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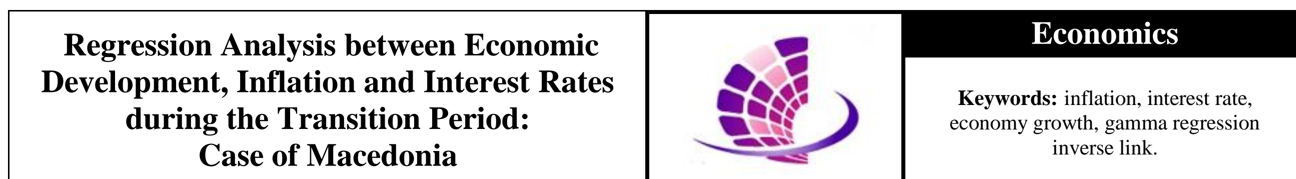
Research Article

Regression Analysis between Economic Development, Inflation and Interest Rates during the Transition Period: Case of Macedonia



Economics

Keywords: inflation, interest rate, economy growth, gamma regression inverse link.

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Abstract

Numerous empirical results show that lending rates have a significant effect on economic growth while in terms of the inflation rate, we can say that it has the relative importance because in some cases it has positive impacts and in some cases it's presented with a particularly negative impact. Interest rates and inflation are two important variables of policy-making in macroeconomics and rate changes have significant effects on economic agents' decision and have often been debate discussion by economic policymakers. This paper discusses the impact of interest rate and inflation on economic growth in the case of Macedonia, during the transition period. The data collected by the World Bank are analyzed and tested using multiple regression technique. The result of the finding revealed that there is an inverse relationship between interest rates and economic growth in Macedonia, which means that the increase in interest rates would reduce the country's GDP and a positive relationship between inflation rate and GDP.

1. Introduction

Like most countries that changed their regimes from centralized economies to the market economy, Macedonia also faced a number of economic, political and social challenges since the 1990s. Among other features, one of the distinguishing features of transition countries was the low financial intermediation and the low use of banking services. Also, the financial system in most of it consisted of banks, while other financial institutions played a negligible role. However, later the situation started to improve and recently there has been a significant increase in second-tier banks and their affiliates across the cities in Macedonia. At the same time, this represents a greater opportunity for massive lending and more suitable conditions. With new foreign investment and privatization of state-owned banks, the level of competition grew and banks began to "struggle" to increase market share in loans and deposits in order to survive in the conditions of a fierce and ruthless competition. Financial institutions have a great financial importance in generating growth within the economy, which has widely been discussed in the literature. Schumpeter in 1911 identified the role of banks in facilitating technological innovation through their intermediary role. He believed that through them was made the efficient allocation of savings through identification and financing of entrepreneurs who have ideas and will manage to materialize them successfully through the process of producing new products. Some other scholars, such as (McKinnon 1973, Shaw 1973, Fry 1988, King & Levine 1993) have supported the statement regarding the importance of banks for lending and its reflection on the growth of the economy[77]. But usually, the borrowing is associated with an amount that a borrower pays for the use of borrowed money and which it should return to the lender for a specified period of time with a certain percentage which represents the interest rate that is closely linked to inflation.

[77] Some scientific research, including De Serres et al (2006) and Levine (2005), discussed the relationship between financial development and economic growth.

Interest rates and inflation have the power to influence people's lives, affecting the economic decisions taken by businesses and individuals, they serve as a determining factor for investments in the overall economy and at the same time in economic growth.

In our paper, priority will be given to determining interest rates on loans but always considering the main factor of price stability and their impact on the economic growth of the country. So, here comes the question why different countries are characterized by different rates of economic growth? What policies should the Central Bank pursue to have economic growth and at the same time price stability? What are the factors that affect them? These are questions that we will try to answer in this research. Through this study, we are aiming to find out what impact will be the change of interest rates in economic growth, as Macedonia is classified as one of the poorest countries in the world and a small reduction in interest rates on loans, is supposed to have significant impact on GDP in the country.

2. Hypotheses definition and Variables identification

The research hypotheses of this research are:

H_1: The reduction of interest rates on loans hasn't effect on economic growth in Macedonia,

H_2: Inflation and economic growth haven't inverse correlations,

H_3: The reduction of interest rates on loans hasn't a positive effect on the demand for money, while in economic literature there are various definitions regarding interest rates, inflation and economic growth. The following gives the identification of variables:

Economic Growth (Y) - a process where real national incomes in an economy grow over a long period of time and have a higher standard of living growth. Thus, economic growth is a process where the total of income per capita is increased. According to Benard Okun and Richard W. Richardson, economic growth can be defined as a steady increase in goods and services and improvement of human wellfare, while Prof. Baran says: "Economic growth or economic development can be defined as the growth of production and capital over a certain period of time" *Inflation (X1)* - the constant rise of the general price level. Samuelsoni says that with inflation is the period of general price rise of goods and production factors, while Kurt Singeri has considered the great inflation of 1923 in Germany and as its main characteristic emphasizes the great increase of the price level which is followed by the growth of bank lending. *Interest Rate (X2)* - the price paid for the use of borrowed money.

3. A literature review of the evidences between variables

From the previous studies we have seen the importance and impact of interest rates and inflation on economic growth. Usually, interest rate reduction increases the demand for loans and the high lending rate reflects a greater economic growth. But in many cases, high lending has also caused bank and financial crisis. As a phenomenon observed in almost all economies despite the fact that it may occur at different time periods, the fast growth of lending has its supporters and opponents. On the one hand, it is argued that a fast lending growth, under the conditions of low credit levels, is a positive step for countries that pass the transition period to the market economy, as it shows the development of the financial system and a natural convergence towards developed countries. On the other hand, there are credit growth critics who raise the suspicion that a rapid growth (which may even end up in a lending boom) has serious economic consequences and may even lead to banking crises or wider . According to an IMF study (2004), data from recent decades show that 75% of lending booms in developing countries have been associated with banking crises and about 85% of them with exchange rate crises. The interest rate is determined by the monetary demand and supply capital forces and thus stimulates economic growth (Keynes, 1936). Different authors using panel data like Seck and El Nile, 1993; Charlier and Oguie, 2002; Allen and Ndikumana, 2000, examined the link between interest rates and economic growth in Africa and found a significant negative correlation between economic growth and interest rates. Obamuyi and Olorunfemi (2011) analysed the implications of financial reform and interest rate behavior on Nigeria's economic growth. The study's findings showed that financial reform and interest rates had a significant impact on Nigeria's economic growth, and the result also made it clear that the interest rate movement is very important for economic growth. However, there are various studies that produce fruitless results in terms of hypotheses that interest rates have a significant impact on economic growth, for example Goldsmith (1969), using data from 35 countries over a period of 1860-1963, reports a not very important correlation between interest rates and economic growth, while Giovanni and Shambaugh (2007) investigated the link between interest rates in large countries industrial and real growth of annual production in other countries. The results show that high foreign interest rates have a tightening effect on annual GDP growth in the domestic economy, but this effect is concentrated in countries with fixed exchange rates such as Macedonia. Fisher's 1930 hypothesis suggests that expected inflation is the main determinant of interest rates. If the inflation rate increases by 1%, the rate of interest increase will increase by 1% also. This suggests that expected interest rates differ in proportion to the expected inflation rate change, while Mundell (1963) concluded that the nominal interest rate with the expected inflation rate does not have a regular relationship.

Research into the existence and the nature of the link between inflation and economic growth have long experienced. The issue has generated a sustainable debate. Some people believe that inflation is essential to economic growth, while monetary analysts see inflation as detrimental to economic progress. Although economists now widely acknowledge that inflation has a negative effect on economic growth, researchers have not discovered this impact on data from the 1950s to the 1960s (Mini, 2005). A series of studies by the IMF Staff Papers in the 1960s did not find

evidence of damage from inflation (Wai, 1959; Bhatia, 1960; Dorrance, 1963, 1966), so in the first appearance in the 1960s it was dominant opinion that the effect of inflation on growth economic situation was not particularly important. This view has prevailed until the 1970s, when many countries, mainly in Latin America, experienced hyper-inflation. Therefore, today the dominant view on the effects of inflation has dramatically changed. Kremer 'et al 2008 examined the impact of inflation on long-term economic growth for 63 industrial and non-industrial countries. Its findings revealed that inflation hinders growth if it crosses the 2% limit for industrial sites and 12% for non-industrial sites. However, below these thresholds, the effect of rising inflation significantly influences positively. Bruno and Easterly (1998) showed that a number of economies have experienced steady inflation of 20% to 30% without any significant negative adverse consequences. However, as the inflation rate exceeds a critical level where Bruno and Easterly estimated to be around 40%, then there will be a significant decline in GDP. Barro (1995) reviewed the five-year data of 100 countries during the period 1960-1990. Its result shows that an increase in average inflation by 10% per year will slow down the real GDP growth rate by 0.2-0.3% per year. He argued that although the negative impact on inflation growth appeared small, the long-term effects on livelihoods were actually considerable. The link between inflation, interest rate, and economic growth has been the subject of exploring research at different time periods. In particular, the effects of inflation and interest rates on economic growth have been studied by the World Bank (1993). This study provides evidence from a sample of twenty countries about the impact of interest rate and inflation rate on the growth rate. The real interest rate has a significant statistical impact on economic growth and the inflation rate to some extent stimulates economic growth, but if it continues over a long period of time it will have adverse effects on economic growth.

4. The performance of Macedonian macroeconomic indicators during the transition period

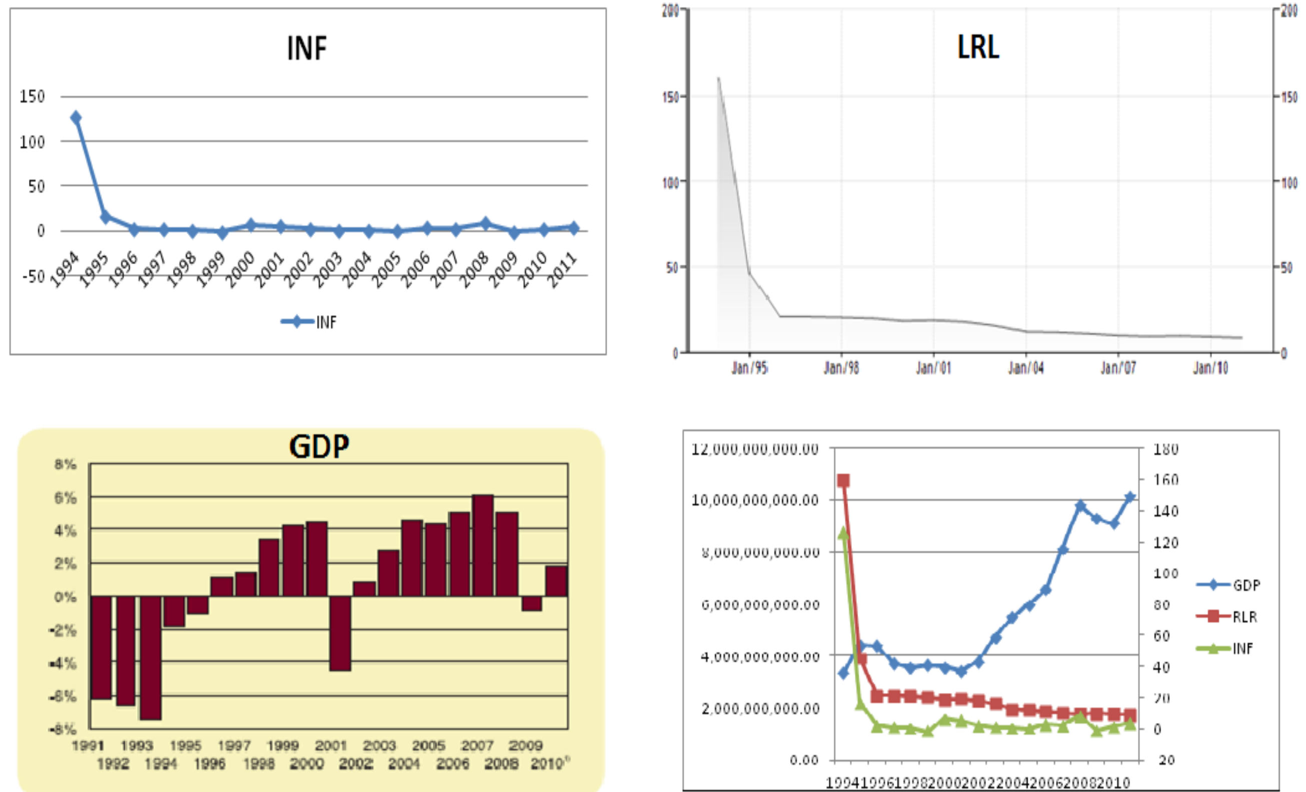
The performance of indicators surveyed in this paper, such as GDP, credit interest rates and inflation rates have moved towards growth and declining year on year. GDP as a synthetic indicator of the success of the economy in the first years after the declaration of independence until 1995 marked a real decline and for the first time in 1996 this indicator marks a positive growth of 1.2%. (Pollozhani 2008). The upward trend in GDP lasted until 2000, reaching a growth rate of 4.5%. In 2001, GDP has a negative growth of 4.5%, while the period 2002-2008 was characterized by economic growth. In 2007, the GDP growth rate reached 6.1%. In 2009, the economy marked a slight decline of 0.9%, whereas in 2010 GDP grew by 1.8%[78].

After independence, Macedonia faced a hyperinflation (about 2,000% in 1992 and over 230% in 1993). High inflation has also contributed to the rise in interest rates and the decline in GDP, which has always been the downward trend from Macedonia's independence until 1995, and

[78] www.stat.gov.mk.

this was the main reason why the People's Bank, in order to overcome the situation, implemented a policy restraining monetary policy and thus managed to significantly reduce the inflation rate. So, in the period 1997-2007, the average inflation rate was 2%. However, this feature was discontinued in 2008, when as a result of external factors, the average rate of inflation accelerated to 8.3%. The deflation process began in the second half of 2008, which continued in 2009. At the end of 2009, a deflation of 0.4% was recorded as a result of the fall in oil and food prices, while in 2010 the inflation rate was 1.6% and in year 20011 it rose by 2.3%[79].

Figure 1. The performance of macroeconomic indicators in Macedonia



Source: The authors' calculations according to the data from the World Bank

In the first half of 1996, interest rates followed the inflation pattern. So even though in the first half of 1996, interest rates on loans dropped from 12.75% to 11.64% in annual terms, they were still high and did not match the price level. The interest rate trend continued until the year 2000, and after this year there was a slight decline or slight decrease.

5. Data, Methodology and Results

This section provides the analytical framework for the study and will help present the results and provide policy recommendations that should be undertaken. To accept or eject the hypotheses set out above in this study will be based on the multiple regression method attributed to McKinnon-Shaw and Albu's authors. According to McKinnon - Shaw and Albu's (2006)

[79] www.nbrm.mk.

economic growth is modeled as a function of GDP, interest rate of credit, inflation rate ... This is specified as: GDPt = d0 + d1**RLR**t + d2 RDRt + d3FIDt + d4**INF**t + d5DSGt + d6FPSt + et

To find the long run relationship between the variables we have used multiple regression analysis. In this research we have focused on secondary type of data, all data is collected from the different official publications of respected banks and Central bank of Macedonia. In this study we have used three variables namely, gross domestic product, inflation, interest rate on loans. In this study we have used the data of two banks from the period of 1994 to 2011. After selection of the above variables we can describe the economic growth function of Macedonia in the following way: GDP = f (RLR, INF), where GDP is the gross domestic product, f represents the function of and RLR, INF represent respectively, real interest rate on loans and inflation rate. After specifying the trade balance function in linear form with an addition of error term, we can write in following way[80]:

$\hat{\gamma} = \hat{\beta}_0 + \hat{\beta}_1 \chi + \mu$ namely for our case: lnGDP = $\alpha + \beta_1 \ln(INF) + \beta_2 \ln(RLR) + \varepsilon$

This research is based on the following hypothesis that clearly defines the research criterion.

H1: Inflation has no significant impact on Economic Growth

H2: Real Interest rate on loans has no significant impact on Economic Growth

H3: Real Interest rate on loans has no significant impact on Demand for Money

To achieve the purpose set out in this study, the World Bank data for the Republic of Macedonia for the period 1994-2011 were analyzed for some variables such as GDP performance, interest rates on loans and inflation rate.

Table 1. Macroeconomic indicators analyzed, 1994 – 2011

Viti	2011	2010	2009	2008	2007	2006	2005	2004	2003
GDP (ne milj.$)	10.16	9.14	9.31	9.83	8.16	6.56	5.99	5.51	4.76
RLR	8.87	9.48	10.07	9.68	10.23	11.29	12.13	12.44	16.00
INF	3.9	1.61	-0.74	8.27	2.24	3.22	0.16	0.93	1.10

2002	2001	2000	1999	1998	1997	1996	1995	1994
3.79	3.44	3.59	3.67	3.57	3.73	4.42	4.45	3.38
18.36	19.35	18.98	20.45	21.03	21.42	21.58	45.95	159.82
2.31	5.20	6.61	-1.28	0.54	1.29	2.47	16.37	126.58

Source: World Bank

[80] The simplest method to solve the above equation is OLS

From the results and testing of hypotheses:

- Hypotheses: $H_0: \beta_1=0$; $H_a: \beta_1 \neq 0$
- Test statistics: $t = \frac{b_1}{S_{b1}}$
- Ejected rule: eject H_0 if t $> t_{\alpha/2}$

and on the analytical analysis through the multiple regression technique, these results are as follows:

$R^2 = 0.6067$

F (2; 15) = 11,57

Table 2. Regression Results

Variables	Coeficients	Standard error	t-statistics	p-value
Constants	23.921	0.325	73.52	0.000
RLR	-0.568	0.120	-4.73	0.042
INF	0.118	0.534	2.22	0.000

Authors' calculations by Stata we conclude that reject null hypothesis and accept the alternative hypothesis. The results show $R^2 = 0.6067$. This implies that close to 61% of the change in GDP is caused by changes in the independent interest rate and inflation variables. This means that interest rate fluctuations and inflation are good determinants of GDP. The F-value is 11.57 which is greater than the critical F value of 3.14 and we can confirm that there is an important relationship between the dependent variable of GDP and the independent interest rate and inflation variables. There is a reverse relationship between the interest rate and the GDP whereas the inflation coefficient in this case is positive. Here it is important to emphasize the fact that if inflation increases at high rates, it will negatively affect GDP in the country, especially in the long run (Akinlo, 2005). But generally speaking, low inflation rates to some extent stimulate economic growth, but rapid economic growth "nourishes" again into inflation.

6. Conclusions and Recommendations

We can say that monetary policy for each country plays a key role in overall economic growth, even in the transition period. Despite the factual situation, the objectives of the Central Bank of Macedonia are the continued economic growth and price stability. Our study reveals how much the interest rate on loans and the inflation rate affects the overall GDP growth in Macedonia. The tight monetary policy in terms of raising interest rates has a significant negative impact on GDP. As far as the relationship between GDP and inflation is concerned, we can not fully predict the relationship between these variables.

The healthy economy can be easily influenced by interest rates and inflation, so the changes in the rates of these variables have significant effects on economic development. Interest

rates on loans represent an important catalyst for reviving and expanding economic activities in Macedonia because very few businesses have the power to finance their cash-based activities and from this we realize that credit interest rates are becoming more and more indispensable element. When interest rates are low, people and businesses are more likely to receive loans from banks because they pay less for interest costs, so they will retain a larger share of their income exploited for their own needs and their benefits will be greater than, and so the economy slowly begins to recover. This at the same time presents a better opportunity for investors who do not want to take many risky actions in their business or private life.

GDP and inflation are often linked to each other because the Government and the Central Bank often make decisions based on these figures and at the same time strive for potential manipulations. If the economy does not grow or is not growing enough, the Central Bank may lower interest rates on borrowing. The logic behind this is that it will whip the costs, which will lead to GDP growth, but the barrier to this move is that, according to popular beliefs, it would also cause inflation.

In summary, from this historical record we can support the main thesis of this study that high inflation causes interest rates to rise and interest rates increase directly impacts on GDP decline.

The country's monetary policy makers should take into account the country's situation and try to improve the current situation through the various mechanisms available to them. All developed economies seek to increase the economy of the country in cooperation with fiscal and monetary policy, and improve the welfare of the population by lowering interest rates on loans and increasing the amount of currency in circulation to a controllable level. But reality tells us that Macedonia deviates these rules both in the transition period and at the present time. Today, instead of releasing monetary policy, the Macedonian National Bank implements a restrictive monetary policy in order to maintain a stable exchange rate and price stability. It reduces the bank's credit potential and the possibility of lowering interest rates and increasing the lending volume through increased reserves that the National Bank obliges second-tier banks. Our recommendations would have been, essentially, vice versa for these problems.

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