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Assessing the role of the credit channel in transmitting monetary policy impacts to the real sector in Algeria

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Abstract:
This study examines the role of monetary policy instruments in Algeria, with a focus on the credit channel as a transmission mechanism to the real economy. The primary objective is to examine how monetary policy shocks impact key macroeconomic variables, namely industrial production, inflation, and short-term credit, within a developing financial environment. The research hypothesizes that the credit channel constitutes the dominant pathway through which monetary impulses affect real activity. Using a Vector Autoregressive (VAR) model, the study analyses dynamic interactions among the money market rate (MMR), real exchange rate (RER), short-term credit (LSTC), consumer prices (LPCI), and industrial production (LIPI). The findings reveal that monetary policy shocks have a significant impact on real activity through the credit channel. At the same time, the exchange rate plays a secondary role, and consumer prices respond weakly due to structural rigidities. The results highlight the importance of strengthening financial intermediation to enhance the transmission efficiency of monetary policy. Policy recommendations include improving credit allocation toward productive sectors and reinforcing institutional frameworks to foster sustainable economic growth.

Keywords: monetary policy, credit channel, transmission mechanism, financial intermediation, real economy.
JEL Classification Codes : E44; E52; E58; C32

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تقييم دور قناة الائتمان في نقل تأثيرات السياسة النقدية إلى القطاع الحقيقي في الجزائر

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ملخص:

تتناول هذه الدراسة دور أدوات السياسة النقدية في الجزائر، مع التركيز على قناة الائتمان باعتبارها آليةً رئيسيةً لنقل آثار السياسة النقدية إلى الاقتصاد الحقيقي. يتمثل الهدف الأساسي في تحليل كيفية تأثير صدمات السياسة النقدية على المتغيرات الكلية الرئيسية، وهي الإنتاج الصناعي، والتضخم، والائتمان قصير الأجل، ضمن بيئة مالية نامية. وتنطلق الدراسة من فرضية مفادها أن قناة الائتمان تمثل المسار المهيمن الذي تنتقل من خلاله الصدمات النقدية إلى النشاط الاقتصادي الحقيقي. وقد اعتمد البحث على نموذج المتجه الذاتي الانحداري (*VAR*) لتحليل التفاعلات الديناميكية بين معدل سوق النقد (*MMR*)، وسعر الصرف الحقيقي (*RER*)، والائتمان قصير الأجل (*LSTC*)، ومستوى الأسعار الاستهلاكية (*LPCI*)، والإنتاج الصناعي (*LIPI*). أظهرت النتائج أن صدمات السياسة النقدية تؤثر بشكلٍ ملحوظٍ في النشاط الاقتصادي الحقيقي عبر قناة الائتمان، في حين يلعب سعر الصرف دوراً ثانوياً، وتبقى استجابة الأسعار الاستهلاكية محدودة بسبب القيود الهيكلية. وتؤكد النتائج أهمية تعزيز الوساطة المالية لرفع كفاءة انتقال آثار السياسة النقدية. وتوصي الدراسة بتحسين توجيه الائتمان نحو القطاعات الإنتاجية، وتعزيز الأطر المؤسسية لدعم النمو الاقتصادي المستدام.

الكلمات المفتاحية: السياسة النقدية؛ قناة الائتمان؛ آلية الانتقال؛ الوساطة المالية؛ الاقتصاد الحقيقي.

تصنيف JEL: E44؛ E52؛ E58؛ C32

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1. INTRODUCTION

In recent years, the study of monetary transmission mechanisms (MTMs) has gained increasing attention as economists strive to understand how monetary policy influences output and inflation dynamics. This issue is particularly relevant for developing economies, where growth trajectories are highly sensitive to both domestic policy orientations and external shocks. Despite a vast body of literature, no consensus has yet emerged regarding the dominant transmission channel to the real sector. Classical theory identifies two main conduits: the money channel, which operates primarily through interest rate adjustments, and the credit channel, reflecting the banking sector's ability to extend or restrict credit in response to policy actions. While the money channel functions effectively in advanced economies with developed financial markets, its influence is often limited in developing countries, where banking institutions dominate financial intermediation. In such environments, the credit channel often represents the most significant pathway through which monetary policy affects real economic activity. This observation is particularly significant in the case of Algeria, where the banking sector continues to play a central role in financing investment and consumption, while financial markets remain underdeveloped. Understanding the functioning of the credit channel in Algeria is therefore essential, not only for assessing the effectiveness of monetary policy but also for designing adequate instruments to support economic diversification and sustainable growth. In this context, the main research problem addressed in this study is formulated as follows: How does the credit channel influence the transmission of monetary policy in Algeria, and what are its effects on economic activity and inflation?

The primary objective of this study is to analyze the role of the credit channel as a transmission mechanism of monetary policy in Algeria. From a theoretical standpoint, the study aims to deepen the understanding of how monetary policy shocks affect key macroeconomic variables, such as output, inflation, and credit, through the financial intermediation process. On an empirical level, it assesses the dynamic effects of monetary policy through econometric analysis to determine whether credit acts as a significant conduit to real economic activity. The importance of this research lies in its contribution to the literature on monetary transmission in developing economies, providing empirical evidence on the Algerian context characterized by structural rigidities and a dominant banking system.

Methodologically, the study employs a Vector Autoregressive (VAR) framework to capture the dynamic interrelations among key variables, including the money market rate (MMR), real exchange rate (RER), short-term credit (LSTC), consumer prices (LPCI), and industrial production (LIPI). Impulse response functions and variance decomposition analyses are employed to evaluate the strength and direction of monetary shocks transmitted through the credit channel in comparison to other mechanisms.

The remainder of this paper is organized as follows. Section 2 provides a review

of the theoretical and empirical literature on monetary policy transmission mechanisms, with a particular emphasis on the credit channel. Section 3 outlines the methodological framework and data sources employed in the empirical analysis. Section 4 presents and discusses the main results, highlighting the dynamics of the credit channel in Algeria. Finally, Section 5 concludes the study with a summary of the key findings and policy recommendations aimed at enhancing the effectiveness of monetary policy transmission in the Algerian economy.

2. Literature Review

The debate on monetary policy transmission mechanisms was notably shaped by the symposium "The Monetary Transmission Mechanism" held in 1995, which provided a comprehensive framework for understanding how monetary actions influence the real economy. The discussions and research emerging from this symposium identified multiple channels through which monetary policy affects aggregate demand and output. According to Mishkin (1995), four principal channels have been traditionally recognized in the literature: the interest rate channel, the exchange rate channel, the asset price channel, and the credit channel. The first three represent the classical mechanisms emphasized in standard macroeconomic theory. In contrast, the credit channel introduces a complementary perspective by focusing on the role of financial intermediation and credit constraints in amplifying or dampening monetary effects. In addition to these well-established pathways, subsequent studies have explored alternative mechanisms such as the cost channel (Barth & Ramey, 2001), the signaling channel (Romer & Romer, 2000), and the mortgage refinancing channel (Wong, 2019), each contributing to a more nuanced understanding of how monetary policy propagates through modern financial systems.

2.1 The Interest Rate Channel or Money View

The interest rate channel is traditionally regarded as the most fundamental and influential pathway through which monetary policy affects real economic activity. A contractionary monetary action, such as an increase in short-term interest rates, typically leads to an upward shift in long-term rates, as explained by the expectations hypothesis of the term structure. Since prices are often rigid in the short run, this adjustment results in a rise in real interest rates. The higher cost of capital discourages both investment by firms and durable consumption by households, ultimately causing a decline in aggregate demand, output, and price levels. According to Mishkin (1995), the interest rate channel has been the central analytical framework for studying monetary transmission for more than half a century. Rooted in Keynesian theory, this mechanism is embedded in the IS–LM model developed by Hicks (1937), where monetary tightening raises interest rates, thereby contracting investment and output. However, conventional macroeconomic models, such as the IS–LM model, have been criticized for their inability to fully capture the complex interactions between financial conditions and real variables. This limitation, described by Bernanke and Gertler (1995) as a "black box," paved the way for the development of alternative frameworks, particularly those that emphasize the role of credit markets in amplifying the effects of monetary policy.

2.2 The Credit Channel or Credit View

In contrast to the traditional channels, particularly the interest rate channel, the credit channel affirms that financial markets do not take perfect information into consideration, as there are significant imperfections in them, which end up by interfering in the transmission of monetary policy and amplifying its effects for the economy. By considering the existence of these imperfections in the analysis of monetary transmission mechanisms, the credit view produces consistent results with reality, unlike traditional models. The latter provide incoherent and distorted findings by ignoring the existence of incomplete information (Bernanke and Gertler, 1995). Furthermore, Peek and Rosengreen (2013) argue that the credit channel, taking into account the existence of imperfections in the market, is a much more exhaustive transmission mechanism than the traditional ones. Although the traditional interest rate channel for the transmission of monetary policy remains intact, the credit channel has become more credible over the past two decades due to its increased effectiveness in enhancing the impact of monetary policy on the economy.

To clarify how central bank actions alter the external financing premium and, consequently, conditions for negotiating and supplying credit and their effects on the real economy, credit channel analysis is divided into two channels: the broad credit channel or balance sheet channel, and the narrow channel or the bank-lending channel.

The bank-lending channel explains how tighter refinancing conditions constrain banks' liquidity, which in turn limits their ability to supply credit and expand money creation. A reduction in credit availability slows down economic activity by restricting corporate investment and household consumption. As argued by Bernanke and Blinder (1988), open market operations that reduce banks' access to liquid resources act as a key mechanism through which monetary policy influences the supply of bank loans and, consequently, overall credit market dynamics.

The broad credit channel, also known as the balance sheet channel, extends the analysis by incorporating the concept of the financial accelerator. This view emphasizes how the financial strength of households and firms conditions the effect of monetary policy, with nominal policy shocks altering the external finance premium. Fluctuations in interest rates reshape balance sheet structures and directly affect the external finance premium. When interest rates rise, the impact is especially severe for highly indebted private agents already facing solvency pressures. In such contexts, the contractionary effects of monetary policy on firms' repayment capacity (captured by the interest rate channel) and on the cost of capital (illustrated by Tobin's Q) are amplified by a rise in the risk premium charged by banks that banks impose on new borrowers. Furthermore, shifts in financial market behavior, driven by changes in risk perception, can amplify these effects and reinforce the transmission of monetary policy.

2.3 The Credit Channel Monetary Policy Analyses

Extensive research has focused on exploring the credit channel and its implications for the transmission of monetary policy to the real economy. These studies have aimed to address the limitations of the conventional monetary channels

and shed light on the specific role of credit in this transmission process.

Bernanke and Blinder (1992) conducted a systematic statistical analysis of the effects of financial variables on real economic activity. They find that the federal funds rate has greater predictive power for real economic variables than monetary aggregates such as M1 or M2. They argue that changes in the federal funds rate signal shifts in monetary policy. The federal funds rate, according to their analysis, is not just an indicator of future real activity, as proposed by Real Business Cycle theorists, but also a measure of monetary policy pressure. To substantiate this claim, the authors first test a reaction function, demonstrating that the federal funds rate is actively adjusted by monetary authorities in response to changes in unemployment and inflation. Second, they show that the rate is relatively insensitive to variations in the demand for bank reserves, suggesting that its fluctuations stem from deliberate actions by the central bank. Using the federal funds rate as an indicator of monetary policy, the authors then examine how key components of bank balance sheets respond to monetary tightening, defined as an increase in the federal funds rate. Impulse response functions reveal that monetary contractions lead to a decline in deposits and securities holdings within six months, while loans remain relatively stable in the short term. However, over a two-year horizon, loans decrease to the same extent as deposits, whereas securities holdings return to their original levels. This distortion in bank assets cannot be explained by the "money view" framework, highlighting the significance of the banking channel in the transmission of monetary policy.

Kashyap, Stein, and Wilcox (1992) provide empirical evidence supporting the credit channel. They define a variable, referred to as MIX, which is the ratio of bank credit to the sum of bank credit and commercial paper. Their analysis shows that the MIX variable decreases during periods of monetary tightening, indicating that bank credit declines more significantly than commercial paper issuance. This observation implies that external financing for firms is not neutral. Furthermore, the MIX variable is significant in firms' investment equations, demonstrating that access to credit can constrain investment. The intensity of monetary policy is represented by dummy variables corresponding to dates of monetary tightening, as identified in Romer and Romer's (1989) study.

Curdia and Woodford (2010) identify specific conditions for the effective operation of the credit channel. First, firms must exhibit a reliance on external financing, particularly bank credit in the case of the narrow credit channel, reflecting the limited substitutability between securities and loans. Second, banks must be sensitive to their refinancing conditions with the central bank, with restricted access to alternative sources of funding in broader financial markets. Finally, the primary activity of banks should be credit provision, with minimal contributions to the economy through other forms of receivable's financing. These conditions underscore the critical role of the banking sector in amplifying the transmission of monetary policy through the credit channel.

Auer, Bernardini, and Cecioni (2021) conducted a comprehensive study examining the credit channel of monetary policy within the Eurozone, using data from

22 manufacturing industries across 7 Eurozone nations. Leveraging high-frequency monetary surprises data from Jarociski and Karadi (2020), the study found that business leverage significantly influences the effectiveness of monetary policy. Higher business leverage amplifies the impact of monetary policy changes on borrowing costs and investment decisions, underscoring the importance of considering leverage levels in understanding the transmission mechanisms of monetary policy. A key finding of the study was that business leverage, which refers to the ratio of a company's debt to its equity, plays a significant role in determining the effectiveness of monetary policy. When businesses have higher levels of leverage, changes in monetary policy have a more pronounced impact on their borrowing costs and investment decisions.

2.4 The General Context of Credit Channel in Algeria:

The credit channel in Algeria has been the subject of increasing academic interest, given the central role of bank intermediation in financing the economy and the persistent challenges of monetary policy effectiveness. However, empirical findings remain mixed, reflecting both structural rigidities and the evolving role of financial institutions. Naamaoui and Yousfat (2021) analysed the monetary transmission through the credit channel for the period 2000–2020, focusing on the relationship between money supply, inflation, and sectoral credit allocation. Their results confirm the existence of a credit channel, particularly through loans to the private sector, which acts as a conduit for monetary impulses toward inflation dynamics. However, they emphasize that its effectiveness depends on directing credit toward productive investment rather than non-productive uses. In contrast, Benamra (2020) finds limited evidence of an operative bank-lending channel during 2000–2018. Using a Structural VAR model, the study shows that while monetary shocks influenced liquidity and credit levels, their transmission to broader macroeconomic variables such as real GDP and inflation remained weak. This suggests that Algeria’s monetary policy framework has struggled to translate financial adjustments into sustained real sector impacts, highlighting structural bottlenecks in credit allocation and economic diversification.

Moreover, Farraj and Hassani (2022) examined the period 2005–2021 and provided a more nuanced view. Their findings suggest that the bank-lending channel plays a significant role in transmitting monetary policy to economic output, particularly through adjustments in required reserves that influence banking liquidity. However, the channel remains ineffective in stabilizing inflation, which continues to be driven by structural and supply-side constraints. Notably, during the COVID-19 crisis, reductions in reserve requirements successfully enhanced liquidity and supported output recovery, underscoring the channel’s countercyclical potential.

Taken together, these studies reveal that the credit channel in Algeria is partially effective, with stronger impacts on real activity than on price stability. Its effectiveness is conditional on both the structure of the banking system and the orientation of credit toward productive uses. This situates the current research within a context where the credit channel is increasingly important for stimulating growth, but still requires complementary reforms to strengthen its role in achieving broader monetary policy objectives.

3. Methodology

The methodology includes the epistemological stance, the method employed, as well as the data and variables used to measure the impact of monetary policy transmission mechanisms on the real sector.

3.1 Epistemological Stance

The epistemological stance legitimizes the creation of knowledge and underpins the validity of the research. Given the extensive body of literature on the impact of monetary policy transmission mechanisms on the real sector, this study adopts a hypothetico-deductive epistemological stance within a confirmatory approach, rooted in positivism. It tests predefined hypotheses on the causal relationships between monetary policy and macroeconomic variables using empirical data and econometric tools. It necessitates the formulation of hypotheses, including at least a central hypothesis. The central hypothesis, aligned with the quantitative theory of money, posits that monetary policy transmission mechanisms always have a significant impact on the real sector. This approach ensures objective, rigorous validation of theoretical expectations, aligning with the goal of understanding monetary policy transmission mechanisms in both short- and long-term dynamics.

3.2 Methodological Approach and Data

To conduct an adequate assessment of the said impacts, the data spans several months, from M1-2010 to M6-2020. These data were collected from the General Directorate of Forecasting and Policies of the Ministry of Finance, as well as the electronic database available on the Bank of Algeria website.

The empirical assessment of the credit channel requires a framework that links monetary policy decisions to real activity through the financial sector. In this study, short-term bank credit is selected as the central variable, reflecting its predominant role in financing productive investment in Algeria. The objective is to test whether fluctuations in credit, influenced by monetary policy instruments, transmit effectively to the real economy.

The econometric specification relies on a vector autoregressive (VAR) model, which allows for the dynamic interactions between monetary, financial, and real variables. Where the variables included in a vector autoregressive (VAR) model are as follows:

- **Short-term credit (STC):** reflecting the primary source of financing for capital expenditures.
- **Industrial Production Index (IPI):** serving as a key indicator of real economic activity.
- **Money Market Rate (MMR):** representing the cost of borrowing and the stance of monetary policy.
- **Real Exchange Rate (RER):** indicating the competitiveness of the economy in international markets.
- **Consumer Price Index (CPI):** used as a measure of inflationary pressure.
- The term **“ε_t”** represents the error, capturing unobserved factors and random disturbances.

All series are transformed into logarithms to stabilize variance and allow for elasticity-based interpretations, except for the interest rate and exchange rate, which remain in levels to preserve their economic significance

3.3 Ordering Strategy

In contrast to earlier work by Barran, Coudert, and Mojon (1995), which treated broad money (M2) as an independent transmission channel, this study, similar to Jmaï and Younsi (2017), excludes it due to the high statistical overlap between M2 and short-term credit. The correlation coefficient between the two exceeds 0.96 (see Appendix 1), suggesting near redundancy. By removing M2, the model avoids multicollinearity and focuses directly on credit dynamics. The assumed causal sequence is as follows:

1. **Interest rate (MMR):** treated as exogenous in the short run, reflecting central bank policy decisions.
2. **Real exchange rate (RER):** responds to monetary conditions and shapes the external environment.
3. **Short-term credit (STC):** adjusts according to liquidity conditions and financial intermediation.
4. **Inflation (CPI):** reflects delayed price responses to credit and exchange rate fluctuations.
5. **Industrial production Index (IPI):** final outcome of the transmission process, summarizing the combined effects of monetary and financial dynamics.

This configuration emphasizes the credit channel as the pivotal link between monetary policy instruments and real activity. By situating credit after financial variables (MMR, RER) and before price and output indicators (CPI, IPI), the model is designed to capture both the immediate and lagged effects of monetary policy on the real economy and economic growth through the banking sector.

4. Results And Discussion

This section presents the main empirical results obtained from the Vector Autoregressive (VAR) model. The analysis examines how monetary policy shocks affect key variables, including short-term credit, industrial production, and inflation, within the Algerian economy. The discussion focuses on the responsiveness of these variables and the effectiveness of the credit channel as a transmission mechanism, providing insights into the dynamic interaction between monetary policy and real economic activity.

4.1 Graphical Analysis of Raw Data

The graphical analysis of the time series provides a preliminary overview of their evolution and interdependence during the period 2010–2020, enabling an initial assessment of the dynamic relationships among monetary, financial, and real sector variables.

The graphical trends depicted in Figure 1 reveal strong interconnections between monetary policy, credit supply, and price dynamics over the period 2010–2020. The money market rate (MMR) fluctuated within a range of 1% to 5%, exhibiting distinct cycles of monetary tightening and easing. Peaks observed in 2016 and 2018

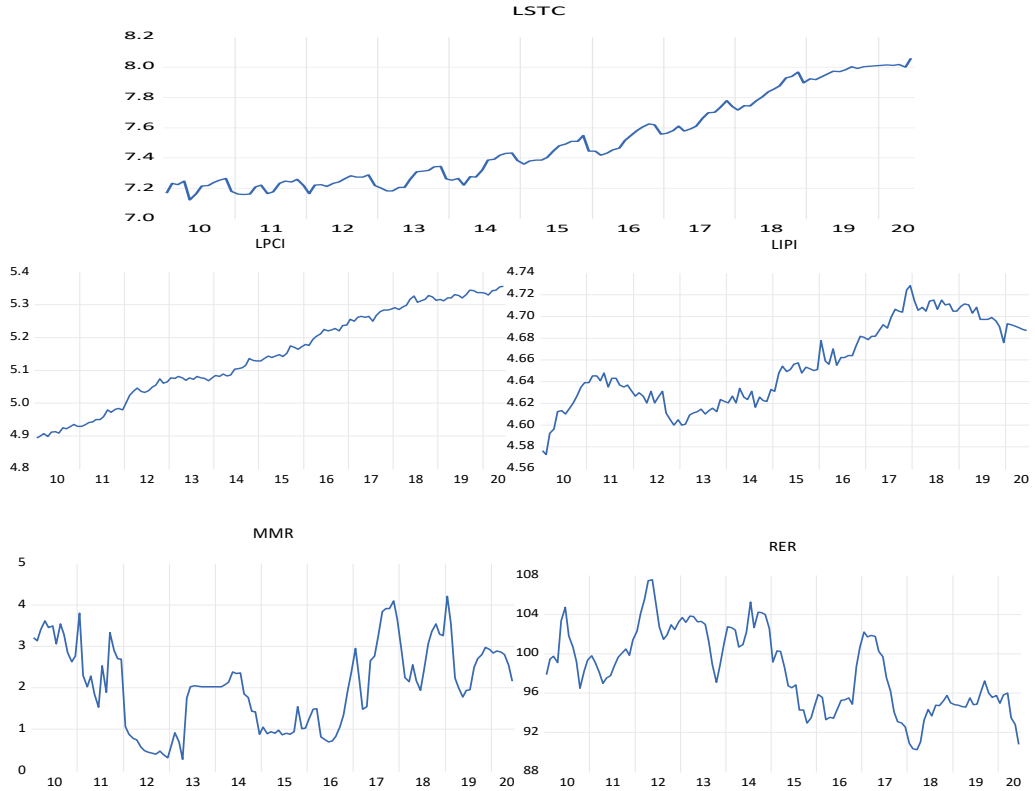
correspond to periods of restrictive monetary policy aimed at curbing inflationary pressures and stabilizing liquidity conditions. In contrast, the sharp decline recorded in 2020 reflects a deliberate easing stance adopted by the Bank of Algeria in response to the COVID-19 shock and the associated economic slowdown.

The real exchange rate (RER) demonstrates notable volatility throughout the sample period. An appreciation during the early years reduced export competitiveness and constrained industrial output, while the substantial depreciation in 2020, driven by global oil price shocks and exchange market adjustments, exacerbated imported inflation pressures. This pattern highlights the sensitivity of Algeria's external balance to exchange rate movements and its subsequent feedback on domestic price formation.

The short-term credit (LSTC) series displays a sustained upward trend, confirming its pivotal role in financing investment and operational activities across the productive sectors. However, its growth appears closely linked to changes in monetary conditions, particularly fluctuations in the MMR and the RER, indicating that bank credit expansion responds actively to both liquidity and external sector developments.

Concurrently, the consumer price index (LPCI) follows a persistent upward trajectory, signalling enduring inflationary pressures throughout the decade. This trend reflects the combined effects of monetary expansion, exchange rate depreciation, and underlying structural rigidities within domestic supply chains. Overall, the graphical patterns summarized in Figure 1 suggest that the credit channel acts as a crucial conduit in transmitting monetary policy impulses to the real economy. At the same time, inflation dynamics continue to be influenced by both financial conditions and external shocks.

Fig.1. Trends in Monetary, Credit, and Price Indicators in Algeria, 2010–2020.



Source: Our estimation using EViews 13 software.

4.2 Var Lag Selection Order Criteria

The results in Table 1 show that both the Schwarz Information Criterion (SC) and the Hannan–Quinn Information Criterion (HQ) favor a single lag, whereas the Final Prediction Error (FPE) and the Akaike Information Criterion (AIC) suggest slightly higher lag orders, which could lead to over-parameterization. Considering the monthly frequency of the data and the need for a parsimonious specification, a VAR(1) model was retained for the analysis.

The model can be mathematically expressed as follow:

$$Y_t = A + BY_{t-1} + \varepsilon_t \quad (01)$$

Where Y_t= (MMR, RER, LSTC, LPCI, LINV) ^{T} represents the vector of the five core variables in the analysis, A represents the vector of intercepts for each equation, while B is a 5×5 matrix capturing the effects of the first lag of all variables on the current period values. The error vector ε_t denotes the vector of innovations specific to each equation, which will later be analyzed through impulse response and variance decomposition.

Table 1: Lag Length Selection Criteria Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	79.11194	NA	2.04e-07	-1.214950	-1.100031	-1.168273
1	823.8831	1416.286	1.53e-12	-13.01448	-12.32496*	-12.73442*
2	852.3718	51.84000	1.45e-12	-13.07167*	-11.80756	-12.55823
3	865.9738	23.63642*	1.76e-12	-12.88482	-11.04611	-12.13799
4	876.9724	18.21078	2.23e-12*	-12.65529	-10.24199	-11.67508

(*) indicates the lag order selected by each criterion at the 5% level.

Source: Our estimation using EViews 13 software.

4.3 Stationarity and Cointegration Test Results

To examine the time-series properties of the variables, the Augmented Dickey-Fuller (ADF) unit root test was employed using the specification with an intercept and no deterministic trend. The test was conducted for each variable both in level and in first-difference form. As reported in Table 1 below, the null hypothesis of a unit root (non-stationarity) cannot be rejected when the variables are in levels. However, it is strongly rejected at the 1% level of significance after first differencing.

Table 2: Results of Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Level		First difference	
	t-Statistic	Prob.	t-Statistic	Prob.
MMR	-1.289178	0.627231	-6.847***	0.0000
RER	-1.141833	0.798231	-4.211***	0.0010
LSTC	-1.945337	0.629135	-5.603***	0.0000
LPCI	-1.946286	0.661568	-5.604***	0.0000
LIPI	-2.347040	0.417519	-6.871***	0.0010
*** denotes rejection of the hypothesis at the 0.01 level				

Source: Our estimation using EViews 13 software.

These results indicate that all series are integrated of order one, I (1), and become stationary after a single differencing. The graphical inspection of the first-differenced series (Appendix 2) further confirms the absence of trend and the constancy of variance over time. Consequently, the data exhibit no unit root problem after first

differencing, which validates their use in the estimation of the VAR model and the analysis of long-run relationships among the variables. Then, performing a cointegration test is necessary to establish a long-run relationship.

Unrestricted Cointegration Rank Tests (Trace and Max-Eigenvalue) presented in table 3 indicate no evidence of long-term cointegration at the 5% significance level. This implies the absence of a stable long-run equilibrium among the variables, justifying the use of a VAR model in first differences rather than a VECM.

Table 3 : Cointegration test results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	Prob.**
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.171788	57.18205	69.81889	0.3319
At most 1	0.118393	33.99823	47.85613	0.5019
At most 2	0.085337	18.49913	29.79707	0.5294
At most 3	0.032865	7.527528	15.49471	0.5172
At most 4	0.027400	3.417259	3.841465	0.0645
Trace test indicates no cointegration at the 0.05 level				
* Denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Max-eigenvalue)				
Hypothesized		Max-Eigen	0.05	Prob.**
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.171788	23.18382	33.87687	0.5165
At most 1	0.118393	15.49910	27.58434	0.7078
At most 2	0.085337	10.97160	21.13162	0.6502
At most 3	0.032865	4.110269	14.26460	0.8475
At most 4	0.027400	3.417259	3.841465	0.0645
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* Denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Our estimation using EViews 13 software.

4.4 Short-Run Dynamics and Granger Causality Test

Regarding results presented in appendix 3, the block exogeneity Wald tests for the first-differenced variables suggest weak short-term causal relationships between the monetary policy and macroeconomic variables. For the money market rate (MMR1), no significant effects are observed from the real exchange rate (RER1), short-term credit (LSTC1), the price consumption index (LPCI1), or the investment index (LIPI1), as indicated by the high p-values across the board (all exceeding 0.05). Similarly, the real exchange rate (RER1) is not significantly influenced by any of the other variables, with all p-values being well above the critical threshold. However, short-term credit (LSTC1) shows a significant causal relationship with both the real exchange rate (RER1, p=0.0103) and the price consumption index (LPCI1, p=0.0002), with the overall joint test confirming a strong significance (p=0.0005). This implies that monetary policy, through its influence on the exchange rate and inflation expectations, has a notable impact on short-term credit dynamics. Conversely, the Price Consumption Index (LPCI1) and the production index (LIPI1) exhibit minimal

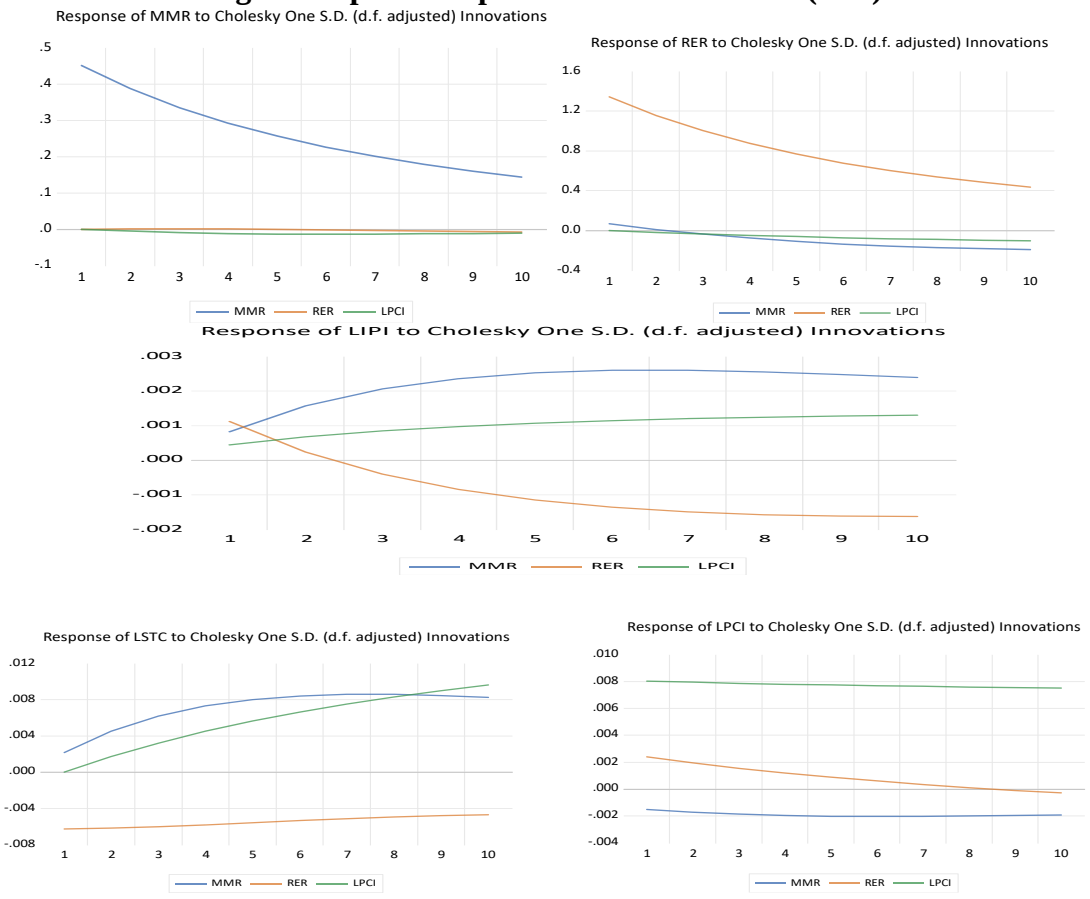
influence from the other variables, with p-values consistently above 0.05, suggesting limited short-term causal relationships. This further reinforces the absence of strong long-term relationships, indicating that monetary policy impacts are largely confined to specific channels, particularly in the short-term credit market, rather than across the broader economy.

These findings suggest that while the variables lack a long-term equilibrium relationship, short-term dynamics are present, particularly through the influence of real exchange rate and price consumption index in influencing short-term credit behavior. This suggests that policymakers should focus on addressing exchange rate volatility and inflationary pressures to manage short-term credit fluctuations effectively.

4.5 Impulse Response Functions Results

Given the previous results from the cointegration tests, which revealed no long-term equilibrium relationships among the variables, and the first-difference causality tests that highlighted significant short-term interactions, particularly between the real exchange rate (RER) and short-term credit (LSTC), it would be pertinent to conduct an impulse response analysis to examine how these variables react to monetary policy shocks. Such an analysis would provide a deeper understanding of how monetary shocks propagate through the economic system, quantifying the magnitude and persistence of short-term effects, as well as the transmission mechanisms, particularly in the credit and exchange rate channels. This would offer valuable insights for assessing the effectiveness of monetary policy interventions and their immediate impact on the economy.

Fig.2. : Impulse Response Functions results (IRF)



Source: Our estimation using EViews 13 software.

Impulse response functions (IRF) presented in figure 2 illustrate the short-term propagation of monetary shocks:

- **Response of MMR (Money Market Rate):** The IRF for the MMR highlights the immediate and significant positive reaction of the money market rate to a monetary policy shock. This response gradually diminishes over the 10 periods, reflecting a typical short-term effect of liquidity adjustments. Given the lack of long-term cointegration relationships, this finding aligns with the expectation that monetary policy influences the MMR predominantly through short-term channels. The rapid decline of the response underscores the transient nature of monetary policy's impact on this variable, which is likely mediated by the operational framework of Algeria's monetary system.
- **Response of RER (Real Exchange Rate):** The RER demonstrates a pronounced and immediate positive response to shocks, followed by a gradual return toward neutrality over time. This behaviour supports the causality test findings, which highlighted significant short-term interactions between RER and LSTC. The sharp initial reaction of the RER suggests a strong exchange rate channel in transmitting monetary policy shocks. However, the persistence of this effect -though moderate- indicates potential rigidities in the exchange rate adjustment process, likely tied to Algeria's reliance on hydrocarbon exports and limited flexibility in the foreign exchange market. This underscores the importance of external factors in amplifying short-term monetary shocks.
- **Response of LSTC (Short-Term Credit):** The IRF for LSTC reveals a progressive positive response over time, with the effect intensifying after an initial lag. This finding complements the causality test results, highlighting significant short-term linkages between LSTC and RER. The delayed but sustained increase in LSTC suggests that monetary policy shocks propagate through the credit channel in Algeria, albeit with a lag. This could be attributed to the structural characteristics of the banking sector, where credit allocation mechanisms may be slower to adjust. Furthermore, the correlation with RER dynamics implies that exchange rate fluctuations could be indirectly influencing credit conditions in the short term.
- **Response of LIPI (Industrial Production Index):** The muted and brief response of the LIPI to shocks indicates that Algeria's industrial production is relatively insulated from short-term monetary policy influences. This aligns with the cointegration test results, suggesting no long-term equilibrium ties between production and monetary variables. The industrial sector's limited sensitivity to monetary shocks could be explained by structural factors, such as its heavy reliance on public investment or the dominant role of the oil and gas sector, which may not directly respond to short-term financial dynamics.

Response of LPCI (Private Consumption Index): The LPCI shows a small negative response in the initial periods, followed by a gradual return to equilibrium. This muted reaction suggests that private consumption in Algeria is relatively inelastic to monetary policy shocks. This aligns with structural characteristics such as the

rigidity of household consumption patterns and the limited penetration of financial products in Algeria. The weak responsiveness also points to potential constraints in the monetary policy transmission mechanism, as private consumption may not serve as a primary channel for the propagation of monetary shocks.

4.6 Variance Decomposition

While impulse response functions provide insights into the time-path of responses to shocks, variance decomposition complements this by quantifying the relative contribution of each variable's shocks to the forecast error variance of other variables over time. Results presented in Appendix 4 will deepen our understanding of how shocks propagate through the Algerian economy and provide a quantitative assessment of the importance of various transmission channels, offering actionable insights for policymakers.

- The decomposition of MMR shows that its variance is initially self-driven, accounting for 100% in the first period. Over time, its variance contribution declines slightly, reaching 97.72% by Period 10. Short-term credit (LSTC) emerges as the most significant external contributor, accounting for 1.82% of the variance by Period 10. The influence of LIPI (0.28%) and LPCI (0.15%) remains marginal. These results suggest that Algeria's monetary policy operates autonomously, with limited feedback from the broader economy. However, the increasing role of LSTC underscores the growing significance of the credit channel in monetary policy transmission.

- The RER is predominantly self-driven, with 99.76% of its variance in Period 1 explained by its own innovations. By Period 10, this decreases to 92.99%, with MMR contributing 2.20% and LIPI accounting for 3.91%. The weak influence of MMR indicates limited interaction between monetary policy and exchange rate dynamics, likely due to Algeria's managed exchange rate regime and limited foreign exchange market flexibility. These findings suggest that the exchange rate channel is underdeveloped in Algeria, reducing the responsiveness of the RER to monetary policy interventions.

- Short-term credit is primarily self-driven in the initial periods, with 95.99% of its variance explained by its own shocks in Period 1. However, by Period 10, MMR accounts for 8.84% of the variance, indicating a significant role of monetary policy in influencing credit availability. The contributions of RER (4.96%) and LPCI (6.69%) are smaller but noteworthy. The growing influence of MMR highlights the importance of the credit channel in Algeria's monetary transmission. This channel can be further strengthened by enhancing the efficiency of financial intermediation and ensuring adequate credit flows to productive sectors.

- The LPCI is primarily self-explanatory in the initial periods, with 88.81% of its variance explained by its own shocks in Period 1. By Period 10, this slightly increases to 91.07%. The influence of MMR remains limited at 5.57%, reflecting the relatively weak role of monetary policy in directly affecting price dynamics. Contributions from RER (2.24%) and LIPI (1.00%) remain marginal. These results indicate a limited transmission of monetary policy to inflation dynamics, likely due to Algeria's

structural rigidities, including high reliance on imports, administrative price controls, and an underdeveloped financial market. Moreover, the dominance of LPCI's own variance suggests that domestic price trends are primarily driven by supply-side factors rather than demand-side monetary policy shocks.

- Industrial production Index shows increasing sensitivity to monetary policy over time. While 95.46% of its variance is self-driven in Period 1, this decreases to 69.55% by Period 10. MMR explains 19.73% of the variance by Period 10, making it the most significant external contributor. The role of RER grows moderately, accounting for 5.89%, indicating potential effects of external competitiveness on industrial output. The significant influence of MMR on LIPI highlights the importance of the MMR as a key channel for monetary policy transmission. Supporting industrial production through targeted credit policies and monetary interventions can have substantial effects on economic growth and recovery.

4.7 Role of Monetary Policy Instruments in Algeria

The empirical analysis, combining IRFs and variance decomposition, reveals that Algeria's monetary policy instruments exert differentiated effects across macroeconomic variables. The monetary policy rate (MMR) emerges as the most influential lever, significantly shaping short-term credit and industrial production, thereby confirming the importance of the credit channel as a key mechanism through which policy shocks affect the real economy. The exchange rate (RER), although relatively stable in the short run, demonstrates moderate effects in the medium to long term, reflecting Algeria's managed exchange rate regime. Short-term credit (LSTC) is strongly responsive to monetary policy impulses, highlighting its pivotal role in channelling liquidity towards economic activity. Conversely, consumer prices (LPCI) exhibit limited sensitivity to monetary shocks, suggesting that inflation dynamics are primarily driven by structural and supply-side factors. Finally, industrial production (LIPI) shows increasing responsiveness to MMR over time, underscoring the efficiency of monetary policy in promoting real activity through the banking sector.

Table 6 presents a summary of the role of policy instruments in our empirical analysis, as derived from the impulse response functions. **"+"** indicates a positive response, **"–"** a negative response, and **"0"** a negligible or no response. An asterisk **(*)** denotes statistical significance, based on the impulse response significance and/or when the Money Market Rate (MMR) explains approximately 8% or more of the variance at period 10.

Table 6: Role of the policy instruments

Horizon \ Response	MMR	RER	LSTC	LPCI	LIPI
Short-term	+*	+*	0	–	0
Medium-term	+*	+	+*	0	+*
Long-term	0	+	+*	+	+*

Source: Our estimation using EViews 13 software.

- **Policy Implications :**

- The MMR is the most influential instrument, particularly through the credit channel, affecting short-term credit and industrial activity. The RER channel is underdeveloped due to exchange rate rigidity, limiting monetary transmission.
- Price dynamics (LPCI) are largely insulated from policy shocks, emphasizing the need for structural reforms alongside monetary interventions.
- Strengthening credit allocation, industrial diversification, and exchange rate management can enhance the effectiveness of monetary policy in Algeria.

5. CONCLUSION

This study set out to assess the role of the credit channel in transmitting monetary policy shocks to Algeria's real sector over the period 2010–2020. Using a VAR framework, the analysis provides clear evidence that credit plays a non-negligible role in the transmission process. The results show that short-term bank credit reacts significantly to monetary policy shocks, influencing both industrial production and inflation. In the short term, the availability of credit emerges as the main lever through which policy decisions affect economic activity, while in the long run, exchange rate adjustments complement the transmission by shaping external competitiveness and price dynamics.

These findings highlight two important aspects. First, the predominance of the banking sector in Algeria implies that the effectiveness of monetary policy continues to depend heavily on the credit channel. Second, the incomplete development of financial markets and structural rigidities in the banking sector limit the full potential of this mechanism. As a result, while the credit channel can serve as a reliable conduit for transmitting monetary impulses, its impact remains somewhat constrained and uneven across macroeconomic variables.

From a policy perspective, the study underscores the importance of reinforcing the institutional and operational environment of the Algerian banking sector. Strengthening credit intermediation, improving risk assessment practices, and deepening financial inclusion would enhance the responsiveness of credit to monetary policy signals. Furthermore, a more effective coordination between monetary policy and structural reforms could improve the allocation of credit towards productive sectors, thereby maximizing its contribution to sustainable economic growth.

In conclusion, the evidence suggests that the credit channel represents a central, though not exclusive, transmission mechanism in Algeria. Enhancing its efficiency will be crucial for the Bank of Algeria to design and implement a monetary policy framework capable of stabilizing inflation, stimulating real sector activity, and supporting long-term economic development.

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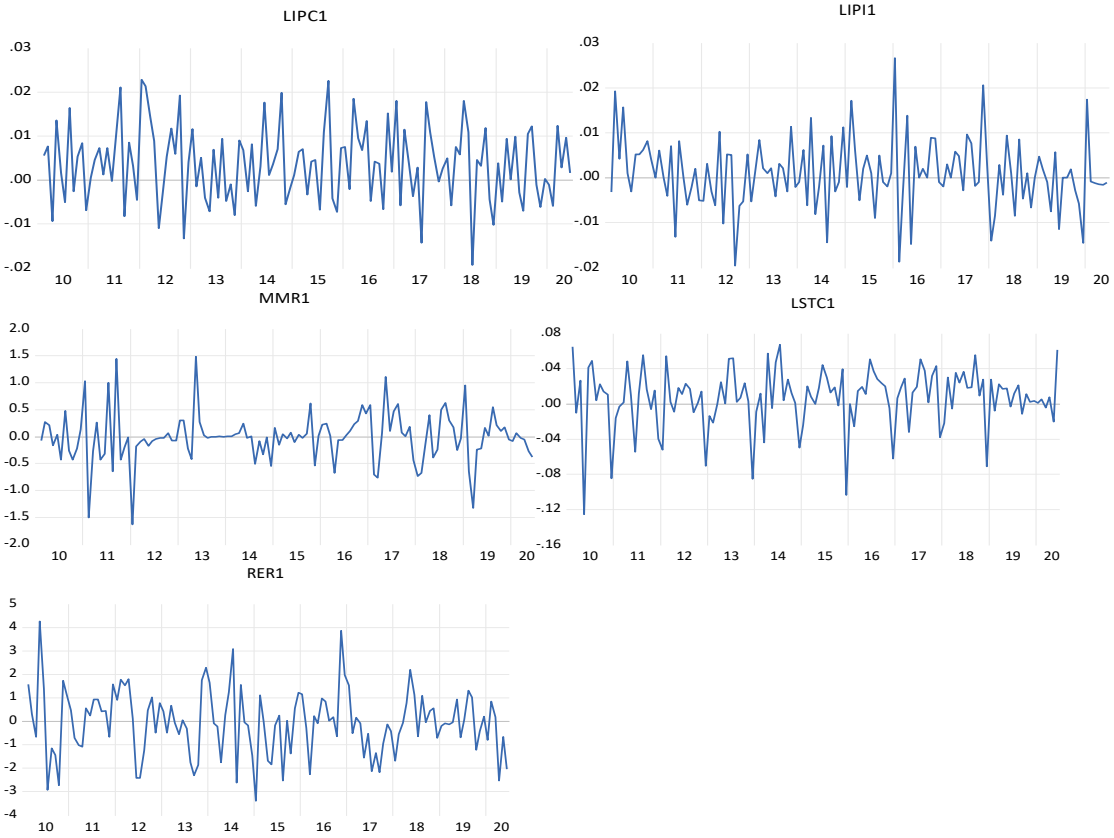
7. Appendices

Appendix 1 : Correlation structure

	LIPC	LIPI	LM2	LSTC	MMR	RER
LIPC	1					
LIPI	0.76185	1				
LM2	0.96754	0.787940	1			
LSTC	0.629991	0.6745383	0.756162	1		
MMR	0.1217076	0.3616393	-0.007561	0.335799	1	
RER	-0.60586	-0.7193077	-0.539381	-0.6855707	-0.297867	1

Appendix 2: Graph of stationary series 1st difference



Appendix 3 : Results of Granger Causality Test

Dependent variable: MMR1				**Dependent variable: LSTC1**			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
RER1	0.012078	1	0.9125	MMR1	2.671186	1	0.1022
LSTC1	0.220944	1	0.6383	RER1	6.579377	1	0.0103
LPCI1	0.161324	1	0.6879	LPCI1	14.14503	1	0.0002
LIPI1	0.348353	1	0.5550	LIPI1	2.224483	1	0.1358
All	0.714400	4	0.9495	All	20.04394	4	0.0005
Dependent variable: RER1				**Dependent variable: LPCI1**			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
MMR1	0.079799	1	0.7776	MMR1	0.000482	1	0.9825
LSTC1	0.016661	1	0.8973	RER1	0.003436	1	0.9533
LPCI1	0.059946	1	0.8066	LSTC1	0.319055	1	0.5722
LIPI1	0.801334	1	0.3707	LIPI1	1.768574	1	0.1836
All	1.010402	4	0.9082	All	2.291310	4	0.6824
Dependent variable: LIPI1							
Excluded	Chi-sq	df	Prob.				
MMR1	1.763347	1	0.1842				
RER1	2.853219	1	0.0912				
LSTC1	0.914122	1	0.3390				
LPCI1	0.007079	1	0.9329				
All	5.209293	4	0.2665				

Appendix 4 : Variance decomposition of variables

Variance Decomposition of MMR:						
Period	S.E.	MMR	RER	LSTC	LPCI	LIPI
1	0.450319	100.0000	0.000000	0.000000	0.000000	0.000000

2	0.594017	99.90315	0.000603	0.067836	0.009419	0.018995
3	0.682642	99.71525	0.000863	0.204908	0.026918	0.052059
4	0.743497	99.46766	0.000756	0.391847	0.048647	0.091088
5	0.787667	99.18458	0.000850	0.611916	0.071646	0.131007
6	0.820903	98.88414	0.001842	0.851313	0.093797	0.168911
7	0.846573	98.57951	0.004312	1.099105	0.113718	0.203352
8	0.866804	98.28000	0.008625	1.346952	0.130618	0.233810
9	0.883007	97.99186	0.014925	1.588733	0.144172	0.260306
10	0.896156	97.71912	0.023173	1.820158	0.154392	0.283154
Variance Decomposition of RER:						
Period	S.E.	MMR	RER	LSTC	LPCI	LIPI
1	1.345591	0.240484	99.75952	0.000000	0.000000	0.000000
2	1.776168	0.142286	99.68900	0.005302	0.010102	0.153312
3	2.043943	0.137852	99.34806	0.018336	0.035335	0.460416
4	2.230791	0.230768	98.77814	0.039105	0.076905	0.875080
5	2.369859	0.415160	98.02522	0.066836	0.135062	1.357719
6	2.478171	0.678670	97.13552	0.100258	0.209297	1.876260
7	2.565526	1.005380	96.15213	0.137869	0.298578	2.406046
8	2.637953	1.378254	95.11292	0.178152	0.401560	2.929113
9	2.699339	1.780900	94.04949	0.219718	0.516758	3.433138
10	2.752281	2.198684	92.98695	0.261388	0.642684	3.910297
Variance Decomposition of LSTC:						
Period	S.E.	MMR	RER	LSTC	LPCI	LIPI
1	0.033030	0.430812	3.583585	95.98560	0.000000	0.000000
2	0.044621	1.270152	3.878886	94.69669	0.149796	0.004474
3	0.052462	2.313353	4.117270	93.07708	0.484221	0.008081
4	0.058383	3.436481	4.309469	91.25767	0.987642	0.008742
5	0.063114	4.555143	4.465698	89.32773	1.643778	0.007648
6	0.067034	5.615394	4.594732	87.34564	2.436756	0.007473
7	0.070367	6.585419	4.703655	85.34813	3.351497	0.011294
8	0.073260	7.448836	4.797960	83.35745	4.373770	0.021983
9	0.075814	8.199649	4.881786	81.38654	5.490107	0.041922
10	0.078103	8.838619	4.958187	79.44260	6.687694	0.072900
Variance Decomposition of LPCI:						
Period	S.E.	MMR	RER	LSTC	LPCI	LIPI
1	0.008522	3.163227	7.844014	0.178420	88.81434	0.000000
2	0.011943	3.699219	6.656152	0.147603	89.47321	0.023819
3	0.014514	4.166648	5.655444	0.118487	89.98319	0.076231
4	0.016647	4.559671	4.820568	0.093949	90.37174	0.154075
5	0.018503	4.878853	4.130656	0.076056	90.66002	0.254420
6	0.020165	5.128555	3.566230	0.066144	90.86453	0.374538
7	0.021683	5.315177	3.109651	0.064935	90.99836	0.511876
8	0.023087	5.446012	2.745246	0.072653	91.07204	0.664048
9	0.024400	5.528509	2.459282	0.089145	91.09424	0.828827
10	0.025637	5.569839	2.239835	0.113984	91.07220	1.004146
Variance Decomposition of LIPI:						
Period	S.E.	MMR	RER	LSTC	LPCI	LIPI
1	0.007299	1.275008	2.327705	0.569026	0.365541	95.46272
2	0.009568	3.445747	1.413042	0.370057	0.705531	94.06562
3	0.011038	6.076034	1.192925	0.280916	1.114100	91.33603
4	0.012149	8.791472	1.469160	0.266138	1.560004	87.91323
5	0.013059	11.35174	2.053004	0.295097	2.020859	84.27930
6	0.013835	13.63481	2.797820	0.345738	2.483216	80.73842
7	0.014513	15.59953	3.603317	0.404069	2.940319	77.45276
8	0.015112	17.25124	4.407129	0.462118	3.389621	74.48989
9	0.015645	18.61773	5.173824	0.515872	3.830894	71.86168
10	0.016123	19.73504	5.885527	0.563699	4.265010	69.55072
Cholesky One S.D. (d.f. adjusted) Innovations						
Cholesky ordering: MMR RER LSTC LPCI LIPI						