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The Relationship Between Fiscal Policy and Economic Growth: The Case of Serbia

Повезаност фискалне политике и економског раста: Пример Србије

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Abstract

Purpose: The main objective of this paper is to examine the potential cointegration relationship and causality between economic growth and fiscal parameters (public expenditures and revenues) in the Republic of Serbia. Additionally, the aim is to analyze the long-term and short-term effects of fiscal parameters on economic growth.
Methodology: Methodologically, the paper applies time series analysis. First, stationarity is tested using the Ng-Perron test, followed by cointegration testing using the Johansen and Bayer-Hanck tests. Finally, VEC (Vector Error Correction) modeling enables the examination of long-term effects and short-term causality.
Findings: The analyzed variables are integrated of order one, I(1). In addition, cointegration between them has been established. The results of the VEC model show that an increase in government expenditures reduces economic growth in the long run, while an increase in government revenues enhances it. The causality test showed that changes in government expenditures cause changes in economic growth in the short run.
Originality/value: To the best of the author's knowledge, this is the first study in Serbia to address such a specifically formulated objective using specific econometric methods..
Practical implications - The results obtained carry practical implications. The negative effect of government expenditures on economic growth indicates low government efficiency, a higher level of corruption, and a lack of institutional quality. In this sense, the recommendations point toward increasing the efficiency of government policies, along with designing an appropriate structure of public spending—focusing on essential services such as education, and healthcare.
Limitations: The key limitations relate to the selection of only aggregated variables. In this paper, consolidated public revenues and expenditures were used as fiscal indicators. In the context of future research, it would be interesting to observe these indicators in a disaggregated manner, in order to enable a more targeted analysis and to test the robustness of the obtained results.

Keywords: government expenditure, government revenue, GDP, cointegration, VEC, case study
JEL classification: C22, H61, O43

Сажетак

Циљ: Основни циљ рада је да се испита потенцијална коинтеграциона релација и каузалност економског раста и фискалних параметара (јавних расхода и прихода) у Републици Србији. Додатно, циљ је испитивање дугорочног и краткорочног ефекта фискалних параметара на економски раст.
Методологија: Методолошки, у раду је примењена анализа временских серија. Најпре, тестирање

стационарности применом Ng-Perron теста, затим тестирање коинтеграције применом Johansen и Bayer-Hanck тестова. На крају, VEC моделирање је омогућило испитивање дугорочних ефеката и краткорочне каузалности.
Резултати: Анализиране варијабле су реда интегрисаности један, I(1). Поред тога, установљена је коинтеграција између њих. Резултати VEC модела су показали да раст државних издатака смањује економски раст у дугом року, док га раст државних прихода увећава. Тест каузалности је показао да промене у државним издацима изазивају промене у економском расту у кратком року.
Оригиналност/вредност – Према сазнању аутора, у питању је прва студија за Србију која тангира овако формулисан циљ применом економетријских метода.
Практична примена - Добијени резултати носе практичне импликације. Негативан ефекат државних издатака на економски раст указује на слабу ефикасност Владе, виши ниво корупције и недостатак у квалитету институција. У том смислу и препоруке иду у правцу раста ефикасности владиних политика, уз дизајнирање одговарајуће структуре државних издатака (у правцу основних услуга попут образовања и здравства).
Ограничења истраживања: Кључна ограничења се односе на одабир само агрегираних варијабли. У раду су као фискални показатељи коришћени консолидовани јавни приходи и расходи. У контексту будућих истраживања занимљиво би било дезагрегирано посматрати ове показатеље ради усмерености анализе и провере робусности добијених резултата.
Кључне речи: државни издаци, државни приходи, БДП, коинтеграција, VEC, студија случаја
ЈЕЛ класификација: C22, H61,O43

Introduction

Governments around the world formulate and implement policies on taxation and public spending. The application of these policies has a strong impact on economic growth, income distribution, and poverty, and is at the center of economic and political debate. After the 1990s, the countries of Central and Eastern Europe went through two transition processes: a political one, involving a shift from totalitarianism to democracy, and an economic one, involving a transition from socialism to a market-based economic system.

The transition process requires fundamental changes in the role of the state - from a situation of pronounced state intervention in the functioning of the economy to one that ensures free competition and private ownership. This change in the role of the state implies a reduction and reorientation of public spending, as well as a comprehensive reform of tax policy and administration. In this context, understanding public finance systems and trends is of great importance - including trends in the overall size of the public sector, as well as specific patterns of taxation and public spending among different groups of countries. In addition, an important goal is to examine the impact of fiscal policy on economic growth and to identify mechanisms for improving the efficiency of fiscal policy.

A large number of authors have demonstrated the importance of fiscal policy and its dominant role over monetary policy in developing countries (among others, Medee & Nenbee, 2011; Munongo, 2012). Furthermore, the complementarity and proper coordination of both policies as a condition for increased economic activity has also been empirically confirmed in certain studies (Falade & Folorunso, 2015). Increasing potential output is a priority for most national economies. Achieving high growth rates requires the effective use of fiscal instruments available to economic policy makers.

Following the transitional recession of the early 1990s, most Central and Eastern European countries began to experience some progress in economic activity. This growth led to a significant reduction in poverty, estimated at around 58 million people (Gray et al., 2007). Public finance reforms have accompanied these economies. A key macroeconomic imbalance - along with its associated risks - in the economy of the Republic of Serbia is driven by the growing share of public spending and fiscal deficit in the gross domestic product, both at the level of the consolidated general government balance and at the level of more narrowly defined public spending balances. The fiscal imbalance is, among other things, the result of increasing public expenditure and the rapid growth of real wages, which have risen at an unexpectedly high rate, significantly outpacing the growth of gross domestic product.

The main objective of the paper is to examine the potential cointegration between economic growth and fiscal parameters (public revenues and expenditures), as well as the impact that fiscal policy parameters have on economic growth. The paper is based on the research question: Do public revenues and expenditures have a statistically significant impact on economic growth in the short and long run? The contribution of the paper lies in the application of econometric procedures, such as unit root tests, cointegration tests, and causality tests, to examine the validity of the proposed assumptions using the specific case of Serbia. Following the introductory considerations, the paper presents the literature review, methodological framework, and empirical results, in that order. Finally, the concluding section provides recommendations for economic policymakers.

1. Literature Review

Barro (1991) and de La Fuente (1997) examined the effects of fiscal policy on economic growth. They investigated how growth is related to the structure and level of public spending. De La Fuente (1997) showed that if public spending increases, economic growth decreases, while an increase in public investment accelerates economic growth. Previous studies generally confirm the positive impact of investment in education and infrastructure on economic growth. However, in developing countries, investment in infrastructure does not have a positive impact. The influence of governance on public finances has not been confirmed. Earlier studies primarily focused on OECD countries, where public institutions - including those responsible for tax administration and public spending - are more developed, have higher levels of technology, and exhibit greater accountability and transparency compared to developing countries.

Several reasons stand out as key factors explaining why a large public sector (government) hampers economic growth in countries with weaker governance. First, a large public sector increases the likelihood of fiscal deficits due to declining economic activity, particularly where public spending is inflexible due to weaker budgeting systems, reliance on high expenditure commitments, and high public sector employment rates.

Second, the high taxation required to finance large governments may discourage private sector activity, especially if tax administration is weak and unable to ensure a broad

tax base. A large public sector can also be accompanied by anti-competitive regulations limiting private sector participation.

Finally, public spending may be misallocated as a result of corruption and weak institutional capacity, which reduces productive resources in the economy. While strong governments are capable of avoiding these problems through budgetary tightening and efficient tax administration, countries with weaker governance should aim to keep public spending and taxation at moderate levels if they wish to stimulate faster economic growth. The fiscal deficit is also very important for economic growth, and fiscal consolidation plays a role in deficit reduction. Fiscal adjustments that reduce the deficit can be accompanied by economic growth, and adjustments based on spending cuts are likely to be more effective than those based on tax increases.

It is also important to note that economic growth is not the only objective of fiscal policy. Income redistribution and social programs aimed at poverty reduction are also critical concerns. Patterns of public spending influence economic growth in at least two ways. First, the composition of public expenditure can affect overall economic growth, since some categories of spending stimulate while others hinder economic activity. Second, within each category of spending, resources can be allocated in a more or less efficient and effective manner. High levels of government investment in unproductive sectors can have negative effects on growth, whereas investment in productive activities can foster economic growth.

Countries with better governance are more capable of collecting taxes efficiently and spending public funds effectively. A higher share of spending in productive areas may lead to higher growth rates in countries with strong governance, while high spending in unproductive areas does not necessarily have a negative effect on growth. However, in countries with weaker governance, economic activity tends to decline with higher levels of unproductive spending and higher taxation, and investments in productive areas do not necessarily yield positive effects (Gray et al., 2007).

1.1. Effects of Government Expenditures on Economic Growth

One of the most significant debates among economists concerns the role of government intervention in managing short-term fluctuations in economic activity. Classical and Keynesian schools of thought offer differing perspectives on this issue. Unlike classical economists, who believe that market forces naturally ensure long-term equilibrium through labor market adjustments, Keynesians are skeptical of self-regulating mechanisms due to rigidities in the labor market. The Keynesian approach particularly emphasizes the role of fiscal policy during periods of recession.

Fundamentally, fiscal policy can be either expansionary or contractionary, and is applied depending on the goals and level of development of a national economy. For example, expansionary fiscal policy, which includes lowering tax rates and increasing

government spending, may initially result in a budget deficit, but in the long term, increased government expenditure can strengthen growth performance. This thesis aligns with Keynesian economic policy, which argues that a budget deficit can have positive long-term effects if the actual output of the economy is below its potential. From a theoretical standpoint, neoclassical economists argue that fiscal policy does not affect the long-term rate of economic growth, as growth is determined by population growth and the rate of technological progress - both considered exogenous. The explosive development of endogenous growth theory has prompted numerous empirical studies on the determinants of economic growth. Examining the relationship between government spending and economic growth is certainly an important issue in the context of this debate. In endogenous growth models, the production function is not characterized by diminishing returns. Fiscal policy can be used to allocate resources more efficiently by correcting market failures and boosting the productivity of human and physical capital.

Okunlola et al. (2024) results indicate that effective government management can have a beneficial impact on economic growth. The structure of public expenditures also plays a crucial role in analyzing the relationship between government spending and economic activity. Government spending on education and healthcare impacts labor productivity growth. Likewise, infrastructure expenditures (e.g., roads) boost private investment rates, which in turn positively influence the rate of economic growth. Barro (1991) emphasized that education expenditures represent a form of public investment rather than public consumption. Using data from both rich and poor countries, Barro (1991) provided strong empirical evidence that a large public sector hampers economic growth. It is well known that the size of government tends to increase with rising income, a tendency known as Wagner's Law. According to this hypothesis, public spending is income-elastic, and the ratio of government expenditure to economic growth tends to rise with development. The relationship aligns with Wagner's Law only when elasticity is significant - that is, when the coefficient is positive and greater than one.

Since the 1990s, the standard approach to testing Wagner's Law has involved time-series analysis, particularly unit root and cointegration tests. Hansson & Henrekson (1994), using disaggregated data, found that government transfers, consumption, and total output have negative effects, while education spending has positive effects, and government investment shows no impact on productivity growth. Barro (1990) also pointed out that unproductive government spending reduces GDP growth, while the effects of productive spending are ambiguous - depending on government behavior and the share of public spending in aggregate demand. The structure of public spending differs significantly between rich and poor countries. Many programs that are theoretically expected to have positive effects on growth - such as education, infrastructure, research and development, and subsidies - account for less than one-fifth of total public expenditures in the most developed countries (OECD countries). In contrast, in developing countries, the share of such programs exceeds half of total public spending. In other words, over 80% of public spending in highly developed countries often does not contribute positively to economic growth. Liu et al. (2024) have shown that government investments in science and

technology have positive spillover effects on the research and development activities of companies and the application of innovative achievements. In this way, more sustainable economic growth is promoted compared to government spending and traditional investments in the long run.

Many studies have tested the impact of government spending on economic growth under the assumption of an inverted U-shaped curve between the two. This idea was popularized by American official Richard Armey, and the curve is named after him — the Armey Curve. The curve is based on the law of diminishing returns and emphasizes the role of government in economic functioning. Armey argued that in the absence of a public sector, an economy produces a very low level of output. At low levels of government spending, governments are unable to provide property rights protection, keeping output low. Conversely, when government spending is too high, individuals lack incentives to invest and produce due to the high level of taxation needed to fund the spending — thus leading to a decline in economic activity. Accordingly, the hypothesis is that at low levels of government spending, increases have a positive impact on economic activity, while at high levels, further increases produce negative effects. The optimal ratio of government expenditure to economic growth (threshold) represents the point at which any increase in government expenditure below the optimal level has positive effects on economic growth, while an increase in government expenditure above the optimal level causes negative effects on growth.

Table 1: The Optimal Ratio of Government Expenditures to Gross Domestic Product (Selected Studies)

Author(s)	Time period	The analyzed economies	Result (*threshold*)
Karras (1996)	1960-1985	OECD and South America	14-33
Karras (1997)	1950-1990	20 European countries	16
Vedder & Gallaway (1998)	1947-1997	USA	17.45
Chao & Gruber (1998)	1929-1996	Canada	27
Herath (2010)	1959-2003	Sri Lanka	27
Facchini & Melki (2011)	1871-2008	France	30
Iyidogan & Turan (2017)	1998-2015	Turkey	16.5

Note: The result represents the optimal ratio of government expenditure to gross domestic product, expressed as a percentage. Source: Author.

1.2. Effects of Taxation on Economic Activity

In endogenous and neoclassical growth models, the impact of taxes on economic growth is also examined. As already noted, in neoclassical growth models there are exogenous forces, such as technological progress and population dynamics, which determine the equilibrium output level. Taxes can only have a temporary effect on the income growth rate on the path toward the equilibrium growth trajectory. On the other hand, in endogenous growth models, the tax rate influences parameters such as the rate of return on capital accumulation or the

volume of investment in research and development. Thus, the tax rate has a permanent effect on the equilibrium output level. From the perspective of both theories, there is a negative relationship between taxes and economic growth, although this relationship is not fully confirmed empirically (Karagianni et al., 2015).

Indeed, several studies have yielded differing results regarding the relationship between economic growth and taxation. Easterly & Rebelo (1993) and Kneller et al. (1999) showed that the relationship between these variables is moderately positive, and in many cases there is no correlation, neither in the short nor in the long run. On the other hand, Barro (1991) and Engen & Skinner (1992) found a negative relationship between the variables. Leibfritz et al. (1997) examined the effects of tax burdens on GDP growth in OECD countries and concluded that an increase in the tax-to-GDP ratio by 10% leads to a reduction in economic growth by 0.5%, with direct taxation reducing growth slightly more than indirect taxation. One possible reason for the differing empirical results is the choice of inappropriate tax indicators. Many studies have used alternative tax rates, such as disaggregated average tax rates on direct and indirect taxes, as well as the effective marginal tax rate, which has recently become increasingly important in studying the impact of taxes on output dynamics. Engen & Skinner (1996) investigated the individual effects of taxation on labor supply, investment, and productivity. They found that a reduction of the marginal tax rate by 5% and the average tax rate by 2.5% increases economic growth by 0.22%. Yamarik (2000), using data from the United States, showed that the use of disaggregated marginal tax rates generates more consistent growth forecasts in line with growth theories compared to the aggregate average tax rate. Padovano & Galli (2002) empirically confirmed that the average tax rate has no effect on growth, while the marginal tax rate and tax progressivity negatively affect economic growth. Mamatzakis (2005), analyzing the impulse response function in Greece, showed that an increase in the tax burden causes a decline in output. A study conducted by Angelopoulos et al. (2007) showed that the income tax on labor is negatively related to economic growth, while capital and corporate income taxes are generally positively related to growth.

The reduction of income tax rates affects the behavior of individuals and businesses through the income effect and the substitution effect. The positive effect of tax cuts on the economy arises from the fact that lower tax rates increase after-tax income levels, which, through the substitution effect, influence levels of saving and investment. Another positive effect relates to the reduction of tax distortions, which induces efficiency in the composition of economic activity.

A reduction in tax rates increases the marginal return to labor and raises the labor supply through the substitution effect. The value of tax subsidies is reduced, and the composition of economic activity is altered. Additionally, after-tax household income increases at every level of labor supply, which reduces the labor supply through the income effect. Therefore, the net effect on the labor force is ambiguous, as is the effect on saving and other activities.

For example, if the initial income tax rate is around 90 percent, a 10 percent tax cut doubles the after-tax wage. If the tax rate is 20 percent, a 10 percent tax cut increases wages

by about 12.5% (Gale & Samwick, 2016). The income effect remains the same, but substitution effects on labor supply and saving are larger when the tax rate is higher, meaning the net gain in labor supply from tax reduction is greater when tax rates are higher.

Since the economic cost increases with the square of the tax rate, efficiency gains from tax rate reductions are also greater when initial tax rates are higher.

Tax reform includes both a reduction in income tax rates and a broadening of the tax base (Gale & Samwick, 2016). By eliminating special treatments for different types of income or consumption, base broadening aims to increase the average effective tax rate on labor supply, saving, and investment. This causes two effects: the average substitution effect will be smaller, and the average income effect will be zero.

Base broadening has an additional effect that is expected to positively impact the economy. The assumption is that it will reduce resource allocation toward sectors and industries that benefit from generous tax treatment. A flatter tax rate and a broader tax base allow resources to shift from sectors with "generous" tax rates to other parts of the economy with higher returns. This reallocation is aimed at enhancing overall economic activity.

2. Data and Methodology

The research includes quarterly time series data for the period from 2005 to 2024, using the case of the Republic of Serbia (80 observations). The variables used in the analysis are consolidated public revenues, consolidated public expenditures, and real gross domestic product. The trivariate model can be specified as follows:

$$lnY_t = \alpha_1 + \alpha_2 lnGE_t + \alpha_3 lnGR_t + \mu_t \quad (1)$$

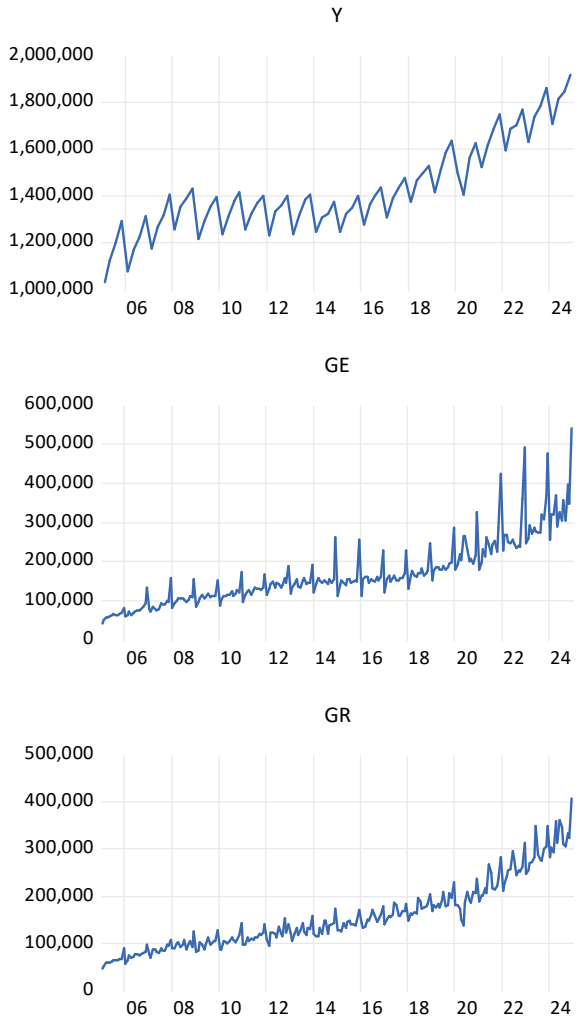
The data on real gross domestic product (Y_t) were obtained from the website of the Statistical Office of the Republic of Serbia (SORS), while the data on consolidated public expenditures (GE_t) and consolidated public revenues (GR_t) were sourced from the website of the Ministry of Finance of the Republic of Serbia (MoF). It is assumed that the residual (μ_t) is normally distributed and represents white noise. The variables are expressed in millions of dinars (RSD) and, for statistical reasons, were converted into logarithmic form (ln). In addition, due to the presence of seasonal components, the time series were seasonally adjusted using the X-13 ARIMA model. Figure 1 shows the trend of the variables before logarithmic transformation and seasonal adjustment, while Table 2 presents the descriptive statistics of the variables after the applied corrections.

The trivariate model was selected in order to examine the effects of government expenditures on economic growth, while also avoiding potential bias problems that are possible in bivariate modeling. To test the stationarity of the time series, the traditional Ng-Perron test was applied, with both a constant and a trend. For testing cointegration between economic growth and government expenditures, in the presence of government revenues as an additional variable, the Johansen (1991) cointegration test was used. The basic

precondition for applying this test lies in checking the stationarity of the variables, and it includes two essential conditions:

1. The variables must be non-stationary in levels,
2. After conversion to first differences, they must become stationary (i.e., they should be integrated of order one, I(1)).

Figure 1: Gross Domestic Product, Consolidated Public Expenditures, and Consolidated Public Revenues in the Republic of Serbia (in millions of dinars)



Source: Author

Table 2: Descriptive Statistics of Variables

Variable	*lnY*	*lnGE*	*lnGR*
Mean	14.16	11.93	11.87
Median	14.12	11.93	11.85
Std. Deviation	0.12	0.44	0.44
Observations	80	80	80

Source: Author

Trace statistics and maximum eigenvalue statistics are used to determine the cointegration rank. However, conclusions about cointegration can vary depending on the test applied. Bayer & Hanck (2013) proposed a new approach called combined cointegration testing. This test has greater power in detecting cointegration and features a unique aspect of generating a joint test statistic based on the Engle-Granger, Johansen, Peter Boswijk, and Banarjee tests. This approach combines the results of different individual cointegration tests to provide more reliable conclusions. This method will also be applied in this analysis to examine cointegration between economic growth, government expenditures, and government revenues in the case of the Republic of Serbia. Bayer and Hanck (2013) specified the model as follows:

$$EG - JOG = -2[\ln(p_{EG}) + (p_{JOH})]$$

$$EG - JOH - BO - BDM = -2[\ln(p_{EG}) + (p_{JOH}) + (p_{BO}) + (p_{BDM})] \quad (11)$$

Where p_{EG}, p_{JOH}, p_{BO}, p_{BDM} represent the p-values of different individual cointegration tests. If the Fisher statistic for EG-JOH or for EG-JOH-BO-BDM exceeds the critical value, the null hypothesis of no cointegration can be rejected. If the variables are found to be cointegrated, then a Vector Error Correction Model (VECM) can be applied, since the variables share a common stochastic trend in the long run. The VECM provides valuable information about the direction of causality between variables. When this model is used, the variables are transformed into their first differences (i.e., stationary form). The model can be specified as follows:

$$\begin{bmatrix} \Delta lnY_t \\ \Delta lnGE_t \\ \Delta lnGR_t \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} + \begin{bmatrix} B_{11,1} B_{12,1} B_{13,1} B_{14,1} B_{15,1} \\ B_{21,1} B_{22,1} B_{23,1} B_{24,1} B_{25,1} \\ B_{31,1} B_{32,1} B_{33,1} B_{34,1} B_{35,1} \end{bmatrix} x \begin{bmatrix} \Delta lnY_{t-1} \\ \Delta lnGE_{t-1} \\ \Delta lnGR_{t-1} \end{bmatrix} + \cdots + \begin{bmatrix} B_{11,m} B_{12,m} B_{13,m} B_{14,m} B_{15,m} \\ B_{21,m} B_{22,m} B_{23,m} B_{24,m} B_{25,m} \\ B_{31,m} B_{32,m} B_{33,m} B_{34,m} B_{35,m} \end{bmatrix} x \begin{bmatrix} \Delta lnY_{t-1} \\ \Delta lnGE_{t-1} \\ \Delta lnGR_{t-1} \end{bmatrix} + \begin{bmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \end{bmatrix} x(ECM_{t-1}) + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \end{bmatrix} \quad (2)$$

Where Δ represents the first difference operator, and ECM_{t-1} is the long-run error correction term. By using the t-statistic associated with the coefficient of the error correction term, it is possible to test for long-run causality. The direction of short-run causality can be determined using the F-statistic for the lagged first differences of the independent variables.

3. Empirical Results

The results of the applied Ng-Perron unit root test are presented in Table 3. According to the obtained results, the variables related to economic activity, government expenditures, and government revenues are non-stationary at level. However, after converting them into first differences, the variables become stationary at the 5% significance level. These results indicate that the variables are integrated of order one, i.e., I(1).

Table 3: Ng-Perron Unit Root Test

Variables	MZa	MZt	MSB	MPT
lnY_t	-2.20	-2.39	1.08	16.773
$lnGE_t$	-2.02	-0.806	0.399	34.106
$lnGR_t$	-3.175	-1.226	0.386	27.919
ΔlnY_t	-16.63 (1)*	-2.87	0.17	1.51
$\Delta lnGE_t$	-20.099 (0)**	-3.147	0.157	4.671
$\Delta lnGR_t$	-22.811 (0)**	-3.169	0.139	5.211

*Note: () indicates the lag length, while ** denotes 5% level of significance.*
Source: Author

In the next step, the results of the Johansen cointegration test are presented. To determine the cointegration rank (r), both the trace statistic and the maximum eigenvalue statistic were used. The results, shown in Table 4, indicate that there is one cointegrating vector. Specifically, the null hypothesis of no cointegration is rejected, which is consistent with the previously obtained results.

Table 4: Johansen Cointegration Test Results

Hypothesis	Trace statistics	Max- Eigen statistics
$lnY_t=f(lnGE_t,lnGR_t)$		
R=0	27.58	20.03
R=1	9.55	6.41
R=2	3.14	3.14

Note: The trace statistic indicates 1 cointegrating equation at the 10% significance level. The eigenvalue statistic also indicates 1 cointegrating equation at the 10% significance level. Source: Author.

Table 5 presents the combined cointegration test results, which include the EG-JOH and EG-JOH-BO-BDM tests. As in the case of the Johansen test, it is crucial to determine the appropriate lag length, since the Fisher statistic is highly sensitive to lag selection (Shahbaz et al., 2014). The results show that the Fisher statistic values for both EG-JOH and EG-JOH-BO-BDM are greater than the critical value at the 10% significance level, in the case where lnYt is the dependent variable. This implies that both tests reject the null hypothesis of no cointegration among the variables.

Table 5: Bayer and Hanck Cointegration Test Results

Estimated models	EG-JOH	EG-JOH-BO-BDM	Cointegration
$lnY_t=f(lnGE_t, lnGR_t)$	8.97	25.04	Yes
$lnGE_t=f(lnY_t, lnGR_t)$	5.69	7.17	No
$lnGR_t=f(lnY_t, lnGE_t)$	4.92	5.72	No

Note: Critical values at the 10% significance level are 8.451 (EG-JOH) and 16.507 (EG-JOH-BO-BDM). Source: Author.

By applying the VEC model, it is possible to establish a long-term relationship between the variables through long-run elasticity coefficients, as follows:

$$lnY = 15.10 - 0.66 * lnGE + 0.58 * lnGR \quad (3)$$

t- value (-2.28) (1.66)

Based on the cointegration equation, we can conclude that government expenditures reduce, while government revenues increase economic growth in the long run. A one-percent increase in government expenditures decreases economic growth by 0.66%. This result is statistically significant. On the other hand, a one-percent increase in government revenues increases economic growth by 0.58%.

The coefficient associated with the error correction mechanism indicates the speed of adjustment toward the equilibrium state from the short run to the long run. It essentially confirms the existence of a long-run relationship between the variables. In this specific case, the coefficient is statistically significant and negative. The value of the coefficient is -0.15, which implies that economic growth adjusts toward the equilibrium state by 15% each quarter, moving from the short run to the long run. The existence of cointegration among the variables allows for examining the direction of causality between them. In this context, a VECM Granger causality test was applied, which distinguishes between short-term and

long-term causality. The results are presented in Table 6. Three causal relationships were identified:

1. Bidirectional causality was found between government expenditures and economic growth, indicating mutual influence over time. The obtained results are in accordance with Kitole et al. (2025).
2. Additionally, changes in government expenditures lead to changes in government revenues, suggesting a unidirectional causal relationship from expenditures to revenues. This result is in contrast with Glavaški et al. (2022). The causality test revealed no causal relationship between economic growth and government revenues, similar to the findings in the study by Gurdal et al. (2021).

Table 6: VECM Granger Causality Analysis

Dependent variable	Type of causality			
	Short- term			Long- term
	ΔlnY_t	$\Delta lnGE_t$	$\Delta lnGR_t$	ECM_{t-1}
ΔlnY_t	-	8.09 [0.00]	0.88 [0.35]	-0.15* [0.00]
$\Delta lnGE_t$	3.43 [0.06]	-	0.08 [0.77]	-
$\Delta lnGR_t$	0.71 [0.40]	9.60 [0.00]	-	-

Note: Values in parentheses refer to the p-value.
Source: Author.

Conclusion

The main objective of this paper was to analyze the relationship between economic growth, government revenues, and government expenditures. The research is limited to the economy of the Republic of Serbia, covering the period from 2005 to 2024. In an effort to capture the key aspects of this relationship, the analysis includes gross domestic product, government budget revenues, and expenditures (in logarithmic form). Since the variables are integrated of order one, I(1), the interdependence between government expenditure, revenue, and economic growth indicators is examined using cointegration techniques.

The results of the cointegration tests show that there is a long-term relationship among the analyzed variables. The estimated parameters of the cointegration equation indicate that government expenditures have a negative effect on economic growth, while government revenues have a positive impact on long-run growth. In the short run, the Granger causality test revealed a bidirectional causality between economic growth and government expenditures. This implies that government spending is income-elastic and may tend to grow alongside economic development.

Although Serbia has run a fiscal deficit over an extended period, in 2009 it exceeded the Maastricht criterion for fiscal deficit levels (3% of GDP) for the first time, with a deficit

of 3.4% of GDP. The budget deficit of 3.4% in 2010 and 4.2% in 2011 served as a prelude to a culmination of instability in 2012, when the budget deficit reached 5.9% of GDP, seriously threatening the functioning of public finances. However, by the end of 2016, the fiscal deficit had dropped to 0.2% of GDP and remained stable (even turning into a surplus) until the COVID-19 pandemic. After 2020, due to the compounded challenges of the pandemic, energy crisis, and supply chain disruptions, the fiscal deficit began to increase again. Serbia needs to continue strengthening the process of fiscal consolidation to avoid a higher level of public debt. Government expenditure remains extremely high in developing countries and exceeds 45 percent of GDP.

Additionally, the tax system is primarily oriented toward financing public expenditures. It is also used for other purposes, such as ensuring fairness and addressing social and economic challenges. Moreover, it aims to minimize administrative costs for the state and deter tax evasion. Taxes affect household decisions regarding saving, labor supply, and investment in human capital, as well as firms' production choices and job creation. For such decisions, not only the level of taxation is important, but also how various tax instruments are structured and combined to generate revenue. The effects of tax levels and tax structure on the behavior of economic agents also influence the overall standard of living in the national economy. One of the reasons behind these results may lie in the fact that Serbia, as a transition economy, lacks adequate institutional quality and experiences a relatively high level of corruption. These factors significantly shape the overall performance of the government and may also contribute to rising poverty in Serbia.

Considering the above statements, recommendations for economic policymakers revolve around increasing government efficiency. In addition, particular attention should be given to designing an appropriate structure for public expenditures. In the context of future research, it would be useful to disaggregate government spending and revenue and examine the effects of individual components of public expenditure and income on overall economic activity.

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