Evaluating the Impact of Monetary Policy on the Growth economic of Algeria – A Structural VECM approach for the period 1980-2017

تقييم اثر السياسة النقدية على النمو الاقتصادي في الجزائر بإستخدام نموذج
الانحدار الذاتي الهيكلي نموذج SVECM

Benazza ikram

University Of Tlemcen,(Algeria), Ikram.benazza@univ–tlemcen.dz, Laboratory Mifma

Abstract:

This study examines the impact of monetary policy on economic growth in Algeria.using time-series data covering the period of 1980 to 2017 .

The study has employed the (SVECM) model ,We conduct the experiment using three alternative policy instruments : broad money (M2), Discount Rate ,and the real effective exchange rate (REER).Inlation Rate (INF)**.**

The results showed that the control of money supply in the Algerian economy is the most influential tool to convey the effects of monetary policy.Which mean that monetary policy has a relative effectiveness in targeting economic growth and inflation through a flexible steering of quantitative instruments, as Liquidity Coverage Ratio ,that directly affect on Money supply.

Keywords: Impact; Monetary Policy; Economic Growth; SVECM**;** Algeria.

JELClassificationCodes: E52,F43,C50,

ملخص:

تهدف هذه الدراسة إلى اختبار اثر السياسة النقدية في تحقيق النمو الاقتصادي في الجزائر   خلال فترة 1980–2017 ذلك باستخدام نموذج متجهات تصحيح الخطأ الهيكلي بإدخال معدل الخصم و العرض النقدي و سعر الصرف و معدل التضخم كمتغيرات تمثل السياسة النقدية.

و تشير النتائج إلى أن التحكم في العرض النقدي في الاقتصاد الجزائري هي الأداة الأكثر نفوذا إلى آثار السياسة النقدية و بتالي يمكن الحديث عن وجود فعالية نسبية تساهم في تحقيق النمو الاقتصادي

---

[1] *Corresponding author: BENAZZA ikram, **e-mail:**benazza.ikram@yahoo.fr.*

واستهداف التضخم من خلال إدارة مرنة للأدوات الكمية كنسب استرجاع السيولة و التي تؤثر بشكل مباشر على إجمالي النقد

كلمات مفتاحية: أثر، سياسة نقدية، نمو اقتصادي، SVECM،جزائر.

تصنيفات**JEL**: C50 ، F40، E52

1. INTRODUCTION

Monetary policy is one the most important economic policies that seek to achieve economic growth and proportional stability of prices, Which has made the effectiveness of monetary policy and its impact on economic growth the focus of many researchers on the theoretical and empirical levels, (Folawewo, A.Osinubi.2006 P93) stated monetary policy as the arrangements which are planned to control supply of money In many central banks throught regulate the development of the money supply according to objectives monetary policy such as price stability, or the revival of economic activity. In practice, some central banks monetary policy revolve around a single final objective price stability, or the revival of economic activity. of intermediate objectives (rules of change in the money supply) and instruments (rates interest).

The review of the economic literature highlights not only theoretically but also empirically, a debate on the relative effectiveness of these policies, as regulation of economic activity instruments As in the studies (Brunner,K .Meltzer,A 1964 P240); (Cagan 1956 P25) ; (FRIEDMAN, SCHWARTZ 1963 P1); (Sims.A 1972 P540) (Bernanke,S. Boivin,J. Eliasz ,P 2005).

the policy monetary in a developing economy like Algeria has made progress in changing its pre-reform banking system ,The April 1990 Law of Money and Credit provided a new legal and regulatory framework for the financial sector. Designed to support economic reforms undertaken since 1989, it constitutes the cornerstone of Algerian monetary and financial reform. It established greater independence for the Bank of Algeria (BA), Algeria's central bank, authorised private domestic and foreign banks, applied new and strengthened central bank regulations to commercial banks, created a stock market. The Law of Money and Credit 1990 has been modified, abandoning fixed-term mandates for the governor and vice-governors as of 20 April 2001 and thereby reducing the independence of monetary authorities – the BA- and the Council of Money and Credit. This resulted in the loss of more than a decade of monetary credibility by sustaining the impression that the government conducts monetary policy, even if indirectly. (AKACEM.K,2006 P115) .

Where monetary policy in Algeria was also characterized after the oil boom known as an expansionary fiscal policy, to develop growth; These policies were used in the frame of many development strategies and programs and based on large financial packages directed to stimulate the dynamics of economic sectors Such as: agriculture, industry and tourism. where the Algerian authorities set up five programs, from the economic recovery program 2000-2004 (to stimulate national institutions and market demand) to the growth support program 2005-2009 (to expand the infrastructures) in addition to the growth program known as the five-year plan covering the period 2010-2014 (for the diversification of the Algerian economy and stimulation of the national production machinery). The final strategy was in 2015 (The new plan for the growth of the green Algeria 2015- 2019).

This paper improves on previous studies by employing **a structural vector error correction (svecm)** to measure the effects of monetary policy on economic activity in Algeria

We ask the crucial question **what are the effects of monetary policy on the economy during the period from 1980 to 2017?**

The answers to this question has been highly idiosyncratic, depending on the structure of the economy under investigation, the approach being adopted, the choice of variables used and the identifying Short-long -run restrictions imposed on the models.

2. Literature Review :

Many studies have been presented on this matter of monetary policy and influence on economic growth. This issue has been discussing globally ,we have reviewed some of these studies to enlarge objectives in the framework of Algeria and moreover to analyze it to draw conclusions. (Bernanke,S. Mihov,I (1998)) seeked the impact of monetary policy using a semi-structural VAR to assess and measure the effects of monetary policy shocks on economic activity They concluded that the interest rate on the interbank market is a better indicator of monetary policy than the money supply and that it is difficult to have an indicator unanimous in evaluating monetary policy.

For middle-income economies, the empirical literature shows that monetary policy shocks have some modest effects on economic parameters. (Ganev, Krisztina 2002) for example, studied the effects of monetary shocks in ten Central and Eastern European (CEE) countries and find no evidence that suggests that changes in interest rates affect output, but find some indication that changes in the exchange rate does. In the same spirit,

(Starr, M.2005) using an SVAR model with orthogonalized identification find little evidence of real effects of monetary policy in five Common wealth of Independent States (CIS) with the notable exception that interest rate have a significant impact on output in Russia.

(Sousa.J, Zaghini.A 2007) the paper analyzed a global monetary aggregate, namely the sum of the key monetary aggregates of the G5 economies (US, Euro area, Japan, UK, and Canada),and its indicator properties for global output and inflation. Using a structural VAR approach and quarterly data over the period from 1980 Q1 to 2001 Q4 , and they found that after a monetary policy shock output declines temporarily, with the downward effect reaching a peak within the second year, and the global monetary aggregate drops significantly. In addition, the price level rises permanently in response to a positive shock to the global liquidity aggregate.

(Chuku A. 2009) estimated the variables of monetary policy with three alternative policy instruments broad money (M2), Minimum Rediscount Rate (MRR) and the real effective exchange rate (REER). Using an SVAR model to trace the effects of monetary policy shocks on output and prices in Nigeria He found that the manipulation of the quantity of money (M2) in the economy is the most influential instrument for monetary policy and he concluded that the impact of monetary policy innovations carried out on the quantity-based nominal anchor (M2) has modest effects on output and prices with a very fast speed of adjustment. While, innovations on the price-based nominal anchors (MRR and REER) have neutral and fleeting effects on output . **(Forgha, 2016**) tested empirically the impact of key monetary policy variables on the economic growth in the CEMAC zone from the period of 1981 to 2015. using the Vector Auto-regressive (VAR) analytical technique. the study reveals that key monetary policy variables influence economic growth of the CEMAC zone in different ways with inflation rate as the impact factor . They concluded that lending and inflation rate generated substantial destabilizing impacts on the economic growth.

The idiosyncratic evidence (inconsistent with theretical expectationsis) like study of (Rafiq,M. Mallick ,S 2008) finds in developed countries like United States and some other European countries there is evidence of the usefulness of monetary policy on real economic parameters, on the other hand in developing economies like Pakistan the indication is weak and full of "puzzles". returned from different investigations in different countries is what economist usually refer to as "puzzles". The

three most common puzzles identified in the literature are; the liquidity puzzle, the price puzzle and the exchange rate puzzle. The liquidity puzzle is a finding that an increase in monetary aggregates is accompanied by an increase (rather than a decrease) in interest rates. While the price puzzle is the finding that contractionary monetary policy through positive innovations in the interest rate seems to lead to an increase (rather than a decrease) in prices. And yet, the most common in open economies is the exchange rate puzzle, which is a finding that an increase in interest rate is associated with depreciation (rather than appreciation) of the local currency (Ismail O.Fasanya 2013) In contemporary studies, researchers have devised convenient ways of eradicating these puzzles. Most of them now follow the framework set by (Lucas. R,1972) , who recommended the incorporation of rational expectations in the studies of the effects of monetary policy. Some recent investigations that follow this approach include (Kahn. M,Kandel.S,Sarig.O 2002); (Berument.H, Dincer, N.2008); (Zhang.2009) And (Siami.S .2018) examined the effects of monetary policy shocks and oil price shocks on the real economy. using the factor augmented vector autoregressive (FAVAR) approach and compare the results with the vector auto-regression (VAR) model by using Iran quarterly data for the period 1988: Q2 to 2011: Q3. The results of FAVAR models are consistent with theory and better than VAR models. VAR models show the existence of price and liquidity puzzles while FAVAR models did not provide any evidence of puzzles.

(Qazi G.M,Haque.Z 2015) proposed a DSGE model for the USA economy consisting four types of agents: households, firms, financial intermediaries and a monetary to examine Monetary Shocks and Bank Intermediation in a Dynamic Stochastic General Equilibrium Model using quarterly data from 1960(1) to 2012(2) the result show that the banking sector plays an important role in the monetary transmission mechanism and money is injected into the model through financial intermediaries. and positive monetary shock reduces interest rates and stimulates economic activity, which is called the liquidity effect.

(Ouglissi .2018) (proposed a DSGE model for the Algerian economy consists of seven economic agents the households, domestic goods firms, , the oil exporting firms, a government, a central bank, the producer of intermediate goods, the producer of final goods, the importer. to measure the effectiveness of monetary policy in Algeria as it is conducted by the Central Bank during period 2000-2015. The results indicate that monetary policy in Algeria has not participated in economic activity. This is due,

according to this study, to the excess liquidity situation experienced by the Algerian banking system and to the dependence of economic activity on imports

(Oziengbe.S,Edore,J .2019) tested the long- run asymmetry effects of monetary policy shocks on economic grouwth in Nigeria. Using nonlinear autoregressive distributed lag (NARDL) approach to cointegration and error correction modeling in Nigeria. during period from 1981-2016. The study found asymmetric relationship between the variables in the short run, as positive change in broad money growth affects economic growth positively and significantly, while negative change has negative, sizable and significant effect on economic growth. The study also found no significant effect of positive change in broad money growth on economic growth in the long run. Negative change in broad money growth positively and significantly affects economic growth in the long run they concluded that growth in government financial consumption expenditure positively affects economic growth in the short- and long-run, the results are not similar to the study of (Olayiwola, A. Ogun,T 2019) who found that the impact of negative shock on output was more significant than that of positive shock in the short run, while the reverse was the case in the long run in Nigeria.

3.Methods and Materials:

3.1 Econometric framework and estimations:

In our study we start by first specifying a priori expectation of our model. We follow the arguments set out in IS-LM model which assumes a priori, that expansionary monetary policy reduces interest rates, depreciates the real exchange rate and increase prices, money supply and the level of real output (Rafiq,M. Mallick ,S 2008). To observe the effects of monetary policy innovations in Algeria we adopt **the structural vector error correction (svecm)** approach with a recursively-orthogonalized identifying restriction to take care of the underlying assumptions we make., including simple recursive frameworks, "contemporaneous" restrictions (on the matrix relating structural shocks to VAR disturbances), short and long run restrictions (on the shape of impulse responses at long horizons), (Chibi.A , Benbouziane.M 2010 P13) we follow The approach in this research model based on the specifications of the structural model approach vector Autoregressions (SVAR) initiated by Bernanke & Mihov (1998) to model the short term, as well as Blancard & Quah (1989) for the long-term (TEGUH SUGIARTO 2015). model refined in the ensuing literature by Christiano et al. (1999) and implemented by Starr (2005).AND We estimate a reduced form VAR and identify monetary-policy innovations

through specification about variable ordering. Specifically, the reduced form VAR is thus: $X_t = \sum_{i=0}^{m} A_i X_{t-1} + \cup_t$

Where **Xt** is the vector of endogenous variables

$\cup_t$ Represents the vector of the structural residues

A is a square matrix n * n of main diameter elements are equal to 1; **m** is the vector of lags that determines the number of delays in The model.

In order to examine the effect of Monetary policy on economic growth, we estimate the following Equation using logarithmic form to minimize seasonal effect for the analysis purpose

$$X_t = \text{LGDP}_t . \text{LDR}_t . \text{LREER} . \text{LBM2}_t . \text{LINF}_t .$$
$$\cup_t = \left[\cup_t^{\text{LGDP}} . \cup_t^{\text{LDR}} . \cup_t^{\text{LREER}} . \cup_t^{\text{LBM2}} . \cup_t^{\text{LINF}} \right].$$

In order to identify structural shocks, a transition matrix P should be formed which achieves the following relationship $\cup_t = p. e_t$

By specifying the transition matrix parameters by:

Write the equal $\cup_t = p. e_t$ as follows $A_0 \cup_t = B. e_t$

Where $P = A^{-1} + B$

The restrictions placed on the contemporaneous relationships Confirmation of some non-diagonal elements for matrices A and B, depending on some economic indications, to assume that one of the residues does not affect the other in the same year (that is, this element will take a value of 0 On the other hand, when measuring the effect, the value of the element αij is given as economic constraints by giving it a value of 1.

Taking into consideration the state of the Algerian economy, the distinction between the short and long term.

3.2- Description of data: The data sets used for this analysis is the annual series of the selected relevant macroeconomic variables from 1980 to 2017. The choice of this period is to enable us focus strictly on the monetary reforms of market-regime in Algeria. The data for reel exchange rate and inflation rate supply money BM2- discount rate, will be used as monetary policy variables. Data for GDP gross domestic product will be used as economic growth variable. The data were obtained from the World Bank, using logarithmic form in order to minimize seasonal effect for the analysis purpose.

3.3 Model specification: After a brief overview of the empirical literature and the theoretical and adaptation foundations of a structural linear dynamic model, it is possible to specify our empirical model in order to resolve our problem. -The main steps of an Svecm model are:

• Unit root test variables must be I(0), I(1) or a mixture of both.

• Estimating the VAR model after determining the lag lengths.
• Estimating the SVECM model after placing structural matrix Constraints.
• Extraction of structural impulse response functions and variance decomposition Before estimating SVAR model we must estimate structural matrices to transform VAR errors into uncorrelated structural shocks.

Restrictions on A and B (short run matrices) and F (long run matrices) take the form of assumptions about the structure of contemporaneous feedback of variables in the SVAR and assumptions about the correlation structure of the errors, respectively Because we are also interested in the answer to the research question about the most influential monetary policy variable, we estimate the SVECM model including four popular measures of monetary policy

- Specifically, our assumption of short run implies that monetary policy shocks affect GDP Through the broad money and reel exchange rate tool
- The exchange rate is affected and responds to all possible shocks It occurs in study variables.

In total, the system consists of the following 5 equations:

- $\mu_t^{LGDP_t} = b_{11} + a_{13}e_t^{LREER} + a_{14}e_t^{LBM2}.\mu_t^{LGDP\ shock}$
- $\mu_t^{LDR} = b_{22} + a_{23}e_t^{LREER}.\mu_t^{LDR\ shock}$
- $\mu_t^{LREER} = a_{31}e_t^{LGDP} + a_{32}e_t^{LDR} + b_{33} + a_{34}e_t^{lBM2} + a_{35}e_t^{linf}.\mu_t^{LREER\ shock}$
- $\mu_t^{LBM2} = a_{41}e_t^{LGDP}b_{44} + a_{45}e_t^{linf}.\mu_t^{LBM2\ shock}$
- $\mu_t^{linf} = a_{51}e_t^{LGDP} + b_{55}.\mu_t^{linf\ shock}$

. MATRIX A - B

$$
\begin{array}{|ccccc|}
\text{LGDP} & \text{LGDP} & \text{LDR} & \text{LREER} & \text{LBM2} & \text{LINF} \\
1 & 0 & a_{13} & a_{14} & 0 \\
0 & 1 & a_{23} & 0 & 0 \\
a_{31} & a_{32} & 1 & a_{34} & a_{35} \\
a_{41} & 0 & 0 & 1 & a_{45} \\
a_{51} & 0 & 0 & 0 & 1
\end{array}
\begin{vmatrix}
e_{1t}^{LGDP} \\
e_{1t}^{LDR} \\
e_{1t}^{LREER} \\
e_{1t}^{LBM2} \\
e_{1t}^{linf}
\end{vmatrix}
\begin{bmatrix}
\mu_{1t}^{LGDP\ shock} \\
\mu_{2t}^{LDR\ shock} \\
\mu_{3t}^{LREER\ shock} \\
\mu_{4t}^{LBM2\ shock} \\
\mu_{5t}^{linf\ shock}
\end{bmatrix}
$$

he Source: Prepared by researchers

To determine the impact of monetary policy shocks in the long run, we can write the matrix f, which determines shocks between variables within the model in the long run**.** we estimate the following equations

$$y_t = A^{-1}C(L)Y_t + A^{-1}B\mu_t$$
$$y_t = [I - A^{-1}C(L)]^{-1}A^{-1}B\mu_t$$

$\mu_t^{LGDP} = b_{11} + a_{12}e_t^{LDR} + a_{13}e_t^{LREER} + a_{14}e_t^{LBM2} + a_{15}e_t^{linf}.\mu_t^{LGDP\ shock}$

$- \mu_t^{LDR} = a_{21}e_t^{LGDP} + b_{22} + a_{23}e_t^{LREER} + a_{24}e_t^{LBM2} + a_{25}e_t^{linf}.\mu_t^{LDR\ shock}$

$- \mu_t^{LREER} = a_{31}e_t^{LGDP} + a_{32}e_t^{LDR} + b_{33} + a_{34}e_t^{LBM2} + a_{35}e_t^{linf}.\mu_t^{LREER\ shock}$

$- \mu_t^{LBM2} = a41 e_t^{LGDP} + a42 e_t^{LDR} + a43 e_t^{LREER} + b_{44} + a_{45} e_t^{linf} . \mu_t^{LBM2\ shock}$

$- \mu_t^{linf} = a_{51} e_t^{LGDP} + a_{52} e_t^{LDR} + a_{53} e_t^{LREER} + a_{54} e_t^{LBM2} b_{55} . \mu_t^{linf\ shock}$

MATRIX F

LGDP	LDR	LREER	LBM2	LINF		LGDP	LDR	LREER	LBM2	LINF
a_{11}	a_{12}	a_{13}	a_{14}	a_{15}		1	NA	NA	NA	NA
a_{21}	a_{22}	a_{23}	a_{24}	a_{25}		NA	1	NA	NA	NA
a_{31}	a_{32}	a_{33}	a_{34}	a_{35}		NA	NA	1	NA	NA
a_{41}	a_{42}	a_{43}	a_{44}	a_{45}		NA	NA	NA	1	NA
a_{51}	a_{52}	a_{53}	a_{54}	a_{55}		NA	NA	NA	NA	1

Source: Prepared by researchers

Note: We have developed Restrictions, taking into account the theoretical aspects of monetary policy and the surrounding economic conditions in the Algerian economy and its structural changes, with the commitment of the central bank clarified by adopting a simple and predictable monetary policy rule.The results of the matrix long-and short run are shown in the table (4)

4.Results and discussion:

4.1 Stationarity of time series (Unit Root test): In order to examine the stationarity of time series ,we have used the ADF and PP test , The results of the ADF and PP tests indicate the probability of calculated values is greater than the critical value (0.05) for all variables and therefore we accept null hypothesis h0, which states the existence of a unit root in all time series. After the same test all variables possess unit roots and became stationary only after we transformed them to their first differences. so they are integrated of order 1

4.2 Lag Selection of var : the table (1) determine the lag lenght order obtained throught unrestricted vector autoregressive (VAR) via:Schwartz Creteria(SC),Akaike Information Creteria(AIC) and Hannan Quinn Creteria(HQ), and throught the creterion values,the lag lenght order is(1).

4.3 Cointegration test: According to Granger, the cointegration test is used to test the long equilibrium relationships between several variables (Regis. B , 2003) .So we will test the equilibrium relationship between GDP, INF, DR, REER BM2. This presence equilibrium relationship between these variables is often verified through statistical procedures, the most used are those which Engle and Granger (1987) and Johansen (1988, 1991). According to the Dickey Fuller stationarity test performed on our various pre-selected variables, they are all integrated of order 1 that's mean, they are all I (1). This justifies the use of cointegration test Engle and Granger. The estimates are presented in the tables 02:

The test results, we show that all variables, are cointegrated at the 5% level. The null hypothesis of no cointegration is rejected because the trace test five (5)cointegration equation r=5

4.4 Model Stability Test: the Figure 1 presents the inverse roots of the AR characteristic polynomial associated with the different lag orders specified by the selection criteria

the results indicate that the estimated model fulfilled the conditions of stability as all Coefficients are smaller than one (VAR satisfies the stability condition) and all the roots lie inside the circle, Which means, the model not suffering of Serial Correlation and Heteroskedasticity problems**.**

4.5 impulse responses and variance decomposition:

Figure 02 : shows panels of impulse response graphs indicating how innovations in respective monetary policy variables affect gdp and inflation in Algeria over a 20 period Each panel illustrates the response of the non-policy variable to a one standard deviation innovation (corresponding to a positive shock) in the policy variable.

Panel B of Figure 1 shows the response of GDP to an expansionary shock in DR one standard deviation. Here, GDP rises quickly and significantly within the first three Period, but quickly decreases by 0.03% in the long run and then stabilizes at the new level. Then This response is consistent with our a priori expectation as presented in the traditional Keynesian IS-LM

In practical terms we note that No immediate response to the discount rate shock on economic growth in Algeria

It is a confirmation of the operation of the banking system in Algeria and its limitations, which gives us an explanation of the relative effectiveness of the instrument which is limited to managing liquidity, the conclusion derived from Panel B The insignificant effect of the Discount rate shock on GDP is simply a confirmation of the thin nature of the credit markets in the economy and relatively inaccessible . the results are similar to that of, Starr (2005), Chuku (2009) .

 In Panel c, we observe that a positive innovation in the real exchange rate of up to 0.05% In the medium run which corresponds to a concessionary monetary policy, has an insignificant effect on GDP and then it fizzles out in the long run with gdp returning to its natural path. Again, this response is consistent with theoretical expectations.

 Also, a positive shock in the real exchange rate (i.e. a real depreciation) increases gdp with the positive effects commencing in the Eighth period and petering out in the 18 period as shown in Panel C. This

response is theoretically consistent especially for an open economy with many trading partners like Algeria and practically, this is startling because depreciation of the real exchange rate should make local tradable goods more competitive globally and hence increase the demand for the local commodities. the results are similar like Chuku(2009) (Seyed Mohammad , 2016).

Panel D reveals that the response of GDP to an expansionary shock in the money supply measured by M2. has negative effect on GDP of up to -0.02% This evidence rules out the likely existence of the liquidity puzzle in Algeria in meduim run As if These shocks are expected by economic agents This response is consistent with our *a priori* expectation as presented in the theory of rational expectations Lucas 1972 model, developed in the United States from the 1970's, no action of economic policy (monetary and fiscal) is able to act effectively on economic activity, unless contains an element of surprise.the results are similar to that of Siami VAR Model (2018).
 (Hamdan .A 2017) but in the long run we observe that shock of the money supply measured by M2 became A positive significant at 0.03% However, the time dynamics are startling, especially when we consider the rigid nature of the production techniques used in the economy. Normally, economic agents are expected to adjust their spending and investment habits moderately and gradually in response to the increased supply money rather than immediately. Therefore, it follows that this quick response may not reflect the usual marginal adjustment to the policy innovation the results are similar to that of Chuku A. (2009) ;STARR (2005) ;Siami-Namini FAVAR Model (2018)

Panel E shows the response of GDP to an expansionary shock in inflation (one standard deviation). has negative effect on GDP of up to -0.04 % for long period Because inflation led to a decrease of domestic currency value due to increases prices and consequently a decrease in domestic demand And it is what matches with monetary Theories the results are similar to that of
(Seyed Mohammad 2016) .

4.6 Variance decomposition: In this section, we carry out a variance decomposition analysis aimed at getting insights into the operations of Algeria's monetary policy transmission process. The results in Table 4: shows that besides its own changes, money supply variations are largely explained by changes in GDP. The results reveals that money supply changes account for 51.38 percent, of the fluctuations in GDP This

suggests that to a great extent, monetary authorities respond to GDP fluctuations by adjusting the growth of money supply M2.

Inflation rate are also observed to play an important role in explaining variations in GDP the changes account 41.28 percent, of the fluctuations in GDP ,in short run . however there are other factors exist can contribute in the fluctuations of GDP as like spending government.

it is observed that monetary authorities do not adjust DR as a tool for the stabilization of inflation rates,. There is no evidence of direct transmission DR to inflation rates and economic growth while The contribution of REER to GDP variations is relatively small at 13 percent after 10 periods.

5.Conclusion:

This study set out to investigate the impact of monetary policy on growth in Algeria using structural vector error correction SVECM a model covering the period 1980 to 2017, the study finds that the control of money supply (M2) in the Algerian economy is the most influential tool to convey the effects of monetary policy.Which mean that monetary policy has a relative effectiveness in targeting economic growth through a flexible steering of quantitative instruments, as Liquidity Coverage Ratio , and transaction on Treasury Bills , that directly affect on Money supply, Which requires to focus on the use a nominal anchor based on quantitative tools such money supply rather than price tools.

Overall, we find evidence that monetary policy innovations have both real and nominal effects on economic parameter depending on the policy variable selected. Our results are of the view that price-based nominal anchors (DR and REER) do not have a significant influence on economic activity. Whereas, innovations in the quantity-based nominal anchor (M2) affects economic activities modestly. It therefore follows that monetary policy shocks have been a modest driver of business cycle fluctuations in ALGERIA. We note that monetary policy implementation in a developing country like Algeria faces additional challenges that are not present in developed economies; such has fiscal dominance and the treat of currency substitution. Therefore, to better understand the impacts of monetary policy shocks on output and prices, it will be instructive for future research in this field to include fiscal policy variables in the analysis.

Finally the most important recommendations that must be madby decision-makers are:• Ensure the independence of the Central Bank in order to achieve better performance of monetary policy**.**

6.Appendices:

Table 1. optimum lags length results

Lag	LogL	LR	FPE	AIC	SC	HQ
3	184.5317	44.18457*	2.20e-09*	-6.148922*	-2.557485	-4.924139
4	204.3936	15.18852	5.60e-09	-5.846681	-1.132920	-4.239154

The source: Eviews: 10 output

Table 2. Johansen Cointegration Test

Hypothesized No. of CE(s)	None *	At most 1 *	At most 2 *	At most 3 *	At most 4 *
Trace Statistic	121.4449	79.83732	45.29938	23.24459	10.34746
Critical Value0.05	69.81889	47.85613	29.79707	15.49471	3.841466
Prob.**	0.0000	0.0000	0.0004	-0.0028	0.0013

The source: Eviews: 10 output

Table 3. Estimating structural impacts in the short and long run

| **Elasticities in the short run**					
MATRIX	LGDP	LDR	LREER	LBM2	LINF
LGDP	1.000000	0.000000	0.833166	-1.706530	0.000000
LDR	0.000000	1.000000	-1.082140	0.000000	0.000000
LREER	0.001741	0.352117	1.000000	0.155640	-0.074450
LBM2	1.361124	0.000000	0.000000	1.000000	0.120663
LINF	-2.484804	0.000000	0.000000	0.000000	1.000000
Elasticities in the long run					
MATRIX	LGDP	LDR	LREER	LBM2	LINF
LGDP	-1.562244	1.582609	1.317312	0.719993	-0.578097
LDR	-0.174237	0.003251	0.318565	0.100147	0.613588
LREER	0.550725	-0.568029	-0.470962	-0.148239	0.064429
LBM2	-1.582124	1.533569	1.272670	0.737893	-0.746612
LINF	-0.283216	-0.303774	-0.015557	0.028189	0.937651

The source: Eviews: 10 output

Table 4. Variance decomposition of GDP

Period	LGDP Shock1	LDR Shock2	LREER Shock3	LM2 Shock4	LINF Shock5
1	7.571480	1.291962	1.469551	51.38114	41.28586
2	5.437807	12.28336	1.901844	46.75486	33.62213
7	22.29817	36.97997	7.440773	11.06121	16.21989
8	22.88223	39.01812	9.622232	9.575504	15.90192
9	23.45792	40.09885	11.19246	8.789296	15.46148
10	23.23018	40.51931	13.21747	8.504916	14.52813

The source: Eviews: 10 output

. **Fig.1.** Inverse Roots of AR Characteristic Polynomial **Fig.2.** panels of impulse response graphs
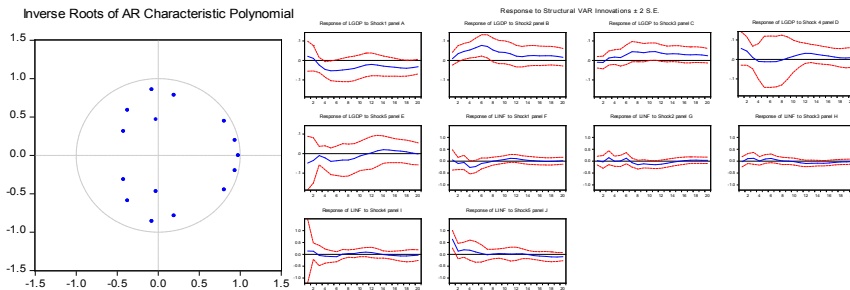
Source: Eviews: 10 output

1. **7. Bibliography List :**
2. cagan (1956) the monetary dynamics of hyperinflation ed., studies in the quantity theory of moneythe university of chicago press, chicago theoretical economics letters**,** 5(6), p 25-117
3. keynes ,   m (1963) the general theory of employment, interest, and money international relations and security network , p 1-190 available at isn free https://www.files.ethz.ch/isn/125515/1366_keynestheoryofemployment.pdf 1-190
4. friedman, schwartz (1963) a monetary history of the united states, 1867-1960 series: nationa bureau of economic research publications princeton university press p 1- 888
5. brunner,k .meltzer,a (1964) some further investigation of demand and supply functions for moneyjournal of finance.19 (2) .p 240-283 , https://doi.org/10.1111/j.1540-6261.1964.tb00767.x
6. sims.a (1972) money income, causality american economic review;62(4) p 540–552 available at https://www.jstor.org/stable/1806097,
7. lucas. r, (1972) expectations and the neutrality of money, journal of economic theory, 4(2) p 103-144 http://www.sciencedirect.com/science/article/pii/0022-0531(72)90142-1
8. bernanke,s. mihov,i (1998) ,the liquidity effect and long-run neutralitycarnegie-rochester conference series on public policy conference series on public policy, elsevier, vol. 49(1), pages 149-194, december
9. ganev, krisztina (2002)transmission mechanism of monetary policy in central and eastern europecentre for social and economic research (case) (report no. 52). p 121-132,available at https://www.files.ethz.ch/isn/105322/rc52.pdf
10. kahn. m , kandel.s , sarig.o (2002) ,real and nominal effects of central bank monetary policy ,journal of monetary economics ,49(8) :p 1493-1519
11. regis bournonnais , (2003) econometries manuelle et exercices corriges, 9eme edition, dunod , paris , p261-2625.
12. mishkin ,f .(2004) the economics of money, banking, financial markets the addison wesley series in economics, seventh edition, united state of american

p522 , available at https://www.yumpu.com/en/document/read/50764871/the-economics-of-money-banking-and-financial-marketspdf

13. bernanke,s. boivin,j. eliasz ,p (2005) measuring the effects of monetary policy: a factor-augumented vector autoregressive approach quarterly journal of economics 120(1):p 387-422

14. starr, m. (2005), does money matter in the cis? effects of monetary policy on output and prices ,journal of comparative economics: 33(1) p 441- 461, https://doi.org/10.1016/j.jce.2005.05.006

15. folawewo, a. osinubi. (2006) monetary policy and macroeconomic instability in nigeria: a rational expectation approach. applied econometrics and international development 5(2) , p 93 -100 doi: 10.1080/09718923.2006.11978375

16. akacem.k,(2006) ,economic reforms in algeria: an overview and assessment. the journal of north african studies. 9, (2) :p 115-125 , https://doi.org/10.1080/1362938042000323383.

17. njimanted ,f. akume ,d.mukete,e (2006) the impact of key monetary variables on the economic growth of the cemac zone.expert journal of economics, 4(2) p 54-67 available at http://economics.expertjournals.com/23597704-406/

18. njimanted ,f. akume ,d.mukete,e (2006) the impact of key monetary variables on the economic growth of the cemac zone.expert journal of economics, 4(2) p 54-67 available at http://economics.expertjournals.com/23597704-406/

19. sousa.j, zaghini.a (2007) global monetary policy shocks in the g5: a svar approach ,journal int. fin. markets, inst. and money , 17(5),p 403–419 online. repec:eee:intfin:v:17:y:2007:i:5:p:403-419(visited 27/02/2019)

20. rafiq,m. mallick ,s (2008) the effect of monetary policy on output in emu: a sign restriction approach journal of macroeconomics 30 (04) p 1756-1791https://doi.org/10.1016/j.jmacro.2007.12.003

21. berument.h, dincer, n. (2008) measuring the effects of monetary policy for turkey ,journal of economics cooperation, 29(1) 83-110 , available at ssrn: https://ssrn.com/abstract=3210659

22. zhang., (2009) china's monetary policy: quantity versus price rules , journal of macroeconomics, 31(3):p 473-484. https://doi.org/10.1016/j.jmacro.2008.09.003

23. chuku a. (2009) measuring the effects of monetary policy innovations in nigeria:astructural vector autoregressive (svar) approach , african journal of accounting, economics, finance and banking research 5(5), p 112- 129

24. chibi.a , benbouziane.m (2010) the macroeconomic effects of fiscal policy shocks in algeria: an empirical study ?the economic research forum (erf) working paper 536 (in arabic) p13availableathttps://www.researchgate.net/publication/46453280_the_macroeconomic_effects_of_fiscal_policy_shocks_in_algeria_an_empirical_study_in_arabic

25. ismail o.fasanya (2013) does monetary policy influence economic growth in nigeria?asian economic and financial review,3(5)p635-646 ;,availableat ,http://www.aessweb.com/download.php?id=1883 (application/pdf)

26. qazi g.m.,haque.z (2015) monetary shocks and bank intermediation in a dynamic stochastic general equilibrium model journal of economies and sustainable development 6, (12) issn (paper) 1700-2222 p2222-2855 online https://www.iiste.org/journals/index.php/jeds/article/view/23656(visited 25/02/2019)

27. teguh sugiarto (2015) svar model to examine the short and long term monetary policy in indonesia international journal of economic sciences vol. 4, (4) p 66-77 doi: 10.20472/es.2015.4.4.005

28. seyed mohammad (2016) monetary policy and economic growth a case study of iran ,international journal of economics, commerce and management united kingdom,. 4 (3), p 234-244 online https http://ijecm.co.uk/

29. hamdan .a (2017) the impact of monetary shocks on the iraqi economy for the period 1990-2015 using the svar model iraqi journal of economic sciences , 15 (52), p 27-59, available at issn https://www.iasj.net/iasj?func=article&aid=131554

30. ouglissi (2018) analyse de la politique monetaire en algerie a l'aide d'un modele dsge , strategy and , development review,mostaghanem university 7, (13),p 71-98, online : https://www.asjp.cerist.dz/en/article/28968 (visited 25/02/2019)

31. siami.s , (2018) the effect of monetary policy shocks on the real economy: a favar approach ,research journal of economics are the property of scitechnol , 2 (1), p 1-9,online, https://www.scitechnol.com/peer-review/the-effect-of-monetary-policy-shocks-on-the-real-economy-a-favar-approach-redz.php?article_id=7202(visited 27/02/2019)

32. oziengbe.s,edore,j . (2019) asymmetric effects of money supply growth on economic growth in nigeria: an empirical investigation kardan , journal of economics and management sciences 2 (3) p 27–42. online http://journals.univdanubius.ro/index.php/euroeconomica/article/view/6089

33. olayiwola, a. ogun,t (2019) asymmetric effect of monetary policy shocks on output and prices in nigeriaafrican journal of economic review, 7(1) p 238- 248 , available at https://www.ajol.info/index.php/ajer/article/view/182560.