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The impact of monetary policy on economic growth in Algeria(1980 – 2024) : Is there an asymmetric effect? An econometric study using the NARDL model.

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Abstract

This study examines how monetary policy variables impacted Algeria's economic growth during the period (1980 – 2024) , employing the nonlinear autoregressive distributed lag (NARDL) method One of the most noteworthy conclusions drawn from cointegration test results is that monetary policy variables—real interest rate, nominal exchange rate, and money supply—have an impact on economic development over time. However, testing for asymmetric effects showed that monetary policy had no asymmetric effect on growth. These results offer strong support for the monetarist school of thought.

Keywords : Monetary policy , Economic growth , NARDL model , Algeria
code JEL : E52; A10; C22

Introduction

One of the topics that is still being discussed in the field of monetary economics an d monetay policies is how monetary policy affects actual economic variables like investment and economic growth. Particularly in recent years when devoloping nations have implemented a variety of monetary and finnacial reforms that have an impact on the banking system and financial institutions .

We cite financial liberalization measures, for instance, which have prompted severa l inquiries from economists regarding the degree to which this policy has improved monetary policy performance and increased economic growth rates.

In terms of theoretical methods, It is crucial to keep in mind that the basis of classical ideas. thought was the idea of monetary neutrality which holds that money is merely a medium of trade and has no bearing on the degree of economic activity These concepts developed as an expansion of classical principles. But according to

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Keynesian economics, money is a key factor in determining income through the interest rate variable

Additionally, people hold money for its own reason and view it as a good store of wealth. Money demand functions were developed as a result of these concepts.

However, the monetarist school of thought, especially that of M. Friedman, emphasizes that monetary policy has little long-term effect on actual variables.

Research Problem: To what extent do monetary policy variables affect economic growth in the Algerian economy?

• Research Hypotheses:

Based on the research problem, the following two hypotheses can be proposed:

-. The economic growth rate and monetary policy variables have a long-term equilibrium relationship.

- The fiscal and monetary reforms adopted by Algeria have led to improved macroeconomic performance and enhanced the economic growth rate.

- There is an asymmetric effect of monetary policy variables on economic growth in Algeria.

II . The study's theoretical framework

A/ Classical Analysis

Jean B. Say's Law of Outlets (1803) is regarded as one of the key tenets of classical theory. Say argues that money is merely a veil concealing the reality of exchanges, and that the exchange process takes place between products. He therefore removes money from the exchange process, considering each commodity as an outlet for another, and that supply creates its own demand. This is what classical theory calls the Law of Outlets (La loi des débouchés). Consequently, a surplus in production cannot occur, and income reaches its equilibrium level at full employment.

Ricardo (1817), however, considers the exchange value of products to be proportional to the labor required to produce them. He argues that if relative prices are determined by the quantity of this labor, then absolute prices are a function of the quantity of money. That is, an increase in the money supply has no effect on production and trade (Jean S. Mill, 1817), but it does affect the general price level. However, Jean S. Mill (Richard Cantillon, 1817), who again relied on the ideas of Richard Cantillon, rejects the notion that an excess of money leads to an immediate and proportional rise in prices; the inflationary effect can only appear when this additional money is put into use. The economists Jean S. Mill and Ricardo (along with the classical economist Jean B. Say) established a mechanistic relationship between the money supply and the price level. The quantity theory is based on the distinction between the real economy and purely monetary phenomena that do not affect this economy. That is, an increase in the money supply automatically affects prices without impacting the currencies of production and exchange.

B/ Analysis by Exchanges (Irving Fisher's Equation of Proximity)

The quantity theory of money is one of the most important and oldest economic theories, still debated today. In its simplest form, it indicates that changes in the general price level are determined by changes in the quantity of money circulating in the economy. This theory is a primary source for describing and explaining classical monetary policy based on the gold standard. It has undergone continuous modifications under the doctrines of the so-called modern monetarist school,

associated with official institutions such as the University of Chicago and the Federal Reserve.

The first form of this theory relates to the famous exchange equation of the renowned economist Irving Fisher. It begins with the idea that individuals hold money to purchase goods and services, and the greater their need for money, the more they hold it. The money available in the economy is linked to the number of monetary units exchanged in transactions. According to Fisher, the quantity equation of money can be formulated as follows:

M*V = P*T…….(1-4)

M: Quantity of money

V: Velocity of money

T: Volume of transactions

P: General price level

C/ Keynesian Analysis

Keynesian analysis is based on the impact of money on economic activity, unlike classical thought, which is based on the principle of the neutrality of money and the idea that supply creates its own demand and that money is merely a medium of exchange. The Keynesian school, headed by Keynes, believes that money can influence economic activity, especially investment, through the interest rate channel. An increase in the money supply in the economy will lead to a decrease in the interest rate. Given the inverse relationship between investment and the interest rate variable, any expansionary monetary policy will encourage investment and increase the gross domestic product. From another perspective, Keynes argues that individuals hold money not only as a medium of exchange but also as a good store of value. This led Keynes to formulate the demand function for money as follows:

• Demand for money for transactions Md t

If we denote Md t as the demand for money for transactions and Y as the gross domestic product (GDP), then the demand function for money for transactions can be written as:

$Md\ t = L_1(Y)$ with $\Delta Md\ t / \Delta Y > 0$

Keynes also defined an alternative relationship for the demand function for money for transactions as follows:

Y = Md t = where V is the velocity of converting output into money and Y is the gross domestic product (GDP)

D/ Monetarism

On the other hand, the principles of the monetarism school, particularly those of M. Friendman (1968), emphasize that the effects of monetary policy are merely circumstantial or temporary (transitioire), meaning they are absent in the long run. Consequently, the hypothesis of monetary neutrality is fulfilled in the long run according to the monetarism school.

E/ Neoclassicism

The neoclassicists, according to the hypothesis of rational expectations (Lucas 1970, Sergent 1972), assert that money does not affect economic activity in the short run, and this effect is also absent in the long run.

III . Literature review

Many researchers have studied the impact of monetary policy on economic growth in different countries using various econometric methods. The most important previous studies can be summarized as follows:

Based on US macroeconomic data, Christopher Sims' 1972 study is regarded as on e of the first practical studies to investigate the causal relationship between money and income.

According to the study's findings, money and income have a unidirectional causal r elationship, which is in line with Keynesian theory. Miller (1991) used the Engel-Granger methodology to assess the cointegration of the research variables in order t o test the long-term relationship

Kuttner, K., and Friedman, M.'s 1990s study is another significant one.

Using the Johansen methodology to test the cointegration between the money suppl y and real income, as well as between the money supply in general and the interest rate on commercial paper and the interest rate from the second quarter of 1960 to th e fourth quarter of 1990, the researchers investigated the causal relationship betwee n income and money in the American economy.

The study came to the conclusion that the variables under investigation had a long-term link. David Dickinson and Jia Liu's (2005) study looked at the Chinese economy from 1984 to 1997. The researchers examined how monetary policy performance was affected by changes in financial structure during times of financial reform. The findings showed that the financial reforms implemented enhanced the effectiveness of monetary policy in the Chinese economy.

Ismail O. Fasanya et al. (2013) looked at the Nigerian economy from 1975 to 2010. An error correction model and time basket analysis were employed by the researchers. Real GDP, the broad money supply, interest rates, exchange rates, inflation rates, and foreign exchange reserves all showed a long- term equilibrium relationship, according to the study. Additionally, the estimation of the long- term equilibrium relationship revealed that real GDP growth in the Nigerian economy is highly influenced by the exchange rate and foreign exchange reserves.

The Pakistani economy from 1972 to 2010 was the focus of Chaudhry's study Imra n Sharif et al (2012). The empirical study’s findings demonstrated that the real exchange rate, the budget deficit , the public debt to GDP ratio , and the ratio of private sector all had a substantial impact on the GDP structure of the Pakistan economy

Manoucheher Nouri and Ahmed Jafari Samimi (2011) examined how the money su pply affected Iran's economic expansion between 1974 and 2008.

To assess the association between the variables, the researchers employed the ordin ary least squares mehod . The study’s findings demonstrated a statistically

significant positive correlation between Iran's money supply and economic growth .

Simon Yannick Fouda Ekobena (2013) employed panel data and econometric te chniques. The findings of the economic growth model estimation usually demonstrated a positive and significant impact of the private sector loan variable on economic growth rates for a sample of CEMAC nations between 1986 and 2006. However, the findings demonstrated that it significantly and negatively affects economic growth rates. (See monetary policy.)

Meghlaoui Amina, Soukeur Fatima Zohra, Zerroukhi Feyrouz (2021) This study's primary goal is to examine how monetary policy affects econo mic growth in Algeria using yearly time series data from 1990 to 2018. The long-term association between monetary policy tools and economic growth has been de monstrated by the application of the ARDL model.

The study's findings indicate that rather than only increasing the money supply, the Algerian central bank should reevaluate its use of monetary policy to promote eco nomic development by utilizing the most effective tools, such as interest rates and e xchange rates.

... order to prevent the detrimental effects of hyperinflation and preserve long-term economic growth and stability.

Benazza Ikram (2022) , The Impact Of Monetary Policy On The Growth Economic Of Algeria A Structural Vecm Approach This study looks at how monetary policy affects Algeria's economic expansion.Using time-series data from 1980 to 2018 Three different policy tools are used in the experiment: broad money (M2), the discount rate, and the real effective exchange rate (REER). The study has used the SVECM model.Rate of Inflation (INF). The findings demonstrated that the most effective means of communicating the effects of monetary policy in the Algerian economy is the management of the money supply.This indicates that monetary policy may effectively target inflation and economic growth by using quantitative tools like the Liquidity Coverage Ratio, which have a direct impact on the money supply

Ernesto Munguambe Gabriel et al (2024) The study investigates how changes in monetary policy affect Mozambique's economic expansion. The study uses the Auto Regressive Distributed Lag (ARDL) model to jointly analyze short-run and long-run dynamics using annual time series data from 1981 to 2021. The findings show that monetary policy has a major impact on Mozambique's economic growth. While inflation and the real interest rate have a negative impact on GDP, the money supply and exchange rate have a positive impact. These results highlight the importance of sound monetary policy in fostering economic expansion and provide policymakers in emerging countries with crucial information.

IV .The Model specification , estimation and results discussion

the econometric model can be specified as

$$\Delta y = \alpha + \rho y_{t-1} + \theta^{+} X_{i-1}^{+} + \theta^{-} X_{i-1}^{-} + \sum_{i=1}^{P-1} \gamma i \, \Delta y_{t-1} + \sum_{i=0}^{q-1} (\delta_i^{+} \Delta X_{i-1}^{+} + \delta_i^{-} \Delta X_{i-1}^{-}) + \epsilon i$$

$$x_t^{+} = \sum_{j=1}^{t} \Delta x_j^{+} = \sum_{j=1}^{t} \max(\Delta x_j, 0)$$

$$x_t^{-} = \sum_{j=1}^{t} \Delta x_j^{-} = \sum_{j=1}^{t} \min(\Delta x_j, 0)$$

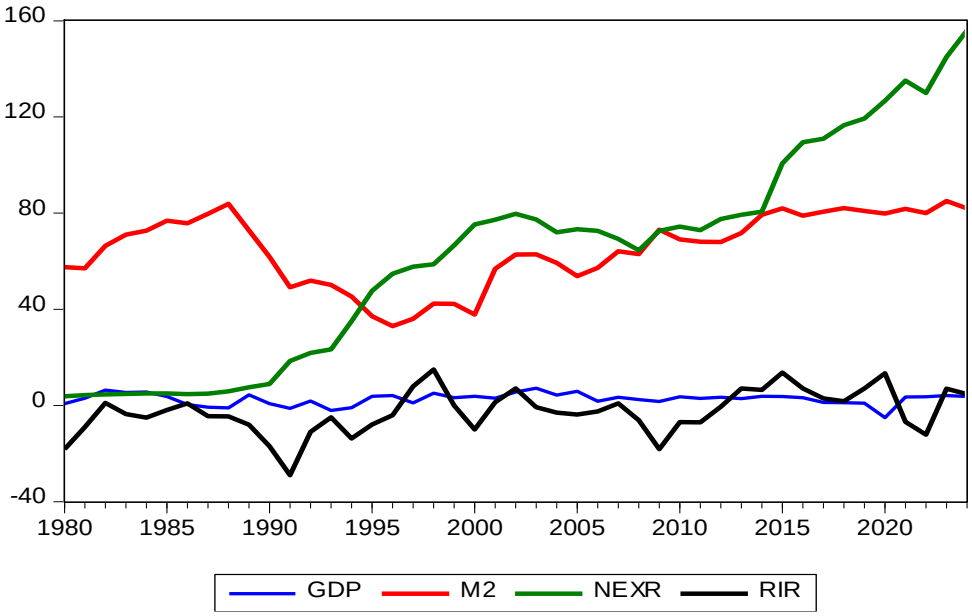
$$\Delta gdp = \alpha + \rho gdp_{t-1} + \theta_1{}^{+} M2_{i-1}^{+} + \theta_2{}^{-} M2_{i-1}^{-} + \theta_3{}^{+} NEXR_{i-1}^{+} + \theta_4{}^{-} NEXR_{i-1}^{-} + \theta_5{}^{+} RIR_{i-1}^{+} + \theta_6{}^{-} RIR_{i-1}^{-} + \sum_{i=1}^{P-1} \gamma i \, \Delta GDP_{t-1} + \sum_{i=1}^{q-1} (\delta_i^{+} \Delta X_{i-1}^{+} + \delta_i^{-} \Delta X_{i-1}^{-}) + \sum_{i=1}^{q-1} (\mu_i^{+} \Delta X_{i-1}^{+} + \mu_i^{-} \Delta X_{i-1}^{-}) + \sum_{i=1}^{q-1} (\beta_i^{+} \Delta X_{i-1}^{+} + \beta_i^{-} \Delta X_{i-1}^{-}) + \epsilon i$$

Where GDP : % grotwh gdp , M2 : money supply % of GDP , RIR the real interest rate , NEXR the nominal exchange rate ,

ΔX_{i-1}^{+} : the positif schocs of exogenous variable

ΔX_{i-1}^{-} the negatif schocs of exogenous variable

Figure 01 : Evolution of variables (1980-2014)



Source : Author using eviews 11

Table 01 : Descriptive statistics

	GDP	M2	RIR	NEXR
Mean	2.650902	64.95105	-2.555400	62.49964
Median	3.200002	67.95313	-3.000000	72.06065
Maximum	7.200000	85.00000	15.00000	156.0000
Minimum	-5.100000	33.00584	-29.00000	3.837450
Std. Dev.	2.414574	14.98865	9.016387	44.26159
Skewness	-0.826469	-0.537714	-0.390041	0.184802
Kurtosis	4.029966	2.185363	3.454689	2.101858
Jarque-Bera	7.111932	3.412838	1.528628	1.768623
Probability	0.028554	0.181515	0.465653	0.412998
Sum	119.2906	2922.797	-114.9930	2812.484
Sum Sq. Dev.	256.5273	9885.020	3576.990	86199.88
Observations	45	45	45	45

Source : Author using eviews 11

Table 02 : Variance Inflation Factors

Variance Inflation Factors			
Variable	**Coefficient Variance**	**Uncentered VIF**	**Centered VIF**
C	3.053325	22.96485	**NA**
M2	0.000695	23.20823	**1.148655**

RIR	0.002171	1.404758	**1.298116**
NEXR	9.40E-05	4.117742	**1.354875**

Source : Author using eviews 11

We see that every value of VIF is smaller than 10 based on the variance inflation coefficient test findings, indicating that the suggested model does not have a multicollinearity problem .

Table 03 : Correlation matrix

Correlation				
VAR	**GDP**	**M2**	**RIR**	**NEXR**
GDP	1.000000			
M2	-0.064213	1.000000		
Pr	0.6752	-----		
RIR	0.172279	0.271118	1.000000	
pr	0.2578	**0.0716***	-----	
NEXR	0.078835	0.335138	0.463166	1.000000
pr	0.6067	**0.0244*****	**0.0014*****	-----

Source : Author using eviews 11

Table 04 : PP Unit root test

Variables	**Level**		**First Difference**	
	Adj. t-Stat	**Probability**	**Adj. t-Stat**	**Probability**
GDP	-4.486253	0.0044***		
M2	0.365728	0.7859	-5.142693	0.0000***
NEXR	3.247797	0.9995	-3.825689	0.0003***
RIR	3.731290	0.0004***		

Source : Author using eviews 11

The real interest rate and the economic growth rate are zero-order complimentary since they are stable at the same level, according to the unit root test results. Additionally, after the initial difference is taken into account, the money supply ratio and the nominal exchange rate remain consistent, suggesting that they are first-order complimentary. All things considered, these findings enable us to test for cointegratio

Table 05 : NARDL estimation results

Dependent Variable: D(GDP) ***Method: Stepwise Regression*** ***Sample (adjusted): 1985 2024***				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
C	-14.12770	3.669895	-3.849621	0.1618
GDP(-1)	-1.386094	0.167285	-8.285830	0.0765
M2_P(-1)	-0.320504	0.052068	-6.155480	0.1025
M2_N(-1)	0.248719	0.064692	3.844694	0.1620

NEXR_P(-1)	-0.514994	0.045841	-11.23444	0.0565
NEXR_N(-1)	0.259073	0.253665	1.021322	0.4933
RIR_P(-1)	0.610138	0.133700	4.563488	0.1373
RIR_N(-1)	-0.410358	0.300987	-1.363374	0.4029
DM2_N(-4)	1.021659	0.060241	16.95949	0.0375
DRIR_P(-3)	0.300281	0.130258	2.305276	0.2606
DM2_P(-1)	-0.143438	0.038122	-3.762571	0.1654
DM2_P(-2)	0.243698	0.045081	5.405726	0.1165
DNEXR_N(-1)	-1.842327	0.090040	-20.46126	0.0311
DRIR_P(-2)	-0.311183	0.090365	-3.443633	0.1799
DM2_N	-0.822986	0.041810	-19.68403	0.0323
DNEXR_P	0.001405	0.033625	0.041785	0.9734
DRIR_N(-1)	-0.052232	0.199362	-0.261994	0.8369
DM2_N(-1)	0.304863	0.130966	2.327813	0.2583
DM2_N(-2)	0.014049	0.161320	0.087087	0.9447
DRIR_N(-4)	-0.087213	0.065901	-1.323394	0.4120
DNEXR_P(-2)	0.497944	0.061513	8.094946	0.0782
DRIR_N(-3)	-0.304290	0.131426	-2.315294	0.2596
DM2_P	-0.322630	0.054903	-5.876407	0.1073
DNEXR_N(-3)	-1.070173	0.097857	-10.93610	0.0581
DRIR_P(-4)	0.601654	0.108445	5.548015	0.1135
DGDP(-2)	-1.193810	0.108592	-10.99356	0.0577
DRIR_P	0.760322	0.062230	12.21797	0.0520
DGDP(-4)	0.604129	0.126946	4.758931	0.1319
DNEXR_N	-0.233912	0.327473	-0.714295	0.6051
DNEXR_N(-2)	-0.019673	0.227265	-0.086563	0.9450
DNEXR_P(-1)	-0.089235	0.079038	-1.129019	0.4615
DNEXR_P(-3)	0.476338	0.035133	13.55797	0.0469
DM2_P(-4)	-0.554653	0.051531	-10.76348	0.0590
DRIR_N	-0.500546	0.058891	-8.499539	0.0746
DNEXR_P(-4)	-0.074130	0.017245	-4.298728	0.1455
DNEXR_N(-4)	0.620204	0.130806	4.741398	0.1323
DGDP(-1)	-0.435798	0.095808	-4.548658	0.1378
DRIR_N(-2)	0.451375	0.143871	3.137353	0.1964
DGDP(-3)	0.298059	0.139975	2.129371	0.2795
R-squared	**0.999895**	**Mean dependent var**		**-0.047500**
Adjusted R-squared	**0.995892**	**S.D. dependent var**		**2.788897**
Log likelihood	**85.89056**	**Hannan-Quinn criter.**		**-1.749149**
F-statistic	**249.8068**	**Durbin-Watson stat**		**2.514062**
Prob(F-statistic) 0.050117				

Source : Author using eviews 11

D(GDP) = -14.1277046648 - 1.38609429374*GDP(-1) - 0.320503904737*M2_P(-1) + 0.248719200924*M2_N(-1) - 0.514994150807*NEXR_P(-1) + 0.259073346292*NEXR_N(-1) + 0.610137601369*RIR_P(-1) - 0.410358435141*RIR_N(-1) + 1.02165917726*DM2_N(-4) + 0.300280716843*DRIR_P(-3) - 0.143438265329*DM2_P(-1) + 0.243697879655*DM2_P(-2) - 1.84232741832*DNEXR_N(-1) - 0.311182676571*DRIR_P(-2) - 0.822986156413*DM2_N + 0.00140503469885*DNEXR_P - 0.052231586274*DRIR_N(-1) + 0.304863417999*DM2_N(-1) + 0.0140489945966*DM2_N(-2) - 0.0872126426791*DRIR_N(-4) + 0.497944269392*DNEXR_P(-2) - 0.304289525454*DRIR_N(-3) - 0.322629778816*DM2_P - 1.07017329875*DNEXR_N(-3) + 0.601654343458*DRIR_P(-4) - 1.19380994423*DGDP(-2) + 0.760322364099*DRIR_P + 0.604128692507*DGDP(-4) - 0.233912339004*DNEXR_N - 0.0196727650406*DNEXR_N(-2) - 0.0892351455286*DNEXR_P(-1) + 0.476338341652*DNEXR_P(-3) - 0.554652538523*DM2_P(-4) - 0.500545897897*DRIR_N - 0.0741302820514*DNEXR_P(-4) + 0.620203928936*DNEXR_N(-4) - 0.43579845111*DGDP(-1) + 0.451374947169*DRIR_N(-2) + 0.298058683831*DGDP(-3) + et

$$\mathbf{GDP} = \frac{0.320503904737}{-1.38609429374}\,\mathrm{M2}_{\mathrm{P}(-1)} + \frac{0.248719200924}{-1.38609429374}\,\mathrm{M2}_{\mathrm{N}(-1)} + \frac{-0.514994150807}{-1.38609429374}\,\mathrm{NEXR}_{\mathrm{P}(-1)} + \frac{0.259073346292}{-1.38609429374}\,\mathrm{NEXR}_{\mathrm{N}(-1)} + \frac{0.610137601369}{-1.38609429374}\,\mathrm{RIR}_{\mathrm{P}(-1)} + \frac{-0.410358435141}{-1.38609429374}\,\mathrm{RIR}_{\mathrm{N}(-1)} + Ut$$

$$\boldsymbol{GDP} = -\mathbf{0,2312}\ \mathrm{M2}_{\mathrm{P}(-1)} - 0{,}1794\ \mathrm{M2}_{\mathrm{N}(-1)} + 0{,}3715\ \mathrm{NEXR}_{\mathrm{P}(-1)} - 0{,}1868\ \mathrm{NEXR}_{\mathrm{N}(-1)} - 0{,}44\ \mathrm{RIR}_{\mathrm{P}(-1)} + 0{,}2958\ \mathrm{RIR}_{\mathrm{N}(-1)} + U$$

Table 06 : Test of cointegration

Wald Test: **Equation: EQ03**			
Test Statistic	**Value**	**df**	**Probability**
F-statistic	**339.2737**	**(6, 1)**	**0.0415***
Chi-square	**2035.642**	**6**	**0.0000**
Null Hypothesis: C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=0 Null Hypothesis Summary:			

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-1.386094	0.167285
C(3)	-0.320504	0.052068
C(4)	0.248719	0.064692
C(5)	-0.514994	0.045841
C(6)	0.259073	0.253665
C(7)	0.610138	0.133700

Source : Author using eviews 11

From the results of the cointegration test, we observe that the calculated Fisher statistic is greater than the critical values (4,35) of pesaran and Shein(2001) at 5 % significance level. Therefore, it can be concluded that the economic growth rate is cointegrated with the monetary policy variables (nominal exchange rate, real exchange rate, and money supply) for the Algerian economy.

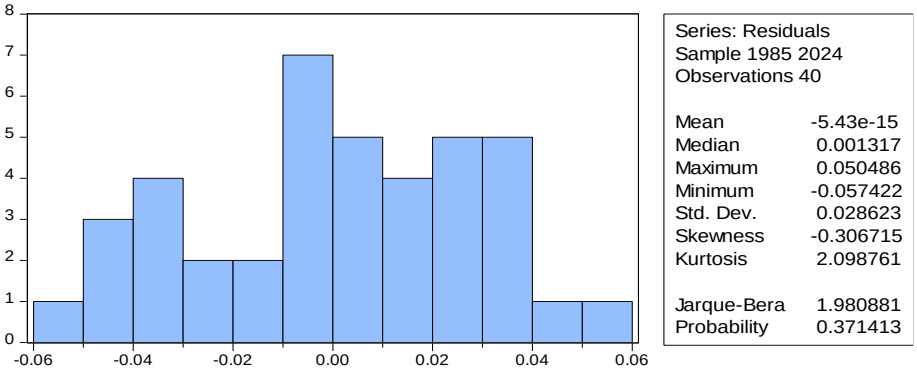
Table 07 : Wald test asymetric effect test

Nul hypothesis H0	*F statistic*	*Probability*	*Decision*
H_0: **M2 no asymetric effect : -C(3)/C(2)=-C(4)/C(2)**	10.75738	0.1884	No asymetric effect
H_0:**NEXR no asymetric effect -C(5)/C(2) + C(6)/C(2)**	4.463614	0.2814	
H_0:**RIR no asymetric effect -C(7)/C(2)=-C(8)/C(2)**	12.50553	0.1754	

Source : eviews 11

The results shown in the table indicate that the statistic is less than the critical values. Therefore, it can be concluded that the monetary policy variables—real interest rate, money supply, and nominal exchange rate—have a symmetrical long-term impact on economic growth. This can be explained by the fact that positive and negative shocks from monetary policy channels have an equal long-term effect on the Algerian economy. The most likely reason is that the structure of economic growth in Algeria remains linked to the oil sector, despite significant efforts to increase the contribution of other sectors to the GDP. Consequently, we conclude that economic growth rates during the study period were not significantly affected by monetary policy tools, as monetary shocks such as changes in the money supply or interest rate had a very weak impact compared to the expectations of economic theory.

Figure 02 : normality test



Source : eviews 11

Heteroskedasticity Test: ARCH

F-statistic	0.602898	Prob. F(2,35)	0.5528
Obs*R-squared	1.265551	Prob. Chi-Square(2)	0.5311

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/15/26 Time: 11:30
Sample (adjusted): 1987 2024
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000938	0.000247	3.800892	0.0006
RESID^2(-1)	-0.175341	0.168285	-1.041930	0.3046
RESID^2(-2)	0.024852	0.168493	0.147496	0.8836

R-squared	0.033304	Mean dependent var	0.000820
Adjusted R-squared	-0.021936	S.D. dependent var	0.000861
S.E. of regression	0.000870	Akaike info criterion	-11.17969
Sum squared resid	2.65E-05	Schwarz criterion	-11.05040
Log likelihood	215.4140	Hannan-Quinn criter.	-11.13369
F-statistic	0.602898	Durbin-Watson stat	1.999698
Prob(F-statistic)	0.552807		

V .Conclusion

This study aims to investigate and evaluate the uneven influence of monetary policy factors on economic expansion in Algeria from 1980 to 2024. The following is a summary of the key findings.

Economic growth and monetary policy variables (interest rate, money supply, and exchange rate) are correlated, which means that over time, these variables act similarly. During the study period, there was no asymmetric impact of monetary policy tools on the Algerian economy's output structure. This can be explained by the fact that shocks to monetary policy tools, such as changes in the money supply, interest rate, or exchange rate, have a small multiplier effect but a symmetrical long-term effect. This illustrates how little monetary policy can do to boost economic growth. Moreover, fiscal policy, which is connected to fluctuations in oil prices, continues to influence macroeconomic policy.

The results show that the banking system performs poorly because it is unable to allocate savings to the most productive enterprises in the economy, which would increase employment rates and economic growth. Due to the high costs of financial intermediation (bank interest), particularly during times of inflationary pressures that Algeria has faced, the financing element has decreased as a result of the lack of a role for the financial market and specialized financial institutions in Algeria and the reliance primarily on bank financing within a debt-based economy.

The overvaluation of the Algerian dinar has led to a decrease in foreign direct investment inflows, as the largest proportion of these inflows target the hydrocarbons and services sectors, excluding other sectors. This prevents the diversification of the structure of Algerian exports and increases demand for the Algerian dinar. - The structure of economic growth in Algeria still depends heavily on revenues from hydrocarbons. Consequently, the economic growth rates achieved during the study period were not due to the performance of monetary policy, but rather to other variables such as oil prices and foreign currency reserves.

The results indicate that the money supply, nominal exchange rate, and real interest rate have symmetrical long-term effects on economic growth in Algeria. The economy is similarly impacted by both positive and negative monetary policy shocks. This can be attributed to the persistent reliance on the oil industry despite efforts to diversify GDP contributions. Consequently, monetary policy tools had minimal impact on economic growth during the research period, as monetary shocks exerted far less influence than economic theory suggested.

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Appendix of econometric study

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.486253	0.0044
Test critical values:	1% level	-4.180911	

	5% level	-3.515523
	10% level	-3.188259

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: RIR has a unit root
Exogenous: None
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.731290	0.0004
Test critical values:	1% level	-2.618579	
	5% level	-1.948495	
	10% level	-1.612135	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	53.83415
HAC corrected variance (Bartlett kernel)	52.81755

Null Hypothesis: NEXR has a unit root
Exogenous: None
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		3.247797	0.9995
Test critical values:	1% level	-2.618579	
	5% level	-1.948495	
	10% level	-1.612135	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	28.69872
HAC corrected variance (Bartlett kernel)	46.10727

Null Hypothesis: D(NEXR) has a unit root
Exogenous: None
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.825689	0.0003
Test critical values:	1% level	-2.619851	
	5% level	-1.948686	
	10% level	-1.612036	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	33.05425
HAC corrected variance (Bartlett kernel)	36.43154

Null Hypothesis: M2 has a unit root
Exogenous: None
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.365728	0.7859
Test critical values:	1% level	-2.618579	
	5% level	-1.948495	
	10% level	-1.612135	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	34.20175
HAC corrected variance (Bartlett kernel)	34.20175

Null Hypothesis: D(M2) has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.142693	0.0000
Test critical values:	1% level	-2.619851	
	5% level	-1.948686	
	10% level	-1.612036	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	33.44327
HAC corrected variance (Bartlett kernel)	31.47909

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
t-statistic	6.715727	27	0.0000
F-statistic	45.10100	(1, 27)	0.0000

Chi-square	45.10100	1	0.0000

Null Hypothesis: -C(3)/C(2)=-C(4)/C(3)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
-C(3)/C(2) + C(4)/C(3)	1.208141	0.179897

Delta method computed using analytic derivatives.

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	11.01456	(3, 27)	0.0001
Chi-square	33.04367	3	0.0000

Null Hypothesis: C(2)=C(3)=C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-1.454082	0.292439
C(3)	-0.092848	0.029039
C(4)	-0.118102	0.033236

Restrictions are linear in coefficients.

Coefficient Confidence Intervals
Date: 03/25/26 Time: 11:12
Sample: 1980 2024
Included observations: 40

		90% CI		95% CI		99% CI	
Variable	Coefficient	Low	High	Low	High	Low	High
C	-14.12770	-37.29851	9.043102	-60.75815	32.50274	-247.7413	219.4859
GDP(-1)	-1.386094	-2.442290	-0.329899	-3.511651	0.739462	-12.03491	9.262718
M2_P(-1)	-0.320504	-0.649249	0.008241	-0.982091	0.341083	-3.634987	2.993979
M2_N(-1)	0.248719	-0.159727	0.657166	-0.573265	1.070703	-3.869334	4.366773
NEXR_P(-1)	-0.514994	-0.804421	-0.225568	-1.097455	0.067467	-3.433062	2.403074
NEXR_N(-1)	0.259073	-1.342502	1.860649	-2.964042	3.482188	-15.88839	16.40654
RIR_P(-1)	0.610138	-0.234010	1.454285	-1.088680	2.308955	-7.900759	9.121034
RIR_N(-1)	-0.410358	-2.310718	1.490001	-4.234765	3.414049	-19.57023	18.74952
DM2_N(-4)	1.021659	0.641312	1.402007	0.256223	1.787096	-2.813096	4.856414
DRIR_P(-3)	0.300281	-0.522136	1.122698	-1.354805	1.955366	-7.991523	8.592084

DM2_P(-1)	-0.143438	-0.384134	0.097257	-0.627829	0.340953	-2.570187	2.283310
DM2_P(-2)	0.243698	-0.040935	0.528331	-0.329116	0.816512	-2.626039	3.113435
DNEXR_N(-1)	-1.842327	-2.410816	-1.273839	-2.986392	-0.698263	-7.573968	3.889313
DRIR_P(-2)	-0.311183	-0.881723	0.259357	-1.459374	0.837009	-6.063502	5.441137
DM2_N	-0.822986	-1.086963	-0.559009	-1.354230	-0.291742	-3.484464	1.838491
DNEXR_P	0.001405	-0.210897	0.213707	-0.425846	0.428656	-2.139078	2.141888
DRIR_N(-1)	-0.052232	-1.310951	1.206488	-2.585361	2.480898	-12.74294	12.63848
DM2_N(-1)	0.304863	-0.522021	1.131748	-1.359212	1.968939	-8.031979	8.641706
DM2_N(-2)	0.014049	-1.004488	1.032586	-2.035722	2.063820	-10.25509	10.28318
DRIR_N(-4)	-0.087213	-0.503294	0.328868	-0.924561	0.750136	-4.282240	4.107814
DNEXR_P(-2)	0.497944	0.109567	0.886322	-0.283652	1.279541	-3.417772	4.413660
DRIR_N(-3)	-0.304290	-1.134080	0.525501	-1.974214	1.365635	-8.670433	8.061854
DM2_P	-0.322630	-0.669271	0.024011	-1.020233	0.374973	-3.817548	3.172288
DNEXR_N(-3)	-1.070173	-1.688017	-0.452329	-2.313563	0.173217	-7.299425	5.159078
DRIR_P(-4)	0.601654	-0.083040	1.286349	-0.776270	1.979579	-6.301600	7.504909
DGDP(-2)	-1.193810	-1.879432	-0.508188	-2.573600	0.185980	-8.106410	5.718790
DRIR_P	0.760322	0.367419	1.153226	-0.030383	1.551027	-3.201026	4.721670
DGDP(-4)	0.604129	-0.197379	1.405636	-1.008877	2.217134	-7.476859	8.685116
DNEXR_N	-0.233912	-2.301496	1.833672	-4.394853	3.927028	-21.07978	20.61196
DNEXR_N(-2)	-0.019673	-1.454566	1.415221	-2.907346	2.868000	-14.48661	14.44726
DNEXR_P(-1)	-0.089235	-0.588260	0.409790	-1.093506	0.915035	-5.120524	4.942054
DNEXR_P(-3)	0.476338	0.254514	0.698162	0.029925	0.922751	-1.760144	2.712820
DM2_P(-4)	-0.554653	-0.880006	-0.229299	-1.209416	0.100111	-3.834947	2.725642
DRIR_N	-0.500546	-0.872369	-0.128723	-1.248826	0.247735	-4.249352	3.248260
DNEXR_P(-4)	-0.074130	-0.183009	0.034748	-0.293245	0.144984	-1.171872	1.023611
DNEXR_N(-4)	0.620204	-0.205674	1.446081	-1.041846	2.282254	-7.706489	8.946896
DGDP(-1)	-0.435798	-1.040707	0.169110	-1.653156	0.781559	-6.534632	5.663035
DRIR_N(-2)	0.451375	-0.456993	1.359742	-1.376683	2.279433	-8.707002	9.609751
DGDP(-3)	0.298059	-0.585709	1.181826	-1.480492	2.076610	-8.612294	9.208411

Date: 03/24/26 Time: 23:31
Sample: 1980 2024
Included observations: 40
Q-statistic probabilities adjusted for 38 dynamic regressors

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
**| . |	**| . |	1	-0.291	-0.291	3.6398	0.056
.*| . |	**| . |	2	-0.190	-0.299	5.2280	0.073
. |*. |	. | . |	3	0.106	-0.064	5.7343	0.125
.*| . |	.*| . |	4	-0.125	-0.197	6.4671	0.167
. | . |	.*| . |	5	0.020	-0.093	6.4870	0.262
.*| . |	**| . |	6	-0.126	-0.278	7.2683	0.297
. | . |	**| . |	7	-0.007	-0.229	7.2706	0.401
. |*. |	.*| . |	8	0.170	-0.068	8.7864	0.361
.*| . |	.*| . |	9	-0.092	-0.153	9.2421	0.415
. |*. |	. | . |	10	0.107	0.010	9.8797	0.451
.*| . |	**| . |	11	-0.121	-0.219	10.725	0.467

. | . |	.*| . |	12	0.034	-0.092	10.794	0.547
. |*. |	. | . |	13	0.101	-0.043	11.428	0.575
.*| . |	.*| . |	14	-0.142	-0.098	12.723	0.548
. |*. |	. | . |	15	0.125	0.056	13.775	0.543
. | . |	. | . |	16	-0.010	0.015	13.783	0.615
. | . |	. |*. |	17	0.038	0.183	13.889	0.675
. | . |	. | . |	18	-0.061	0.026	14.171	0.718
.*| . |	.*| . |	19	-0.176	-0.068	16.643	0.614
. | . |	.*| . |	20	0.025	-0.187	16.694	0.673

*Probabilities may not be valid for this equation specification.

Wald Test:
Equation: EQ03

Test Statistic	Value	df	Probability
t-statistic	-3.279845	1	0.1884
F-statistic	10.75738	(1, 1)	0.1884
Chi-square	10.75738	1	0.0010

Null Hypothesis: -C(3)/C(2)=-C(4)/C(2)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
-C(3)/C(2) + C(4)/C(2)	-0.410667	0.125209

Delta method computed using analytic derivatives.

Wald Test:
Equation: EQ03

Test Statistic	Value	df	Probability
t-statistic	-2.112727	1	0.2814
F-statistic	4.463614	(1, 1)	0.2814
Chi-square	4.463614	1	0.0346

Null Hypothesis: -C(5)/C(2)=-C(6)/C(2)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
-C(5)/C(2) + C(6)/C(2)	-0.558452	0.264328

Delta method computed using analytic derivatives.

Wald Test:
Equation: EQ03

Test Statistic	Value	df	Probability
t-statistic	3.536316	1	0.1754
F-statistic	12.50553	(1, 1)	0.1754
Chi-square	12.50553	1	0.0004

Null Hypothesis: -C(7)/C(2)=-C(8)/C(2)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
-C(7)/C(2) + C(8)/C(2)	0.736239	0.208194

Delta method computed using analytic derivatives.