Tax Structure and Economic Growth: New Empirical Evidence from the European Union

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ABSTRACT: The impact of taxation on economic growth is a controversial issue in the academic literature, with no consensus yet reached on the optimal tax burden and growth- supportive tax structure. This study aims to contribute new empirical evidence regarding the impact of tax burden and tax structure on growth within the European Union (EU-27) member states. The methodology includes descriptive, comparative, correlation and regression analyses using annual panel data spanning from 2000 to 2022. Regression estimations employ the Panel Least Squares method. In addition, causality hypotheses are tested using the pairwise Granger causality test. Our findings reveal a negative impact of general government expenditure on the growth rate, whereas total tax revenue has a positive effect. These results suggest inefficiencies in public spending. The structures of tax systems across EU-27 countries appear conducive to economic growth, evidenced by growth-supportive effects observed in both direct and indirect tax revenues. However, social security contributions are found to adversely affect the growth rate. Moreover, value added tax, property taxes, and both corporate and personal income taxes are consistent with economic growth, whereas excise duties show no significant impact. The study has several practical and research implications. The findings indicate that government expenditure does not effectively contribute to positive fiscal impacts on the economy. Therefore, policymakers could enhance economic growth by gradually reducing public spending and striving for balanced budgets to maintain macroeconomic stability. Tax structures based on consumption and income taxes appear to be compatible with economic growth, while higher shares of social contributions are identified as detrimental to growth.

KEYWORDS: Tax Structure, Fiscal Policy, Economic Growth, European Union (EU).

INTRODUCTION

Taxation remains a topical issue, given its complex objectives and multi- faceted fiscal implications. It is expected to finance public spending in line with accepted fiscal policies and mitigate inequalities through income and wealth re- distribution, while supporting economic growth. The relationship between tax revenue and growth has been extensively discussed and analyzed in both theoretical and empirical studies. While government spending is generally expected to support growth, taxation is believed to cause dis- tortions and have a detrimental effect on economic development.

Neoclassical growth theory postulates that higher taxes can discourage saving, investment, and entrepreneu- rial activity, thereby hindering long-term economic growth. Lower tax burden, on the other hand, is expected to incentivize productive behavior and stimulate GDP growth.

At the same time, endogenous growth theory suggests that the impact of taxation on growth is much more nuanced. It claims that well-designed tax policies that fund public goods, infrastructure, and human capital development can positively influence productivity, innovation, and overall economic performance. Converse- ly, an excessive tax burden spread over inefficient public programs is believed to be harmful for the economy.

In this regard, the scientific community argues that the tax structure exerts a stronger effect on the growth rates than the level of taxation. Numerous studies suggest that indirect taxes on consump- tion tend to have a less harmful impact on economic growth than direct taxes on income and wealth, which can discourage savings and investment.

However, no consensus has yet been reached on the optimal tax burden and growth-supportive tax structure.

This study aims to examine the impact of total tax burden and tax structures on economic growth rates in the member states of the European Union (EU-27) for the period 2000–2022.

The study tests three hypotheses that are consistent with conventional econo- mic logic:

H1: Total tax revenue negatively im- pacts economic growth.

H2: Direct taxes on income and wealth (i.e. corporate income tax, personal in- come tax and property taxes) as well as so- cial security contributions have a negative effect on growth.

H3: Indirect taxes on consumption (i.e. value added tax and excise duties) have a positive impact on economic growth.

This study is organized into six main sections. Following this brief introduction, the second section reviews classi- cal and contemporary literature on the impact of taxation on economic growth. The third section outlines the methodological framework and data employed in the study. The fourth section presents the main results. In the fifth section, out fin- dings are discussed in relation to the empirical evidence from previous research on the topic. The final section draws conclusions, outlines the limitations of the study and formulates policy implications.

LITERATURE REVIEW

A multitude of empirical research efforts have explored the connection be- tween overall tax burden and economic growth. These studies utilize diverse methodologies, span various time frames, and focus on a range of countries or re- gions. Despite this extensive investigation, there remains no consensus on the nature, significance and direction of this relation- ship. This lack of agreement is understan- dable, given the intricate and multifaceted link between tax burden and economic growth. Some research indicates a positive correlation, suggesting that higher tax revenues can fund public in- vestments and stimulate growth rates. Conversely, other studies emphasize the necessity of efficient public expenditure management and caution against excessive tax burdens on labor and capital, which could impede private sector activity.

Certain studies suggest that higher tax burden can act as a constraint on economic growth.

Folster & Henrekson [1] conducted econometric studies using data covering the period 1970–1995 for a panel of rich countries and found that both taxation and public spending were negatively related to economic growth.

A study by Chu et al. [2] employed two approaches, namely generalized method of moments (GMM) and ordinary least squares (OLS), on panel data from 22 low- to middle-income countries and 37 high-income countries covering the period from 1993 to 2012. Their analysis revealed a significant negative impact of elevated government spending and tax revenue on growth, as anticipated.

Similarly, Koester & Kormendi [3] examined a dataset covering 63 countries and revealed that tax rates have a clear negative effect on growth. This finding is corroborated by Kaneva et al. [4], who ar- gued that the overall tax burden adverse- ly affected GDP per capita growth rates in Baltic States and Central European coun- tries between 2000 and 2021.

Further evidence is provided by Pradhan [5], who identified a negative impact of taxation on economic growth in a panel of middle-income countries over the period 1960–2017. Ozpence & Mercan [6], utilizing vec- tor autoregression (VAR) and Granger causality tests discovered a negative re- lationship between tax burden and econo- mic growth in Turkey from 1970 to 2018.

Çollaku et al. [7] applied VAR and vector error correction models (VECM) to examine the relationships between tax revenues and growth in Kosovo over the period 2010–2021, finding negative long- run effects. This is further supported by the re- sults of Voskanyan & Galstyan [8], who employed a VAR model and determined that the tax burden negatively impac- ted GDP growth in Armenia from 2008 to 2022.

Nguyen et al. [9] also used a VAR model and found negative long-term ef- fects of tax revenues on economic growth in Vietnam over the period 1990–2019.

Conversely, several studies present findings that challenge these results. Zhang et al. [10] applied the fixed and random effect models, the robust test method, and the GMM estimation tech- nique to panel data covering 31 provin- ces in China for the period 2010–2022, and found that the total tax burden, measured as the ratio of tax revenues to GDP, exerts a positive stimulating effect

on economic growth.

Vintilă et al. [11] used the OLS method and GMM technique, concluding that total tax revenue contributed to eco- nomic growth in 36 OECD countries over the period 2002–2017. This finding is verified by Spulbar et al. [12], who employed structural equation modeling (SEM) to demonstrate that taxation positively influences GDP dynam- ics in 28 EU countries from 2005 to 2017. Additionally, Pradhan et al. [13] argued that taxation contributed to long-term growth in both OECD countries and non- OECD countries over the period 1961–2019.

Kalaš et al. [14] examined the effect of tax revenue on growth in the United States from 1996 to 2016, discovering a robust positive relationship. Similarly, Gashi et al. [15] identified a positive im- pact of taxation on GDP growth in Koso- vo using regression analysis of time series data from 2007 to 2015.

Krysovatyy et al. [16] also reported a positive correlation between tax burden and economic growth in Ukraine. An em- pirical study by Alzyadat & Al-Nsour [17] employed VAR and VECM on annual data from 1970 to 2019, finding a positive short- term impact of tax revenues on growth in Jordan, although the effect became nega- tive in the long term.

In South Africa, Moyo et al. [18] used the autoregressive distributed lag (ARDL) model to reveal a significant positive re- lationship between tax revenue and GDP growth for the period 1991 to 2018. Sumandeep et al. [19] investigated the correlation between economic growth, tax revenue and government spending in 17 Indian states covering the years from 1990 to 2020. Based on GMM and fully modified OLS estimations, the authors concluded that fiscal sector expansion boosts economic growth in India.

Hodžić et al. [20] applied fixed-effects panel regressions to a dataset of 21 Central and Eastern European (CEE) countries for the period 2000–2018 and found a significant positive relationship between total tax revenue and economic growth. It is noteworthy that some studies challenge the notion of a clear and direct relationship between tax burden and eco- nomic growth.

Easterly & Rebelo [21] analyzed data from a wide range of countries between 1970 and 1988, concluding that it is difficult to isolate empirically the effects of taxation. They argue that key fiscal variables are highly autocorrelated, such that countries with higher tax burdens often have higher public expenditures. Consequently, the empirical results are fragile, making it challenging to identify a clear relationship between government size and GDP growth.

Oyinlola et al. [22] supported these findings by applying the GMM estimation approach to a dataset from 27 sub-Saharan African countries for the period 1995–2015, determining that taxation has no significant effect on economic growth. Sopronenkov et al. [23] share a similar view, showing that there is a very weak correlation between the total tax burden, measured as a share of GDP, and eco- nomic growth rates in the countries of the European Union (EU-27) for the period 2000–2022.

This is confirmed by Bogachov et al. [24] who examined the changes in tax levels and structure across 17 developed and 12 developing countries over the period 2009–2022 in relation to eco- nomic growth. Their findings do not reveal distinct patterns in the relationship between tax indicators and growth, sug- gesting that it is not conclusively evident that lower tax levels or higher shares of indirect taxes directly promote national economic growth. They conclude that the impact of taxes on GDP growth differs significantly between developed and develo- ping countries, indicating that the nature and intensity of this effect are largely de- termined by the unique conditions of each location and time period.

Another set of studies argue that tax structure (determined by the share of di- rect versus indirect taxes) exerts a stronger impact on GDP growth than the level of taxation. Several influential studies suggest that reliance on indirect taxes, such as taxes on consumption, tends to show less detrimental effects on growth than direct taxes on income and wealth. The authors claim that direct taxes, including income and corporate taxes, can poten- tially discourage savings and investment, thereby negatively impacting economic growth. For instance, a landmark study by Myles [25] presents a detailed overview of the literature on the topic and raises the argument that transitioning from direct to indirect taxation could enhance the economic growth. Several OECD studies also

report that corporate and personal income taxes are the most detrimental to growth, while the effects of taxes on property and consumption are considered less harmful. Arnold [26] ran several growth regres- sions for a panel of 21 OECD countries co- vering the period 1971 to 2004 and identi- fied property taxes as the most conductive to economic growth, followed by taxes on consumption, while the growth effects of corporate income taxes and personal inome taxes appeared strongly negative.

This is further supported by the fin- dings of Şen & Kaya [27] who argue that corporate and personal income taxation negatively affected economic growth in nine OECD countries over the period 1981–2017.

Oz-Yalaman [28] applied a panel VAR on annual data for 29 OECD countries and reported that the corporate tax rates negatively affected GDP growth over the period 1998–2016.
Similar findings were reported by se- veral panel studies covering broad samples of countries.
McNabb [29] argued that increased income taxes were associated with lower long-term growth in a group of 100 countries.

Hakim [30] applied GMM techniques to a dataset of 51 countries covering the period from 1992 to 2016 and argued that a tax structure based on direct taxes on profits, income, and capital gains is effective in terms of collecting revenue but is harmful to economic growth.

Balasoiu et al. [31] used dynamic GMM methods and fixed effect models and concluded that corporate income taxes and personal income taxes had negative impacts on GDP growth in the EU-27 countries over the period 2008–2020. Not surprisingly, a number of European Commission reports [32; 33] observed a general trend in some EU member states to shift the tax burden from direct taxes on labor and capital to indirect taxes on consumption.
In addition, direct taxes are identified as growth-suppressing by various country studies.

Examining Turkey over the period 2006–2018 using the ARDL model, Korkmaz et al. [34] identified significant po- sitive effects of indirect taxes on growth along with negative effects of direct taxes. Neog & Gaur [35] applied the ARDL approach on data for India covering the period 1980 to 2016 and found that the excise duties, corporate income taxes and personal income tax are detrimental to the long-term growth.

Tala [36] analyzed the impact of per- sonal income tax on South Africa's eco- nomic growth using nonlinear autoregres- sive distributed lag (NARDL) estimations and concluded that taxes on personal in- come appear to be growth-friendly in the short term, but growth-suppressing in the long term.

In contrast to these findings, several authors believe that the benefits of shifting from direct to indirect taxes do not appear to be as robust and clear as previous re- search has claimed.

This is the opinion of Baiardi et al. [37] who constructed several panels of OECD countries covering different time periods and found no robust relationship between revenue-neutral tax shifting and econo- mic growth. Furthermore, they empha- sized that findings in the short and long run are inconsistent, thus casting doubt on the potential growth-enhancing effect of the shift from direct to indirect taxation. This is further confirmed by Stoilova [38] who studied the impact of tax revenue on GDP growth in the member states of the European Union (EU-28) over the period 1996–2013 using regressions on panel data. She argued that value added tax affects negatively EU-28 economies and concluded that a tax system based on personal income tax, selective consump- tion taxes, and taxes on property appears to be consistent with economic growth.

While estimating the effects of taxa- tion on economic growth in Latin Ame- rican countries using VAR techniques, Canavire-Bacarreza et al. [39] found that the personal and corporate income taxes do not have the expected negative effects on growth. The reliance on consumption taxes appears to have a positive effect on growth in the region of Latin America as a whole, although authors identified negative effects in some of the analyzed countries.
Some country studies also argue in favor of direct versus indirect taxation.

Shafiq et al. [40] used the ARDL ap- proach to estimate the impact of tax revenue on Pakistan's economic growth over the period 1985–2021, concluding that tax burden has a negative

impact on growth and implying that direct rather than in- direct taxes would support economic development.

Chugunov et al. [41] estimated the re- lationship between taxation and economic growth in Ukraine during the period from 2014 to 2018 by applying correlation-re- gression analysis and the concept of the multiplier effect. The results show that an increase in the share of direct taxes leads to economic growth, while an increase impact of taxation on growth is not so clearcut but much more nuanced. Since one of the most important purposes of taxation is to finance government operations, chan- neling tax revenue through efficient public spending could favor economic growth. The impact of the tax structure on growth has also been extensively studied using various methods and covering different time periods and various samples of countries. Although there are findings that point in opposite directions, most studies seem to identify direct taxes as hindering economic growth, while indi- rect taxes are generally estimated as less harmful.

METHODOLOGY AND DATA

This paper uses descriptive and com- parative analysis as well as correlation and regression analysis on panel data to study the impact of total tax burden and tax structure on economic growth in the EU member states.

The regression model is based on the endogenous growth model proposed by Barro [42] and further developed by Davoodi & Zou [43], who present the long-term growth rate as a function of ta- xation and spending at different govern- ment levels.

Our empirical study applies the ge- neral approach followed by most of the studies on this topic. A conventional spe- cification explains the economic growth through public expenditure and tax revenue, so the basic regression equation has the following structure (Equation 1):

$$GDP\_GR_{it} = b_0 + b_1 GEXP_{it} + b_2 TAX_{it} + \varepsilon_{it}. \quad (1)$$

The dependent variable (GDP_GRit) is the annual economic growth rate of country i in year t, calculated as a percentage change over the previous period. The independent variables are the ratio of total government expenditure to GDP for each country and year (GEXPit) and the total government revenue from taxes and social contributions presented as a ratio to GDP for each country and year (TAXit). The parameters of the model are b0, b1, and b2, respectively. The equation ends with the symbol εit, which marks the error term.

This simple specification is further ex- tended to take into account the three main types of government revenue, i.e. direct income and wealth taxes, indirect con- sumption taxes and social security contri- butions (Equation 2).

$$GDP\_GR_{it} = b_0 + b_1 GEXP_{it} + \\ + b_2 IND\_TAX_{it} + \\ + b_3 DIR\_TAX_{it} + b_4 SSC_{it} + \varepsilon_{it}. \quad (2)$$

In addition, the final regression model includes each of the specific taxes that are present in the tax systems of the EU-27 countries, such as personal income tax, corporate income tax; value added tax, excise duties, and property taxes (Equation 3).

$$GDP\_GR_{it} = b_0 + b_1 GEXP_{it} + b_2 PIT_{it} + \\ + b_3 CIT_{it} + b_4 VAT_{it} + b_5 EXCISE_{it} + \\ + b_6 PROP_{it} + b_7 SSC_{it} + \varepsilon_{it}. \quad (3)$$

Thus, the complete list of variables included in the regression analysis is as follows:
GDP_GRit – GDP growth rate of coun- try i in year t (percentage change over the previous period);
GEXPit – total government expendi- ture of country i in year t (% of GDP);
TAXit – total revenue from taxes and social security contributions of country i in year t (% of GDP);
IND_TAXit – indirect tax revenue of country i in year t (% of GDP);
DIR_TAXit – direct tax revenue of country i in year t (% of GDP);
SSCit – social security contributions of country i in year t (% of GDP);

PITit – revenue from personal income tax of country i in year t (% of GDP);

CITit – revenue from corporate income tax of country i in year t (% of GDP);

VATit – revenue from value added tax of country i in year t (% of GDP);

EXCISEit – revenue from excise duties of country i in year t (% of GDP);

PROPit – revenue from property taxes of country i in year t (% of GDP).

The tests for stationarity and cointe- gration are performed using Augmented Dickey-Fuller (ADF) test and Kao (Eng- le-Granger based) cointegration test. The parameters of the regression model are estimated using the Panel Least Squares (PLS) method. Correlation coefficients between the main variables of the regression model are calculated and presented in the correlation matrix.

To confirm the main findings, causality hypotheses are tested using the pairwise Granger causality test. The analysis is based on annual data for the period 2000–2022 provided by the European Commission in the Eurostat database1.

RESULTS

Comparative Analysis of Government Spending and the Related Tax Burden in the Member States of the European Union (EU-27)

Over the period 2000–2022, government spending in the member states of the European Union (EU-27) demonstrates clear cyclical patterns and fluctuates between 45% and 53% of GDP (Figure 1).

It is evident that the size of the public sector has expanded during major global crises, as government interventions have been essential to avoid the collapse of economic and social systems. Notewor- thy, the size of government varies widely across European countries.

Some of the countries, such as Bulgar- ia, Estonia, Ireland, Latvia, Lithuania and Romania, demonstrate quite restrictive fiscal models, with the ratio of govern- ment expenditure to GDP rarely exceed- ing 40%. Public spending in the Czech Re- public, Slovakia, Poland, Malta, Cyprus, Luxembourg and the Netherlands varies on average within 40–45% of GDP.

The proportion of public expenditure relative to GDP in Germany, Spain, Italy, Portugal, Croatia, Slovenia, and Hungary falls within the range of 45% to 55%. This expenditure level is consistent with the average for the European Union (EU-27) during the analyzed period.

Austria, Belgium, Denmark, Finland, France, Sweden, and Greece report the largest public sectors among the EU-27 member states. In these countries, public spending averages between 50% and 56% of GDP. Large government expenditures in most EU-27 countries lead to permanent budget deficits during the analyzed period.
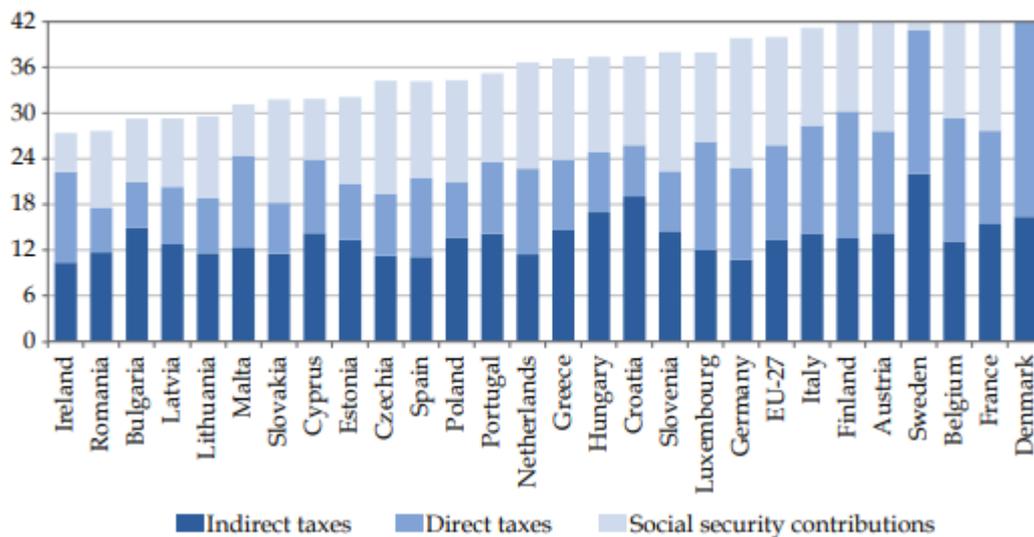
The average total tax burden in the European Union (EU-27) is relatively high, approximately 40.0%, due to the strong tradition of government intervention and social protection in most of the member states (Figure 2). Higher levels of public spending are usually associated with a higher tax burden. As anticipated, the lowest total tax-to-GDP ratios are observed in Ireland (27.4%), Romania (27.6%), Latvia (29.3%), Bulgaria, and Lithuania (29.5%). Conversely, the highest average ratios for the period are found in Denmark (47.0%), Belgium (45.9%), France (45.8%) and Sweden (44.4%), followed by Austria (42.8%), Finland (42.6%), Italy (41.5%), and Germany (40.0%).

Figure 1. Tax revenue, government expenditure and budget balance in the EU-27, % of GDP
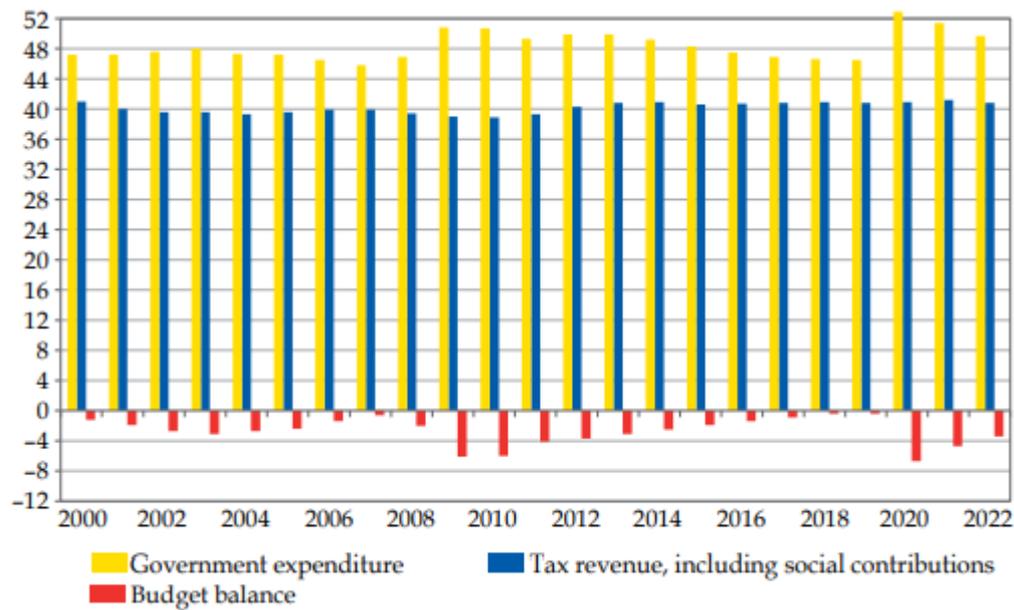
Source: Eurostat Database

Figure 2. Total tax burden in the EU-27 (mean 2000–2022, % of GDP)

Source: Eurostat Database

A notable characteristic of the analy- zed period is the relatively even distribu- tion of the average tax burden within the European Union (EU-27) among indirect taxes, direct taxes, and social security con- tributions. On average, social contribution receipts constitute 14.2% of the GDP. Indirect taxes follow, representing 13.3% of GDP, while direct taxes account for 12.5% of GDP. However, the significance of indirect taxes, direct taxes, and social contributions in terms of revenue generation varies widely across countries, due to the diverse structures of national tax systems. A distinctive feature of the member states from the southern and eastern parts of Europe is their reliance on indirect taxes as the primary source of government revenue. In contrast, northern countries depend mainly on direct taxes.

Thus, the lowest ratios of direct taxes to GDP among EU-27 countries are repor- ted by Romania (5.9%), Bulgaria (6.0%), Slovakia (6.7%) and Croatia (6.8%), followed by Poland (7.2%), Lithuania (7.2%), Estonia (7.4%), Latvia (7.5%), Hungary (7.9%), Slovenia (7.9%) and Czechia (8.1%).

Respectively, the highest revenues from direct taxes are collected by Den- mark (29.4%), Sweden (18.8%), Finland (16.7%), Belgium (16.2%), Luxembourg (14.2%), Italy (14.2%) and Austria

(13.4%). It is not surprising that some of the hig- hest ratios of indirect tax revenues to GDP are recorded in Croatia (19.0%), Hungary (16.9%), Bulgaria (14.9%) and Slovenia (14.5%), while the lowest levels of indirect tax revenues are found in Ireland (10.3%), Germany (10.7%) and Spain (11.1%).

Regression and Correlation Analysis of the Impact of Tax Revenues on Economic Growth in the Member States of the European Union (EU-27)

Several tests are applied to ensure robust and credible analysis and to enhance the validity and reliability of the empirical findings. The univariate Augmented Dic- key-Fuller (ADF) test has been performed to detect the presence of a unit root, which serves as an indicator of whether the series in the dataset exhibit a persistent trend or non-stationarity (Table 1). The results indicate that GDP_GR, GOV_EXP, DIR_TAX, PIT, CIT and SSC are stationary at level (in- tegrated of order 0), while TAX, IND_TAX, VAT, EXCISE and PROP are stationary at first difference (integrated of order 1).

The results from the Kao (Engle-Granger based) cointegration test imply that there is a long-run equilibrium relationship between the variables in the regression model (Table 2).

The results from the Panel Least Squares estimations are reported in Table 3. Three regression equation specifications are constructed using different combinations of independent variables. As a starting point, the regression pa- rameters are estimated using the simplest version of the equation (Model 1), which includes only total government spending and total tax burden as independent variables. In the subsequent models, the total tax revenue is replaced by disaggregated tax revenue variables.

Table 1. Augmented Dickey-Fuller (ADF) test

Variables	Level		First difference		Conclusion
	t-Statistic	Prob.	t-Statistic	Prob.	
GDP_GR	299.215	0.0000			I(0)
GOV_EXP	118.678	0.0000			I(0)
TAX	64.009	0.1654	291.762	0.0000	I(1)
IND_TAX	68.401	0.0899	328.889	0.0000	I(1)
DIR_TAX	119.875	0.0000			I(0)
PIT	78.532	0.0163			I(0)
CIT	98.072	0.0002			I(0)
VAT	69.842	0.0722	361.650	0.0000	I(1)
EXCISE	45.852	0.7130	273.554	0.0000	I(1)
PROP	53.155	0.1622	279.929	0.0000	I(1)
SSC	89.704	0.0016			I(0)

Model 2 estimates the impact of indi- rect taxes, direct taxes and social security contributions, while Model 3 studies the influence of corporate income tax (CIT), personal income tax (PIT), value added tax (VAT), excise duties (EXCISE), property taxes (PROP) and social security contribu- tions (SSC). The probability of the F-statis- tic confirms the adequacy of the applied models. The reported R-squared values indicate that, across models, 23–26% of the variations in the dependent variable can be explained by the variations in the selected independent variables.

Table 2. Kao (Engle-Granger based) cointegration test

Series: GDP_GR, GOV_EXP, TAX, IND_TAX, DIR_TAX, PIT, CIT, VAT, EXCISE, PROP, SSC		
Sample: 2000–2022		
Observations: 621		
Null Hypothesis: No cointegration		
Trend assumption: No deterministic trend		
	t-Statistic	Prob.
ADF	−6.340766	0.0000

Residual variance	15.80487
HAC variance	4.032004

Table 3. Panel Least Squares (PLS) estimations

Variable	Model 1	Model 2	Model 3
(Constant)	12.2345*** (13.1757)	11.6012*** (11.3295)	12.1569*** (9.6694)
GOV_EXP	−0.4589*** (−13.2822)	(—0.4454*** 12.0749)	(—0.3875*** (−11.2793)
TAX (−1)	0.2942*** (7.4927)		
IND_TAX (−1)		0.3806*** (5.5732)	
DIR_TAX		0.2354*** (5.5744)	
SSC		−0.2523*** (−4.4739)	−0.1377*** (−2.5783)
PIT			0.2029*** (4.0613)
CIT			0.3269*** (3.0289)
VAT (-1)			0.2977*** (2.5139)
EXCISE (-1)			0.2894* (1.8711)
PROP (-1)			0.8559*** (2.9288)
R-squared	0.261365	0.252037	0.239789
Adjusted R-squared	0.258866	0.246958	0.230708
Akaike info criterion	5.243937	5.263221	5.289565
Schwarz criterion	5.266093	5.300148	5.348648
Durbin-Watson statistic	1.763014	1.799286	1.771954
F-statistic	104.5625	49.61811	26.40549
Prob(F-statistic)	0.0000	0.0000	0.0000
Observations	594	594	594

Notes: t- statistics is reported in the parentheses below the coefficients; Asterisks (***, **, *) indicate the significance level (1%, 5%, 10%) of the coefficients.

Contrary to conventional econo- mic logic, the regression results indicate a significant negative impact of general government expenditure on GDP growth, whereas total tax revenue exerts a positive influence. These results suggest inefficien- cies in public spending in the analyzed countries. The overall structure of the tax systems across the EU-27 countries does not seem to hinder economic growth, but it is evident that government spending does not contribute effectively to the posi- tive fiscal impacts on the economy.

Notably, both direct and indirect tax revenues positively affect GDP growth rate. Value added tax (VAT), property taxes, and income taxes (both personal and corporate) are estimated to be growth-sup- portive, whereas social security contri- butions impede economic growth. As for excise duties, they do not appear to have significant influence on the growth rate.

The correlation matrix displays the correlations between the pairs of variables included in the regression model (Table 4).

The correlation analysis confirms a negative correlation between general government expenditure and economic growth, whereas the correlation between total tax revenue and growth is positive. Notably, both direct and indirect tax revenues exhibit positive, albeit extremely weak, correlations with economic growth. As anticipated, social contributions are negatively correlated with growth. Con- versely, revenues from the taxes on per- sonal income and corporate profits, pro- perty taxes, excise duties, and value ad- ded tax (VAT) demonstrate weak positive correlations with economic growth.

As expected, the results of the pairwise Granger causality tests indicate bi- directional causal relationships between general government expenditure, total tax revenue, and the economic growth rate (Table 5).

Evidently, revenues from direct and indirect taxes, social contributions, and value added tax (VAT) are also influen- tial factors in economic growth. At the same time, the null hypothesis cannot be rejected for some of the variables, name- ly personal income tax, corporate income tax, property taxes, and excise duties, suggesting that these variables do not have a definitive causal effect on GDP growth.

DISCUSSION

The analysis results do not support our first hypothesis that the total tax burden negatively impacts economic growth. Contrary to conventional economic logic, our findings reveal a significant negative impact of general government expenditure on the GDP growth rate, whereas total tax revenue exerts a positive effect. In this regard, the hypothesis H1 Total tax revenue negatively impacts economic growth is rejected.

Table 4. Correlation matrix of variables from the regression model

	GDP_GR	GOV_EXP	TAX	IND_TAX	DIR_TAX	PIT	CIT	VAT	EXCISE	PROP	SSC
GDP_GR	1.000	−0.435	0.218	0.076	0.075	0.093	0.075	0.002	0.084	0.117	−0.175
GOV_EXP	−0.435	1.000	0.822	0.464	0.464	0.469	−0.041	0.212	0.168	0.436	0.308
TAX	0.218	0.822	1.000	0.508	0.713	0.689	0.118	0.215	−0.013	0.462	0.226
IND_TAX	0.076	0.464	0.508	1.000	0.268	0.328	−0.209	0.724	0.385	0.299	−0.264
DIR_TAX	0.075	0.464	0.713	0.268	1.000	0.948	0.227	0.041	−0.226	0.270	−0.390
PIT	0.093	0.469	0.689	0.328	0.948	1.000	−0.073	0.122	−0.191	0.307	−0.398
CIT	0.075	−0.041	0.118	-0.209	0.227	−0.073	1.000	-0.289	−0.206	−0.104	0.020
VAT	0.002	0.212	0.215	0.724	0.041	0.122	−0.289	1.000	0.445	−0.004	−0.216
EXCISE	0.084	0.168	−0.013	0.385	−0.226	−0.191	−0.206	0.445	1.000	0.041	0.003
PROP	0.117	0.436	0.462	0.299	0.270	0.307	−0.104	−0.004	0.041	1.000	0.132
SSC	−0.175	0.308	0.226	−0.264	−0.390	−0.398	0.020	−0.216	0.003	0.132	1.000

Notably, both direct and indirect tax revenues positively affect economic growth. At a disaggregated level, value added tax (VAT), property taxes, and in- come taxes (both personal and corporate) are estimated to be growth-supportive, whereas social security contributions impede economic growth. As for excise duties, they do not seem to exert a significant impact on the GDP growth rate.

These findings are consistent with the hypothesis H3 Indirect taxes on consumption have a positive impact on economic growth, so this hypothesis is confirmed.

The hypothesis H2 Direct taxes on in- come and wealth, as well as social security contributions, have a negative effect on growth is partially confirmed, as only social security contributions demonstrate a significant negative impact on the growth rate. Contrary to our expectations, direct taxes on income and wealth are found to have a weak positive impact.

Although unconventional, our findings are supported by the works of numerous authors. The negative impact of general government expenditure on growth has been confirmed by Folster & Henrekson [1], Chu et al. [2], Vintilă et al. [11], Barro [42], Tanchev & Todo- rov [44] and Todorov & Durova [45].

Additionally, Esener & Ipek [46] iden- tified significant negative effects of public spending on economic growth using dy- namic GMM techniques applied to panel data for 33 middle-income countries from 1999 to 2014.

Cenc [47], employing linear regressions on panel data, found a negative impact of government expenditure on GDP growth in 19 Eurozone countries over the period 1995–2020.

Table 5. Pairwise Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
GOV_EXP does not Granger Cause GDP_GR	594	10.1984	0.0015
GDP_GR does not Granger Cause GOV_EXP		4.37173	0.0370

TAX does not Granger Cause GDP_GR	594	15.4218	0.0001
GDP_GR does not Granger Cause TAX		6.39219	0.0117
IND_TAX does not Granger Cause GDP_GR	594	1.60605	0.0055
GDP_GR does not Granger Cause IND_TAX		29.8447	7.E-08
DIR_TAX does not Granger Cause GDP_GR	594	4.15674	0.0419
GDP_GR does not Granger Cause DIR_TAX		0.15598	0.6930
PIT does not Granger Cause GDP_GR	594	3.02423	0.0826
GDP_GR does not Granger Cause PIT		0.22494	0.6355
CIT does not Granger Cause GDP_GR	594	1.19864	0.2740
GDP_GR does not Granger Cause CIT		2.89236	0.0895
VAT does not Granger Cause GDP_GR	594	13.8837	0.0002
GDP_GR does not Granger Cause VAT		0.22456	0.6358
EXCISE does not Granger Cause GDP_GR	594	0.28415	0.5942
GDP_GR does not Granger Cause EXCISE		9.26031	0.0024
PROP does not Granger Cause GDP_GR	594	1.99603	0.0582
GDP_GR does not Granger Cause PROP		6.98089	0.0085
SSC does not Granger Cause GDP_GR	594	4.64599	0.0315
GDP_GR does not Granger Cause SSC		1.69996	0.1928

Note: lags = 1

Vdovichen et al. [48] also concluded that over the period 2012–2021, the main fiscal indicators in the EU-23 member states were negatively correlated with the economic growth indicators. On this base they recommended a gradual reduction in public spending and the pursuit of a balanced budget as a measure for mac- roeconomic stability. Similar results were reported by Shaddady [49], who analyzed panel data from 19 Eastern European and Central Asian countries for the pe- riod 1995–2019 and found that govern- ment expenditures were negatively related to economic growth.

Alfonso & Tovar [50] further confirmed these findings by analyzing empirical data from a group of 108 countries covering the period 1970–2008, suggesting that growth rate was negatively affected by the size of government.

On the other hand, there are several studies that challenge our results. For instance, Alzyadat & Al-Nsour [17], and Moyo et al. [18] estimated that govern- ment spending has positive growth-supporting effects. This is verified by Rubinson [51], who analyzed several samples, including from 7 to 91 countries, arguing that higher government expenditure sti- mulates growth, particularly in poorer and less developed countries.

Lin [52] also found a positive impact of government spending on growth rate for both developed and less-developed economies. Additionally, Alzyadat & Al- Nsour [17], Attari & Javed [53] and Hamza & Milo [54] concluded that public spen- ding positively affects GDP growth in Jor- dan, Kosovo and Pakistan, respectively.

Consistent with our findings, seve- ral studies identify total tax revenues as positively related to economic growth, including those by Vintilă et al. [11], Spul- bar et al. [12], Pradhan et al. [13], Kalaš et al. [14], Gashi et al. [15], Krysovatyy et al. [16] and Hodžić et al. [20]. However, other research, such as that by Folster & Henrekson [1], Koester & Kormendi [3], Kaneva et al. [4], Ozpence & Mercan [6], and Çollaku et al. [7], contends that the to- tal tax revenue is detrimental to economic performance.

Our results indicating the positive effects of direct taxes on economic growth are supported by the studies of Canavire-Bacarreza et al. [39], Chugunov et al. [41], and Tanchev [55]. Conversely, research by Arnold [26], Dackehag & Hans- son [27], Oz-Yalaman [28], McNabb [29], Hakim [30], Balasoiu et al. [31], and Neog & Gaur [35] identifies direct taxes as growth-suppressing. Similar to our fin- dings, a significant positive impact of indi- rect taxes on economic growth is estimated by Korkmaz et al. [34], Canavire-Bacarreza et al. [39], and Rexha et al. [56]. However, Chugunov et al.

[41] argue that an increase in the share of indirect taxes leads to a re- duction in the gross domestic product.

Only a few studies have identified similar unidirectional effects of both indirect and direct taxes on economic growth. Consistent with our results, Hoang et al. [57] analyzed data from 63 countries over the period 2003–2017 using the GMM technique and found that most taxes pos- itively impact GDP growth in poor coun- tries, while taxes on goods and services seem to support economic growth, especially in the wealthy countries.

Kutasi & Marton [58] also conducted dynamic GMM tests using a database of EU-25 countries for the period 1996–2018 and estimated both consumption and in- come taxes as growth-supportive.

Stoilova [59] estimated indirect and direct taxes as compatible with economic growth in 11 countries from the region of Central and Eastern Europe over the pe- riod 2000–2021. Contrasting our results, Abd Hakim et al. [60] explored the impact of taxation on the economic growth using datasets for 90 developing countries and 47 developed countries from 2000 to 2020, concluding that both indirect and direct taxes suppress economic development in developing countries. At the same time, they identified a significant positive rela- tionship between direct taxes and growth in developed countries.

Furthermore, a study by Luo [61] argues that both distortionary and non-distortionary taxation were negatively related to growth in a group of OECD countries during the period 1980–2015.

Our findings on the positive effects of VAT revenue on the growth rate are sup- ported by several studies. Ayoub & Muk- herjee [62] explored the role of value ad- ded tax on economic growth in China from 1985 to 2016, finding a significant positive relationship. This is further confirmed by the work of Avila-Lopez et al. [63], who identified a positive relationship between VAT and GDP in China and Mexico over the period 1991–2021. Similarly, Elshani & Pula [64] argued that VAT positively impacted growth in Eurozone countries from 2002 to 2019.

Omodero & Eriable [65] found that aggregate VAT revenue had strong positive causal effects on manufacturing output in Nigeria for the period 2010–2021. Nguyen et al. [66], using regression estimations, stated that VAT revenue positively affected economic growth in various localities in Vietnam from 2007 to 2017. Contrasting these findings, Koroleva [67] concluded that VAT did not have a significant impact on economic growth in Russia.

The depressing effects of social security contributions on economic growth are corroborated by Vintilă et al. [11], who concluded that social contributions ne- gatively impacted GDP in 36 OECD coun- tries during the period 2002–2017.

Similar results are reported by Acos- ta-Ormaechea et al. [64]. They constructed an extensive dataset covering 70 countries (including 24 low, 23 middle and 23 high income countries) for the period 1970–2009 and found a strong negative relationship between social security contributions and economic growth.

Kutasi & Marton [58] also determined the higher share of social contribution as a destructive factor for the growth rate. Conversely, Zhang & Zhang [68] found social security contributions to be condu- cive to growth.

It is noteworthy that, like any research, our study has temporal and territorial lim- itations. The analysis covers the period 2000–2022 and is limited to the European Union (EU-27) member states. Further research efforts are needed to examine the specific channels through which tax structure and tax burden affect the rates of economic growth, especially in different country contexts. Such insights can sup- port evidence-based policymaking and improve overall economic performance in the analyzed countries.

CONCLUSIONS

It is obvious that the relationship between taxation and growth is complex and multifaceted, so it cannot be fully revealed and proven by a single study. Modern societies must develop tax

policies that balance revenue generation with the promotion of economic growth. In this respect, well-designed tax systems, which support public investments and social cohesion, can stimulate economic development. Conversely, an excessive tax burden spread over inefficient public programs is believed to be harmful for the economy.

Our findings reveal a significant negative impact of general government expenditure on the GDP growth rate, whereas total tax revenues exert positive effects. These results suggest inefficiencies in pub- lic spending. Notably, the structures of the tax systems across EU-27 countries appear conducive to economic growth, evidenced by growth-supportive effects observed in both indirect and direct tax revenues. However, social security contributions are estimated to adversely affect the growth rate. Moreover, value added tax, proper- ty taxes, and both corporate and personal income taxes are consistent with econo- mic growth, whereas excise duties show no significant impact.

The study has several practical and research implications. The findings indicate that general government expen- diture does not effectively contribute to positive fiscal impacts on the European economy. Therefore, policymakers could enhance economic growth by gradually reducing public spending and striving for balanced budgets to maintain macroeconomic stability. Tax structures based on consumption and income taxes appear to be compatible with economic growth, while higher shares of social contributions are identified as detrimental to growth.

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