The monetary policy transmission mechanism evidence from the Algerian economy An SVAR approach

مكانيزمات انتقال السياسة النقدية في الجزائر بإستخدم نموذج متجه الإنحدار الذاتي الهيكلي

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Abstract:

 The main purpose of this study is to investigate the transmission mechanism of monetary policy in algeria,The study uses the quarterly series, data covering the period of 2000 to 2018 Using , structural vector autoregression model (SVAR) to examine the transmission of the effects monetary policy shock on the economy. The results provides evidence that monetary policy shocks are transmitted to the algerian economy principally via broad money supply (m2) and the exchange rate channels

keyword: Monetary policy; transmission ; SVAR ; Algeria
JEL classification code : C32, E12, E32, E52, O4

ملخص:

يهدف البحث إلى دراسة ميكانيزمات إنتقال السياسة النقدية في الجزائر بإستخدام بيانات فصلية التي تغطي الفترة من 2000 إلى 2018 ، بواسطة تقدير نموذج متجه الانحدار الـذاتي الهيكلي (SVAR) لفحـص آثـار انتقـال صـدمات السياسـة النقديـة إلـى النشـاط الاقتصادي. و تشير النتائج إلى أن صدمات السياسة النقدية تنتقل إلى الاقتصاد الجزائري بشكل رئيسي من خلال القناة النقدية (M2) وقناة سعر الصرف.

الكلمات المفتاحية : : السياسة النقدية ؛ انتقال ؛ SVAR ؛الجزائر؛

تصنيف JEL : C32، E12، E32، E52، O4.

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1. Introduction :

The issue of the effects of monetary policy on real economic activity and the rate of inflation lies at the core of macroeconomics. However, despite the very large amount of research that has been undertaken on the monetary transmission mechanism, there is little consensus among economists regarding the exact effects of monetary policy and the extent to which these differ across countries. One reason for the lack of consensus is that it is econometrically very difficult to disentangle time series on financial variables such as interest rates and exchange rates into the parts due to monetary policy measures and the parts merely reflecting endogenous responses of financial markets to unobserved economic disturbances. Alternative empirical methodologies therefore tend to give different estimates of the role and effects of monetary policy. One consequence of the sensitivity of the results to the choice of identification strategy is that, since most studies focus on one country, it is difficult to compare estimates from different countries. Thus, relatively little is known about the extent to which the monetary transmission mechanism differs across countries.

Empirical researches have largely focused on addressing two issues first, to examine if money supply could forecast output given predictive power of past values of output., the second issue is to examine whether such relationship is stable over time or not. Some researchers have found evidence of the predictive ability of monetary aggregates (Krol, R. &chainian, 1993). Though, some of these studies argued that such relationship seems to have changed overtime (Cagan 1956) . Similar studies that have found a strong support for a positive effects of money supply on growth include (Sims 1992) (Bernanke, Boivin,Eliasz 2005) The impact of policy monetary on economic growth has received tremendous attention than any other subject matter in the field of monetary economics in recent times This is as a result of the pertinent

nature of economic growth among the macro-economic goals of nations either developed or developing 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).

We use Structural Vector Autoregressions (SVARs) to analyse differences in the effects of monetary policy on output . VARs have been a popular tool for studying the monetary

transmission mechanism.' They require only a minimum of restrictions in order to disentangle movements in endogenous variables such as output, prices and interest rates into the parts due to underlying shocks, such as shifts in aggregate supply and demand schedules and changes in the stance of monetary policy. The transparency of the identifying restrictions is of particular interest in a crosscountry study, since it facilitates an assessment of whether the results are driven by different or implausible identifying assumptions. Moreover, once an identification scheme has been adopted, SVARs are easy to estimate, which again makes them particularly suitable for algeria study.

1.2 We ask the crucial question:

- How Effective Are Monetary Policy Transmission Channels? 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. These restrictions are applied in conjunction with information from the co-integrating relationships between the macroeconomic variables to model the long run, allowing for both permanent and transitory components and a mixture of stationary and non-stationary variables.

1.3 The remainder of this paper is structured as follows: Section 1 provides a brief overview of the various conventional channels of monetary transmission in Algeria, followed in Section 2 reviews the corresponding academic literature. Section 3 gives a description of the data. Section 4 details the structural vector autoregression (SVAR . Section 5 discusses the results. Section 6 concludes.

1.4 Objective Of The Study: This paper explores the monetary policy transmission channels and analyzes available options to strengthen monetary policy effectiveness in Algeria., by employing SVAR approach.

1.5 Empirical Review:

The literature on of the monetary policy transmission mechanism is still at the nascent stage in Algeria. we have reviewed some of these studies to enlarge objectives in the framework of Algeria and moreover to analyze it to draw conclusions

(Sousa& Zaghini , 2007 ,P 403–419) 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.

(Gupta& Abhay 2008,P 56-1) has found the presence and importance of bank lending channel of the monetary policy transmission in India and Pakistan using the structural Vector Auto Regression (SVAR) approach..and the Changes in the monetary policy instruments affect the credit variable (private sector claims) which in turn transmits the

shocks to the real side of the economy, i.e. output and prices. Compared to the bank lending in other developing countries the channel in these countries is different and more vital. Another finding is that apart from interest rates, money also seems to play an important role in these economies and its shocks are significantly transmitted to the real macroeconomic activities through changes in the credit variable (Chuku A&Chuku , 2009,P112 -129) 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 .

(Carlo Migliardo , 2010,P167–139) proposed a Bayesian VAR model to examine the short term effects

of monetary policy shocks on the Italian economy. to identify four kinds of macroeconomic shocks, namely, supply, demand, interest rate and monetary shocks. Then, from the theoretical model, they derived and imposed a minimum set of robust sign restrictions to identify the transmission mechanism of monetary

tightening. the results show a greater persistence of inflation to monetary restriction than Cholesky identification presents, they found that a monetary innovation brings a decline of 30 basis point of GDP,

(Forgha, 2016,P 54-67) 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

(Rafiq&Mallick, 2008,P 1756-1791) 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,P635-646) In contemporary studies, researchers have devised convenient ways of eradicating these puzzles. Most of them now follow the framework set by (Lucas. R, 1972,P 103-144) 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&Shmuel 2002,P 493-519); (Berument, 2008, P83 - 110), (Zhang 2009,P 484-473)And the study (Siami 2018,P1-9) 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**.**

2. Algeria's Monetary Policy Framework: High liquidity has been the hallmark of the Algerian monetary policy framework for most of the 2000s. Under current provisions, hydrocarbon resource inflows have to be deposited in dinars in the banking sector. As a result, in the early part of the 2000s, rapid net foreign assets (NFA) accumulation fueled by large hydrocarbon exports and rising prices and large public (both current and capital) spending led to a fast rise in liquidity. The interbank market progressively dried out, to the point that only six transactions were recorded in 2012, compared to an average of 184 over 2007–2011. With no financing needs in the banking sector, the Banque d'Algérie (BA) progressively shifted its toolkit from interest rates towards liquidity management tools, developing deposit auctions instruments and using required reserves actively to contain the growth in liquidity (Amina .L & Andrew,2010 ,P5) .

2.1. Monetary policy instruments and transmission channels:

- The BA has three policy instruments: liquidity management tools (required reserves and deposit facilities), interest rates, and the exchange rate. In a context of ever-increasing liquidity, developments in the monetary policy toolkit have been dominated by the introduction of liquidity management instruments, which have become the main policy tool. In April 2002, the BA introduced a 7-day deposit auction facility; a 3-month deposit auction facility was set up in August 2005; and a remunerated deposit facility was put in place in June 2005. In

January 2013, a 6-month deposit auction facility was added to the liquidity management toolkit. The BA has also been using required reserves actively since 2004. The lack of refinancing need in the banking system has led the BA to give up using the discount rate as a signaling instrument, while auction rates have been set at very low and stable levels. The exchange rate is assigned to preserving competitiveness, but has occasionally been used to contain price pressures, a policy that is easily implemented thanks to the price-maker status of the BA on the forex market (Amina .L& Andrew,2010,P 7).

3. Study Methodology   The identified VAR model The choice of variables in the VAR reflects the theoretical set up of a Keynesian small open economy model, IS-LM such as that described in Svensson (2000) and Clarida et al. (2001). In particular, the VAR model comprises the quarterly data changes of the log of the domestic consumer price index (CPI) referred to inflation, log of the Discont rate (DR), the log of the real exchange rate against a basket of trading partners (REER) the log of supply money (BM2), and log of (GDP),

- We first define Zt as the (5×1) vector of the macroeconomic variables Assuming Zt to be invertible, it can be written in terms of its moving average (ignoring any deterministic terms) B(L) υ_t where vt is a (5×1) vector of reduced form residuals assumed to be identically and independently distributed,υ_t~iid $(0,\Omega)$ with positive definite covariance matrix . B(L) is the (5×5) convergent matrix polynomial in the lag operator . L,B(L)=B_j L^j Following the literature, the innovations (υ_t), are assumed to be written as linear combinations of the underlying orthogonal structural disturbances.

(ε_t)i.e ,υ_t= sε_t .The VAR can then be written in terms of the structural shocks as ,Z_t=C(L)ε_t (Bjørnland.H.& Jacobsen.d 2010,P218-229)

We follow the approach initially developed by (Siami 2018 ,P540 – 542,and implemented by (Starr, M. 2005,P441- 461) .

AND We estimate a reduced form VAR and identify monetary-policy innovations through specification about variable ordering. Specifically, the reduced form VAR is thus:

$$X_t = \sum_{i=0}^{m} A_i X_{t-1} + U_t$$

In order to examine the effect of Monetary policy on economic growth, we estimate the following
equation

$$X_t = LGDP_t.\ LDR_t.LREER.LBM2_t.LCPI.$$

$$U_t = \left[U_t^{LGDP}.U_t^{LDR}.U_t^{LREER}.U_t^{LBM2}.U_t^{LCPI}\right].$$

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

 U_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 identify structural shocks, a transition matrix P should be formed which achieves the following relationship $U_t = p.e_t$

By specifying the transition matrix parameters by:

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

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 α_{ij} is given as economic constraints by giving it a value of 1 (Chibi & Benbouziane 2010,P13).Taking into consideration the state of the Algerian economy, the distinction between the short and long term

3.1 .Description of data: The data sets used for this analysis is the quarterly series of the selected relevant macroeconomic variables from 2000 to 2018. 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 the domestic consumer price index (CPI**)** supply money BM2- discount rate (DR), 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, are used. Log transformation to minimize the hetroskedasticity problem (Gujarati &Sangeetha, 2007,P 76). All the empirical tests have been carried out by using E views10 Software.

3.2 .Model specification: Following the previous empirical studies, **(**Chuku A&Chuku, 2009,P 112- 129.), (Starr, M. 2005,P 441-461) (Hamdan 2017,P27-57) , (Sousa & Zaghini 2007,P403 -419) ,it is possible to specify our empirical model in the following manner:

The main steps of an SVAR 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 SVAR model after placing structural matrix Constraints.

• Extraction of structural impulse response functions and variance decomposition

3.3 .Model Estimations :

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, we estimate the SVAR model including four popular measures of monetary policy

We order the policy variables in the SVAR after the non-policy variables with GDP.coming first, based on the assumption that it adjusts most sluggishly.

- 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.

- $\mu_t^{LGDP_t} = b_{11} + a_{13} e_t^{LREER} + a_{14} e_t^{LBM2} . \mu_t^{LGDP\ shock}$
- $\mu_t^{LDR} = b_{22} + a_{23} e_t^{LREER} . \mu_t^{LDR\ shock}$
- $\mu_t^{LREER} = a_{31} e_t^{LGDP} + a_{32} e_t^{LDR} + b_{33} + a_{34} e_t^{IBM2} + a_{35} e_t^{ICPI} . \mu_t^{LREER\ shock}$
- $\mu_t^{LBM2} = a_{41} e_t^{LGDP} b_{44} + a_{45} e_t^{ICPI} . \mu_t^{LBM2\ shock}$
- $\mu_t^{ICPI} = a_{51} e_t^{LGDP} + b_{55} . \mu_t^{ICPI\ shock}$

MATRIX A

$$
\begin{vmatrix} e_{1t}^{LGDP} \\ e_{1t}^{LDR} \\ e_{1t}^{LREER} \\ e_{1t}^{LBM2} \\ e_{1t}^{LCPI} \end{vmatrix}
\begin{matrix}
 & LGDP & LDR & LREER & LBM2 & LCPI \\
 & 1 & 0 & a_{13} & a_{14} & 0 \\
 & 0 & 1 & a_{23} & 0 & 0 \\
 & a_{31} & a_{32} & 1 & a_{34} & a_{35} \\
 & a_{41} & 0 & 0 & 1 & a_{45} \\
 & a_{51} & 0 & 0 & 0 & 1
\end{matrix}
\begin{vmatrix} \mu_{1t}^{LGDP\ shock} \\ \mu_{2t}^{LDR\ shock} \\ \mu_{3t}^{LREER\ shock} \\ \mu_{4t}^{LBM2\ shock} \\ \mu_{5t}^{LCPI\ shock} \end{vmatrix}
$$

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

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

$$\mu_t^{LGDP} = b_{11} + a_{13}e_t^{LREER} + a_{14}e_t^{LBM2} + a_{15}e_t^{ICPI}.\mu_t^{LGDP\ shock}$$
$$\mu_t^{LDR} = b_{22} + a_{23}e_t^{LREER}.\mu_t^{LDR\ shock}$$
$$\mu_t^{LREER} = a_{31}e_t^{LGDP} + a_{32}e_t^{LDR} + b_{33} + a_{34}e_t^{LBM2} + a_{35}e_t^{ICPI}.\mu_t^{LREER\ shock}$$
$$\mu_t^{LBM2} = a_{41}e_t^{LGDP}b_{44} + a_{45}e_t^{ICPI}.\mu_t^{LBM2\ shock}$$
$$\mu_t^{ICPI} = a_{51}e_t^{LGDP} + b_{55}.\mu_t^{ICPI\ shock}$$

MATRIX F

LGDP	LDR	LREER	LBM2	LCPI
a_{11}	0	a_{13}	a_{14}	0
0	a_{22}	a_{23}	0	0
a_{31}	a_{32}	a_{33}	a_{34}	a_{35}
a_{41}	0	0	a_{44}	a_{45}
a_{51}	0	0	0	a_{55}

Source: Prepared by researchers

We assume in the long run that the money supply (BM2)   and the real exchange rate and the domestic consumer price index (CPI) can affect the GDP, because the hyperinflation will cause the value of currency to diminish quickly in short periods In such cases people attempt not to hold or use the currency or attempt to exchange it for something else immediately after receiving it exactly because the store of value function has broken down (hyperinflation causes the price level to rise and the value of a currency unit to fall appreciably,
This leads to a decline in domestic demand, and consequently, domestic

production decreases.

-The second assumption, in the long run, the discount rate response to a structural shock of the exchange rate, where we assume that the central bank adjusts the discount rate depending on the price level to achieve the goal of price stability, taking into account the exchange rate, which is a final goal and at the same time an intermediate goal   in Algeria According to Article 35 of the Money and Credit Law This formulation framework is relatively close to the framework of Bank Algeria. Because the annelle reports (ex: considering that of 2010,2015) explain well the objective of the monetary policy

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. Study Results:

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 in the table (01) 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

Table 1 Unit Root Test

	Test Techniques				Results Stationary
	ADF test (prob)		P-P test (prob)		
Variables	Level	1st dif	Level	1st dife	
LGDP	0.6013	0.0128	0.456	-3. 5969	1st diff
LDR	0.5491	0.0023	0.756	-4. 556	1st diff

LREER	0.256	-2.325	0.6785	-3.4312	1st diff
LM2	0.453	0.012	0.3775	-3.3420	1st diff
LCPI	0.0425	0.0000	0.0924	-8.549	1st diff

Source: Eviews: 10 output

4.2 . Lag Selection of var : the table (2) 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(2).

Table 2 : optimum lags length results

Lag	LogL	LR	FPE	AIC	SC	HQ
2	802.88	46.58*	7.09e-17*	-23.01*	-21.17	-22.28

Source: Eviews: 10 output

4.3. Cointegration test: According to Granger, the cointegration test is used to test the long equilibrium relationships between several variables (Gujarati&Sangeetha, 2007,P76), (Regis Bournonnais, 2003P81) 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 03:

Table 3 : Johansen Cointegration Test

| Hypot No. of	None *	At most 1	At most 2	At most 3	At most 4
Trace Sta	106.04	52.460	27.335	10.3878	0.0267
Critical	69.818	47.856	29.797	15.494	3.8414
Prob.**	**0.0000**	0.0174	0.0937	0.2521	0.8699

Source : Eviews: 10 output

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=2

4.4. Model Stability Test: the Figure 2 presents the inverse roots of the AR characteristic polynomial associated with the different lag orders specified by the selection criteria

Fig.1 : Inverse Roots of AR Characteristic Polynomial
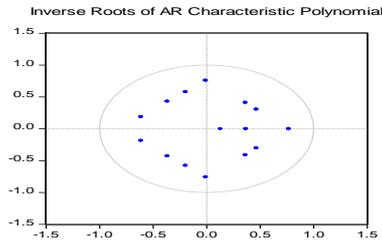
Source: Eviews 10 output

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.see See Table N4, which shows the LM with 10 lag test value is less than the critical value, which leads us to accept the null hypothesis, that is, the model does not have Serial Correlation problem table no shows probability of Chi-sq 0.28, is greater than the significance level 0.05, which leads us to accept the null hypothesis, which mean that the model does not have Residual Heteroskedasticity problem

Table 4: Heteroskedasticity Tests And Serial Correlation LM Tests

| Lag	Prob.	Prob.
1	0.4285	0.4309
2	0.1138	0.1152
9	0.2721	0.2744
10	0.1709	0.1727
Chi-sq	df	Prob.
466.818	450	0.2823

Source: Eviews 10 output

4.5. impulse responses and variance decomposition :

Figure 3 : shows panels of impulse response graphs indicating how innovations in respective monetary policy variables affect gdp 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.

Graph 2 of Figure 2 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 0.009% in the long run and then stabilizes at the new level. 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 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) . Graph 3, we observe that a negative innovation in the real exchange rate of up to 0.03% In the short run, this response is not consistent with theoretical expectations. Because , the real exchange rate (i.e. a real depreciation) increases gdp with the positive effects. 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.Graph 4 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 (2017 ‹we conclude A expansionary monetary policy generally is expected to increase the gdp level, not reduce it. Results indicate the existence of liquidity puzzle in algeria over the period studied. It is also suggested that monetary policy shocks are not only the dominant sources of gdp .Graph 5 shows the response of GDP to an expansionary shock in inflation (one standard deviation). has negative effect on GDP of up to 0.002 % for long period it has an insignificant effect 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)

Fig.2:panels of impulse response graph
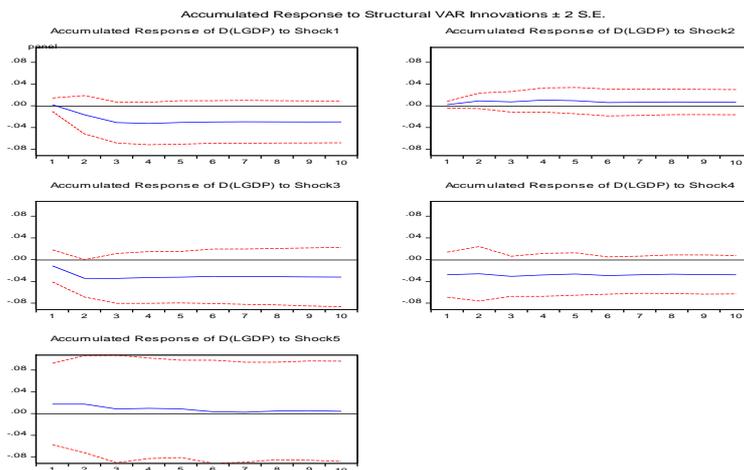
Source: *Eviews: 10 output*

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. We pay particular attention to growth economic as a policy goal in the investigation of the mechanism.

Table 5: 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 63. 65 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. Then This results is consistent

in the theory of monetarism that The major tenets is Money supply has a direct and significant impact on growth economic. which implies that growth in monetary aggregates affects aggregate economic performance. Thus, the need to focus on money stock as the proper target of monetary The real exchange rate are also observed to play an important role in explaining variations in GDP the changes account 30.92 percent, of the fluctuations in GDP ,in short run.

Table 5: Variance decomposition of GDP

Period	LGDP	LDR	LREER	LM2	LCPI
1	0.322	0.330	10.826	63.652	24.867
2	16.14	2.583	30.921	36.247	14.105
3	22.51	2.395	26.980	32.512	15.599
4	22.40	2.845	26.805	32.444	15.503
9	21.95	3.318	26.197	32.097	16.428
10	21.94	3.318	26.182	32.080	16.475

Source: Eviews: 10 output

5. Conclusion: The main purpose of this study is to investigate the transmission mechanism of monetary policy in Algeria, taking external constraints on monetary policy into consideration. This study uses a structural vector autoregression model (SVAR) to examine the transmission of the effects of a positive monetary policy shock to the economy. The analysis

provides evidence that monetary policy shocks are transmitted to the algerian economy principally via the supplay money bm2 and exchange rate channels.   Furthermore, the findings show that the monetary aggregate contains important additional information in the transmission of monetary policy shocks that are similar to the consensus effects in the United States or other advanced countries. And (for the case of transition in small open economies),   The results of SVAR analysis show that an unexpected monetary policy shock produces a transitory decrease in output.

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.

. The needed of additional efforts to develop a more resilient, competitive and dynamic financial system, to further diversify the financing alternatives for the private sector, and to establish more

Flexible exchange rate. Wich is enhance the functioning of the the transmission of policy monetary.

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