Effect of Monetary policy on output and inflation in Algeria through the main transmission channels in the period (1990-2018)

أثر السياسة النقدية على الناتج والتضخم في الجزائر من خلال قنوات الانتقال الرئيسية للفترة (1990-2018)

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ملخص

تهدف الدراسة إلى تقييم أثر السياسة النقدية بالجزائر في التأثير على التضخم والناتج الداخلي الخام من خلال قنوات الانتقال الرئيسية في الفترة 1990-2018. نبحث من خلال الدراسة عن فعالية القنوات التي تعمل من خلالها السياسة النقدية في الجزائر والتي تم أخذها بعين الاعتبار في هذه الورقة والمتمثلة في كل من قناة النقود وقناة الائتمان. للتوصل إلى نتائج استخدمنا منهجية ARDL و أيضا منهجيةVAR .تظهر النتائج أن السياسة النقدية في الجزائر ليست فعالة من خلال قناة النقود فيما هي ذات فعالية من خلال قناة الائتمان في التأثير على كل من الناتج الداخلي الخام والتضخم، حيث أن صافي الائتمان المحلي له تأثير معنوي على كل من الناتج الداخلي الخام والتضخم.

الكلمات المفاتيح: التضخم، الناتج، قناة الائتمان، نموذج ARDL.

التصنيف JEL، E31,E52, E51

Abstract

The study aims to evaluate the effect of monetary policy in Algeria through the main channels on inflation and the gross domestic product GDP in the period of 1990-2018. We investigate the effectiveness of the main operational monetary transmission channels considered in the paper that is the money channel and the lending channel. We utilize ARDL methodology also VAR methodology to reach ours results. Results shows that monetary policy in Algeria is not effective via money channel, whereas is effective via lending channel, and the net domestic credit have a significant effect on GDP and inflation.

Key words:inflation, output, credit channel, ARDL model.

Jel Classification Codes : E31,E51, E52

Introduction:

Monetary policy in Algeria appear as an important part of economic policy since 1990 by the virtue of the money and credit law, we suppose that its effectiveness depends largely to the financial system structure and financial intermediation characteristics as well as the structure of the banking system largely owned by government. this study attempt to evaluate the effect of monetary policy on inflation and output by investigating the important operational channels, we focus both on money channel – considering money base as the primary instrument chosen by the central bank to operate in monetary policy practice – and lending channel. we exclude exchange rate channel – as a classical channel in the open economy which is not the case of Algeria – as well as the interest rate channel that we consider having a weak performance to affect the real economy in Algeria, due to the nature of the economy structure, underdeveloped capital market and a weak financial intermediation.

Our study investigate the effectiveness of the two channels (separately) through it monetary policy works its effect on inflation and Gross Domestic Product GDP in Algeria over the period of 1990 to 2018, we try empirically answer the following question:

are there a significant effect of monetary policy on output and inflation in Algeria in the period (1990-2018) through the money channel and the lending channel ?

as well as we attempt to answer two sub questions :

- Does the money channel -including money growth, net domestic credit as the main policy instrument- have a significant effect on inflation and GDP in the period of 1990-2018?
- Does the credit channel -including the main policy instrument: discount rate, reserve requirement rate, lending rate, net domestic credit- have a significant effect on inflation and GDP in the period of 1990-2018?

Hence, we suppose the following hypothesis:

- money channel - that includes the two principal variables: money growth, net domestic credit - has an important effect on inflation, also on GDP;
- credit channel -that contain the principal variables namely: discount rate, reserve requirement rate, lending rate, net domestic credit- has an effect on GDP and also on inflation .

The study aims to investigate the effect of monetary policy on output and inflation, and search about the expected effect of the main transmission channels considered in the paper. To attain results, we utilize ARDL methodology as well as VAR methodology to treat the data available in the case of Algeria in the period 1990-2018. For that, we first expose reviews on different studies that dealt with the theme to have an overview on the methodology used in assessing the transmission channels effect on economic performance.

Numerous studies attempts to assess the monetary policy effectiveness through investigating monetary policy transmission channel. Michel Cyrille Samba (2013) evaluate the effectiveness of monetary policy under the Central African Economic and Monetary Union CEMAC, in the period from 1990 to 2007, the study emphasis on traditional interest rate channel and the bank lending channel, using a methodology based on to a vector auto regression (VAR) approach. The basic model includes three variables: the real GDP, the consumer price index and the policy interest rate, results show many differences among CEMAC countries concerning the effect of common monetary policy, which reflects difficulties faced by central bank in implementing a common monetary policy. Moreover, the traditional interest rate channel is not effective enough in the CEMAC area, and for bank lending channel, researcher was not inconclusive about the latter channel in this region, so he suggest more further studies about to shed light on the lending channel issue in CEMAC (Samba, 2013). Our study utilize the VAR methodology as it has done in this previous study, but differs in the fact that we don't focus on interest rate channel, using just endogenous variables in a case of one country, however the study use both endogenous and exogenous variables because of the study sample contain six countries, furthermore we use ARDL

methodology.

in his research paper, Muhammad Khoirul Fuddin (2014) analyse the effectiveness of the transmission mechanism of monetary policy of Indonesia in influencing economic growth and inflation, the main channels modeling in the study was money, credit, interest rate and exchange rate, the analytical tool utilized is Vector Error Correction Model (VECM) to study the observation period of 1961-2011. The result explain that the credit channel is found effective in explaining economic growth and interest rate seem to be effective in explaining inflation in Indonesia (Fuddin, 2014). This study and ours are closely similar in the methodology used to investigate the effectiveness of each channel, except that we didn't focus on the interest rate channel and exchange rate channel due to the characteristics of the Algerian economy discussed above, and the fact that we utilize ARDL methodology.

in another study, Gabriel Efe Otolorin and Pius Effiong Akpan (2017) assess the effectiveness of monetary policy channels in a recessed economy in the case of Nigeria, especially in achieving macroeconomic objectives of low inflation rate, financial stability and economic growth, using VAR approach, result indicate that monetary policy has a significant role on financial sector and inflation control but insignificant impact on real sector, so both of interest rate channel, asset price channels and credit channels affect asymmetrically financial sector and inflation rate, while didn't generate any impact on real sector. the study recommend to strengthen the naira (Nigeria currency) by insuring viable economic strategy, in order to face a reversal in the trend of exchange rate due to a downward price in oil . Furthermore, the study suggests to utilize an effective monetary and fiscal policy mix to reduce inflation rate. Pertaining underground money issue, it should have a development of reintroduction strategy of those money into the economy (Otolorin & Akapan, 2017) .the study evaluate the effect of monetary policy on the financial stability while our study focus only on inflation and GDP.

To examine the relative effectiveness of the use both of direct and indirect monetary policy instruments in Barbados, Jamaica and Trinidad and Tobago, Keyra Primus 2018 estimate a restricted Vector Autoregressive model with Exogenous Variables (VARX). Assuming the use of Taylor-type rule in the conduct of monetary policy, so a Taylor type short term interest rate is considered as the indirect policy instruments and the required reserve ratio as the direct policy instrument. The finding of the study was a weak transmission of interest rate channel due to the situation of a high liquidity in financial system, whereas, an increase in the required reserve ratio attains reduction in private sector credit and excess reserve, as well as reduce pressures on exchange rate. Therefore a reserve requirement seems to be a good complement to interest rate policy to achieve macroeconomic objectives especially in small open economies (Primus, 2018). the study differs from our study in the model used and in the fact that in the case of the countries studied they use a taylor rule, that is the interset rate policy effect on inflation, lending and exchange rate, and the crucial expected role of the direct instrument as the reserve requierment in transmission mechanism that is an imporatnt instrument in the case of Algeria.

To reach our results, the rest of our paper is structured as following: first section, present brief literature review, the second analyze the monetary policy in Algeria, the third present our empirical analysis methodology and the fourth present the study results, finally we conclude.

I- Literature Review

In the conduct of Monetary policy, policy makers attempts to have an impact on economic performance, especially output and inflation, and this can be done through the monetary policy transmission mechanism MTM. the extend in which central bank affect the real economy shows the scope of monetary policy effectiveness. Monetary policy effects on

economic outcomes must be evaluated accurately, obviously explained by investigating the effectiveness of transmission mechanism through it monetary policy actions works their effect on real economy.

However, the way by it monetary policy transmission mechanism operates differs across countries, as well as the importance of each channels from an economy to another, and various elements could specify the effect of monetary shocks upon the real economy in each country. Some factors can impede the monetary policy effectiveness. For instance, a significant level of dollarization and financial sector underdevelopment are found as a serious obstacle to the functioning of the monetary transmission channels, especially for interest rate channel, as it had been concludes in the case of economies in the central Asia, Those factors leads to more limited real effects of interest rate policy. Deeper financial markets, developed financial intermediation and competition will contribute to the effectiveness of monetary transmission channels (Asel, 2008). That is, the nature of transmission mechanism depends on the structure of the country's banking system, and financial system in general.

Financial regulation also influence economic outcomes because of their impact on ability of central bank in using their policy tools. distinguishing here between a banking system largely owned and controlled by government in which monetary policy unable to stabilize activity, and contrarily when banks are privately owned practicing in market law, consequently monetary policy become more effective because of the ability of central bank interest rate changes to effect the private lending, creating more effective interest rate channel. Moreover, the presence of explicit deposit insurance have an impact on willingness of bank managers to take risks and encourage firms to finance their activity from banks instead of capital markets (Cecchetti & Krause, 2001). Furthermore, the size and scope of capital markets, and the ability of alternatives to bank financing are determinant of monetary policy transmission differences across countries, countries with many small banks, less healthy banking systems, and poorer direct capital market access present a high sensitivity to policy changes (Cecchtti, 1999), in this lending view of monetary policy transmission mechanism, financial structure seems to be a crucial determinant of monetary policy effectiveness.

Regarding the case of developing countries, its typical financial environment is characterized by the absence of markets for domestic securities; the presence of capital controls; and legally determined interest rates on bank assets and liabilities. Legal restrictions on both foreign exchange and loans transactions largely contribute to parallel markets especially for foreign exchange as well as for loans, and in such context of financially repressed economy the way how the transmission mechanism operates would be problematic (Montier, 1991). Furthermore, monetary policy in most developing countries focus on maintaining a fixed exchange rate system, the reason of it luck of monetary policy independence and the weakness of achieving the mains domestic objectives, especially for attaining the economic performance.

II- Monetary policy in practice: the case of Algeria:

The evolution of the monetary policy since issuing the money and credit law 90/10 can be divided into the main following periods:

II-1- Period of (1990-1999):

The year 1990 represent a beginning of a new era of a monetary and banking system in Algeria, by the reform provided in the money and credit law 90/10 dated in 16/04/1990, the law assign to the Bank of Algeria BA large prerogative in the conduct of monetary policy never known before this dates. The law specifies the BA objectives, that its mission in the field of money, credit and exchange rate is to provide the best conditions for regular growth of the national economy and maintain it by developing all national production capacities while ensuring the internal and external stability of the money (Bank of Algeria, 90/10).The most efforts of monetary authority in this period was made to try keeping inflation rate under control, especially in such economic conjuncture characterized by the economic reforms

recommended by the International Monetary Fund. The conduct of monetary policy in this period focused on direct instruments. But since 1994, BA utilize indirect instruments in particular open market operations, adjudication system, reserve requirement and repurchase agreement (لطرش, 2012)

II-2- Period of (2000/2009):

The beginning of this period was characterized by the amendment of the money and credit law by the ordinance n°01/01 dated in 27/02/2001, wich include the separation of the board of directors of the bank of Algeria from the monetary authority. Later, the credit and money law was twice amended, including a modification of the objectives, where the mission of the Bank of Algeria in the fields of money loan and exchange rate is to provide and maintain the best conditions for rapid growth of the economy while ensuring the internal and external stability of the money, without stating the objective of employment (Bank of Algeria, 03/11), even this objective still implicitly stated with an objective of a rapid growth (Ilmane, 2006). Since 2000, the banking system was characterized by a liquidity excess, hence banks didn't request the bank of Algeria function's as la lender of last resort, while the discount rate still been an eventual instrument of monetary policy in this period. In this context, the Bank of Algeria reactive the reserve requirement instrument since 2001, and initiate the application of some new instruments (resumption of liquidity by bidding; paid deposit facility).

II-3- Period of (2010/2018):

Since 2010, Bank of Algeria adopt inflation targeting, by determining the price stability as an objective of monetary policy in the amendment of the money credit and law of 2010, in the order n° 10/04 dated in 26/08/2010 amending and supplementing decree n° 03/11 relative to money and credit law. Till the year 2013, the Bank of Algeria continuous to use the same instruments in the purpose of the absorption of liquidity excess in the banking system, but starting to 2014, the situation changed to a liquidity deficit due to the decrease in foreign assets since the external shock of oil in 2014, and the liquidity keep dwindling as more the price of oil and exchange reserves alleviate, so the BA operates with its instruments to provide liquidity to the banking system, the mains instruments used was: the discount rate; open market operation; reserve requirement. But since November 2017, the liquidity in the banking system increases as a result of the unconventional financing adoption, that consist mainly of mobilizing funds from the Bank of Algeria for issuing government bonds with different maturities of 5 to 30 years at a single interest rate of 0.5% (بنك الجزائر, القانون17/10).

III. Empirical Analysis:

The purpose of the study is to assess the effectiveness of monetary policy in Algeria in the period of 1990-2018, to do this we focus on the effect of monetary policy - via the two important channel considered here by our study (money channel and lending channel) - on economic stability represented by two economic variables which are inflation and Gross Domestic Product GDP. The data used are money growth MG ,net domestic credit LEND, GDP, inflation, discount rate RESC, loan interest rate RPRET, the data for the study was derived from the Bank of Algeria and the world Bank database.

We suggest that variables of money channel (money growth, net domestic credit, inflation, GDP), and for credit channel (discount rate, reserve requirement rate, lending rate, net domestic credit, inflation, GDP). To reach our results we proceed as following:

III.1. Stationary test :

First, we perform a stationary test of variables, since le number of observation is equal to 29 (less than 30 observations) we use KPSS test, in the following table we summarize the results:

Table n° 1:KPSS test of stationarity money channel

variable		t- cal	t-tab	result
GDP	Level	0.675355	0.463000	Not stationary
	1st difference	0.377459	0.463000	stationary
INF	level	0.399182	0.463000	stationary
LEND	level	0.121110	0.146000	stationary
MG	level	0.117815	0.146000	stationary

Source: EViews 9 outputs

Table n° 2:KPSS test of stationarity lending channel

variable		t- cal	t-tab	result
GDP	level	0.675355	0.463000	Not stationry
	1st differrence	0.377459	0.463000	stationary
INF	level	0.399182	0.463000	stationary
LEND	level	0.121110	0.146000	stationary
RESER	level	0.208558	0.463000	stationary
RESC	level	0.127388	0.146000	stationary
RPRET	level	0.080371	0.146000	stationary

Source: EViews 9 outputs

III.2. Monetary policy effect on GDP and Inflation:

we attempt to assess the effectiveness of monetary policy on inflation and GDP through money and lending channel. First we investigate the effect on GDP via both the two channels and then the effect on inflation.

III.2.1. Effect on GDP:

we evaluate the effect of monetary policy on GDP via money channel and lending channel.

A. Effect on GDP via money channel:

First, we evaluate the **money channel**, the independent variables (LEND, MG) are all I(o) and GDP are I(1), and since the sample size is small than we can use the ARDL methodology.

Table n° 3:test bound

Test Statistic	Value	k
F-statistic	5.191305	2
Critical Value Bounds		
Significance	I0 Bound	I0 Bound
10%	2.63	3.35
5%	3.1	3.87
2.5%	3.55	4.38
1%	4.13	5

Source: EViews 9 outputs

We notice that the value F-statistic of 5.191305 is greater than the Io bound 3.87 at 5%, as result we reject the null hypothesis (No long-run relationships exist), this explain that

there is a long run relationship between the variables (LEND, MG) and GDP. Therefore we can estimate Error Correction Model ECM, the short run equation:

DGDP= 0.375687 D(GDP(-1))+ 0.291408 D(GDP(-2))+ 0.261482 D(GDP(-3))+ 276020.209461 D(MG) -0.010192 D(LEND)+ 0.076732 D(LEND(-1))

And the long run equation: **GDP= 3720941.247590 MG - 0.367632 LEND + 237288753.275102**

We notice that the value CointEq(-1) = -0.074180 is a negative value and non significant (p=0.0517) wich indicate that there are no adjustment to equilibrium of GDP in the long run.

In the short run D(LEND(-1)) has a positive significant(p= 0.0170) effect on GDP, whereas in the long run there are non significant effects of independent variables (positive for MG and negative for LEND) on GDP. monetary policy didn't have an effect on GDP through money channel in the long run, but it has a positive effect through LEND (t-1) in the short run.

B. Effect on GDP via lending channel:

Second, we assess the effect of monetary policy on GDP via **lending channel**, the independent variables (LEND, RESER, RESC, RPRET) are stationary at level I(0) and the dependent GDP I(1), and then we can utilize ARDL methodology.

Table n° 4 :test bound

Test Statistic	Value	k
F-statistic	19.76778	4
Critical Value Bounds		
Significance	I0 Bound	I0 Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: EViews 9 outputs

We notice that the value F-statistic of 19.76778 is greater than the Io bound 3.49 at 5%, as result we reject the null hypothesis (No long-run relationships exist), this explain that there is a long run relationship between the variables (LEND, RESER, RESC, RPRET) and GDP. Therefore we can estimate ECM as following:

DGDP=-0.598937 D(GDP(-1))+ 0.250254 D(GDP(-2))+ 0.006329 D(LEND) -0.051102 D(LEND(-1))+ 0.137165 D(LEND(-2))+ 3591743.51 D(RESER) -558491.46 D(RESER(-1))+ 4857993.805 D(RESER(-2)) +18336284.15 D(RESC)+ 9210906.33 D(RESC(-1))+ 13801439.60 D(RESC(-2))+ 10937302.32 D(RPRET)+ 10771389.34 D(RPRET(-1)) -11591868.61 D(RPRET(-2))

the value CointEq(-1) = -0.381641 is negative and significant (p=0.0018) which represents the speed of adjustment at which equilibrium in GDP is restored that is 38.16% per year, as well as, indicate the long run relationship between GDP and both of (LEND, RESER, RESC, RPRET).

In the short run, there are a positive significant effects on GDP of: LEND of the period (t-1), and RESER (t) and (t-1), and RESC (t), (t-1) and (t-2), and finally RPRET of the periods (t) and (t-1). Also there are a negative significant effect on GDP of GDP(t-1) and RPRET(t-2).

Long run equation:

GDP=161706626.68-0.005895LEND+2438786.58RESER-46068077.28RESC+65339603.87 RPRET

In the long run there are significant effect of RPRET(positive) – that didn't correspond to the economic theory – and RESC(negative) on GDP, whereas non significant negative effect of LEND on GDP, also there is a non significant positive effect of RESER on GDP.

In the long run, monetary policy have an effect GDP via the lending channel using RESC (negative effect). Monetary policy works effects GDP through lending channel both in the short and long run.

III.2.2. Effect on Inflation:

We evaluate the effectiveness of monetary policy via the two channel on inflation, the independent variables (LEND, MG, RESER, RESC, RPRET) and the dependent variable (INF) are all stationary in the level I(0), therefore we investigate the presence of a cointegration in the long run between variables.

A. Effect on Inflation via money channel:

We attempt to evaluate the effect of monetary policy channel on inflation, and determine the presence of a long run relationship between variables using Johansen Cointegration Test. first, we determine the lag length (= 1).

Table n°5 : Lag length

La	LogL	LR	FPE	AIC	SC	HQ
0	-636.7447	NA	2.90e+20	55.62997	55.77808	55.66722
1	-594.4171	69.93258	1.62e+19*	52.73192	53.32435*	52.88091
2	-586.5865	10.89471	1.88e+19	52.83361	53.87036	53.09435
3	-579.4806	8.032715	2.51e+19	52.99832	54.47939	53.37080
4	-569.4823	8.694176	3.00e+19	52.91151	54.83691	53.39574
5	-555.0155	8.805875	3.17e+19	52.43613	54.80586	53.03211
6	-536.5279	6.430490	4.25e+19	51.61112*	54.42517	52.31885*

Source: EViews 9 outputs

Table n° 6 : Cointegaration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.507670	31.03111	29.79707	0.0359
At most 1	0.290207	11.89873	15.49471	0.1619
At most 2	0.093271	2.643612	3.841466	0.1040

Source: EViews 9 outputs

The Trace Test indicate a cointegration equation, and the test reject the null hypothesis at 5% (Trace Statistic >critical value), since there exist one 1 cointegration equation we can use Engle and Granger methodology. we estimate the model INF= f(MG, LEND) as following:

INF = 25.63648 - 0.284404 MG +1.53E-09 LEND
R^2 = 0.1783, R=0.115 , F-statistic= 2.821784 , Prob(F-statistic)= 0.077, DW=0.3763

Results of unit root test shows that residues are stationary.

Table n° 7 : unit root test of residues

variable		t- cal	t-tab (5%)	result
Resid	**Level**	**0.211553**	**0.463000**	**stationary**

Source: EViews 9 outputs

The long run equation :**INF =25.63648 – 0.284404 MG + 1.53E-09 LEND**

the variables MG and LEND explains 17.83 % of changes in INF, the F-statistic (2.821784) and Prob(F-statistic) (0.77793) indicate that the model is statistically not significant. The results shows that: In the long run monetary policy didn't have an effect inflation via money channel.

the short run equation:

INF =-0.364842 – 0.150286 DMG + 1.96E-09 DLEND - 0.158729 RESID (-1)

R^2 = 0.06033, R=-0.0571 , F-statistic= 0.5136 , Prob(F-statistic)= 0.6767, DW=1.82105

The model seem to be statistically no significant, the results shows that even in the short run there no effect of monetary policy on inflation via the money channel.

B. Effect on Inflation via lending channel:

Second, we investigate the presence of a cointegration in the long run between variables of the lending channel.

Table n° 8 : Lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-853.5305	NA	2.86e+21	63.59485	63.83482	63.66621
1	-730.4615	191.4407	2.08e+18	56.33048	57.77030	56.75861
2	-682.5094	56.83208*	4.70e+17*	54.63033*	57.26999*	55.41524*

Source: EViews 9 outputs

The result shows that the hypothesis of cointegration is rejected, so there are no long run relationship between independents variables (RESER RESC LEND RPRET) and the dependent variable INF.

Table n° 9 : Cointegration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.983471	217.0275	69.81889	0.0000
At most 1 *	0.879008	110.3593	47.85613	0.0000
At most 2 *	0.627266	55.44662	29.79707	0.0000
At most 3 *	0.584586	29.78750	15.49471	0.0002
At most 4 *	0.234474	6.946996	3.841466	0.0084

Source: EViews 9 outputs

Since there is no cointegration between variables we can't estimate VECM model, Then we can utilize VAR methodology to assess the effectiveness of monetary policy on inflation through lending channel as follow:
first, we use the Granger Test to determine causality between variables. Results shows that only RESER and RPRET causes INF.

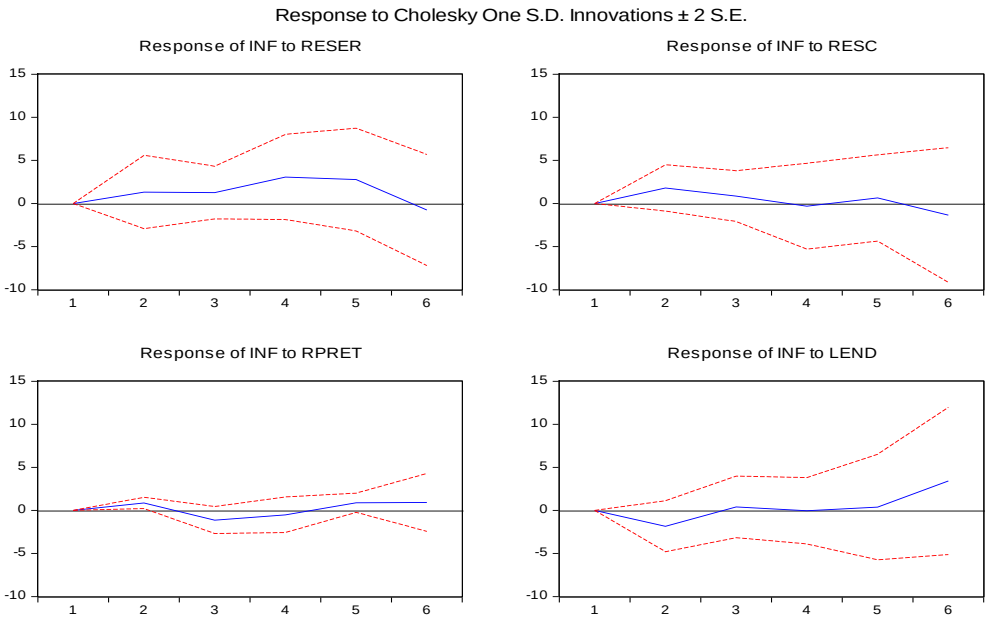
Table n° 10 : Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
RESER does not Granger Cause INF	27	11.9146	0.0003
INF does not Granger Cause RESER		6.83223	0.0049
RESC does not Granger Cause INF	27	2.24676	0.1295
INF does not Granger Cause RESC		5.44521	0.0120
LEND does not Granger Cause INF	27	0.10305	0.9025
INF does not Granger Cause LEND		0.07906	0.9242
RPRET does not Granger Cause INF	27	5.33050	0.0130
INF does not Granger Cause RPRET		2.22785	0.1315

Source: EViews 9 outputs.

we utilize impulse response function to identify the movements in INF due to any shock . we notice that any shock in RESER has a positive impact on INF and the response take a period of 6 years, the effect vanishes in the 6th year . RPRET has a positive impact on INF that last to the 2nd year and INF starts to fail until the 4th year and then returned to increase after 4 years of fall. Also INF response positively to a shock in RESC that continuous to the 3rd year. Whereas a shock in LEND results in a negative impact on INF that disappear after 2 two years .

Figure n° 1: Impulse Response



Source: EViews 9 outputs

From the variance decomposition we notice that in short run (2nd year) variation in inflation can be explained 17.67% by RESC, 18.74% by LEND, whereas in the medium and long term RESER explain 47.27% of variation in INF in the 5th year and 20.95% in the 10th year, also LEND explain most variation of INF in long run between 25.88% in the 7th year and 40.29% in the 10th year.

Table n°11 : variance decomposition

Perio	S.E.	INF	RESER	RESC	LEND	RPRET
1	2.967684	100.0000	0.000000	0.000000	0.000000	0.000000
2	4.270604	49.84649	9.643839	17.67202	18.74869	4.088962
3	4.709873	41.86677	15.09857	17.79871	16.13172	9.104224
4	5.842611	33.53961	37.44557	11.85619	10.48738	6.671249
5	6.579944	26.72728	47.27316	10.29595	8.614891	7.088727
6	7.741536	22.05948	35.11836	10.47971	25.80716	6.535297
7	11.52509	19.20684	24.39414	15.69514	35.37950	5.324388
8	15.44855	23.29696	20.92960	16.77274	33.23260	5.768095
9	16.57520	27.72856	19.17560	16.81570	29.54869	6.731446
10	20.11091	19.24861	20.95033	14.92546	40.29166	4.583937

Source: EViews 9 outputs

IV. Study Results:

The study concludes the main following results:

- Monetary policy didn't effect GDP through money channel in the long run but it has a positive effect through LEND (t-1) in the short run;
- In the long run, monetary policy effect GDP via the lending channel using RPRET (positive effect) that seem to be not convenient with economic theory, and RESC (negative effect). Whereas, monetary policy works its effects in the short run on GDP via lending channel through: (a significant positive effect of LEND(t-1); RESER(t) and (t-1); RESC(t), (t-1) and (t-2); RPRET (t) and (t-1)) also a significant negative effect of GDP(t-1) and RPRET (t-2));
- There are no effects of monetary policy on inflation via the money channel both in the long and the short run;
- In the short and the long run monetary policy is effective on inflation via lending channel using RESER and LEND in the long run as well as RESC and LEND in the short run.

Conclusion:

To evaluate monetary policy effect on economic performance in Algeria, especially on inflation and GDP, we investigate monetary policy transmission mechanism effectiveness, focusing on the main channels: money channel and lending channel. Results shows that our first hypothesis was rejected, that is monetary policy can't work it effect on INF through money channel neither in short run nor in long run, even on GDP in the long run. but in the short run, we notice an effect of LEND (t-1) on GDP of a value 7.673% in GDP when a change of 1% occur in LEND (t-1), also we notice that the money growth didn't have an effect on both inflation and GDP. However, lending channel seems to be effective on GDP in the long run using RESC in the conduct of monetary policy. Also monetary policy is effective on inflation via lending channel using RESER and LEND in the long run as well as RESC and LEND in the short run, thus the second hypothesis is correct.

The monetary policy in Algeria works its effect on economy through the lending channel, whereas isn't effective through money channel on inflation and GDP (except on GDP in the short run). The most important variables that could be considered are: the net domestic credit LEND (consists of the net claims on government and credit to economy) that effect GDP in the short run, and impact inflation both in the short and the long run. Also reserve

requirement present an important instrument set in monetary policy practice that influence more than 40% of inflation variance both in the medium and long run.

That is, the most used instruments that monetary policy focus on to effect inflation and output are : RESER, and less RESC since it was not operational for a long period due to the state of excess liquidity on the banking system from 2001 to 2014, also LEND have a crucial effect because of important role of the credit in the economic policy in Algeria.

For more effectiveness of monetary policy, using money and credit channel, as well as the other classical channels that should be operational namely the interest rate and exchange rate channel, we suggest :first, the ownership of the banking system (both public and private) working in market law, that would make monetary policy more effective also considering the role of interest rate as an important instrument as well as channel by implementing a set of financial and banking reforms that allow to the interest rate having a pass through effect process from central bank rate to the retail rates. Furthermore, legal restrictions on both exchange transactions and loans should been considered as an obstacle that can impede monetary policy to works its effect largely through all classical channel on economic performance in Algeria. To conclude, effect of credit channel, setting reserve requirement, rediscount rate as monetary policy instrument as well as net domestic credit seem to be insufficient to achieve economic stability using monetary policy effectively as an important part of economic policy.

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