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## **THE ROLE OF MACROECONOMIC INDICATORS IN STIMULATING ECONOMIC GROWTH: A CASE STUDY OF THE REPUBLIC OF SERBIA**

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***Abstract:** For Serbia, as a country in transition, it is essential to manage the instruments of monetary and fiscal policy adequately in the context of the intensification of economic activity. The primary aim of this paper is to examine the connections between economic growth, inflation, money supply, interest rates and government expenditure, with special emphasis on causalities moving to and from economic growth. Granger causality test was used to determine potential causalities of the variables. Variance decomposition of prediction error was also used as an additional method. Time period of observation ranges from Q1 2007 – Q2 2016. The empirical results show that given macroeconomic indicators cause certain changes in the economic growth. The analysis has shown that monetary policy instruments have greater impact on fluctuations. Consequently, an adequate coordination of monetary and fiscal policy is required for stable and sustainable growth in Serbia.*

***Keywords:** economic growth, economic policy, the Republic of Serbia, Granger causality, variance decomposition*

### **1. Introduction**

Recently, there have been more and more studies examining the field of modeling causalities between macroeconomic indicators, both in theoretical-methodological and empirical ways, independently of whether the approach is bivariate or multivariate. The characteristics of these studies are: the use of various econometric approaches that have evolved in recent years, and as consequence, the divergence in results. For many relations between variables, even those where certain rules, principles or laws are defined, there is no consensus among macroeconomists, and there are many controversies. Thus, in terms of integration variables, different types of causality are differentiated and they all carry certain macroeconomic implications.

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Serbian economy, in the first years after the October changes, achieved relatively high annual economic growth rates. Such progress was achieved through institutional reforms and economic and social policy, primarily through a growing fiscal deficit and high inflation rate. Also, one of the main reasons for the growth of economic activity expressed through economic growth is a very low starting base in the late nineties. The global crisis strongly affected the Serbian economy. It revealed all the deficiencies of the model of economic growth. Like other countries in transition, for Serbia it is also crucial to achieve macroeconomic stability. Among other things, it involves the use of fiscal policy instruments to reduce or eliminate budget deficit, and the implementation of monetary policy instruments to guide appropriate non-inflationary monetary policy (Đorđević & Veselinović, 2010). The main objective of this paper is to examine whether changes in macroeconomic variables such as inflation, money supply, interest rates, government spending cause changes in the economic growth of Serbia. In accordance with the set goal, we will test the following hypothesis:

*X<sub>0</sub>: Adequate coordination of monetary and fiscal policy can provide long-term and sustainable economic growth in the Republic of Serbia.*

The structure of the paper is as follows: after the literature review, the methodological part starts with the basic VAR model and test causality with Granger causality test. Variance decomposition shows the effects of shocks on fluctuations of the chosen variables. The results are presented in the fourth part: unit root tests, VAR model specifications, or VAR stability, autocorrelations, normality, Granger causalities, and the results of the variance decomposition. Finally, the concluding remarks include the discussion about the obtained results with implications for policymakers.

## **2. Review of empirical and theoretical studies**

*Inflation and economic growth.* On the one hand, the high rate of inflation has a negative impact on economic trends, primarily on spending decisions and investments. A huge amount of money in circulation increases production costs, leading to a depreciation of exchange rate, and reduces the availability of limited resources, such as food and oil. On the other hand, the reduction of inflation may be associated with a loss in output and higher unemployment. Inflation is a signal that the economy is growing, because national economy without inflation stagnates. High rates of economic growth can generate hyperinflation, which has negative consequences on national economy. At the time of the domination of Keynesianism, inflation was not regarded as a fundamental economic problem. In accordance with the interpretation of the Phillip's curve, higher rates of inflation reduce unemployment rates, which ultimately should contribute to a higher economic growth. According to the Keynesian vision of economic direction, moderate inflation is essential for economic growth. Monetarists see inflation as a major problem and a limiting factor for economic progress. This assertion is supported by the events during the seventies of the twentieth century, when there was a decline in economic activity in countries with high inflation rates.

From the empirical point of view, a number of studies have pointed to the existence of positive causal relations between these two variables (Malik & Chowdury, 2001), but there are those who have confirmed negative causal relations between these two variables (Barro (1995); Valdovinoz (2003)). On the other hand, Erbaykal & Okuyan (2008) found no statistically significant long-term relationship between inflation and economic growth.

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*Economic growth and money supply.* The relations between economic growth, money supply and prices are subjects of many debates, especially between Keynesians and monetarists. Monetarists see money supply as an important factor that determines price levels and the total income. They argue that the causality runs from money supply towards income and prices, without reversible effects. On the other hand, Keynesians argue that changes in income lead to changes in money supply, through changes in demand for money. Consequently, the causality goes from income to money, without reversible effects. Pioneering research on this relation was conducted by Sims (1972). Using quarterly data for the United States and bivariate model, he confirmed the existence of direct causation, i.e. that changes in money lead to changes in income, which is consistent with the monetarist understanding. In the theoretical literature, two different theories that explain the direction of causality have been distinguished. Firstly, the monetary theory of the business cycle (*monetary-business-cycle*) explains that changes in money supply growth cause changes in economic growth. This causality can be explained through the *sticky-wage* model, which observes agreements in earnings as a central feature of each economy. This model, therefore, describes a positive relationship between the growth of money supply and economic growth. In addition, there is one more explanation in the monetary theory of business cycles which concerns the non-neutrality of money. It derived from the model known as the model of *imperfect information*. This implies that the relative increase in demand, as a result of misperception, leads to production growth.

The second theory, the theory of real business cycle (*real-business-cycle*) primarily differs in the direction of causality between money supply and economic growth. According to this theory, real economic activity influences money supply. Shocks can affect the supply of real resources and relative prices which individuals are expected to meet during time. Thus, the growth of economic activity is determined by real shocks, rather than by the growth of the money supply. This implies a unidirectional causality from economic growth to money supply.

*Economic growth and interest rate.* In the above-mentioned theoretical considerations on the relations between monetary aggregates and economic growth, interest rate and its correlations with economic growth were not taken into consideration. According to the influential models related to McKinnon (1973) and Shaw (1973), financial liberalization is a necessary condition for economic development, especially in the countries with financial repression, or where negative real interest rate is the result of a combination of high inflation and the restrictions on the nominal interest rate imposed by monetary authorities. This theoretical assumption has been challenged with different empirical results. For example, Warman & Thirlwall (1994) have found that high interest rates do not lead to an increase in savings, investment and economic growth. This is supported with the study conducted by Taylor (1999). Analyzing the connection between the components of aggregate demand, especially consumption and investment with interest rates, Taylor (1999) has concluded that correlations are very weak.

*Economic growth and government spending.* The explosive development of the endogenous growth theory has prompted a large number of empirical studies on the determinants of economic growth. Testing the links between government spending and economic growth is certainly an important issue in the context of this debate. Barro (1991) has made a special contribution to the empirical analyses. Using the data for rich and poor countries, Barro (1991) has presented a strong empirical evidence that large public sector

stifles economic growth. Tendency that government tends to increase the volume with the growth of income is known as Wagner's rule (*Wagner's law*). By using disaggregated data, Hansson & Henrekson (1994) have determined that government transfers, consumption and total output have negative effects on productivity growth. On the other hand, expenditure on education has positive effects, and government investments have no effect on productivity growth. Barro (1990) has pointed out that unproductive government spending reduces the growth rate of gross domestic product. The effects of productive government spending are ambiguous, depending on the behavior of governments, as well as on the share of government expenditures in the structure of aggregate demand. Negative relation of government expenditure and economic growth has been found in Folster & Henrekson (2001), while the positive relation between variables has been showed in Chinweoke, Ray, & Paschal (2014), Cooray (2009), Iheanacho (2016) Olay (2009), Wu et al. (2010).

### 3. Data and methodology

In this analysis, five variables will be examined: economic growth, inflation, government expenditure, interest rates and money supply. Economic growth is expressed through the movement of gross domestic product (GDP), inflation rates through consumer price (CP), government expenditures through consolidated public expenditures (GE), money supply through M1 money supply (MS) and interest rates through key policy rate (IR). Data on gross domestic product, money supply and government expenditure are given in millions of dinars, while the key policy rate and consumer prices are given in percentages. For all the variables we used quarterly data which cover the time period from the first quarter of 2007 to the second quarter of 2016. Thus, there are 38 observations. Data on the movement of money supply, interest rates and consumer prices are obtained from the website of the National Bank of Serbia. Data on gross domestic product are downloaded from the Republic Statistical Office, while data on state expenditure are taken from the website of the Ministry of Finance of the Republic of Serbia. For statistical reasons, the data on gross domestic product, money supply and government spending, after seasonal adjustment, are converted to logarithmic form (L). Multivariate model is specified follows:

$$LGDP_t = \alpha_0 + \alpha_1 LMS_t + \alpha_2 LGE_t + \alpha_3 CP_t + \alpha_4 IR_t + \mu_t \quad (1)$$

The residual ( $\mu_t$ ) is assumed to be normally distributed and "white noise". Granger test is widely used in the examination of the causal links between macroeconomic variables. Granger (1969) and Sims (1972) made a special contribution to the development of causality tests. Granger developed a relatively simple test which defines causality as follows: a variable  $y_t$  can be said to cause  $x_t$ , if  $x_t$  can be predicted with greater accuracy by using past values of  $y_t$  variables, than in such case when past values are not used, while all other variables remain unchanged. These tests give priority to time rather than causality. For this reason, they show certain deficiencies and weaknesses while restoring variables that are "forward-looking". Despite this, these tests are very useful and are used in the analysis of multidimensional time series.

These tests are based on asymptotic theory and are valid only for stationary series. If a batch is unsteady, i.e. has form of I(1), in the assessment of the VAR model, it is

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necessary to convert variables into first differential. Granger test can be carried out by using the following regression equations:

$$\Delta y_t = \alpha + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \sum_{i=1}^p \gamma_i \Delta x_{t-i} + \varepsilon \quad (2)$$

Statistically significant result indicates that the variable X has a productive ability to move the variable Y based on the information from the previous periods. The sequence of further operations performed in this study is presented below. First, the stationarity of the variables was tested. To examine whether the time series is stationary or not, there were used two traditional tests – (ADF) test (Dickey & Fuller, 1981) and Kwiatkowski, Philips, Schmidt, & Shin (1992) (KPSS) test. It should be noted that the VAR model has certain limitations. Namely, the procedure of determining the potential causality cannot display the strength of the causal links between variables outside the selected time period. For this reason, this paper uses Innovative Accounting Approach (IAA), such as variance decomposition. By using this method, we can indirectly conclude what are the structural relations in a given economic system (Mladenovic & Nojković, 2015).

#### 4. Results and discussion

In order to ensure the robustness of the results, the empirical analysis starts with testing the existence of unit root of the variables. Testing stationary before applying causality and co-integration tests is very important. The results of the ADF and KPSS test are shown in *Table 1*.

**Table 1. Unit root test results**

Variable	ADF		KPSS	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LGDP	-1.64(4)	-4.39(3)*	0.48	0.05
LMS	1.61(2)	-0.86(2)	0.71	0.18
LGE	-2.63(2)	-3.91(1)*	0.74	0.19
CP	-3.1(1)**	-5.4(1)*	0.46	0.13
IR	-2.04(1)	-4.47(1)*	0.54	0.09
D(LGDP)	-4.50(3)*	-4.40(3)	0.13	0.09
D(LMS)	-5.43(1)*	-6.03(1)*	0.22	0.13
D(LGE)	-6.05(1)*	-5.59(1)*	0.24	0.13
D(CP)	-5.64(3)*	-5.71(3)*	0.13	0.07
D(IR)	-3.84(2)*	-4.01(2)*	0.11	0.07

*Source:* author. Remark: () indicates lag length. \* and \*\* show significant at 1% and 5% level, respectively. Critical values at 5% level for KPSS test are: intercept 0.463 and intercept and trend 0.146.

It is evident, based on the results, that the variables have a different order of integration. Variable IR is stationary at the level, and its order of integration is I(0). CP is *something-in between*. The other three variables have a unit root at the level and they become stationary after converting into the first differential, so it can be said that the LGDP, LGE and LMS have the order of integration I(1). Since the determination of the

optimal size of lag length largely determines the results of the study, *Table 2.* shows the results of the information criteria. The information criteria by some rule do not suggest an identical number of delays. Such is the case in *Table 2.* The difference in information criteria is in way a "punishment" for the presence of a large number of parameters in the model. In further modeling two lags are used as optimal, because in choosing such a lag, autocorrelation is not present. This choice is adequate from the practical point of view, because it does not increase the number of parameters for evaluation.

**Table 2. Lag length selection**

Endogenous variable: LGDP CP LMS IR LGE						
Exogenous variable: C						
Observation: 35						
Lag	logL	LR	FPE	AIC	SC	HQ
0	-6.28	HA	1.31e-06	0.64	0.87	0.72
1	131.88	228.96	2.07e-09	-5.82	-4.49	-5.36
2	182.30	69.14*	5.32e-10	-7.27	-4.83*	-6.43
3	216.83	37.48	3.99e-10*	-7.82*	-4.26	-6.59*

LR: sequential modified LR test statistic; FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.  
*Source:* author

**Table 3. Granger causality test results**

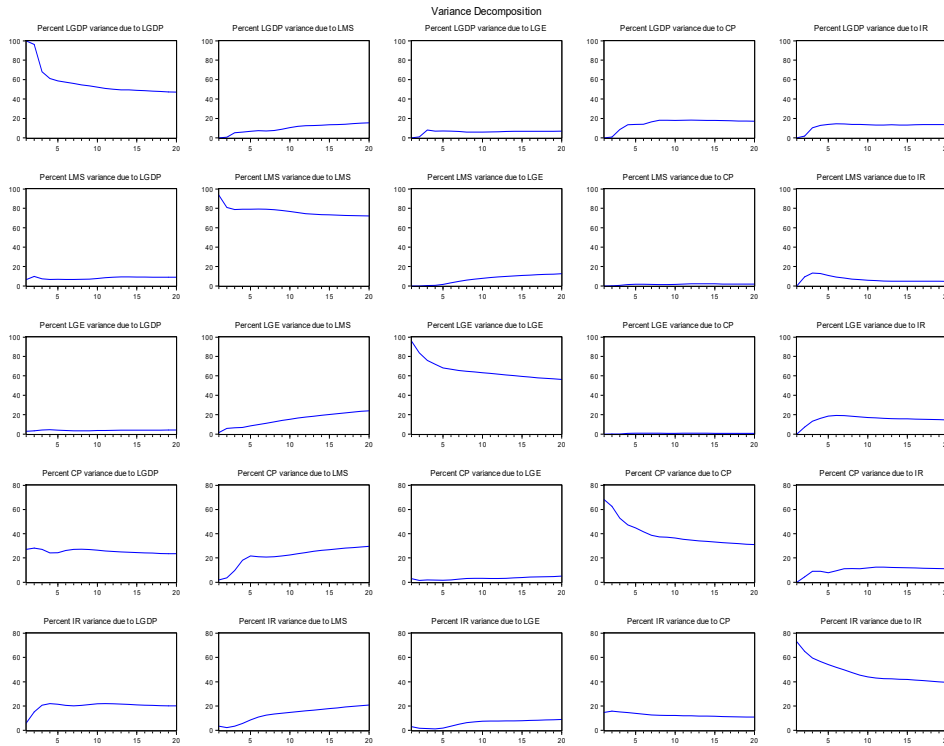
Dependent variable	Independent variable				
	LGDP	LMS	LGE	CP	IR
LGDP	-	16.34*	15.33*	22.57*	12.03*
LMS	1.52	-	0.67	3.86	8.53*
LGE	3.46	1.03	-	1.01	3.58
CP	0.63	14.18*	3.77	-	4.63***
IR	3.87	4.37***	0.61	1.13	-

*Source:* author. Remark: Values refer to Granger test statistics. \* and \*\*\* show significant at 1% and 10% level, respectively.

The results of Granger causality are shown in *Table 3.* Eight causal relations between variables are established. All four macroeconomic variables cause changes in economic growth at the level of significance of 1%. Changes in inflation are influenced by money supply and interest rates, money supply are influenced by interest rates, and the changes in interest rates are under the influence of changes in money supply. The problem with Granger causality is that it examines only causal relations within the selected period. Thus, variance decomposition of prediction error has been also used to determine to what extent the variability of other variables participate in the variability of the particular variable (*Figure 1*). The results of the variance decomposition after 20 periods (quarter) show that over 47% of the fluctuations in economic growth occur as a result of its own variability, while the impact of government expenditure in the total variability is 7.17%, of money supply 15.13%, of inflation 11.17% and of interest rates 13.54%. On the other hand, in the variability of total government expenditures, money supply, inflation, interest rates and economic growth participate with the following shares (respectively): 4.16%, 8.86%, 23.42% and 20.09%.

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**Figure 1. Variance decomposition analysis**



### 5. Conclusion

This paper has explored the relations between economic growth, inflation, money supply, interest rates and government expenditures, in the case of the Republic of Serbia. The time horizon of the observation ranges from Q1 2007 to Q2 2016. To determine the causality of macroeconomic indicators it has been used Granger causality test and variance decomposition of prediction error. It is noticeable that all four macroeconomic variables have a statistically significant effect on the trends of economic growth. The relations are not bidirectional, i.e. inflation, money supply, government spending, and interest rates are not the incoming elastic variables. Empirical results have some implications that may be significant for policymakers. First, the link between economic growth and inflation suggests a need to conduct macroeconomic policy which should ensure price stability for sustainable economic growth. This result is consistent with the primary objective of the monetary policy as well as the monetary strategy of the National Bank of Serbia, which refers to inflation targeting. Secondly, the influence of monetary aggregates and interest rates on economic growth is significant. In accordance with these results, monetary policy is an essential determinant for sustainable economic growth. In monetary policy we should

be cautious for two reasons. First, in the mechanism of monetary transmission, interest rate channel has a limited effect, because of the high degree of national economy euroization. In addition, money supply causes economic growth, but also causes the rise in prices (inflation). For this reason, it is desirable that money supply growth is in line with the increases in economic activities. Thirdly, the role of government, i.e. fiscal policies, in sustainable economic growth is of particular interest. Government expenditures affect economic growth, but one should be careful in implementing this policy since higher government spending may cause a high budget deficit.

The results of the variance decomposition showed that in promoting economic growth, both monetary and fiscal policy have certain roles. Based on this result, it can be said that adequate coordination of monetary and fiscal policies is a prerequisite for sustainable growth and macroeconomic stability, which is in line with the initial hypothesis of the paper. Monetary policy has a significant influence in Serbia. One of the reasons for this result can be found in the fact that Serbia does not have an adequate standard of quality in institutions and that there is a high level of corruptive activities, which reduce the effectiveness of fiscal policy. Also, the structure of government expenditure should be re-examined. In the implementation of these policies we should take into account the current global crisis and the economic situation in Serbia, since the delayed process of transition determines the macroeconomic environment to a large extent.

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**ULOGA MAKROEKONOMSKIH INDIKATORA  
U STIMULIRANJU EKONOMSKOG RASTA:  
STUDIJA SLUČAJA REPUBLIKE SRBIJE**

**Rezime:** Za Srbiju, kao zemlju u tranziciji, neophodno je adekvatno upravljanje instrumentima monetarne i fiskalne politike u kontekstu intenziviranja ekonomske aktivnosti. Primarni cilj ovog rada je ispitati veze između ekonomskog rasta, inflacije, novčane mase, kamatnih stopa i troškova vlade, sa posebnim naglaskom na uzročnosti koje se kreću ka i od ekonomskog rasta. Grangerov test uzročnosti korišćen je za utvrđivanje potencijalnih uzročnosti varijabli. Razlaganje varijanse greške predviđanja takođe je korišćeno kao dodatna metoda. Vremenski period posmatranja kreće se od Q1 2007 do Q 2016. Empirijski rezultati pokazuju da dati makroekonomski indikatori uzrokuju određene promene u ekonomskom rastu. Analiza je pokazala da instrumenti monetarne politike imaju veći uticaj na fluktuacije. Shodno tome, potrebna je adekvatna koordinacija monetarne i fiskalne politike za stabilan i održiv rast u Srbiji.

**Ključne reči:** ekonomski rast, ekonomska politika, Republika Srbija, Grangerova uzročnost, razgradnja varijanse