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THE EFFECT OF MONETARY POLICY ON GROSS DOMESTIC PRODUCT IN THE REPUBLIC OF SERBIA

Abstract

The aim of this paper is to carry out an analysis of the impact of the monetary and credit policy on the real economic flows in the Republic of Serbia. In order to answer to the given goal, a correlation and regression analysis was performed for the period from 2004 to 2020. The results of this analysis have shown that there is a strong influence of the monetary and credit policy on the gross domestic product of the Republic of Serbia. Based on the results of the conducted regression analysis, it was found that in the Republic of Serbia, with the growth of the monetary aggregate M2 by 1%, gross domestic product grew by 0.691%. It was also found that the growth of approved long-term loans by 1% had a positive impact on the growth of gross domestic product by 0.425%. These values point to the great importance of the monetary and credit policy on economic growth in the Republic of Serbia and the need to attach great importance to monetary policy in the future period.

Key words: *Gross Domestic Product, Monetary Policy, M2, Loans.*

JEL classification: *E51,E52,C12.*

ЕФЕКАТ МОНЕТАРНЕ ПОЛИТИКЕ НА БРУТО ДОМАЋИ ПРОИЗВОД У РЕПУБЛИЦИ СРБИЈИ

Апстракт

Циљ овог рада је да се изврши анализа утицаја монетарне и кредитне политике на реалне економске токове у Републици Србији. Да би се одговорило на постављени циљ, извршена је корелациона и регресиона анализа за период од 2004. до 2020. године. Резултати ове анализе су показали да постоји снажан утицај монетарне и кредитне политике на бруто домаћи производ земље. Република Србија. На основу резултата спроведене регресионе анализе, утврђено је да је у Републици Србији, уз раст монетарног агрегата М2 од 1%, бруто домаћи производ порастао за 0,691%. Такође је утврђено

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да је раст одобрених дугорочних кредита од 1% позитивно утицао на раст бруто домаћег производа од 0,425%. Ове вредности указују на велики значај монетарне и кредитне политике за привредни раст у Републици Србији и потребу да се монетарној политици придаје велики значај у наредном периоду.

Кључне речи: *Бруто домаћи производ, Монетарна политика, М2, Кредити.*

Introduction

The goal of each country's economic policy is to have as high a GDP growth rate as possible, but also to develop sustainably. In order to achieve these goals monetary policy, as an integral part of economic policy should contribute to the realization of these goals. The monetary policy holder is the central bank. In the case of the Republic of Serbia, it is the National Bank of Serbia. Monetary policy, led by the NBS, and central banks of other countries, consists of emission (this function does not have a central bank of dollarized economies), credit and foreign exchange policies. Through the emission policy, the central bank may broadcast additional amounts of money in circulation. Through a credit function, the central bank lends money to commercial banks with defined interest rates, which has an impact on the level of the interest rate and on the offer of loans by commercial banks to business entities, citizens and the public sector. The foreign exchange policy of the central bank is linked to the management of the exchange rate and foreign exchange reserves.

Performing its functions, the central bank, has an impact through the transmission mechanisms of monetary policy on the business flows. In the open market operations, the central bank through the appropriate channels affects the aggregate demand, which further has a positive effect on the growth of economic activity and the development of the country.

When it comes to the NBS, a particularly important channel of monetary transmission is the channel of bank lending (Lučić, 2006). The main reason why this channel has special significance is the importance of banks within the financial system in the Republic of Serbia and insufficient development of the capital market, which would enable the issuance of securities to provide additional cash for business and development of business entities. The essence of this channel is that banks' reserves are changing through open market operations, which further has an impact on demand for loans and hence on investments and the value of gross domestic product.

Due to this great importance of the great importance of the banking lending channel, within this paper, an analysis of the impact of the monetary aggregate M2 and the approved long-term loans to the private sector on the value of GDP will be carried out in order to determine how much monetary and credit policy strongly influence the movement of gross domestic product, as real economic variable.

A review of literature

When it comes to the monetary influence on the real economic flows in the Republic of Serbia, theoretical analyzes are present in the literature. It is therefore important in this paper to make an empirical analysis and give answers to the hypotheses that will be defined in the paper.

When it comes to foreign literature, empirical analyzes are present, and mainly the authors came to the conclusion that there is a strong positive link in some countries between monetary and real economic variables.

In the nineties, in the Republic of Serbia, monetary policy was extremely inefficient. The imposed sanctions against Yugoslavia, as well as the war in the former Yugoslavia, led to the printing of huge amounts of money without cover, which led to hyperinflation (Djurovic, 2004; Pitić, Dimitrijević, 1995). Also, during the 1990s, a complete collapse of the banking system occurred due to the banks Jugoskandik and Dafiment. By offering high interest rates, these banks have accumulated large amounts of deposits. By the bankruptcy of these banks, clients who deposited deposits remained without their money, which led to the collapse of confidence in the banking system. Over time, trust in the banking system has been restored, and today the channel of bank lending in the framework of the transmission mechanism is considered as the most important (Kujundžić, S., Otašević, D., 2012).

The significance of the banking lending and monetary policy channel to real economic trends will be tested by correlation and regression analysis, but before defining the model and conducting an analysis based on the available data, we will present the results of other authors' research on the topic we deal with in this paper.

Robbi Fazli (2011) analyzed the link between monetary policy and the real sector, by analyzing the relationship between supply of money, gross domestic product and consumer price index in developing countries. By analyzing the time series for the period from 1972 to 2005, he concluded that there is a strong and statistically significant link between the observed variables.

Khin et al. (2014) have carried out the analysis for Malaysia. The study was conducted on the basis of the collected secondary data for the period 1991-2011. The aim of their study was to answer the question of whether there is a positive link in Malaysia between the supply of money and the real interest rate on loans on the one hand and the gross domestic product on the other. By applying Johansson co-integration analysis and Vector error correction models, these authors have proved that the relationship between the observed variables is present and strong.

Ayub and Shah (2015) state that monetary policy plays a key role in the economic movements of each state. These authors analyzed the impact of monetary policy on economic growth on the example of Pakistan for the period 2005-2014. In their analysis, they applied correlation and regression analysis, where they analyzed the impact of monetary aggregate M2, interest rates and inflation rates on GDP. Based on the results of the conducted research, they came to the conclusion that the monetary policy in Pakistan and how it affects the gross social product of this country.

Mathenge (2011) found in its research that there is a link between monetary policy and gross domestic product. He came to the conclusion that gross domestic product strongly depends on the monetary policy of the state. Using the regression analysis on

the example of Kenya for the period 2002-2011, the author has proven that growth in money supply has a strong impact on GDP, but also that there are many unknown factors that have an impact on GDP.

Koivu (2002) dealt with the impact of the banking sector on real economic trends. Namely, using the panel data analysis, this author analyzed the link between approved loans to the private sector and the growth of gross domestic product. The analysis was conducted in 25 transition countries for the 1993-2000 period. It was found that the link between approved loans to the private sector and economic growth is extremely weak. It has also been established that the link between previously approved loans and current economic growth is negative. However, taking into account numerous studies that showed a positive link between these variables, this author concluded that the results obtained may be the reason for the insufficient development of the analyzed countries and the inadequate placement of approved loans. Cristea and Dracea (2010) came to similar results. Contrary to these surveys in the literature, there are numerous studies that prove the positive effect between approved loans to the private sector and the growth of gross domestic product. For example, Cojocaru et al. (2021), in its analysis, established a positive relationship between the volume of loans approved and GDP growth, in the period when the central bank maintains inflation in reasonable values, using the generalized method of moments model.

Rousseau and Wachtel (2009), in their analysis, concluded that there is a positive link between lending and economic growth. They also state that this connection was significantly stronger before, but with the strengthening of the capital market, it was possible for the resources to be supplied with the issue of securities, which affected the decrease in the significance of the loan. Considering the insufficient development of the capital market in the Republic of Serbia, it is expected that the results of the analysis in this paper will show a positive link between the approved long-term loans to the private sector and the growth of gross domestic product.

Cappielo et al. (2010) in his paper answered to the question whether monetary policy through a channel of banking lending affects the loan offer and whether this loan offer by commercial banks continues to have an impact on economic growth. In the analysis, the authors included countries from the European area: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain for the period 1999-2008. By applying panel data regression analysis, the authors have come to the conclusion that in these countries there is a positive impact of monetary policy on the growth of loan offerings, and that the growth in loan supply continues to lead to the growth of gross domestic product.

Korkmaz (2015) came to similar results. He dealt with the analysis of the impact of bank credit on economic growth and inflation. By applying the panel data regression model on the example of ten European countries, for the period 2006-2012, this author came to the conclusion that the higher amount of loans granted by banks had an immanent effect on inflation growth, but the growth of loans to the private sector had a positive impact on growth gross domestic product.

Driscoll (2004) and Ashcraft (2006) found no link between credit and output in the US case in their analyzes. Takast and Upper (2013) concluded in their studies that there is no positive correlation between loans and gross domestic product in the US, especially after the period of an economic crisis.

Research methodology

The research in this paper is based on the impact of monetary policy on gross domestic product, as the most important variable through which economic growth is expressed. In order to carry out the regression analysis, which will show us the connection between the monetary aggregate M2 (cash in circulation, transaction deposits, other dinar demand deposits and time deposits in dinars, short-term and long-term) and gross domestic product, as well as long-term loans companies and population and gross domestic product, data were collected from the NBS website for the period 2004-2020. The data were collected in millions of dinars and their logarithm was performed before conducting the research.

Secondary data used for research are taken from the National Bank of Serbia website on December 10, 2021. The Statistical Package for the Social Sciences (SPSS) was used to process these data. In order to obtain the relevant results, the maximum number of years for which data are available is used.

The subject research is of a deductive-implicit type, because in the research we start from the results of previous studies and theoretically defined frameworks, and then on the basis of the obtained research results we can conclude whether the same phenomena apply in the case of the Republic of Serbia.

In order to realize the set goal of the research the hypotheses are defined:

Hypothesis H1:

H0: There is a positive and strong relationship between the supply of money and the value of gross domestic product;

H1: There is a poor link between the supply of money and the value of gross domestic product:

Hypothesis H2:

H0: The higher amount of long term loans to the private sector leads to a faster growth of gross domestic product.

H1: The higher amount of long-term loans to the private sector does not lead to a faster growth of gross domestic product.

Proof of zero hypotheses, ie denial of alternative hypotheses, will lead to significant conclusions, which will show whether there is a positive effect of the monetary and credit policy on the real economic trends in the Republic of Serbia, as well as the strength and direction of this connection. The empirical results of this research will provide answers to numerous theoretical controversies about the importance of monetary and credit policy on real economic trends in the RS. This is also the significance of this research.

Model

In order to prove or deny hypotheses, correlation and regression analysis are used. By using the correlation analysis we will get an answer on the degree of agreement between the observed variables, while the application of the regression analysis will give an answer to the question of how many changes in independent variables have an effect on the dependent variable.

Since Pirson's correlation coefficient is suitable for interval or continuous variables (Pallant, 2009), as such will be applied in analyzing the relationship between given variables.

The Pirson Correlation Coefficient Form can be represented by the following formula (Sharma, 2007):

$$r = C_{xy}/SD_x SD_y \qquad (1)$$

where:

Cxy - covariance and
SDx, SDy - standard deviations of variables x and y.

By introducing the defined variables into a given formula, Pirson's correlation coefficient between the monetary aggregate M2 and gross domestic product, i.e. between the amount of approved long-term loans and gross domestic product can be obtained on the basis of the following formula:

$$r1 = C_{lnM2lnGDP}/SD_{lnM2}SD_{lnGDP} \qquad (2)$$
$$r2 = C_{lnDKlnGDP}/SD_{lnDK}SD_{lnGDP} \qquad (3)$$

Unlike Pirson's correlation coefficient, the determination coefficient, which will also be part of the analysis, will show how much changes in gross domestic product can be explained by changes in M2, or the sum of long-term loans granted to the private sector.

In defining the regression model, we start from the simple linear regression model, which can be represented by the following formula (Yan, Gang Su, 2009):

$$y_i = \beta_o + \beta_1 x_{i+} \varepsilon_i \quad i = 1,2.....N \qquad (4)$$

where:
yi - ith dependent variable;
xi - ith value of the explanatory variable;
ßo and ß1 - regression parameters, which is a section or a free member in the model, while ß1 is a slope;
Ɛi - stochastic member or accidental error;
N - the core of the basic set and
I - ith value in the basic set.

By reaching the result, it will be possible to determine how many percentages will change the dependent variable if the independent variable increases by 1% (Chatterjee, Hadi, 2006). In order to consider the obtained analysis results statistically significant, it is necessary that the parameter p, that is, probability be less than 0.05 ie. 5%.

In accordance with the model of regression analysis presented, we can define a model for the concrete problem, which this paper deals with. Before the data was entered into the model, their logarithm was performed, so the form of the monetary aggregate M2 impact on gross domestic product can be shown as follows:

$$lnGDP_i = \beta_o + \beta_1 lnM2_{i+} \varepsilon_i \quad i = 1,2.....N \qquad (5)$$

where:
lnGDPi - logarithmic GDP, for i = 1 ... .N;
lnM2i - logarithmic M2, for i = 1 ... .N.

When it comes to the impact of the amount of approved long-term loans to the private sector on gross domestic product, the following formula is applied:

$$lnGDP_i = \beta_0 + \beta_1 lnDK_{i+}\varepsilon_i \quad i = 1,2.....N \qquad (6)$$

where:

lnDKi - the logarithmic sum of long-term loans, for i = 1 ... .N.

In the continuation of the paper, by using the defined model, a response will be given to the defined hypotheses, which will enable us to give a conclusion on the importance of the monetary and credit policy for the real economic sector in the Republic of Serbia.

Research results and Discussion

Before determining the Pirson correlation coefficient and linear regression, the results of descriptive statistics for the listed variables, which are the subject of analysis, are presented and analyzed.

Table no. 1 Results of descriptive statistics of defined variables in millions

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
GDP	17	1526205	5502216	3681983.56	1219373.154
M2	17	146209.00	1553797.00	618895.5294	371123.50602
L_loans	17	102756.00	2359708.00	1155138.0000	673516.85478
Valid N (listwise)	17				

Source: Authors

As can be seen from Table no. 1 in the analysis of this problem, a period of 17 years is used. In this period, the highest value of gross domestic product was 5502216 million dinars, while the lowest value of gross domestic product amounted to 1526205 million dinars. The average value of GDP, which is obtained when the values of GDP for all observed years are divided by the number of years, in the observed period amounted to 3681983.56 million dinars. The standard deviation from the determined mean value for GDP is 1219373.154 million dinars.

The highest value of monetary aggregate M2 is 1553797.00 and the lowest is 146209.00 million dinars. The arithmetic mean of this monetary aggregate is 618895.53 million dinars, while the standard deviation from the determined mean value is 371123.51 million RSD.

Table no. 2 Results of the correlation analysis of GDP and monetary aggregate M2

Correlations

		LN_GDP	LN_M2
LN_GD	Pearson Correlation	1	.970**
	Sig. (2-tailed)		.000
	N	17	17
LN_M2	Pearson Correlation	.970**	1
	Sig. (2-tailed)	.000	
	N	17	17

**. Correlation is significant at the 0.01 level (2-tailed).

Source:Autors

The amount of 102756.00 million dinars represents the lowest amount of long-term loans granted to the private sector for the period 2004-2020, while the sum of 2359708.00 million dinars represents the highest amount of approved long-term loans. The average value of approved long-term loans in the observed period equals 1155138.00 million dinars. Standard deviation from the average value of approved long-term loans, amounts to 673516.85 million dinars.

After the presentation of descriptive statistics, the data are logarithmic and the results of the correlation analysis of gross domestic product and monetary aggregate M2 are shown in table no. 2.

The results of the Pirson linear correlation between GDP and M2 show that there is a positive link between these two variables. The obtained score of 0.970, with the realized significance level $p = 0.000 < 0.01$, shows that this connection is extremely strong, which means that the changes in the money supply (M2) have a strong impact on the growth of gross domestic product in the Republic of Serbia. On the basis of the Pyrson's correlation results, a coefficient of determination was obtained, which in this case amounts to 97 %, which means that the changes in GDP are strongly influenced by the changes in M2.

Table no. 3 Results of regression analysis of GDP and M2

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.271	.505		14.403	.000
	LN_M2	.691	.038	.970	15.440	.000

a. Dependent Variable: LN_GDP

Source: Autors

Table 3 shows the results of the regression analysis on the basis of which the regression equation can be written, using the equation number 4, which shows the effect of monetary aggregate M2 on GDP in the Republic of Serbia:

BDP = 7.271 +0.691*M2   (6)

based on which it can be seen that with the growth of money supply (M2) by 1%, the gross domestic product increase by 0.691%, with the level of statistical significance $p = 0.000 < 0.05$. Based on the obtained results the zero hypothesis, within the hypothesis H1 has been proven, ie in the Republic of Serbia there is a strong connection between the

supply of money (monetary aggregate M2) and the growth of gross domestic product. In this way, we came up with similar results as the authors of Fazli (2011), Khin et al. (2014) and Ayub and Shah (2015) who have shown in their analyzes the existence of a strong link between money supply and economic growth in the countries that were the subject of their analysis.

As in the analysis of the relationship between GDP and M2, in calculating the ratio between the volume of long-term loans and gross domestic product, the Pirson coefficient of correlation was first calculated, and the results are shown in table no. 4.

Table no. 4 Pirson's correlation coefficient between the sum of approved long-term loans and GDP

		LN_GD	LN_Lloans
LN_GD	Pearson Correlation	1	.989**
	Sig. (2-tailed)		.000
	N	17	17
LN_Lloans	Pearson Correlation	.989**	1
	Sig. (2-tailed)	.000	
	N	17	17

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Autors

And in the case of these two variables there is a strong correlation, with the realized level of statistical significance $p = 0.000 < 0.05$. Similarly, changes in the level of approved long-term loans to the private sector have a strong impact on economic growth, ie on the movement of gross domestic product. The coefficient of determining this model is 98.9%, which means that changes in GDP can be explained with 98.9% in oscillations in the scope of approved long-term loans.

Table no. 5 Results of regression analysis between GDP and long-term loans

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.238	.229		40.273	.000
	LN_Lloans	.425	.017	.989	25.420	.000

a. Dependent Variable: LN_GD

Source: Autors

Based on the results of the regression analysis, it can be concluded that the growth in the volume of long-term loans granted to the private sector of 1% leads to a growth of gross domestic product of 0.425%. This result of the regression analysis can be represented by the following formula, and by the model of the equation number 5:

BDP = 9.238 +0.425*LL   (6)

The obtained results are statistically significant. We conclude this on the basis that the realized level of statistical reliability is less than 0.05. Based on the results obtained in this way, another paper hypothesis is proved that the volume of approved long-term loans has a positive impact on economic growth, i.e. growth of the gross domestic product of the Republic of Serbia. In this way, as well as the authors of Cojocaru et al. (2011), Cappielo et al. (2010), Rousseau and Wachtel (2009) and Karkmaz (2015), we have come to the conclusion that there is a positive impact of credit on the real economic sector.

These results, which are determined by the analysis, point to the need to place monetary policy a special place within economic policy. In the Republic of Serbia, monetary policy, especially in recent years, has gained in importance, and it is especially important that inflation is maintained in reasonable values, the exchange rate is stable, and interest rates are lower than before. However, it should be emphasized that, compared with EU member states, interest rates in our banks are still high. This certainly negatively affects the demand for loans, and therefore the investment in expanding the existing one or starting a new business, i.e. on the demand of loans by the sector of the population, which can increase demand and encourage additional production of goods and services in the country.

Conclusion

The monetary and credit policy of the central bank plays an extremely important role when economic growth is in question. In the nineties, in the Republic of Serbia, an inefficient monetary and credit policy was conducted, and then there was a collapse of the banking and economic system. However, after this period, the level of efficiency of monetary policy has increased, and the trust in the banking sector has gradually returned. Considering the insufficient development of the capital market and the significance of the banks in the Serbian financial system, the channel of bank lending, as part of the transmission mechanism, is of great importance.

The analysis of the impact of monetary policy and approved credits on gross domestic product, as the most significant macroeconomic variable, was dealt with by a large number of authors. Most of them by analyzing developing countries, and some developed countries, came to the conclusion that there is a strong link between these variables in a large number of countries. The extremely high significance of bank loans is determined in the case of countries in which the capital market is underdeveloped, and the banking sector as a form of obtaining funds is dominant.

In order to analyze the impact of the monetary and credit policy on the real sector in the Republic of Serbia, a correlation and regression analysis was applied.

Based on the conducted analysis for the period 2004-2020. The positive relationship between monetary aggregate M2 and gross domestic product, ie between approved loans to private sector and gross domestic product, was established. On the basis of the conducted regression analysis, it was found that with the growth of monetary aggregate M2 by 1%, there is GDP growth of 0.691%, with the realized significance level $p = 0.000$, thus the hypothesis H1, which reads "There is positive and a strong link between the supply of money and the value of gross domestic product, " is proven. It was

also found that with the growth of approved loans to the private sector by 1%, the level of gross domestic product is increasing by 0.425%, which means that another hypothesis set in the paper, that the higher amount of long term loans placed in the private sector leads to a faster growth of gross domestic product is also proven.

The obtained results point to the need to give greater importance to monetary and credit policy in the future period, given that banks have a dominant role in obtaining the necessary long-term funds in relation to the capital market in the Republic of Serbia.

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