
The Impact of Monetary Policy on Algerian Economic Activity

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Abstract: This study investigated the role of monetary policy in financing economic activity in Algeria during the period 1990-2017 using quarterly data. The application of the VAR model has shown the negligible effect of credit and interest rate on gross domestic product. On the other hand, it appears a more significant positive effect of the real money supply. The modest contribution of the financial system to economic growth could be attributed to the excess of liquidity and the weak development of the financial system, the Algerian capital markets are nascent, the lengthy administrative procedures and the lack of competition in the banking sector.

Keywords: Monetary Policy, Economic Growth, Credits, Interest Rate

1. Introduction

The authorities can influence economic activity through two policies: fiscal policy and monetary policy. The main objective of the latter is to ensure sufficient liquidity to finance the economy while maintaining price stability, in other words; achieve non-inflationary growth. According to Fisher (1991) [1], a stable macroeconomic environment is needed to support sustainable growth that could eventually lead to good economic performance.

For a country to develop, it must have enough capital by appropriately allocating them. For this, it would be necessary to have an efficient money market able to cope with a shortfall in the financial structure of companies, increased savings and an imbalance in public finances.

Although difficult to conduct, monetary policy is deeply affected by the financing conditions of the economy, not only the costs, but also the availability of credit, the willingness of banks to assume specific risks etc. For example, a monetary policy decision that reduces the interest rate reduces the cost of borrowing, which translates into higher investment activity and the purchase of consumer durables. Expectations of stronger economic activity may also encourage banks to relax their lending policies, allowing businesses and households to boost their spending. A good economic policy would therefore be to promote financial deepening and certainly not

to limit the development of intermediation activities. With regard to the relationship between credit supply and economic growth, credit to the economy is a form of money offered by banks. This form of money creation consists of a transformation, by the banking system, of claims on non-bank agents in payment immediately usable to make payments.

We cannot talk about monetary policy in Algeria until 1990 with the advent of the law on Money and Credit which has fixed price stability as the final goal of monetary policy. However, at the same time, the authorities initiated a series of economic reforms as well as a fiscal policy aimed at achieving a satisfactory growth rate, which went against the monetary policy which had to be restrictive by absorbing structural excess liquidity in the banking system and slowing credit expansion.

The question that arises to us is: does the monetary policy conducted in Algeria manage to properly finance economic activity? We will attempt through this article to determine the effects of monetary policy on economic activity in Algeria during the period from the first quarter of 1990 to last quarter of 2017.

2. Theoretical Background and Literature Review

2.1. Theoretical Background

Theoretically, the ability of monetary policy to influence economic growth can be discussed in two extreme cases: on the one hand, Keynesians suggest that the change in the money supply may affect the level of production indirectly via the interest rate and investment. On the other hand, monetarists believe that money can affect real variables only in the short term, and only nominal aggregates vary in the long term, in this case we speak of currency neutrality.

According to Keynesian theory, the transmission mechanism called the cost of capital channel, is made up of three stages: an increase in the money supply will induce a fall in interest rates which will encourage investment and will result a rise in income.

Monetarists who believe that "only money matters" emphasize the role of money in explaining short-term changes in national income. They argue that the role of money has been neglected by Keynesians. According to Friedman (1982) [2], any change in the money supply will cause a change in the national income. Suppose the central bank buys securities in the open market, it will increase the price of securities and lower the interest rate. As a result, people will start selling securities and hold more money, thus spending their excess cash balances on financial assets and consumer durables. Others, attracted by low interest rates, will borrow from banks for spending on consumer durables and equipment, which will increase overall spending and revenues through Tobin's effects. According to monetarists, all recessions and depressions are caused by a sharp contraction of money and credit, and booms and expansions by excessive increases in the money supply. On the other hand, Keynesians who believe that money does not matter, reject the monetarists' view that changes in national income are caused solely by variations in the money supply. On the contrary, they argue that changes in national income cause changes in the money supply.

Another important channel through which a tightening of monetary policy tends to reduce economic activity is the credit channel. As early as the 1960s, some economists like Tobin and Brainard (1963) [3] and Modigliani (1963) [4] had already shown how credit rationing could operate on economic activity.

According to economic theory, increasing credit to the economy has major implications for monetary and macroeconomic policies. The increase in credit stimulates aggregates, especially on the demand side. Second, the process is maintained by an increase in bank lending for import demand and the consumption of capital-intensive products. Some empirical studies such as King and Levine (1993) [5], Levine (1997) [6] and Favara (2003) [7] have shown that increasing credit to the economy results in a simultaneous increase in production, particularly during the growth phase of the economy. According to Fuerst (1994)

(1994) [8], the rapid increase in credit over this period is due to growth in demand for capital investment and capital requirements for jobs, leading to increased economic growth. This is often the case in emerging economies. In addition, the rapid rise in credit can lead to huge risks in return for these emerging economies themselves.

2.2. Literature Review

Many empirical studies have focused on the impact of monetary policy on the real economy, especially in the short term. Kahn and Knight (1991) [9] developed a macro-econometric model to highlight the predominant role of monetary policy in the real sector. The study of annual data for 29 countries showed that the monetary imbalance did have a significant effect on production.

Naastepad C. W. M. (2001) [10] attempted to examine the macroeconomic effects of India-led credit using a new real-financial Computable General Equilibrium (CGE) model that focuses on credit rather than currency. The results of the short- and medium-term simulation experiments indicate that when credit market failures lead to rationing as in the small-scale agricultural and industrial sectors, the macroeconomic effects of directed credit are likely to be significant and positive.

Starr (2005) [11] money supply, the interest rate and the exchange rate) in four countries namely; Russia, Ukraine, Byelorussia and Kazakhstan using time series of quarterly data from 1995 to 2003. The results showed that the real effects of monetary policy in these four countries, with the notable exception of interest, have a significant impact on economic activity, especially in Russia.

Berument H. and Dincer N. (2008) [12] studied the effects of monetary policy for Turkey using the structural VAR technique during the period from 1986 to 2000. The results showed that a restrictive monetary policy has a temporary effect on production.

Bhuiyan R. (2008) [13] applied the structural VAR model for Canada to determine the effects of the monetary policy shock. The study used the overnight target as a monetary policy instrument on monthly data for the period 1994-2007 and concluded that the transmission of the monetary policy shock to real output depends both on the rate exchange rate and interest rate.

Nouri M. and Samimi J. (2011) [14] examined the relationship between monetary policy and economic growth in Iran using the least squares method and data covering the period 1974-2008. They found that there is a positive relationship between money supply and economic growth in Iran.

Johnson Kuawo-Assan (2014) [15] investigated the nature of the relationship between the evolution of credit to the economy on economic growth in Togo over a period from 1970 to 2010. He arrived at the result that credits to the economy had no impact on economic growth in the short term. However, any increase in credits reduced economic growth in the long run. He explained this result by the fact that the sectors receiving credits did not bring economic

growth.

As for the case of Algeria we can quote the study made by Azzouz Y. and Baroudi N. (2017) [16]. She examined the relationship between financial development and economic growth during the period 1970-2014. This study has shown that the relationship between different financial development indicators (represented by the ratio of commercial bank assets to GDP, the ratio of money supply (M2) to GDP and the ratio of loans contracted by the private sector to GDP) and economic growth is characterized by a demand-side effect where the intensification of economic activity creates its own demand on the different services of financial intermediaries. The situation remains unchanged even by differentiating between the oil sector and other sectors.

Khallout A. and Hafsaoui N. (2017) [17] tried to determine the role played by the Algerian banking system (represented by the ratio of money and quasi-money to GDP, total credit ratio to GDP and the credit ratio granted to the private sector) in the promotion of economic activity during the period (1990-2014) using a VECM model. The results show that there is a long-term causal relationship between the banking system and economic growth. However, this relationship is absent in the short term.

3. Monetary Policy and Financing the Economy in Algeria

The repeal of the Currency and Credit Act in 1990 was a turning point for the Algerian economy in the context of the transition of the economy to the market economy. According to this law, the objectives of monetary policy, price stability was the main point but not the only one since it was accompanied by that of full employment and economic growth (Ilmane M. C. (2005)) [18]. The law on money and credit has contributed to the evolution of commercial banks in order to give the Algerian financial system more responsibility in financing the economy by gradually withdrawing the Central Bank (Boumghar M Y. (2009)) [19]. From 1990, only commercial banks can grant loans to economic agents. However, these credits are not subject to profitability and risk criteria.

Until the cancellation of the credit ceiling on the economy and rediscount rates by sector of activity, commercial banks were limited in their financing operations. The Bank of Algeria began to apply the funding program only from 1991 and this after removing these constraints. In 1992, the capping of commercial banks' credit operations was canceled, which caused an increase in domestic credits leading to an increase in liquidity, thus slowing the smooth running of the credit channel.

Prior to the 1990s, Algerian interest rates were stable at low levels with negative real values. By adding monetary and economic factors, this led during this period to an unstable financial situation (Benziane R. and Chkebek A. (2016)) [20]. For this, the monetary authorities have started a process of gradual liberalization of interest rates in order to adapt

them to the existing economic conditions by setting positive real interest rates through the application of interest rates. nominal savings, as well as encouraging savings to provide financing for investments.

During the period of liberalization of interest rates, Algeria had to acquire means allowing it the cash flow. The transition to positive real interest rates from 1997 continued between 1998 and 1999. This resulted in a positive impact on the financing conditions of the economy. However, and on the other hand, interest rates had to fall to allow economic recovery. In fact, the transmission of director rates at market rates gives a pull to monetary policy through credit, savings or wealth. Higher market rates increase the cost of credit reducing the demand for credit [21].

Since 2004, the rediscount rate has stopped signaling the direction of monetary policy and has been replaced by the liquidity recovery, whose rates have been set at low levels so as not to discourage credit. High liquidity and capital controls put downward pressure on interest rates [22].

The liquidity of the banking system exploded during the oil boom years. The dollar product of hydrocarbon exports was transferred by law to the Bank of Algeria, which resulted in continuous liquidity injections into the banking system [23]. Banks no longer need financing, the Bank of Algeria has had to resort to term deposits and reserve requirements to contain the growth of liquidity.

Following the oil price drop in 2014, the excess liquidity of the banking system evaporated, implying that banks' ability to absorb the new public debt without crowding out the private sector has become more limited. In other words, increasing government borrowing has reduced lendable funds to the private sector, resulting in negative repercussions on private sector investment and growth [24].

4. Research Methodology and Data

According to Walsh (2003) [25], the use of VAR models to estimate the impact of monetary policy on the economy was initiated by Sims (1972) [26]. Lütkepohl and Krätzig (2004) [27] argue that VAR models are an appropriate model class for describing the process of generating data from a set of low or moderate time series variables. In these models, all the variables are often considered to be a priori endogenous, and a rich dynamic is taken into account. Restrictions are usually imposed with statistical techniques instead of previous beliefs based on uncertain theoretical considerations. The results of the VAR models are generally analyzed using the Granger causality test, the response functions and the decomposition of the error variances. Using these techniques, practitioners using VAR models have achieved results that make economic sense.

Regarding the case of Algeria, we will use the Real Gross Domestic Product (PIBR) as a variable representing economic activity. In terms of financial sector variables and more specifically the instruments used by the monetary authorities to finance economic activity, we have broad money in real terms (M2R) as a measure of the size of the

sector because it represents the liquidity needed for financing economic activity. Although the rediscount rate is the direct instrument of monetary policy, we cannot consider it as an explanatory variable for the financing of the economy since the monetary authorities have not always used this policy rate to guide the monetary policy. However, the interbank money market rate (INT), although not a political variable per se, could be used as an appropriate indicator of monetary policy since it reflects the actions of the Central Bank (Amarasekara C. (2008)) [28]. Finally, credit to the economy in real terms (CREDITR) will be used as a measure of financial depth and banking development (Levine R. (1997)).

The data come from the Bank of Algeria and the ONS. We used quarterly data covering the period from the first quarter of 1990 to the last quarter of 2017.

5. Data Analysis and Interpretation of Results

Enhanced Dickey-Fuller (ADF) test procedures, applied to logarithmically transformed variables (represented by the letter L preceding the name of the variable), rejected the unit root null hypothesis for all variables. So, they are not stationary in level. On the other hand, the first differences have a stationary behavior (table 1). We conclude that all series are integrated of order one I (1).

The non-stationarity of the variables in level implies conducting the econometric estimations in a multivariate framework. In this case, two types of models are available to us, VECM models or VAR models. But before that we tried to determine the optimal number of lags which is, according to the different criteria, (01) (Table 2).

We then performed a cointegration test based on Johansen's approach using the Trace and Eigenvalue test, and found that there was at most one cointegrating relationship, which led us to apply an ECM model (table 3). However, by performing the stationarity test on the residues resulting from the long-term relationship, the results showed that the latter were not stationary (table 4) so, the application of an ECM was impossible, for this reason we opted for a VAR model.

The Granger causality test (Table 5) showed that the economic activity represented by the LPIBR variable is not caused by credits LCREDITR nor by the interest rate LINT. On the other hand, the real money supply LM2R causes LPIBR.

There are two schools of thought as to whether the variables used in the VAR need to be stationary. A school is opposed to differentiation even when the variables are I (1). Sims (1988) [29], Leeper, Sims and Zha(1996) [30], belong to this category and argue that differentiation adds value. The information and the standard asymptotic tests are still valid even if the VAR is estimated in levels. According to Bernanke and Mihov (1997) [31], the specification of the levels will give consistent estimates of the existence or not of cointegration, whereas a specification of the differences is inconsistent if certain variables are cointegrated. In

consideration of what has been preceded we therefore chose to work on an estimated VAR model in levels.

The response functions of the LPIBR show the weak effect exerted by financial variables on economic activity (Figure 3). A positive credit shock to the economy has a positive but very negligible effect on LPIBR (0.007), which falls in the second period to become negative in the tenth period but close to zero (-0.0002). Similarly for the interest rate which has a negative effect almost zero (even if it increases with time, it does not exceed -0.006 in the tenth period). On the other hand, we detect a more significant positive effect of the real money supply. A positive shock of LM2R causes an effect in the same direction equal to 0.01 during the first period and reaches 0.022 at the tenth period.

The decomposition of the error variance supports the results obtained previously (Figure 4). In fact, LPIBR explains its own variations at over 88% at the beginning of the period and reaches 72% in the tenth period. Credit has a very weak role in explaining LPIBR variations since it recorded a maximum rate of 2.92% at the beginning of the period. Weaker is still the share of explanation of the interest rate which, of a rate almost nil at the beginning of period, reaches just the 2.61%. There is, however, a larger and increasing role of M2R in explaining LPIBR variations, from 8.82% at the beginning of the period, this rate increases to 25.12% in the tenth period.

6. Conclusion

Like most economies, the Algerian economy has a multitude of variables that characterize the direction of monetary policy in shaping its policy of financing the economy. This study examined the effect of some of these variables on economic activity represented by real gross domestic product over the period 1990 to 2017 using quarterly data. The variables representing the financial instruments are: credit to the economy, the interest rate and the money supply in the broad sense.

The present study analyzed the results of an estimated VAR model in levels using Granger causality test, response functions, and the variance decomposition of the LPIBR series. The results obtained showed the negligible effect of credits and the interest rate on the gross domestic product. On the other hand, we recorded a more significant positive effect of the real money supply.

The modest contribution of the financial system to economic growth could be attributed to the following causes:

1. Monetary policy in Algeria is characterized by strong liquidity absorptions and leaks outside the banking system. In fact, the informal sector is estimated at between 30% and 40% of the economy, which limits the efficiency of the money supply channel.
2. Algerian capital markets are nascent and market capitalization represents less than 1% of GDP.
3. The lengthy administrative procedures added to subsidized bank loans made market financing unattractive, which has contributed to hampering the

development of financial markets.

4. Due to excess liquidity and the weak development of the financial system, the interest rate channel is also relatively weak. In addition to political decisions, capital controls and significant liquidity put downward pressure on interest rates so that some market rates remained negative in real terms.
5. Credit to the economy remains underdeveloped. The financial sector being dominated by state-owned banks, contributed to the lack of competition in the banking sector which resulted in inadequate access to finance.
6. Compared to other countries, the credits granted to the private sector, in particular to small and medium-sized enterprises (SMEs), are relatively small.

Appendix

Table 1. ADF test results at level and first difference.

Variables	ADF at level	Critical value	ADF test value at first difference	Critical value	Result
LCREDITR	-2.493		-10.202		I(1)
LINT	-2.214	-4.044	-7.049	-4.045	I(1)
LM2R	-2.453	-3.451	-9.185	-3.451	I(1)
LPIBR	-1.835	-3.151	-7.720	-3.151	I(1)

Table 2. Lag order selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-79.61795	NA	6.06e-05	1.639568	1.742508	1.681252
1	433.2717	975.4961*	3.56e-09*	-8.103367*	-7.588667*	-7.894947*
2	443.3174	18.31859	4.00e-09	-7.986616	-7.060155	-7.611460
3	451.0705	13.52998	4.72e-09	-7.824913	-6.486691	-7.283021
4	462.6511	19.30088	5.19e-09	-7.738256	-5.988274	-7.029629
5	472.6155	15.82581	5.90e-09	-7.619911	-5.458169	-6.744548
6	482.3854	14.75074	6.79e-09	-7.497754	-4.924251	-6.455655
7	487.6545	7.542035	8.58e-09	-7.287344	-4.302080	-6.078509
8	503.2852	21.14741	8.92e-09	-7.280102	-3.883079	-5.904532

* indicates lag order selected by the criterion

Table 3. Cointegration test.

Nul hypothesis	Trace	Prob.	Eigenvalue	Prob.
None*	49.75	0.03	31.51	0.01
At most 1	18.23	0.54	10.00	0.74
At most 2	8.23	0.44	7.53	0.42
At most 3	0.69	0.40	0.69	0.40

* denotes rejection of the hypothesis at the 0.05 level

Table 4. ADF test results of residus

Variables	ADF test	Critical values	Prob.
RESID	-3.326	-4.044415 -3.451568 -3.151211	0.671

Table 5. Granger Test Causality.

Null Hypothesis:	Obs	F-Statistic	Prob.
LINT does not Granger Cause LCREDITR	110	0.95667	0.3876
LCREDITR does not Granger Cause LINT		2.22839	0.1129
LM2R does not Granger Cause LCREDITR	110	3.19989	0.0449
LCREDITR does not Granger Cause LM2R		0.20146	0.8179
LPIBR does not Granger Cause LCREDITR	110	2.74458	0.0690
LCREDITR does not Granger Cause LPIBR		0.17468	0.8400
LM2R does not Granger Cause LINT	110	5.39655	0.0059
LINT does not Granger Cause LM2R		0.35268	0.7036
LPIBR does not Granger Cause LINT	110	4.43787	0.0142
LINT does not Granger Cause LPIBR		2.87573	0.0609
LPIBR does not Granger Cause LM2R	110	2.22716	0.1130
LM2R does not Granger Cause LPIBR		4.25417	0.0168

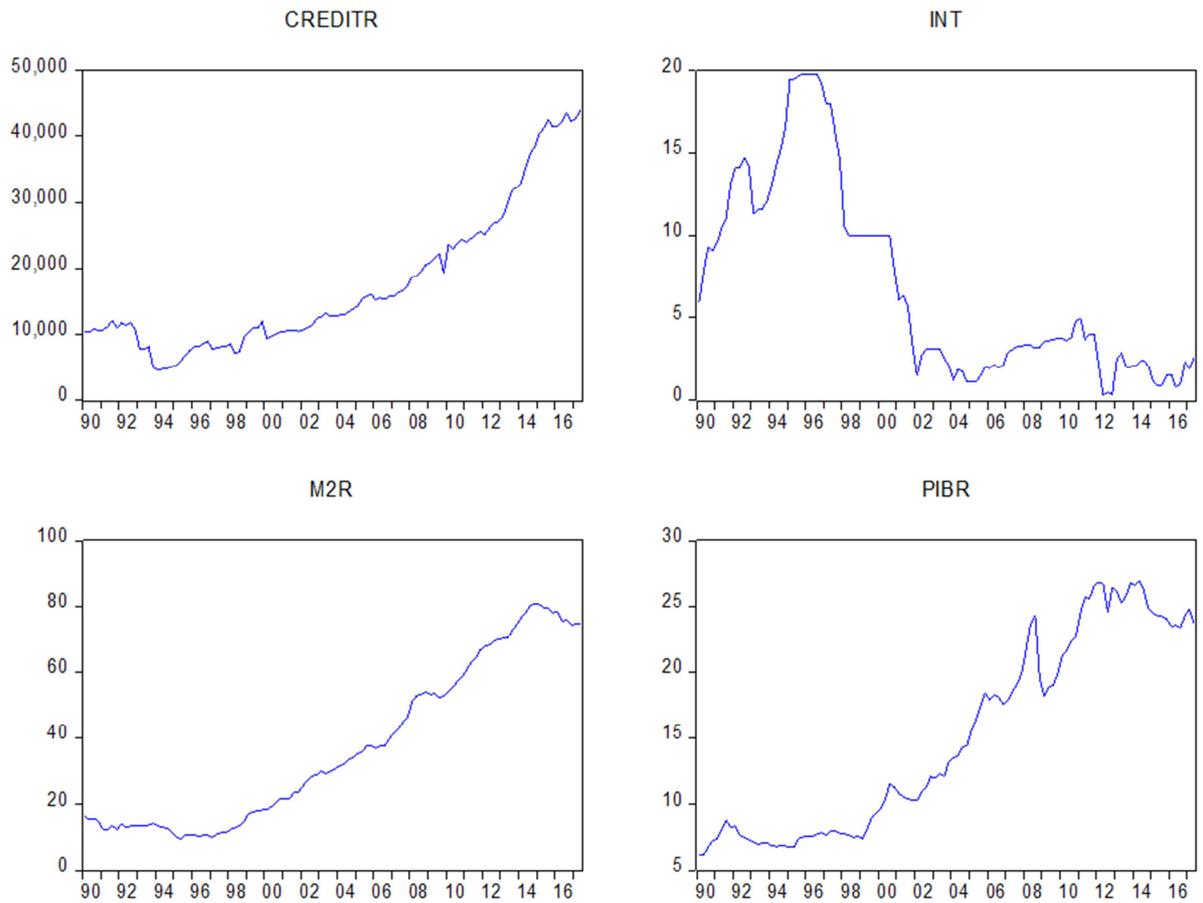


Figure 1. Raw series.

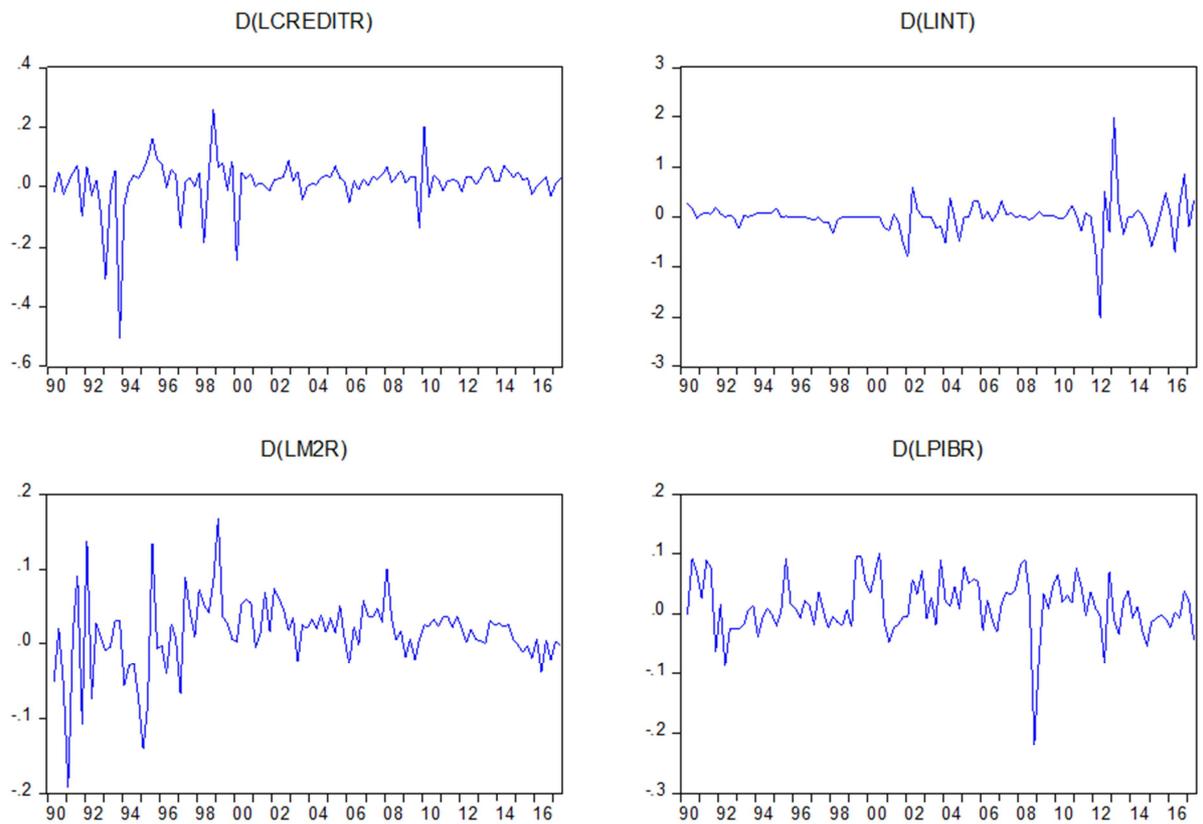


Figure 2. Stationary series.

Response to Cholesky One S.D. (d.f. adjusted) Innovations \pm 2 S.E

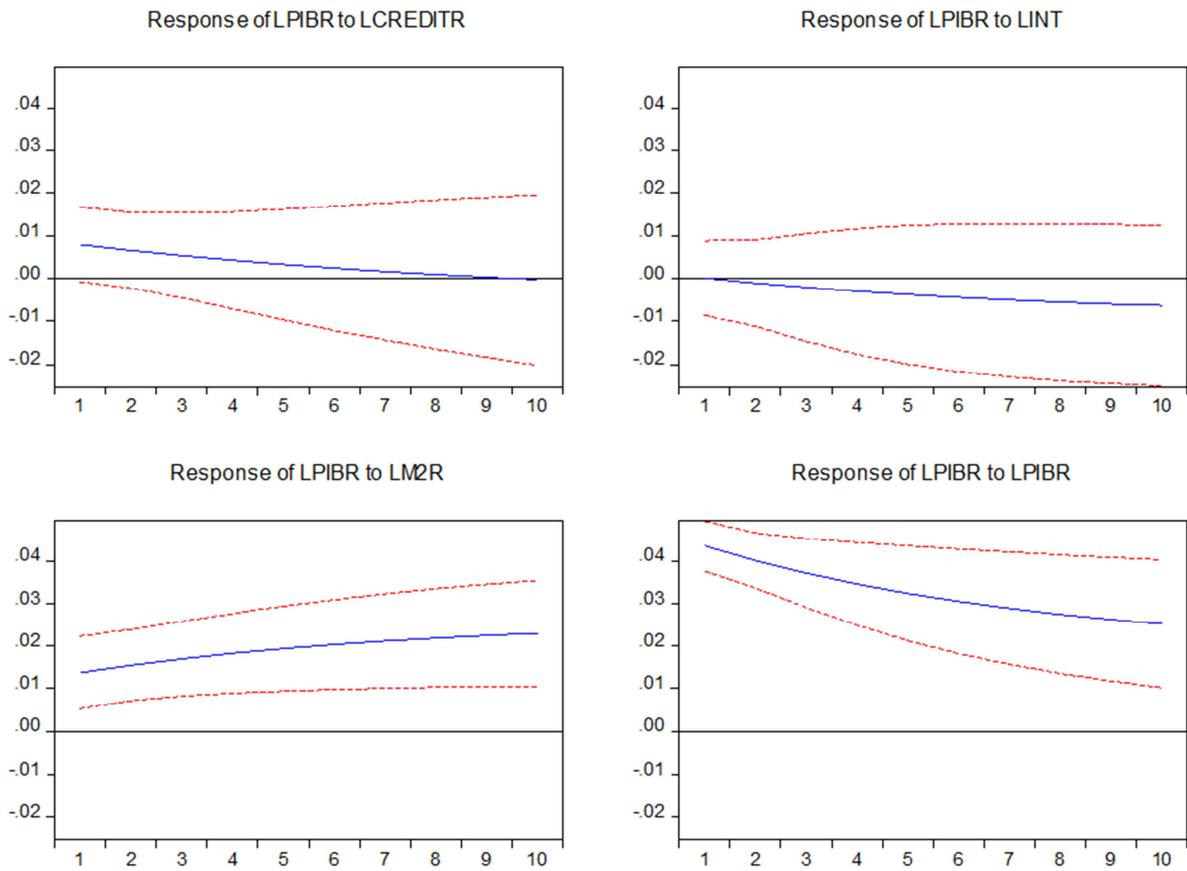


Figure 3. Response functions of LPIBR due to others variables.

Variance Decomposition using Cholesky (d.f. adjusted) Factors

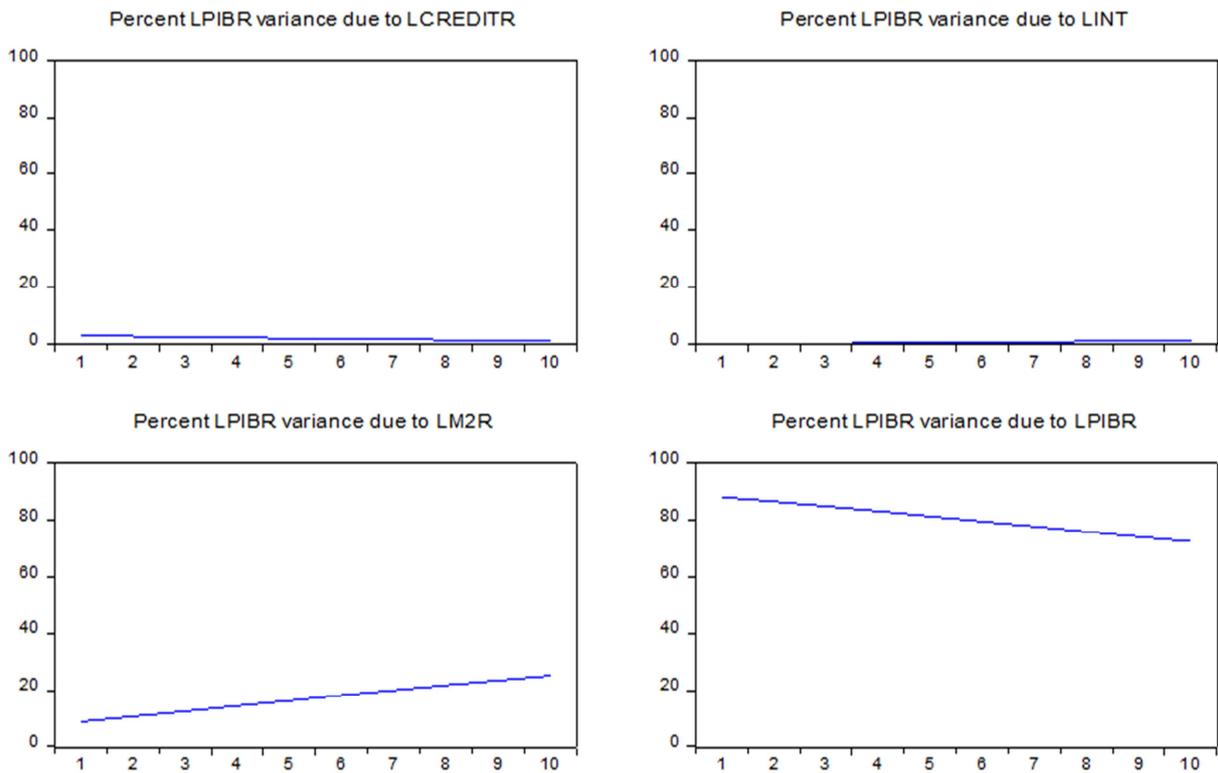


Figure 4. Variance decomposition of LPIBR due to others variables.

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