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The Effect of the Share of Taxes and Expenditures in National Income on Growth, a Multi-Country Analysis

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Abstract

Economic growth stands as a crucial objective in macroeconomic policies. Within the scope of fiscal policy, government expenditures and tax revenues play significant roles. This study utilizes panel data from 103 countries spanning the period 2005 to 2019. After conducting tests for stationarity, homogeneity, and cross-sectional dependency, Panel Granger Causality tests and panel data analyses are carried out. Instead of nominal values, the shares of government expenditures and tax revenues in national income are considered. The findings reveal a reciprocal causal relationship between government expenditures and tax revenues, as indicated by the Granger Causality tests. Furthermore, economic growth is identified as a Granger cause for both tax revenues and government expenditures. While government expenditures Granger-cause growth in the short term, there is no statistically significant impact of tax revenues on economic growth. The panel regression analysis reveals a negative coefficient of government expenditures on growth, as well as a positive coefficient of taxes, both of which are statistically significant. Hence, it can be inferred that decreasing the share of government expenditures in national income positively affects economic growth while simultaneously increasing the share of tax revenues in national income. This dual effect not only contributes to economic growth but also helps achieve budget equilibrium.

Keywords: *Economic Growth, Fiscal Policy, Panel Data Analysis, Time Series Analysis*

Jel Codes: *O40, E62, C23, B23*

Vergi ve Harcamaların Milli Gelirdeki Payının Büyümeye Etkisi, Çok Ülkeli Bir Analiz

Öz

Ekonomik büyüme, makroekonomik politikaların temel amaçlarından biridir. Devlet harcamaları ve vergi gelirleri ise maliye politikasının iki önemli bileşenidir. Çalışmada verileri eksiksiz mevcut olan 103 ülkede 2005-2019 yılları arası panel veri kullanılmıştır. Durağanlık, homojenlik ve yatay kesit bağımlılığı için testler yapıldıktan sonra verilere uygun Panel Granger Nedensellik testleri ve panel veri analizleri uygulanmıştır. Devlet harcamaları ve vergi gelirleri değişkenlerinin aldıkları değerler değil, milli gelir içindeki payları kullanılmıştır. Çalışmada devlet harcamalarının ve vergi gelirlerinin birbirlerinin Granger nedeni olduğu bulunmuştur. Büyüme ise hem vergi gelirleri hem de devlet harcamalarına Granger nedendir. Devlet harcamaları da kısa vadede büyümeye Granger neden iken vergi gelirlerinin büyüme üzerinde bir etkisine ise rastlanmamıştır. Panel regresyon sonucunda, devlet harcamalarının büyüme üzerindeki etkisinin katsayısı negatif, vergilerin ise pozitif olduğu görülmüştür. Katsayılar istatistiksel olarak anlamlı bulunmuştur. Bunların sonucu olarak devlet harcamalarının milli gelir içindeki payının azaltılmasının büyümeye pozitif etkisinin olduğu ve bu durumun aynı zamanda vergi gelirlerinin milli gelir içindeki paylarını da arttırdığı için bütçe dengesi üzerinde de pozitif etkide bulunacağı söylenebilir.

Anahtar Kelimeler: *Ekonomik Büyüme, Maliye Politikası, Panel Veri Analizi, Zaman Serisi Analizi*

Jel Kodu: *O40, E62, C23, B23*

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INTRODUCTION

Economic growth, one of the primary objectives of macroeconomic policies, represents the sustained increase in a country's real gross domestic product (GDP) over a specific time period. It is measured by the percentage change in real GDP and serves as an indicator of the expansion of an economy's production capacity and the overall improvement of living standards. Growth encompasses rising levels of output and productivity, increasing income levels, employment opportunities, technological advancements, and improvements in physical infrastructure and socio-economic living conditions within an economy. Positive economic growth signifies an economy's enhanced capacity to generate higher levels of output and income. Understanding the determinants and drivers of economic growth has been a constant subject of interest for policymakers, economists, and researchers. Factors such as investment in physical and human capital, technological advancements, institutional frameworks, trade openness, and macroeconomic policies can significantly influence the pace and sustainability of economic growth.

Economic literature inherently associates growth with production, emphasizing the pivotal role of factors such as labor and capital. These two elements, labor and capital, stand out as primary contributors to the dynamics of production and growth. In the realm of economic models and research dedicated to production and growth, variables related to labor and capital frequently take center stage. The models and studies crafted in this context often delve into the intricate interplay between these fundamental factors and the overarching concept of economic growth. In synthesizing these observations, it becomes evident that labor and capital play crucial roles in shaping the discourse on production and growth in economic literature. In this study, the aim is to measure the effects of the fiscal policy instruments, namely government expenditures and tax revenues.

Government expenditures refer to the funds allocated by the government for various purposes, such as infrastructure development, social welfare programs, defense, education, healthcare, and public administration (Musgrave, 1959). Following the increased significance of Keynes' views in the aftermath of the Great Depression, the effects of changes in government expenditures on economic variables have been extensively investigated by economists, regardless of their adherence to Keynesian, monetarist, or neo-classical perspectives. Public expenditures can be analyzed in three distinct categories: current expenditure, capital expenditure, and transfer payments.

Tax revenues, on the other hand, are the funds collected by the government from individuals and businesses through various taxation mechanisms. Governments can increase their revenues by raising taxes and tax rates, but in particular, in relatively small open economies, high taxes negatively impact the growth process (King & Rebelo, 1990).

Social contributions typically encompass deductions made for financing social programs such as retirement benefits, health insurance, and unemployment insurance, which contribute to the social security system. In the study, tax revenue data excluding social contributions is used. It refers to the data on tax revenue that does not include social contributions.

Government expenditures and tax revenues are two significant components of fiscal policy that play a crucial role in shaping a country's economic landscape (Easterly & Rebelo, 1993). The allocation and utilization of public resources hold substantial implications for economic growth and development. While fiscal policy is often perceived as a short-term concern, its effects, particularly in certain areas of government spending, manifest in the long run (Zagler & Durnecker,

2003).

In this research, our objective is to examine the repercussions of government expenditures and tax revenues on economic growth through an extensive analysis of a dataset spanning multiple countries. By taking into consideration the varying degrees of government spending and tax systems across nations, we seek to illuminate the intricate mechanisms and dynamics through which fiscal policy influences economic growth. To empirically investigate this connection, we will adopt a panel data methodology, utilizing an encompassing dataset that includes multiple countries during a specific timeframe. This approach permits us to accommodate and analyze cross-sectional and time-series variations, thereby facilitating a more robust exploration of the interplay between the proportions of taxes and expenditures in relation to national income and its impact on economic growth. Within the study, we will abstain from utilizing direct amounts of expenses and taxes, and instead opt for their respective proportions in GDP.

The subsequent sections of this article will provide a review of relevant literature, outline our research methodology, present empirical findings, and conclude with implications and policy recommendations based on our analysis. The first section of the study is the literature review, where significant research investigating the impact of fiscal policies on growth has been examined. In this section, important studies utilizing cross-country and panel data were reviewed. In many of these studies, it can be observed that the share of tax revenues and government expenditures in national income is not often used as an independent variable. The second section provides information about the scope of the data used in the study. After explaining the methodology used in the third section, empirical results are presented. Finally, in the conclusion section, the findings, contributions to the literature, and limitations of the study are discussed. The study contributes to the literature by using the share of independent variables in national income and covering 103 countries over an extensive period.

1. LITERATURE REVIEW

In the field of economics, numerous studies have been and continue to be conducted to analyze the impact of fiscal policies, specifically government expenditures and taxes, on economic growth. A significant portion of these studies has focused primarily on government expenditures and the specific areas where these expenditures are allocated. Furthermore, a substantial number of studies have explored the effect of different types of taxes on economic growth. In many research endeavors, there has been a comprehensive examination of how various fiscal policy instruments collectively influence economic growth. Although most fiscal policies have been perceived to have short-term effects, human capital investment and education expenditures may have a long-term impact that spans over a significant period, as acknowledged by Fisher and Keuschnigg (2002). Consequently, research studies concerning fiscal policies can be classified into two categories based on their duration, which are short-term and long-term.

Many studies have examined government expenditures under two separate headings as productive and unproductive. For instance, expenditures directed toward education, research and development, and health are regarded as productive (Chu et al., 2020).

In his study, Balaev (2019) observed that productive expenditures have a positive effect on growth while examining Russia's share of government expenditures in GDP.

Examining various Organization for Economic Co-operation and Development (OECD) member countries over a 26-year period, Kneller et al. (1999) discovered that productive government expenditures have a positive impact on growth while non-productive expenditures have a negative impact. Moreover, they found that distortionary taxation reduces the growth of taxes, while non-distortionary taxation increases growth.

Martin and Fardmanesh (1990) conducted a comprehensive analysis of the relationship between taxes, government spending, deficits, and economic growth across 76 countries using a 10-year panel data. They found that taxes have a negative impact on growth, while expenditures have a positive effect; however, upon incorporating the budget deficit factor into the model, the effects reversed.

In a study by Zidar (2019), the effects of taxes levied on different income groups on growth were examined.

In their study, Bhattarai et al. (2019) investigated the impacts of taxes by categorizing them into direct and indirect taxes.

Romer and Romer (2010) demonstrated that a one percent increase in exogenous taxation, measured as a proportion of GDP, led to a substantial decline of nearly three percent in real GDP in United States context.

In various studies, the size of the government has been considered as a predictor variable. For instance, Awaworyi Churchill et al. (2017) discovered that the impact of government expenditure size on growth differs between developed countries and other nations. Forte and Magazzino (2011) aimed to determine the optimal government size for growth in European Union countries.

Agell et al. (2006) conducted an investigation on the impact of tax revenues and government expenditures in rich countries.

Additional studies in the literature have incorporated the consideration of the proportion of fiscal policy variables in relation to GDP. In a study conducted in Romania, the period prior to the 2008-2009 crisis was examined, and it was revealed that a reduction in the share of taxes in GDP had a detrimental effect on growth (Pitu et al., 2019).

In his study utilizing per capita income, Barro (1991) demonstrates an inverse relationship between growth and the proportion of government consumption in GDP. Robert Barro has made significant contributions to the fiscal policy literature through several influential studies.

Grier and Tullock (1989) found a negative correlation between the share of government expenditures in GDP and growth in OECD countries.

Furthermore, notable research by Landau (1985), Devarajan et al. (1996), Angelopoulos et al. (2007), Sheehey (1993), Lin (1994), and Bernholz (1986) can be cited as examples of important studies that employ the proportions of government expenditures and tax revenues in relation to GDP. These studies provide valuable insights into the dynamics of fiscal policies.

In recent years, an examination of studies related to government expenditures, tax revenues, and growth reveals some noteworthy articles that have received a high number of citations. Gurdal et al. (2020) conducted a study spanning the years 1980-2016 on G7 countries, focusing on GDP as the dependent variable. In this study, where they investigated bidirectional causality, they demonstrated that the causality patterns vary among countries. For instance, they found that when

government expenditures are reduced in Japan, a negative impact on growth is observed. On the contrary, in the cases of the USA and France, an increase in government expenditures is associated with growth. In Canada, they identified a bidirectional causality.

Arvin et al. (2021) investigated the relationship among institutional quality, government expenditure, tax revenue, and economic growth. They limited their analysis to low-income and lower-middle-income countries in the sample they employed for the years 2005-2019. The utilization of the institutional quality variable and the identification of both short and long-term causal relationships with some variables in the study constitute original findings.

Aydın and Esen (2019) conducted an examination in 11 European countries using a panel threshold model, specifically focusing on the share of tax revenues in GDP. They identified distinct ideal tax percentages, with 18.5% for developing countries and 23% for developed countries.

Tashevska et al. (2020) investigated the relationship between government revenue and expenditures in six Southern European countries during the period of 1999-2015. They found that in five of these countries, increasing taxes also led to an increase in government expenditures, indicating a unidirectional relationship. However, in Macedonia, they demonstrated a bidirectional relationship.

Nguyen and Darsono (2022) examined nine Asian countries during the period 2000-2020, taking into account the nonlinear effects of tax revenues. They demonstrated the non-linear impact of tax revenues, indicating a negative effect on growth and suggesting that reducing taxes is necessary to achieve economic growth.

Hassan et al. (2020) focused on 31 OECD countries from 1994 to 2013. The study explored the relationship between environmental taxes and growth variables. The authors concluded that in countries with high per capita income, increasing environmental taxes has a positive effect on economic growth.

Onifade et al. (2020) conducted a single-country time series analysis, examining Nigeria from 1981 to 2017. They investigated the impact of government expenditures on economic growth using Granger causality tests and found evidence of causation.

The literature review revealed a multitude of studies on measuring the effects of government expenditures and tax revenues on growth and GDP. These studies exhibit variations in terms of included countries in the sample, time series dimensions, econometric methods employed, and variables added to the models.

2. DATA

The research draws on a sample of data spanning 103 countries between 2005 and 2019. The analysis focuses on the relationship between economic growth rates as the dependent variable and the proportionate representation of tax revenues and government expenditures in GDP as independent variables. The initial dataset, consisting of records from 217 countries over the period 2002 to 2022, underwent a screening process whereby countries were excluded where the relevant variables were missing or displayed irregular patterns of availability. Notably, many of these excluded countries were characterized by lower income levels and populations relative to those included in the study sample. One reason for excluding the year 2020 is the economic contraction resulting from the impact of the COVID-19 pandemic. The economies experienced a

shrinkage due to the effects of the pandemic. In future studies that include the years 2020 and 2021, it will be necessary to use models that take into account structural breaks.

The study opted for a balanced panel design and thus excluded certain years to ensure data consistency across countries. Specifically, the years 2002-2003-2004-2020 and 2021 exhibited substantial gaps in data for certain countries, and therefore, were not incorporated into the research. Consequently, the study's sample comprises 103 countries, as presented in Table 1. The study utilized data spanning the period between 2005 and 2019 to conduct its analyses.

Table 1: List of the 103 Countries that Constitute the Sample

Angola	Chile	France	Korea, Rep.	Netherlands	Sri Lanka
Argentina	China	Georgia	Latvia	New Zealand	Sweden
Armenia	Colombia	Germany	Lebanon	Nicaragua	Switzerland
Australia	Congo, Rep.	Ghana	Lesotho	North Macedonia	Thailand
Austria	Costa Rica	Greece	Lithuania	Norway	Togo
Bahamas, The	Cote d'Ivoire	Guatemala	Luxembourg	Paraguay	Türkiye
Bangladesh	Croatia	Honduras	Macao SAR, China	Peru	Ukraine
Barbados	Cyprus	Hungary	Madagascar	Philippines	United Kingdom
Belarus	Czech Republic	Iceland	Malaysia	Poland	United States
Belgium	Denmark	India	Mali	Portugal	Uruguay
Bhutan	Dominican Republic	Indonesia	Malta	Romania	Vanuatu
Bosnia Herzegovina	Egypt, Arab Rep.	Ireland	Mauritius	Russian Federation	West Bank and Gaza
Botswana	El Salvador	Israel	Mexico	Serbia	Zambia
Bulgaria	Equatorial Guinea	Italy	Moldova	Seychelles	
Burkina Faso	Estonia	Jamaica	Mongolia	Singapore	
Cabo Verde	Ethiopia	Japan	Morocco	Slovak Republic	
Cambodia	Fiji	Jordan	Namibia	Slovenia	
Canada	Finland	Kazakhstan	Nepal	South Africa	

The sample data is referred to as panel data because it contains both time series and cross-sectional data. It is considered as micro panel because the cross-sectional dimension is relatively larger compared to the time dimension. The growth data (World Bank, 2023a) and government expenditure data (World Bank, 2023b) were obtained from the World Bank (World Development Indicators,) and the tax revenue data (excluding social contributions) was obtained from the United Nations University World Institute for Development Economics Research (Government Revenue Dataset, 2022). The study was carried out with the percentages of tax revenues and government expenditures in GDP. Growth is the annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars.

3. METHOD AND ANALYSIS

The econometric model estimated in the study is shown in Equation 1:

$$G_{it} = \beta_0 + \beta_1(TAX/GDP)_{it} + \beta_2(GOVEXP/GDP)_{it} + \mu_{it} \quad (1)$$ where:

G is the GDP growth rate in country i and time period t

TAX/GDP_{it} is the percentage of tax revenues in GDP in country i and time period t

$GOVEXP/GDP_{it}$ is the percentage of government expenditures in GDP in country i and time period t

β_0 is the intercept or constant term

β_1 and β_2 are the coefficients or slopes of the independent variables TAX/GDP and GOVEXP/GDP, respectively, which indicate the magnitude and direction of the effect of these variables on growth

μ_{it} is the error term or the unobserved factors affecting G (growth) that are not included in the model

This equation specifies a fixed-effects panel regression model because it includes country-specific fixed effects that capture time-invariant differences across countries that may affect economic growth. The fixed effects are not shown explicitly in the equation, but they are included in the estimation and are absorbed by the intercept term. The model can be estimated using panel data methods such as pooled OLS, fixed-effects, or random-effects regression, depending on the assumptions and objectives of the analysis.

Before performing the causality test and estimating the panel regression, some assumptions need to be tested. Firstly, whether there is a cross-section dependency or not was examined. Cross-section dependence was determined as a result of the four most preferred tests for cross-sectional dependence.

Then, whether the slope coefficients are homogeneous or heterogeneous was examined. As a result of the Pesaran-Yamagata (2008) Homogeneity Test, it was decided that the slope coefficients were not homogeneous.

According to the results obtained, an appropriate unit root test has been selected and applied. CIPS and $CIPS^*$ statistics were obtained for stationarity, and it was concluded that all three variables used were stationary. As the variables were found to be stationary, a cointegration test was deemed unnecessary and, therefore, not conducted.

Dumitrescu Hurlin Panel Causality test was employed for the causality analysis, which is known to be well-suited for heterogeneous panel data.

In the panel regression model, the fixed effects approach was preferred over the random effects approach, as determined by the Hausman test. The parameter estimates of the model revealed that the share of government expenditures in GDP has a negative effect on growth, while the share of tax revenues has a positive effect.

3.1. Cross-Sectional Dependence

The appropriate unit root tests are determined based on whether there is cross-sectional dependence in the panel data. In the case of no cross-sectional dependence, 1st generation unit root tests should be used, while in the case of cross-sectional dependence, 2nd generation unit root tests should be used.

The results of the Cross-Sectional Dependence Tests applied to the residuals and variables of the panel equation are given in Table 2.

MODEL H_o: There is no cross-sectional dependence (correlation) in the residuals of the panel equation.

GROWTH H_o: There is no cross-sectional dependence in the GROWTH variable.

TAX/GDP H_o: There is no cross-sectional dependence in the TAX/GDP variable.

EXP/GDP H_o: There is no cross-sectional dependence in the EXP/GDP TAX/GDP variable.

Table 2: Cross-Sectional Dependence Tests Results

	Test	Statistic	d.f.	Probability
MODEL	Breusch-Pagan LM	16364.72	5253	0.000
	Pesaran Scaled LM	108.408		0.000
	Scaled and Corrected LM	104.729		0.000
	Pesaran CD	88.050		0.000
GROWTH	Breusch-Pagan LM	18278.84	5253	0.000
	Pesaran Scaled LM	127.082		0.000
	Scaled and Corrected LM	123.403		0.000
	Pesaran CD	94.893		0.000
TAX/GDP	Breusch-Pagan LM	16351.83	5253	0.000
	Pesaran Scaled LM	108.282		0.000
	Scaled and Corrected LM	104.604		0.000
	Pesaran CD	21.649		0.000
EXP/GDP	Breusch-Pagan LM	15896.66	5253	0.000
	Pesaran Scaled LM	103.841		0.000
	Scaled and Corrected LM	100.163		0.000
	Pesaran CD	24.559		0.000

Source: Test results of EViews 12

In EViews, the "cdtest" command tests the H_o hypothesis that there is no cross-sectional dependence using 4 different tests. These tests are the Breusch-Pagan Lagrange multiplier test (Breusch & Pagan, 1980), Pesaran's CD and scaled LM tests (Pesaran, 2004), and the corrected and scaled Lagrange multiplier test by Baltagi et al. (2012).

When looking at the probability values, H_o is rejected at a 5% significance level in all tests. Therefore, given the results, it is necessary to use second-generation stationarity tests because there is cross-sectional dependence in the residuals.

3.2. Pesaran-Yamagata (2008) Homogeneity Test

The test of the homogeneity or heterogeneity of panel slope coefficients is important in the steps of estimating the panel equation. In the study, the updated version of the statistic with the same name developed by Swamy, Δ and Δ_{adj} (corrected delta), was used. The test statistics was developed by Pesaran and Yamagata (2008). It is a frequently preferred test, especially in the case of N>T, as in the study. The null hypothesis is that the slope coefficients are homogeneous. The rejection of the null hypothesis means that the slope coefficients are not homogeneous (they are heterogeneous).

The Δ and Δ_{adj} values calculated for the panel regression based on TAX/GDP and EXP/GDP were 9.69 and 11.321, respectively. Both statistics are significant at the 1% level.

Table 3: Pesaran-Yamagata Homogeneity Test Results

Test Stat.	Value	Sig
Δ	9.69	0.000

Δadj	11.321	0.000

Source: Test results of STATA 15

3.3. Stationarity and Unit Root Tests

Regression estimates made with non-stationary time series can result in misleading outcomes. Therefore, it is necessary to test for stationarity in studies involving time series or panel data. In this study, the suitability of the horizontal section and time dimension of the data used was also tested for the presence of a unit root in the entire panel by using CIPS (Cross Sectionally Augmented IPS), which is one of the second-generation stationarity tests, after conducting a horizontal section dependency test (Pesaran, 2007).

The CIPS test is the cross-sectionally corrected version of the IPS (Im, Pesaran, Shin) test. When the time dimension is between 10 and 20 (small t) as in this study, it is more appropriate to use the truncated version of it (CIPS*).

Since the number of horizontal sections is 103, the CADF statistic values and significance levels are not shown for each country. The Ho hypothesis is that the panel contains a unit root. In the Pesaran study, critical values for the CIPS statistic at significance levels of 1-5% and 10% were determined using Monte Carlo simulations. The unit root is rejected when the calculated CIPS values are larger than these critical values. The CIPS statistics and significance levels calculated from the CADF test statistics are shown in the table.

Table 4: CIPS Stationarity Tests

VARIABLE	CIPS		CIPS* (Truncated)	
	t-stat	p-value	t-stat	p- value
Growth	-4.902	<0.01	-2.099	<0.05
GOVEXP/GDP	-3.777	<0.01	-2.124	<0.05
TAX/GDP	-5.910	<0.01	-2.216	<0.01

Source: Test results of STATA 15 and EViews

According to the results shown in Table 4, all the data used is stationary at the same level.

3.4. The Dumitrescu Hurlin Panel Causality Test

As is well known, regression analysis can statistically explain the relationship between two variables, but it does not make a causality claim about the two variables. A method that tests whether one variable causes the other by adding the delayed values of the variables in the regression equation in the Granger time series was developed (Granger, 1969). This method has become generally accepted and is used in many fields. The application of this causality to panel data has not been delayed much, and many studies have been carried out for this purpose. The Dumitrescu Hurlin Panel Causality Test is one of them. It is applied to heterogeneous panels.

First, the Standard Granger Causality Test is applied for each unit. From this, the average of the test statistics, $\tilde{W}$, is obtained. The Dumitrescu-Hurlin panel causality test is then performed using the $\tilde{Z}$ statistic calculated from $\tilde{W}$ (Dumitrescu & Hurlin, 2012) given in equation 2.

$$\tilde{Z}_N^{Hnc} = \frac{\sqrt{N}\left[W_{N,T}^{Hnc} - E(\tilde{W}_{i,T})\right]}{\sqrt{Var(\tilde{W}_{i,T})}} \qquad (2)$$

The H_o hypothesis is that X does not cause Y. X is said to cause Y if H_o is rejected. When the lag numbers are taken as 1 and 2, respectively, the results and the significance levels are shown in Table 5 and Table 6:

Table 5: Dumitrescu Hurlin Panel Causality Tests Results (Lag=1)

Pairwise Dumitrescu Hurlin Panel Causality Tests	**Lag: 1**		
Null Hypothesis:			
	W̃	Z̃	Prob.
TAX/GDP does not homogeneously cause GOVEXP/GDP	3.540	2.350	0.000
GOVEXP/GDP does not homogeneously cause TAX/GDP	4.936	6.108	0.001
GROWTH does not homogeneously cause GOVEXP/GDP	2.739	7.455	9.00E-14
GOVEXP/GDP does not homogeneously cause GROWTH	1.861	3.140	0.002
GROWTH does not homogeneously cause TAX/GDP	2.449	6.029	2.00E-09
TAX/GDP does not homogeneously cause GROWTH	1.278	0.276	0.782

Source: Test results of EViews 12

Table 6: Dumitrescu Hurlin Panel Causality Tests Results (Lag=2)

Pairwise Dumitrescu Hurlin Panel Causality Tests	**Lag: 2**		
Null Hypothesis:			
	W̃	Z̃	Prob.
TAX/GDP does not homogeneously cause GOVEXP/GDP	1.896	3.310	1.00E-09
GOVEXP/GDP does not homogeneously cause TAX/GDP	3.084	9.147	0.018
GROWTH does not homogeneously cause GOVEXP/GDP	3.844	3.170	1.50E-03
GOVEXP/GDP does not homogeneously cause GROWTH	3.110	1.195	0.231
GROWTH does not homogeneously cause TAX/GDP	3.448	2.103	3.54E-02
TAX/GDP does not homogeneously cause GROWTH	3.046	1.021	0.307

Source: Test results of EViews 12

The findings in Table 5 and Table 6 demonstrate a bidirectional causality between TAX/GDP and GOVEXP/GDP. Specifically, TAX/GDP can be predicted based on GOVEXP/GDP, and vice versa. This result, while anticipated, is not a significant discovery in the context of research. Notably, as both variables are expressed as proportions within GDP, an increase in one variable results in a decrease in the other, a pattern that is expected.

Regarding government expenditures, the evidence indicates that growth causes GOVEXP/GDP, yet the inverse is not always true. When the lag is 1, GOVEXP/GDP can cause growth, however, this effect diminishes when the lag is 2. Thus, it can be concluded that GOVEXP/GDP can stimulate growth in the short run.

On the taxation side, there exists a unidirectional causality from growth to TAX/GDP, whereby growth causes the tax-to-GDP ratio to increase. However, the reverse causality from TAX/GDP to growth is not statistically significant, implying that changes in the tax-to-GDP ratio do not affect economic growth. Conversely, as GDP expands due to growth, the proportion of tax revenues to GDP also proportionally increases.

3.5. Panel Regression Model

In the panel data analysis, the variables of GOVEXP/GDP and TAX/GDP were treated as exogenous variables, while the growth rates were the endogenous variables. Initially, a random effects model was established to obtain the residuals. Then the Hausman test conducted on the residuals indicated that the fixed effects estimator was more appropriate for the analysis.

Table 7: Fixed Effect Panel Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.354	0.866	6.177	0.000
GOVEXP/GDP	-26.373	2.392	-11.024	0.000
TAX/GDP	29.783	3.861	7.713	0.000

Source: Test results of EViews 12

The findings presented in Table 7 demonstrate that the proportion of government expenditures in GDP has a negative impact on economic growth, while the proportion of tax revenues in GDP has a positive effect. Notably, both variables are statistically significant at the 1% level, suggesting a robust relationship between the variables under scrutiny.

CONCLUSION

The present study aimed to obtain growth data, the percentage of tax revenues in GDP, and the percentage of government expenditures in GDP variables from all countries across the globe, spanning from 2002 to 2021. In order to ensure data completeness, an optimally balanced panel was constructed, comprising a sample of 103 countries from the years 2005 to 2019. The selection process involved eliminating countries and years with incomplete data, resulting in a sizeable sample for analysis. As such, this study was notable for its large sample size.

Preceding the panel data and causality analyses, our study performed tests for stationarity, homogeneity, and cross-sectional dependency. The outcomes revealed the existence of cross-sectional dependency and non-homogeneous slope coefficients. Consequently, we conducted stationarity tests and causality analyses that appropriately accounted for these conditions.

The utilization of independent variable percentages in GDP has yielded a favorable outcome, whereby the presence of a unit root problem was not detected. This suggests that the data possesses stationarity, thus precluding the need for any transformations such as logarithmic or first difference techniques.

The empirical evidence suggests that economic growth has a positive causal effect on the ratio of government expenditures to GDP, while the reverse causality is not always statistically significant. Specifically, when there is a one-period delay, an increase in GOVEXP/GDP can stimulate economic growth. However, this relationship weakens when the delay increases to two periods. Hence, it can be inferred that GOVEXP/GDP can only act as a short-term driver of economic growth.

The examination of the causal relationship between the proportion of tax revenues in GDP and economic growth has revealed a unidirectional pattern. Specifically, the results indicate that growth is the causal determinant of the proportion of tax revenues in GDP, while the inverse causal direction is not statistically significant. As the economy grows and expands, there is a corresponding increase in the share of tax revenues to GDP. This relationship is due to the fact that economic

growth leads to higher tax revenues, as taxpayers' incomes and consumption levels rise, resulting in a proportional increase in the tax base. Consequently, the tax-to-GDP ratio increases in tandem with the overall growth of the economy.

In our panel regression model, wherein growth is considered the dependent variable, the coefficient associated with the proportion of tax revenues exhibits a positive relationship with growth, whereas the coefficient corresponding to the proportion of government expenditures exhibits a negative relationship with growth.

One noteworthy outcome of the study is the indication that a reduction in the proportion of government expenditures in GDP is necessary for facilitating economic growth for the short run.

ETİK BEYAN VE AÇIKLAMALAR

Etik Kurul Onay Bilgileri Beyanı

Çalışma, etik kurul izni gerektirmeyen bir çalışmadır.

Yazar Katkı Oranı Beyanı

Yazarın katkısı %100'dür.

Çıkar Çatışması Beyanı

Çalışmada potansiyel bir çıkar çatışması bulunmamaktadır.

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