ANALYSIS OF ASYMMETRICAL EFFECTS OF FISCAL POLICY IN SERBIA

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Analysis of asymmetrical effects of fiscal policy in Serbia

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Abstract: The research focuses on analysing the impact of fiscal policy on economic activity in Serbia, with a particular emphasis on the asymmetry of effects in the short and long run. Using data from the first quarter of 2007 to the first quarter of 2025, we applied a Nonlinear Autoregressive Distributed Lag (NARDL) model, which enabled the separation of positive and negative fiscal shocks and the examination of their impact on real GDP. Control variables were included in the model: the real effective exchange rate, the consumer price index, and the key policy rate, to more precisely assess the impact of fiscal policy. The results show that fiscal policy in Serbia has almost symmetrical effects in both the short and long term, with a 1% increase in public expenditure leading to a 0.55% growth in GDP in the long run, while a reduction in public expenditure of the same magnitude contributes to a 0.47% decrease in GDP. The effects of fiscal policy on aggregate demand suggest that a countercyclical approach – increasing government spending during recessions and rationalization (austerity measures) during periods of expansion – can contribute to more stable economic growth while maintaining fiscal sustainability. The recommendations include the consistent and responsible use of fiscal instruments, coordination with monetary policy, and the planning of a long-term fiscal strategy aimed at sustainable growth and economic stability.

Keywords: fiscal policy, current public expenditure, GDP, Non-linear ARDL model
[JEL Code]: H30, H50, O47

Non-technical summary

Fiscal policy is one of the key economic policy tools for managing macroeconomic performance and entails the use of public revenues and public expenditures to prevent excessive fluctuations in economic activity. The role and significance of fiscal policy have changed in line with shifts in the macroeconomic paradigm, and according to the current consensus, fiscal policy should have a countercyclical character – stimulating economic activity during recessions, and vice versa. In accordance with this, this research empirically examines the effects of the degree of fiscal policy expansiveness on economic activity, with a particular focus on analysing their asymmetry.

Fiscal policy in Serbia over the past almost two decades has gone through various phases, in line with challenges from the domestic and international environment. The initial years of the observation period were marked by a rising primary fiscal deficit and an increase in public debt, to which the global economic crisis significantly contributed. In response to the rising level of public debt, the Serbian Government began implementing fiscal consolidation measures at the end of 2012, initially focused on the revenue side of the budget. However, from 2014, measures on the expenditure side were also introduced, the most significant of which were the reductions in public sector wages and pensions. These measures, along with accelerated economic activity in the country driven by private investment and exports, yielded results in the subsequent period, with a primary fiscal surplus achieved for four consecutive years in the period 2016–2019, alongside a simultaneous decrease in total public debt both in relative terms (share of GDP) and in absolute amount. These favourable trends were interrupted in 2020 due to the coronavirus pandemic, when a high fiscal deficit was recorded alongside an increase in public debt to support economic activity affected by the pandemic; however, from 2021, a downward trajectory for the deficit and a declining path for public debt were resumed.

For the purposes of the paper, we conducted an empirical analysis of the effects of fiscal policy on Serbia's economic activity from Q1 2007 to Q1 2025, using an econometric model (NARDL) that allows for the separate examination of the effects of positive and negative changes in government consumption, i.e. its increase and decrease. Control variables were also included in the model – the real effective exchange rate of the dinar, the consumer price index, and the key policy rate of the National Bank of Serbia – to obtain a more complete picture of the impact of fiscal policy. The results show that expansionary and restrictive fiscal policy in Serbia have symmetrical effects both in the short and long term, meaning economic activity reacts equally to increases and decreases in public expenditure, only in opposite directions, with the effects of fiscal policy on economic activity being significantly more pronounced in the long run. Specifically, a 1% increase in public expenditure leads to a rise in GDP of approximately 0.55%, while a decrease by the same amount reduces GDP by approximately 0.47%, when viewed in the long term.

Contents:

1 Introduction

Fiscal policy, alongside monetary policy, is a key lever of a state's economic policy, with its most important instruments being public revenues and public expenditures. Approaches and attitudes regarding the significance of fiscal policy have evolved throughout history – from classical economists, who emphasized the limited role of the state, to Keynes and the concept of active intervention, then monetarists and representatives of new classical macroeconomics, who again limited the state's role, and finally to New Keynesians, who advocate for an active approach in coordination with monetary policy. In the previous period, fiscal policy in Serbia played a significant role in stimulating economic activity, following a successfully implemented fiscal consolidation aimed at stabilising public finances, particularly through measures supporting the economy and the population during external shocks.

Numerous previous studies have dealt with analysing the effects of fiscal policy on economic activity, which forms the basis of this paper. To measure fiscal policy, we used current public expenditures, which accurately approximate fiscal policy and are often used as a regressor in similar empirical studies. In doing so, we included appropriate control variables in the model – the real effective exchange rate, the consumer price index, and the key policy rate of the National Bank of Serbia – to better observe the impact of fiscal policy on economic activity. The research first conducted unit root tests, which showed that the time series are of different orders of integration – I(0) or I(1) – which is why we used the Non-linear Autoregressive Distributed Lag (NARDL) model. The constructed model is well-specified, stable, and meets all assumptions, as shown by the relevant tests, and the obtained results are in line with expectations.

The aim of this paper is to examine whether fiscal policy contributes to economic growth in Serbia, as well as to determine whether the effects of expansionary and restrictive fiscal policy are asymmetric, as suggested by some literature. The empirical results show that fiscal policy significantly determines the rate of economic growth in Serbia, with the effects of expansionary and restrictive fiscal policy being symmetrical.

The paper is structured as follows. The first part presents the role and significance of fiscal policy, along with a review of the relevant literature. In the second part, we reflect on the movements of fiscal policy in Serbia in the previous period. The third part is dedicated to the methodology and description of the data used in the empirical research. The fourth part encompasses the research results and their analysis, while the final part contains concluding considerations.

2 Theoretical framework and literature overview

Fiscal policy represents a set of measures implemented by the state through the use of public revenues and expenditures to influence macroeconomic variables, primarily with the aim of mitigating excessive fluctuations in economic growth (Fabris, Jandrić & Ješić, 2023). In this regard, during periods of recession, an expansionary fiscal policy is recommended, which entails increasing government spending – thereby directly stimulating aggregate demand – and/or reducing taxes, which results in an increase in disposable income.

Conversely, during periods of expansion and under conditions of so-called overheated demand, a restrictive fiscal policy should be pursued to curb inflationary pressures. Beyond this stabilisation objective, fiscal policy has two other primary objectives – allocative and redistributive – which are not the focus of this paper.

Fiscal policy gained significance in economic theory following the Great Depression in the United States in the 1930s, after representatives of classical theory failed to provide adequate solutions for the prevailing decline in economic activity and rising unemployment. In this context, an interventionist approach based on Keynesian theory took primacy as an effective instrument of economic stabilisation. The dominance of the Keynesian paradigm lasted until the period of the oil crisis and stagflation, after which fiscal policy declined in importance due to the rise of the monetarist school and the real business cycle theory (Hall, 1992). However, the Great Recession considerably shook the foundations of the new consensus (Mihajlović & Marjanović, 2019), leading to fiscal policy once again becoming a focus for economic policymakers, in line with New Keynesian theory. Bearing this in mind, it is clear that the shocks which have severely impacted the global economy in recent years – including the coronavirus pandemic, the energy crisis, as well as geopolitical tensions and trade protectionism – have resulted in significant state interventions. This was particularly evident during the pandemic, under conditions of a sharp decline in economic activity, when the majority of countries responded with substantial aid packages.

According to economic theory, there are several factors due to which fiscal policy can have asymmetric effects on economic growth, with the most commonly cited being the crowding-out effect and nominal rigidities (Kandil, 2001; Branichon, Matthes & Price, 2017; Xu & Wu, 2023). These factors influence the size of the fiscal multiplier, which represents the measure of change in GDP resulting from a change in fiscal expenditure. Regarding nominal rigidities, primarily sticky prices and wages, the focus is on the New Keynesian interpretation of the slower downward adjustment of prices and wages compared to a significantly more flexible upward adjustment. This results in stronger effects from a negative fiscal shock. In other words, during restrictive fiscal policy, the economy will reduce quantities rather than prices, whereas during expansionary fiscal policy, it will adjust both quantities and prices. Similarly, the crowding-out effect also suggests potentially stronger effects from restrictive fiscal policy compared to expansionary policy. Specifically, when the state increases expenditure financed by borrowing, interest rates rise, which limits private investment and consumption, thereby reducing the overall effect of expansionary policy.

The literature in this field contains a large number of papers that have empirically investigated the effects of fiscal policy on economic growth. However, most of these papers start from the assumption that these effects are linear, and that fiscal policy has symmetrical effects on economic activity, regardless of the direction of the response (Shevchuk & Roman, 2018; Deskar-Škrbić & Šimović, 2017; Klyuev & Snudden, 2011; Mirdala, 2009; Ocran, 2011; Quashigah, Grace & Pickson, 2016). Conversely, Yusuf and Mohd (2021) showed that the effects of fiscal policy in Nigeria during the period 1980–2018 were asymmetric in both the short and long term, with the variables approximating fiscal policy and GDP growth being cointegrated. Similarly, Ali, Mohamed, and Mohamed (2024) demonstrated the cointegration of the used time series and the asymmetry of fiscal policy effects in Somalia during 1970–

2019, where the long-term effect of restrictive fiscal policy was more pronounced, while the opposite was true in the short term. In contrast, Donkor et al. (2022) showed that in the long run, a positive fiscal impulse has a stronger effect on economic growth than a negative one in Ghana. Using the example of Turkey, Kocman (2022) investigated the asymmetry of the effects of fiscal and monetary policy during 2005–2019, proving that economic activity reacts more to restrictive fiscal policy. Regarding developing European countries, Asandului et al. (2021) analysed the asymmetric effects of fiscal policy on inflation and economic activity in twelve former socialist countries. They state that fiscal expansion can even have negative effects on economic activity in the long run, as the inflationary effect of fiscal stimulus outweighs the fiscal multiplier effect.

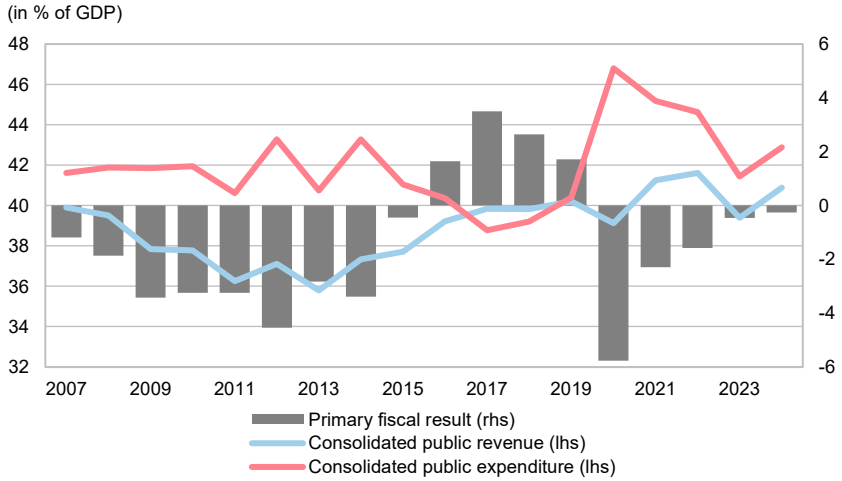
Regarding research in developed countries, Sosvilla-Rivero and Rubio-Guerrero (2022) demonstrated, using the example of Spain, that an increase in public consumption and a decrease in taxes positively affects economic growth in both the short and long term, and vice versa, with the effects of a positive fiscal shock being more pronounced. They used linear and non-linear autoregressive distributed lag models in their research for the period 1980–2020. Baum and Koester (2011) examined the asymmetric effects of fiscal policy on economic activity in Germany, depending on the phase of the business cycle, showing that fiscal policy has significantly stronger effects during crisis periods, i.e., when the output gap is negative. According to research conducted by Gogas and Pragidis (2013, 2015), fiscal policy in the USA during the period 1967–2011 had asymmetric effects on GDP, with expansionary fiscal policy having a stronger influence. In contrast, a greater impact of restrictive fiscal policy on US GDP was also confirmed by Xu and Wu (2023). Despite the numerous studies conducted, on the whole, it can be said that there is no unanimous conclusion regarding the symmetry of fiscal policy effects, indicating that they depend on the specificities of each individual country, the period covered by the analysis, and the phase of the cycle and structure of public finances.

3 Fiscal policy in Serbia

Fiscal policy in Serbia over the past nearly two decades has gone through various phases, in line with challenges from both the domestic and international environment. During the first years of the observation period, the global economic crisis adversely affected fiscal trends (Kisin, Mašović & Ignjatović, 2021). In this regard, the primary fiscal deficit (the fiscal deficit excluding interest costs) increased from 1.2% of GDP in 2007 to 4.5% in 2012, which also impacted the rising trajectory of public debt, expressed as a share of GDP, which reached 50.8%. In response to the rising level of debt, the Government began implementing fiscal consolidation measures in October 2012, which were primarily focused on the revenue side of the budget, most significantly through an increase in the VAT rate from 18% to 20%. However, although the primary deficit was reduced, total public debt continued to rise, reaching 63.4% of GDP by the end of 2014. This led to the adoption of new fiscal consolidation measures to halt the growth of public debt and ensure the sustainability of public finances. The three-year fiscal consolidation programme included reductions in public sector wages and pensions, while on the revenue side, the key focus was on reducing the grey economy and tax evasion.

The fiscal consolidation yielded positive results in the subsequent period, with the primary deficit already reduced to just 0.5% of GDP by 2015, while a surplus was achieved in the following four years. Such developments had a positive impact on the movement of public debt, which was reduced to 49.7% of GDP by the end of 2019. This was not exclusively the result of real GDP growth, but also of a decrease in the total debt in absolute terms by approximately EUR 1 bn compared to 2015.

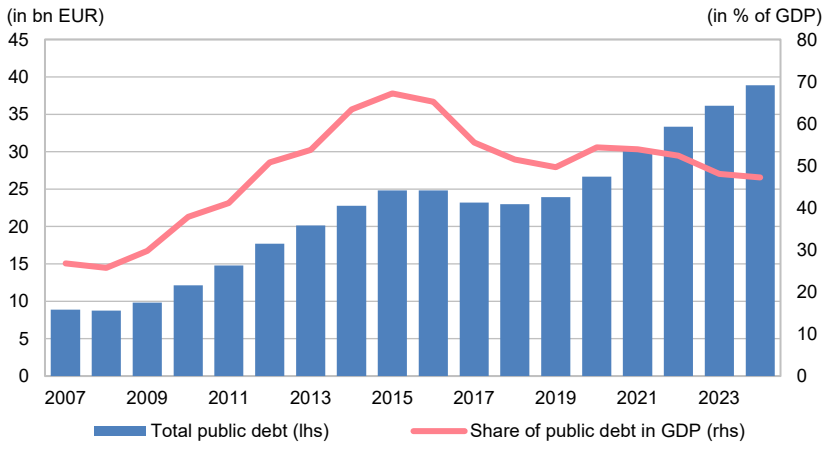
Chart 1 **Primary fiscal result of general government budget**



Source: Ministry of Finance.

The favourable fiscal trends were interrupted in 2020 under the influence of the coronavirus pandemic, which required a strong state response through a package of economic support for the economy, alongside a simultaneous increase in citizens' healthcare costs (Kisin, Ignjatović, 2020). Consequently, in 2020, a primary fiscal deficit of 5.8% of GDP was recorded, with public debt rising to 54.4% of GDP. However, according to the World Bank, this significantly mitigated the effects of the pandemic, primarily on the labour market (2021). While the Fiscal Council emphasized that the economic aid package in Serbia was relatively more extensive compared to comparable countries in Central and Eastern Europe, with some

Chart 2 **Serbia's public debt – central government level**



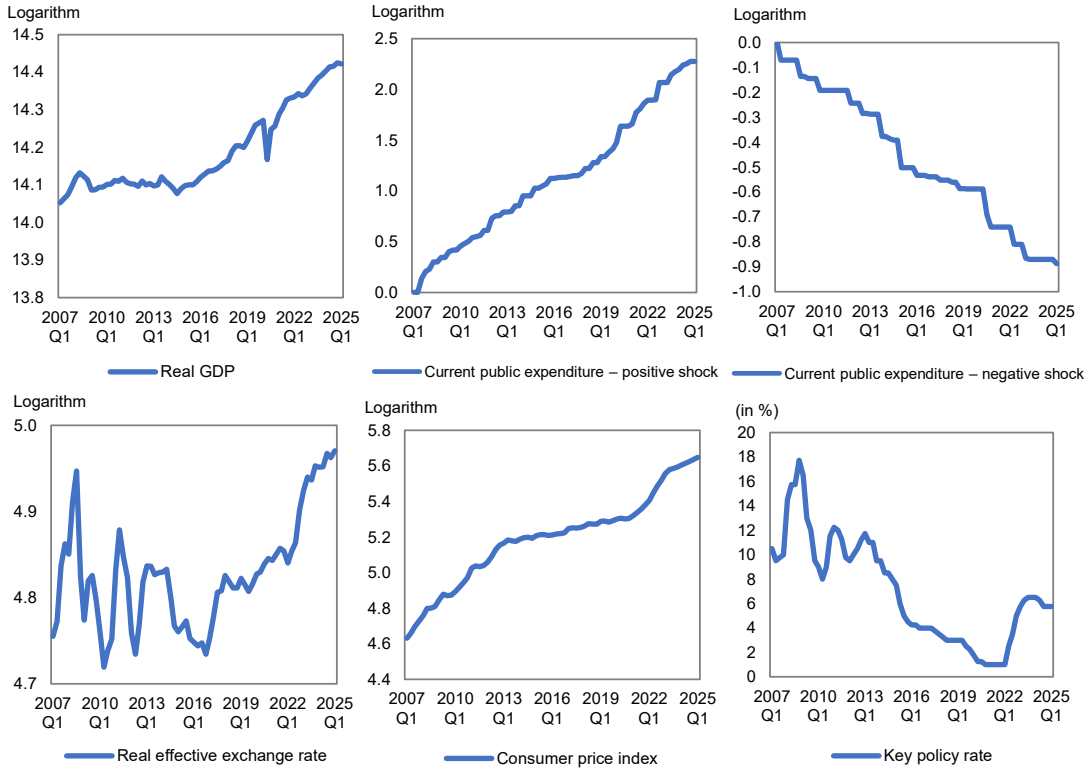
Source: Ministry of Finance.

measures being non-selective and therefore showing limited effectiveness (2022), the World Bank's view was that the scale of the aid package in Serbia was made possible thanks to the successfully implemented fiscal consolidation in the years preceding the crisis, which provided stable fiscal space for response (2021). Despite numerous challenges from the international environment (energy crisis, geopolitical tensions, trade protectionism), through the continued pursuit of responsible fiscal policy, the primary fiscal deficit was consequently reduced to just -0.3% of GDP by 2024, with a simultaneous fall in public debt to 47.2%, which is significantly below the Maastricht criterion.

4 Research data and methodology

For the empirical research, quarterly data from the Serbian Statistical Office, the National Bank of Serbia, and the Ministry of Finance were used, covering the period from Q1 2007 to Q1 2025. In accordance with previous literature dealing with similar research, current government expenditures at the consolidated level were used as an approximation of fiscal policy. The dependent variable in the model is real GDP, with both variables being seasonally adjusted using the ARIMA X-13 Census method. Furthermore, the real effective exchange rate, the consumer price index, and the key policy rate were included in the model as control variables. All variables were transformed into logarithmic forms to reduce heteroscedasticity and allow for the interpretation of coefficients as elasticities, with the exception of the key policy rate, which was used in its original form, as it can have zero or negative values.

Chart 3 **Time series of variables that are the subject of the empirical analysis**



Sources: SORS, NBS and Ministry of Finance.

The selection of an appropriate methodology for time series analysis is the most crucial step in research, which is why we used an algorithm for methodology selection developed by Shrestha and Bhatta (2018). After gathering the aforementioned data, we conducted unit root tests, determining that the variables are of different orders of integration – I(0) or I(1) – which is why the NARDL model was selected for the investigation. To ensure the robustness of the results in determining the stationarity of the time series, Augmented Dickey–Fuller (ADF) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) unit root tests were conducted in the study.

The NARDL model was developed by Shin, Yu, and Greenwood-Nimmo (2014) and represents an extension of the linear Autoregressive Distributed Lag (ARDL) model constructed by Pesaran, Shin, and Smith (2001). For its application, all variables must be integrated of order zero or one. The advantage of this model is that it better captures the dynamics of the relationship between variables and avoids residual autocorrelation problems, given that lagged values of the dependent variable and independent variables are included as regressors (Mihajlović, 2020). Furthermore, this model allows for the decomposition of changes in the independent variables into positive and negative shocks, which provides the possibility to examine their asymmetric effects on the dependent variable.

The first equation shows the general form of the NARDL model, where y_t is the dependent variable, while $x_{\tau-j}^{+}$ and $x_{\tau-j}^{-}$ are the decomposed positive and negative changes of the independent variable, and ε_τ is the stochastic error term.

$$y_t = \sum_{j=1}^{p} \phi y_{\tau-1} \sum_{j=0}^{g} \left(\theta_j^{+} x_{\tau-j}^{+} + \theta_j^{-} x_{\tau-j}^{-}\right) + \varepsilon_\tau \tag{1}$$

In this process, the partial sums of the positive and negative changes in the independent variable were obtained in the following manner:

$$x_\tau^{+} = \sum_{j=0}^{t} \Delta x_j^{+} = \sum_{j=0}^{t} max\left(\Delta x_j, o\right)$$

$$x_\tau^{-} = \sum_{j=0}^{t} \Delta x_j^{-} = \sum_{j=0}^{t} min\left(\Delta x_j, o\right) \tag{2}$$

Following the determination of the time series' stationarity and the construction of partial sums of positive and negative changes in the series approximating fiscal policy, a bounds test was conducted to examine the cointegration of the variables. To answer the research questions, a Wald test for long-run and short-run asymmetry was performed, after which the stability of the model was tested.

5 Empirical analysis of the impact of fiscal policy on economic activity in Serbia

The third equation shows the model to be estimated, where the dependent variable is the logarithm of real GDP (lny), β is the constant in the model, and λ is the short-term coefficient of the model's autoregressive component. The parameters δ_i^{+} and δ_i^{-} represent the short-term coefficients of the partial sums of positive ($\ln e\_pos$) and negative ($\ln e\_neg$) changes in

fiscal expenditure, respectively. In accordance with economic theory, we expect positive values for both parameters, as an increase in fiscal expenditure has a stimulating effect on economic activity, and vice versa. The parameters $\gamma_i^{(1)}, \gamma_i^{(2)}\ and\ \gamma_i^{(3)}$ represent the short-term coefficients of the control variables in the model: the real effective exchange rate (*lnex*), the consumer price index (*lnp*), and the reference interest rate (*int*), respectively. A negative sign is expected for the real effective exchange rate because a real appreciation reduces the competitiveness of the domestic economy, which diminishes exports and overall economic activity. A negative sign is also expected for the coefficient of the consumer price index, considering that a rise in prices reduces real disposable income and aggregate demand. A negative sign is likewise expected for the coefficient of the reference interest rate, as an increase leads to a reduction in investment and consumption.

Simultaneously, ρ represents the coefficient of the model's autoregressive component in the long run, while Φ^+ and Φ^- represent the coefficients for the long-term effects of positive and negative fiscal shocks respectively, whereby we also expect positive signs in this case. The coefficients for the long-term effects of the model's control variables are θ_1, θ_2 and θ_3. In the long run, we expect a positive relationship between the real effective exchange rate and economic activity, which can be explained by the Balassa-Samuelson effect (*Amstad & Mauro*, 2017). This effect implies a real currency appreciation resulting from productivity growth in the tradable sectors of the economy (*Bussiere, Lopez & Tille*, 2014). Furthermore, there is evidence that a real exchange rate appreciation, through cheaper imports, can contribute to higher economic growth and lower inflation in both developed and developing countries (*Kandil*, 2015). The coefficient θ_2 relates to the long-term effect of the consumer price index, for which a negative sign is expected, as is the case for θ_3, which represents the long-term effect of the key policy rate. V_t denotes the model's random error.

$$\begin{aligned}\Delta \ln y_\tau = \beta + \sum_{j=1}^{p-1} \lambda_j \Delta lny_{t-i} + \sum_{i=0}^{q} \delta_i^+ \Delta \ln e\_pos_{t-i} + \sum_{i=0}^{q} \delta_i^- \Delta \ln e\_neg_{t-i} + \sum_{i=0}^{q} \gamma_i^{(1)} \Delta \ln ex_{\tau-i} \\ + \sum_{i=0}^{q} \gamma_i^{(2)} \Delta \ln p_{\tau-i} + \sum_{i=0}^{q} \gamma_i^{(3)} \Delta int_{t-i} + \rho lny_{\tau-1} + \Phi^+ \ln e\_pos_{t-1} + \Phi^- \ln e\_neg_{t-1} \\ + \theta_1 \ln ex_{\tau-1} + \theta_2 \ln P_{\tau-1} + \theta_3\, int_{\tau-1} + v_t \end{aligned} \quad (3)$$

However, the aforementioned coefficients (Φ^+, Φ^-) reflect the long-term effects conditioned by the immediate and short-term changes in the model. In other words, they are not entirely "pure" indicators of the long-term relationship between the regressor and the dependent variable, as they also take into account dynamic short-term adjustments. For this reason, we have constructed cointegration coefficients, which represent the long-term relationship among the variables without the influence of short-term fluctuations; these are shown in the fourth equation, where L^+ denotes the coefficient for the long-term effects of positive changes in fiscal expenditure, and L^- denotes the coefficient for the long-term effects of negative changes in fiscal expenditure.

$$L^+ = \frac{-\Phi^+}{\rho};\ L^- = \frac{-\Phi^-}{\rho} \quad (4)$$

The initial research hypotheses concerning the asymmetric effects of fiscal policy on economic activity are presented in Table 1. The first hypothesis pertains to the long-term

effects of fiscal policy, while the second hypothesis concerns the short-term effects. In both cases, the null hypotheses imply that the effects of positive and negative fiscal policy shocks on economic activity are symmetric. Conversely, the alternative hypotheses assume an asymmetry of these effects.

Table 1 **The initial research hypotheses**

H_0	H_1
$L^+ = L^-$	$L^+ \neq L^-$
$\sum_{i=0}^{q} \delta_i^+ = \sum_{i=0}^{q} \delta_i^-$	$\sum_{i=0}^{q} \delta_i^+ \neq \sum_{i=0}^{q} \delta_i^-$

Source: drafted by the author.

The first step in the empirical analysis was to conduct appropriate unit root tests to verify the stationarity of the used time series. For greater robustness of the results, the analysis employed both the **ADF** and **KPSS** tests. In cases where the results of these tests were not concordant, i.e. when one test indicated the presence of a unit root in the level series while the other suggested stationarity, the stricter criterion for determining the order of integration was used.

The **Stock–Watson procedure** was used to determine the deterministic components in the model, which enabled the correct specification of the unit root tests. The results of the conducted tests showed that the series of negative changes in fiscal expenditures is stationary at level – I(0), while all other observed series were stationary at first difference – I(1) (Table 2). These results justify the application of the **NARDL** model in the further empirical analysis.

Table 2 **Unit root tests**

Variables	Unit root testing	ADF (k) test	Presence of unit root	KPSS test	Presence of unit root	Determinist component
lny	Level	-1.06 (1)	Yes	0.28	Yes	Constant and trend
	I difference	-10.45 (0) ***	**No**	0.11*	**No**	
lne_pos	Level	-1.97 (0)	Yes	0.19***	**No**	Constant and trend
	I difference	-10.23 (0)***	**No**	-		
lne_neg	**Level**	-3.20 (0)*	**No**	0.06*	**No**	Constant and trend
	I difference	-		-		
lnex	Level	-1.25 (2)	Yes	0.53***	**No**	Constant
	I difference	-5.20 (2)***	**No**	-		
lnp	Level	-2.28 (1)	Yes	0.16***	**No**	Constant and trend
	I difference	-4.52 (0)***	**No**	-		
int	Level	-1.61 (1)	Yes	0.84	Yes	Constant
	I difference	-4.10 (0)***	**No**	0.09*	**No**	

Source: the author's calculation using EViews 13.

Note: Designation *k* with the ADF test pertains to the number of correction factors added in order to eliminate autocorrelation in residuals. Designation *** means 1% of statistical significance, ** means 5% of statistical significance, and * means 10% of statistical significance.

To determine the optimal number of lags, an auxiliary VAR model was first constructed, and the decision was made based on information criteria, primarily the SC (Schwarz) criterion. Based on the obtained results, a NARDL (1,1,1,1,1,1) specification model was estimated. Following this, an F-bound test for restrictions was conducted to verify the existence of a cointegrating relationship between the observed variables. The obtained F-statistic value was 8.86, which is significantly above the upper critical value bound for all significance levels; accordingly, we reject the null hypothesis of no cointegration, and the existence of a long-run equilibrium between the variables is confirmed.

Table 3 presents the short-run results of the NARDL model, based on which **we conclude that an increase in fiscal expenditure in Serbia, measured by current public expenditure at the consolidated level, stimulates an increase in overall economic activity, and vice versa**. An increase in fiscal expenditure has a statistically significant positive effect on GDP growth, whereby a 1% increase in expenditure in the short run contributes to a 0.07% increase in GDP. In contrast, although the coefficient for a negative shock to fiscal expenditure is somewhat more pronounced, it is not statistically significant. The coefficient for the first lag of the dependent variable is positive and statistically significant, indicating a high degree of inertia in economic activity growth; specifically, a 1% growth in the previous quarter leads to a 0.76% growth in the current quarter.

Regarding the model's control variables, an appreciation of the real effective exchange rate also has a statistically significant positive effect on economic activity in the short run. This is explained by the fact that a real appreciation of the domestic currency reduces the level of public debt denominated in foreign currency, which creates room for an increase in government consumption and total investment, thereby positively affecting economic activity. GDP growth in the short run is negatively affected by an increase in the price level, measured by the consumer price index. A 1% increase in the index compared to the previous quarter slows the growth of real GDP by 0.22%, and this effect is statistically significant. Conversely, the key policy rate does not have a statistically significant impact on economic activity in the short run, which is unsurprising given that the effects of monetary policy typically manifest with a certain lag, after three to four quarters. Furthermore, a dummy variable, V2020Q2, was included in the model. It takes the value of 1 in the Q2 of 2020 and 0 in all other observed periods to capture the specific effect of the shock caused by the coronavirus pandemic. The effect of this variable proved to be statistically significant, justifying its inclusion in the model. The coefficient suggests the pandemic had a pronounced negative shock on economic activity – real GDP was approximately 13% lower than would be expected under normal conditions.

The estimated speed of adjustment coefficient (*CointEq(-1)*) indicates the rate at which deviations from the long-run equilibrium are corrected in subsequent periods. The coefficient is statistically significant, and its negative sign indicates convergence towards the long-run equilibrium; specifically, approximately 24% of the deviation of GDP from its long-run relationship with the real exchange rate, consumer prices, the key policy rate, and the character of fiscal policy is corrected each quarter.

Table 3 **Estimated NARDL model in the short run**

Variable	Coefficient	*t* statistics
Dependent variable: change in real s-a GDP – ($\Delta \ln y$)		
$\Delta \ln y_{t-1}$	0.76	13.54***
Δlne_pos_t	0.07	2.16**
Δlne_neg_t	0.09	1.57
$\Delta lnex_t$	0.15	3.55***
Δlnp_t	-0.22	-2.80***
Δint_t	0.0016	1.33
$\Delta V2020Q2$	-0.13	-12.03***
c	3.67	4.66***
Coeff. of speed of adjustment *CointEq(-1)*	-0.24	-8.27***
R^2	0.77	
Corrected R^2	0.75	
Period	Q1 2007 – Q1 2025	

Source: the author's calculation using EViews 13.

Note: *** means 1% of statistical significance, ** means 5% of statistical significance, and * means 10% of statistical significance.

In the long run, an increase in fiscal expenditure also contributes positively to the growth of real GDP, and vice versa, with the effects of a positive shock being moderately more pronounced (Table 4). Specifically, a 1% increase in fiscal expenditure leads to a 0.55% growth in economic activity, while a 1% decrease in fiscal expenditure negatively impacts GDP by 0.47%, with both coefficients being statistically significant. These results indicate that fiscal impulses are a persistently significant factor for economic growth in Serbia.

The coefficient for the real effective exchange rate is statistically significant and shows that a 1% appreciation in the long run leads to a 0.37% increase in GDP growth, which is in line with expectations. Specifically, in accordance with the Balassa–Samuelson effect, an appreciation of the domestic currency indicates a stronger economy, as it contributes to lowering the price of imported capital and energy, resulting in lower inflationary pressures and more favourable conditions for economic growth. Conversely, a rise in the price level in the long run undermines purchasing power and the investment environment, which is confirmed by a statistically significant negative coefficient indicating that a 1% increase in prices in the long run reduces economic activity by 0.6%. In contrast to the short run, the key policy rate proved to be statistically significant in the long run. Its coefficient indicates that a 1 pp increase in the interest rate reduces real GDP by approximately 0.79%, which is consistent with expectations.

Table 4 **Estimated NARDL model in the long run**

Variable	Coefficient	*t* statistics
Dependent variable: real GDP – logarithmic value of real s-a GDP ($ln\ y$)		
lne_pos_t	0.55	4.72***
lne_neg_t	0.47	2.40**
$lnex_t$	0.37	1.97*
lnp_t	-0.60	-4.09***
int_t	-0.0079	-2.08**
c	15.21	10.80***
***F-Bounds* test statistics**	8.86***	
Period	Q1 2007 – Q1 2025	

Source: the author's calculation using EViews 13.

Note: *** means 1% of statistical significance, ** means 5% of statistical significance, and * means 10% of statistical significance.

To examine whether the model is stable and well-specified, we conducted appropriate tests, the results of which are presented in Table 5. Using the Jarque–Bera test, we showed that the model's error terms are normally distributed, as indicated by the high *p*-value leading us not to reject the test's null hypothesis. To demonstrate the absence of autocorrelation in the error terms, the Breusch–Godfrey test for autocorrelation was applied; based on the *p*-value, we accepted the test's null hypothesis. The Glejser test was used to determine the homoscedasticity of the error terms, showing that the model does not suffer from heteroscedasticity. The Ramsey RESET test was employed to check for specification errors, and the CUSUM and CUSUM of squares tests confirmed that the model is stable and well-specified.

Table 5 **Stability and model specificity tests**

Assumption	Test	*p* value
Normality	Jarque–Bera	0.93
Autocorrelation	Breusch–Godfrey	0.14
Heteroscedasticity	Glejser	0.11
Model specification	Ramsey RESET	0.31
Model stability	CUSUM и CUSUM SQ.	Stable

Source: the author's calculation using EViews 13.

Finally, to examine whether the effects of fiscal policy in Serbia are asymmetric, a Wald test was conducted, the results of which are presented in Table 6. The obtained results do not allow for the rejection of the null hypotheses, leading us to **conclude that the effects of fiscal policy on domestic economic activity are symmetric in both the long and short run**.

Specifically, although the effects of a positive shock are somewhat more pronounced in the long run compared to those of a negative shock, there is no statistically significant difference to confirm asymmetry. We therefore conclude that expansionary and restrictive fiscal policies have nearly equal effects on GDP.

Table 6 **Wald test results**

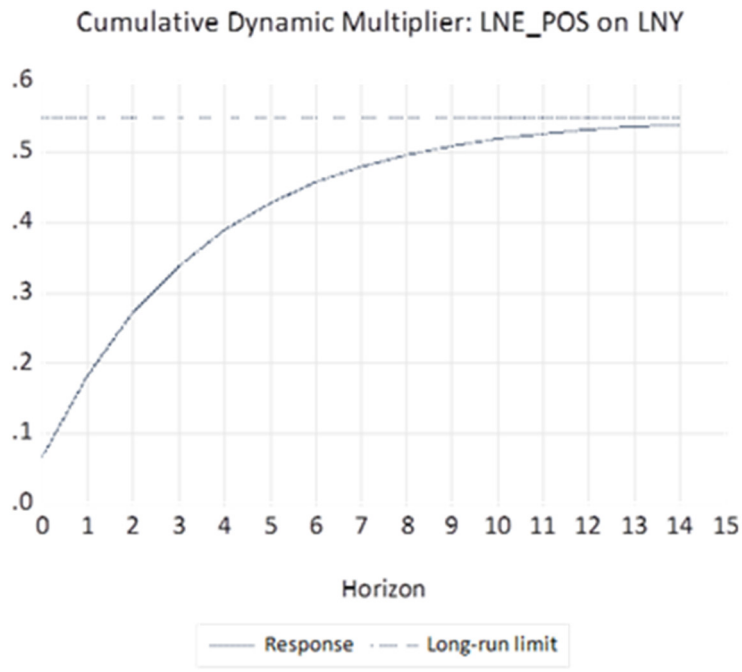
H_0	H_1	Wald test *p* value
$L^+ = L^-$	$L^+ \neq L^-$	0.55
$\sum_{i=0}^{q} \delta_i^+ = \sum_{i=0}^{q} \delta_i^-$	$\sum_{i=0}^{q} \delta_i^+ \neq \sum_{i=0}^{q} \delta_i^-$	0.80

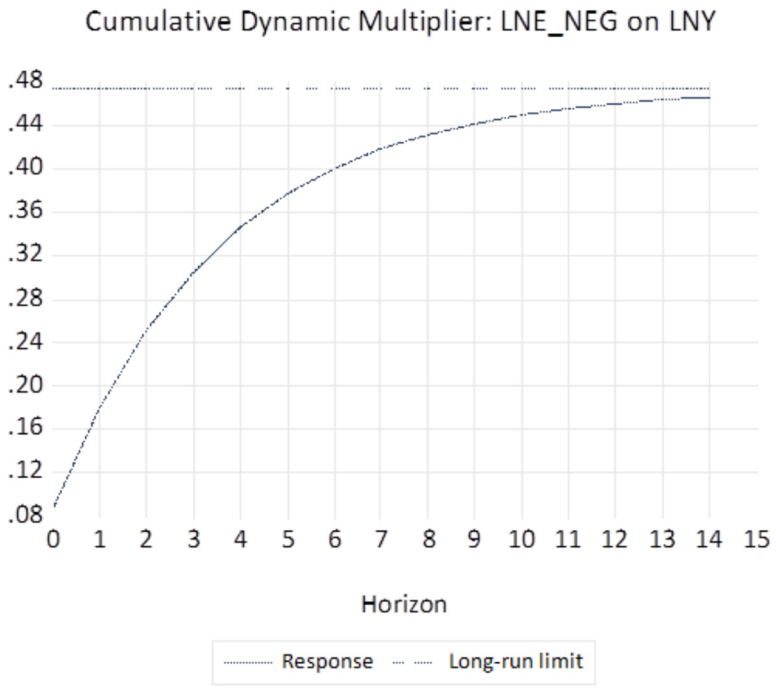
Source: the author's calculation using EViews 13.

The effects of positive and negative fiscal expenditure shocks, as well as the tendency to re-establish long-run equilibrium following an initial shock, can be illustrated using dynamic multipliers (Shin, Yu & Greenwood-Nimmo, 2014). The dynamic multiplier chart for a positive fiscal shock (Chart 4, left) shows that the short-run effect of an increase in fiscal expenditure on GDP growth is relatively small, amounting to approximately 0.07% in Q1. In the subsequent quarters, the effect grows rapidly – reaching about 0.4% after one year and approaching 0.5% after two years. This pattern indicates **an efficient transmission of the fiscal shock, which gradually converges to the long-run effect on economic activity of 0.55%, suggesting that fiscal policy has a pronounced and stable influence on economic growth in the long run**.

The dynamic multiplier for a negative fiscal shock (Chart 4, right) shows that the initial effect is somewhat more pronounced than that of a positive shock, at approximately 0.09%, but the growth of the effect occurs more slowly – reaching roughly 0.35% after one year and about 0.43% after two years, converging in the long run to 0.47%.

Chart 4 **Dinamic multiplier of curant public expenditures**





6 Conclusion

Based on the conducted research and the obtained results, we can conclude that fiscal policy in Serbia has symmetric effects on economic activity in both the short and long run. This suggests that expansionary and restrictive fiscal policies influence GDP almost equally. Therefore, it is recommended that fiscal instruments be used consistently and responsibly, particularly during periods of economic fluctuation, to avoid excessive inflationary pressure during expansions and to prevent further constraints on growth during recessions. Also, maintaining fiscal responsibility represents a significant factor for fostering sustainable long-term economic growth (Ješić, 2023).

The short-term effect of fiscal shocks on economic activity is relatively small – a 1% increase in public expenditure leads to a 0.07% growth in GDP, while the effect of a 1% decrease in expenditure is approximately 0.09%. The long-term effect of fiscal shocks is considerably more pronounced, with a 0.55% increase in GDP following an increase in expenditure and a 0.47% decrease in GDP following a decrease in expenditure, indicating a stable and sustainable influence of fiscal policy on economic activity.

Consequently, fiscal policy should be countercyclical in nature, meaning that public expenditure should be increased during recessions to stimulate aggregate demand (taking into account the high long-term multiplier of 0.55%), while carefully managing the trajectory of public debt and sustainable economic growth. Conversely, during periods of expansion, the volume of fiscal expenditure should be reduced.

The effect of monetary policy in the long run also proves to be significant, as a 1 pp increase in the key policy rate reduces real GDP by approximately 0.79%. The other control variables – the real effective exchange rate and the consumer price index – also show statistically significant long-run effects, and the directions of their influence are in line with expectations.

Given the demonstrated strong effect of monetary policy on long-term economic activity, the coordination of fiscal and monetary policy is a necessary condition for the effectiveness of economic policies in achieving macroeconomic stability. This is particularly important since a single policy maker rarely has full controllability over a specific target (Ješić, 2019).

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