revenue is the revenue the federal government receives from the taxation of people's income, purchases of goods, and use of services.	WDI
Corruption (Index)	Corruption is the misuse of authority for one's own benefit.	Transparency International

Model Specification

The basic model adapted from Ishi (1990) is shown in Equation 1:

$\ln (DEBT)_{it} =$ (1)

Where;

DEBT = Government debt, measured in % of GDP

TAX = Tax, measured in % of GDP

$$\beta_{0_{it}} + \beta_1 \ln(TAX)_{it} + \varepsilon_t$$

As a result, for greater contribution and relevance to the current scenario, the model is extended as Equation 2 by including more relevant variables that cause government debt, as follows:

$$\ln(\text{DEBT})_{it} = \beta_{0_{it}} + \beta_1 \ln(GDP)_{it} + \beta_2 \ln(TAX)_{it} + \beta_3 \ln(COR)_{it} + \beta_4 \ln(PRO)_{it} + \varepsilon_t \quad (2)$$

Where;
DEBT = Government debt level, measured in % of GDP
TAX = Tax revenue collected by the government, measured in % of GDP
COR = Corruption, measured in Corruption Perception Index (CPI)
PRO = Country productivity, measured in % of GDP

Diagnostic Test

To ascertain whether the model's multicollinearity or the error term's normalcy was an issue, a diagnostic test was run. The test's goal was to determine whether the model complies with the Best Linear Unbiased Estimators standards (BLUE). A data set's normalcy was determined by the normality test. If the error term was not regularly distributed, the data set would be untrustworthy. The distribution of the error component in the model was examined using the Jarque-Bera test. The multicollinearity test was then used to evaluate whether there was a linear or non-linear relationship between the independent and dependent variables.

Panel Unit Root Test

The stationarity of the model's variables was evaluated using the panel unit root test function. A violation of this assumption (non-stationary or has unit root) would generate incorrect findings, also known as spurious regression, which is why the stationarity assumption in the variables is crucial to verify the validity of the model. Panel unit root tests such as the Im-Pesaran-Shin Test (IPS) and the Levin et al. (2002) Test were employed in this study.

Estimation Method

The Pooled OLS model is renowned for being simpler to use than other models, but it has significant drawbacks that prevent it from being widely used in panel data investigations. First of all, the researchers are unable to separate the nature and course of the observations.

Furthermore, the study is likely to provide biased conclusions if the data are varied across time periods (Gujarati & Porter, 2009). Due to heterogeneity, the outcome is biased, inconsistent, and ineffective, which goes against the BLUE characteristics.

The Least-Square Dummy Variable (LSDV) model, commonly referred to as the Fixed Effects Model (FEM), permits the intercept in the regression model to vary according to individual characteristics. "Fixed Effects" refers to the distinctive traits that set each person apart in terms of their background and risk tolerance. In the basic LSDV form, such "Fixed Effects" were taken to stay constant over time.

Additionally, the REM model is additionally referred to as the error component model, which is a regression with random constant terms (Gujarati & Porter, 2009). By evaluating changes among groups and gathering all potentially omitted factors to make them an independent variable, it is used to avoid variable bias. The REM model presupposes that independent variables and individual effects do not interact, making individual effects an independent variable. REM is different from FEM in the sense that REM assumes the unobserved effects are uncorrelated with the independent variables $(\boldsymbol{\mu i} \,|\boldsymbol{Xit}) = 0$ (Baltagi, 2013).

Apart from that, the Breusch-Pagan Lagrange Multiplier (BGLM) test is a common method used by econometricians to choose the better model between POLS and REM.

$$Y_{it} = \beta_1 + \beta_2 X_{itk} + \mu_i + \varepsilon_{it}$$

The null hypothesis (Ho) of BGLM test is that the variance of random effects is equal to zero: Var [μi] = 0, then the intercepts of every cross-sectional unit are constant, which means that there is no random effect in the model and POLS is preferable. Hausman (1978) proposed a test based on the difference between the estimates of random effects and fixed effects. The purpose of this test is to determine whether REM or FEM is better suited for testing in panel data (Hill et al., 2008).

RESULTS

The results of the normality and multicollinearity tests are displayed in Tables 2 and 3. The error term has a P-value of 0.24 and is normally distributed, as shown in Table 2. The link between the independent

and dependent variables' linearity or nonlinearity is then determined using the multicollinearity test. The test results are shown in Table 3. There are not any significant multicollinearity issues in the model, as shown by the Variation Inflation Factor (VIF) of all variables being less than 10. As a result, the parameters are accurately, consistently, and efficiently estimated.

Table 2

Normality Test

Jarque-Bera test	P-value	Decision
2.85	0.24	Normally distributed

Table 3

Result of Variance Inflation Factor (VIF)

Variables	VIF	Low/High
ln(Corruption)	1.07	Low
ln(GDP_Growth)	1.01	Low
ln(Productivity)	1.08	Low
ln(Tax_Revenue)	1.01	Low

Table 4

Results of Levin, Lin & Chu (LLC) Test

Variables	Levin, Lin & Chu (LLC) Test	
	Individual Intercept	Individual Intercept and Trend
ln (Debt_Level)	-17.07***	-1.68**
ln (GDP_Growth)	-10.83***	-9.43***
ln (Tax_Revenue)	-1.52*	-2.87***
ln (Corruption)	-4.09***	-7.61***
ln (Productivity)	-3.09***	-4.50***

Note: The asterisks, *, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% levels of significance, respectively.

Additionally, the Levin, Lin, Chu Test (LLC) and Im-Pesaran and Shin tests were utilised to assess whether the variables were stationary

or non-stationary using the unit root test (IPS). Tables 4 and 5 show the results of the stationary test for this study at level form I (0). According to the table, all variables are significant at I (0) for both the LLC and IPS tests. According to the panel unit root hypothesis, the significant value of 5 percent indicates that the data is stable and stationary.

Table 5

Results of Im-Pesaran-Shin (IPS) Test

Variables	Im-Pesaran-Shin (IPS) Test	
	Individual Intercept	Individual Intercept and Trend
ln (Debt_Level)	-2.69***	-1.71**
ln (GDP_Growth)	-7.38***	-5.00***
ln (Tax_Revenue)	-1.44*	-1.48*
ln (Corruption)	-2.80***	-5.36***
ln (Productivity)	-1.73**	-1.67**

Note: The asterisks, *, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% levels of significance, respectively.

Model Comparison

Since all variables are significant at I (0), the panel regression estimation method was used. POLS, REM, and FEM were used to identify the significant variables influencing government debt. Table 6 shows the model's results based on each test.

Pooled Ordinary Least Square

Table 6 shows that, with the exception of tax revenue, which is insignificant with p-values larger than 0.01, the coefficient of GDP growth rate, corruption, and productivity are statistically significant at the 1 percent significance level with P-values less than 0.01. The significant variables suggest an inverse link between the independent and dependent variables based on the sign.

Random Effect Model

According to Table 6, the random effect mode (REM) coefficients of GDP Growth Rate and corruption have statistically significant

p-values less than 0.01. The coefficients productivity and tax revenue are insignificant in the REM results, with P-values greater than 0.05, respectively.

Fixed Effect Model

Finally, the fixed effect model (FEM) results show that the coefficients of GDP growth rate, corruption, and productivity are statistically significant with P-values less than 0.01. However, the coefficient productivity has a positive relationship with the dependent variable, while the others have a negative relationship. The coefficient of tax revenue is still insignificant at a p-value of 0.27, which is greater than 0.05.

Table 6

Results Based on POLS, FEM and REM Models

	POLS	FEM	REM
C	16.57*** (0.95) [0.00]	-14.30*** (4.16) [0.01]	9.34*** (2.01) [0.00]
ln (GDP_Growth)	0.097*** (0.02) [0.00]	-0.07*** (0.02) [0.00]	-0.06*** (0.15) [0.00]
ln(Tax_Revenue)	-0.017 (0.069) [0.80]	-0.26 (0.23) [0.27]	-0.22 (0.14) [0.10]
ln(Corruption)	-1.12*** (0.09) [0.00]	-1.80*** (0.27) [0.00]	-1.66*** (0.18) [0.00]
ln(Productivity)	-0.65*** (0.08) [0.00]	2.38*** (0.32) [0.00]	0.24 (0.17) [0.15]
R-squared (R^2) Adjusted R-squared (R^2)	0.54 0.53	0.80 0.78	0.25 0.24

Dependent Variable: ln (Debt_Level)

Note: The asterisks, *, ** and *** indicate rejection of null hypothesis at 10%, 5% and 1% levels of significance, respectively. Standard error in parentheses.

Model Comparison Test

The best-fitting model among POLS, FEM, and REM was chosen for this investigation using the Lagrange Multiplier (LM) and Hausman tests. The results of the LM test are shown in Table 7, with a test statistic value of 308.50 and a P-value of 0.00. We can, therefore, say that REM is superior to POLS. The difference between REM and FEM was determined using the Hausman test (1978). The results of the Hausman test are shown in Table 7, with a test statistics value of 81.25 and a P-value of 0.00, demonstrating that FEM is more significant than REM. As a result, we draw the conclusion that the FEM is the ideal model for our study. The R square value for FEM is 0.80, indicating that the model's independent variables account for 80 percent of the variance in the dependent variable, which is government debt.

Table 7

Model Comparison Based on LM and Hausman Test

	LM test	Hausman test
Test statistic	308.50***	81.25***
	[0.00]	[0.00]
Decision making	Reject null hypothesis	Reject null hypothesis
Conclusion	REM is preferable than POLS	FEM is preferable than REM

Note: The asterisks, *, **, *** indicate rejection of the null hypothesis at 10%, 5% and 1% levels of significance, respectively.

We compared the expected and actual sign of independent variables in the FEM. According to the FEM results, productivity is increasing. Government debt increased by 2.38 units, while productivity increased by one unit, ceteris paribus.

DISCUSSIONS AND IMPLICATIONS

The government debt of the nation will have an impact on its economic expansion. However, according to Keynesian theory, fiscal policy-driven economic growth is stimulated by a reasonable level of public debt (Afonso & Jalles, 2013). Additionally, Mo (2001) and Aidt et

al. (2008) found that corruption affects a nation's ability to prosper economically. By integrating a fiscal component of tax income, an economic performance indicator, and a corruption index, this study has improved on prior studies. We discovered that government debt is significantly impacted by GDP growth, corruption, and productivity. Government debt and productivity have a positive link. Higher production might give businesses more confidence in asking for more credit to buy more inputs, which could lead to debt traps. The results are in line with earlier research showing a favourable correlation between government debt and productivity (Levine & Warusawitharana, 2014; Afonso et al., 2013). A country's present government spending on inputs may increase if the government anticipates a big rise in future productivity, leading to high levels of debt.

Additionally, the government debt was negatively impacted by both corruption and the GDP growth rate. Government debt decreases by 0.07 units, on average, for every unit of GDP that increases. Globan and Matosec (2016) asserted that because the GDP growth rate lowers the possibility of both internal and external borrowing, it has a detrimental effect on debt. A nation with high revenue levels will require less external funding (Waheed, 2017). GDP becomes the most important determinant of debt situation, especially during debt crisis, because government debt is under control if economic activities perform well (Sinha et al., 2011; Bittencourt, 2015).

Additionally, if corruption persists, public sector funds may be reduced (Tanzi & Davoudi, 1998). The findings show that, ceteris paribus, for every unit increase in corruption, the level of public debt falls by 1.80 units. This suggests that corrupt nations may struggle to access external financing from global capital markets, which has a detrimental effect on government debt (Tanzi, 1995). Cooray et al. (2017) claimed that when corruption levels rise, general government gross debt rises as a result of a greater shadow economy, which lowers tax receipts while amplifying the impact of corruption on debt. Tax revenue is, therefore, insignificant.

The European Union has filed for bankruptcy and implemented structural economic reforms as a result of the debt crisis. This has served as a warning and a precedent to other affluent nations about the possible drawbacks of relying heavily on debt finance. This study

aims to examine how government debt in a group of 16 Western European nations is affected by productivity, GDP growth, tax income, and corruption. This study's key finding is that productivity has a favourable effect on government debt. Both the GDP growth rate and corruption are unfavourable signs of public debt. Tax revenue, however, has little impact on the debt of the government. Overall, the model is free of diagnostic problems and has a normally distributed.

The findings have led to the proposal of a few policies. The first and most significant result of the study is the need to effectively control productivity when managing government debt. Increased efficiency may give businesses more confidence to ask for more credit when making input purchases, which could lead to debt traps. Therefore, efficient use of inputs like labour, capital, and land would increase value addition and result in cheaper costs for manufacturing and services, thereby aiding in the reduction of a nation's debt level. Future research should focus on abrupt shocks that produce distortions from the true impact, such as the financial and sovereign debt crises.

The government should, therefore, work harder to create top-tier human capital with smart talent or skill management. Instead, they would be paid more to boost their level of competition at work. More economically viable purchasing power has been achieved as a result of the salary increase. Additionally, in order to boost productivity, the government should provide incentives to export-focused companies to encourage them to change and advance into the Industrial Revolution 4.0 wave. These businesses are expanding exponentially, which is good for the economy's performance.

The government should also spend more money on capital and technology, as these investments will boost the nation's productivity and, as a result, indirectly boost GDP growth. Corruption in capital-intensive projects could result in an increase in public debt. As a result, the government must enhance its procedures for approving public expenditures or tenders in a manner that is more transparent and accountable. Overall, GDP growth will support government investments in raising the nation's productivity at the expense of reduced corruption. Additionally, the government should put into place regulations that, by offering incentives, encourage manufacturers to focus on exports in order to discover new markets.

However, the government is crucial to the country's efforts to fight corruption. Therefore, in order to maximise the effectiveness of public finances, the government must step up its efforts to prevent corruption in various government projects. In fact, a full assessment of the viability, economic, and social benefits of government public projects is required before deciding whether it is appropriate to allocate public resources to them. When public employees strictly adhere to anti-corruption regulations, there is no chance for anyone to corrupt the government, which lowers corruption and ultimately improves government debt. Long-term societal welfare projects, such as the construction of highways and railways, could be postponed at this time and resumed when there is evidence that the government can sustain its debt level.

A well-established and sustainable taxation system must be strengthened, decreasing the development of the black market or tax evasion, in addition to streamlining government spending (Kundera, 2015). West Europe has to accelerate its transition to Industrial Revolution 4.0, where productivity is centred on automation and artificial intelligence. This will enable them to further simplify and increase productivity. Due to their position at the forefront of technology, other nations are unable to take their place.

LIMITATIONS, DIRECTIONS FOR FUTURE RESEARCH, AND CONCLUSION

There are some limitations to this study. Due to data availability, not all Western European countries were included in this study. In the future, more developed countries should be included in the study, and the same model should be tested with developing countries to compare debt management in both regimes. Overall, our findings support the theoretical relationship that exists in developed countries between government debt, economic growth, productivity, and corruption.

Our findings show that in Western European countries, productivity is positively correlated with government debt and negatively correlated with GDP growth and corruption. However, due to data availability, the study’s inclusion of only a few Western European countries may not be representative of the outcome for developed countries. However, future research should adapt this study model to compare

the factors that contribute to government debt in developed and developing countries. Moreover, this study could be expanded to compare government external debt, which has an indirect impact on measuring government debt as a whole.

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