

The Impact Of Algeria's Monetary Policy On The Country's Economic Growth Throughout The Period (1997–2022)

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Abstract:

This study examines the influence of monetary policy on the economic growth of Algeria between 1997 and 2022. It uses multiple linear regression models to evaluate monetary policy impacts across both short- and long-term periods. The results demonstrate a strong and lasting correlation between economic development and two variables: the amount of credit provided to the private sector and the inflation rate. Conversely, the rediscount rate and the overall money supply have an inverse relationship with long-term economic growth. However, the relationship is different in the near run: economic growth negatively correlates with inflation and private sector credit but positively correlates with the broad money supply and rediscount rate .

Keywords: monetary policy, economic growth, multiple linear regression models

1. INTRODUCTION

The economic policy of the state and its quality is one of the most important reasons that increase or weaken the rates of economic growth, and the study of the impact of these policies on the growth process, especially monetary ones, has received the attention of many economic researchers, whether in the form of theoretical or empirical models, by Examining the relationship between monetary policy and economic growth provides an important perspective for determining the effectiveness or ineffectiveness of monetary policy initiatives (Bofinger, 2001, p. 156). Researchers can get insights into the larger implications of monetary policies by examining how changes in interest rates, money supply, and other monetary tools affect economic growth. Changes in the Gross Domestic Product (GDP) or other economic production indices are popular indicators of economic growth, and they can have a substantial influence. For example, executing an expansionary monetary strategy, which entails lowering interest rates and extending the money supply, can stimulate investment and consumption, resulting in increased GDP. In contrast, an expansionary monetary strategy, (Guo & Al, 2024)typified by increasing interest rates and reducing the money supply, could inhibit economic.

The central bank attempts to ensure price stability by regulating the quantity of money in circulation. Monetary policy has a stabilizing effect on economic growth by affecting it losses to keep pace with the changes taking place internationally and regionally.

Monetary policy affects economic results in numerous ways. However, other fundamental monetary policy objectives can mitigate its effects. Money policy transmission, which is how policy-setting changes spread through the financial system and effect the economy, is complex and influenced by many factors. These aspects include policy framework, implementation strategies, and financial market and institution adaptability. Outside factors like other economic policies and economic uncertainties like global events or consumer confidence often affect monetary policy's efficacy. Fiscal policy and regulatory frameworks can support or oppose monetary policy aims, affecting economic development and stability. Controlling economic activity with monetary policy is effective. Its extent and efficacy depend on its compatibility with other policy goals, its methods, and the economic and policy context.

Furthermore, the simultaneous pursuit of intermediate goals can impact the achievement of the ultimate purpose of attaining sustainable growth. Monetary policy's contribution to sustainable growth lies in its role of ensuring price stability. Given that a persistent rise in prices is mostly attributed to monetary factors, monetary policy employs its instruments to effectively control the amount of money in circulation in order to ensure price stability over the medium to long term. Both theoretical analysis and actual research in the literature indicate that sustained long-term economic expansion is linked to decreased pricing levels. Put simply, Excessive inflation rates may be detrimental to the long-term health and prosperity of the economy. Monetary policy greatly influences the financing environment of the economy, which affects not only the costs but also the availability of credit and banks' willingness to take on particular risks (Rebel & Cole, 1998, p. 964). It also impacts predictions of the future course of economic activity and inflation, hence influencing the prices of goods, asset prices, currency rates, as well as consumption and investment. By

implementing monetary policy to lower interest rates, it stimulates a decrease in the cost of borrowing. This, in turn, promotes more investment activities and leads to an increase in consumer spending on long-lasting items.

The anticipation of an improvement in economic activity may also lead banks to relax their lending policies, so allowing businesses and people to increase their expenditure. During a period of low interest rates, the appeal of purchasing stocks increases, leading to an increase in the financial assets of families. This can also enhance consumer spending and increase the appeal of corporations' investment programs. Low interest rates can lead to currency depreciation as the demand for domestic goods increases due to the higher cost of imported goods. The confluence of these factors amplifies output and employment, as well as bolstering investment and consumer expenditure.

Algeria's monetary policy was dominated by the national treasury before Law 10/90. This regulation caused many monetary imbalances, hurting the economy. Algeria needs a more organized and effective currency management system before 1990. However, the 1990 Monetary and Loan Law changed everything. This law clarified and framed the country's monetary policy, which was vital. Setting financial management goals and methods matched them with conventional procedures. These changes have helped Algeria's monetary policy achieve its goals during the 1990s. This success has also been boosted by collaboration with international financial institutions, which promote a more strategic and practical approach to monetary policy.

With the beginning of the year 2000, the improvement of the State's financial indicators and the laying of the foundations for the strengthening of macroeconomic stability, which characterized macroeconomic development, monetary policy relied in achieving its objectives on indirect instruments, and in the face of the liquidity surplus, which became structural, the Bank of Algeria managed monetary policy mainly through these instruments with the introduction of two new instruments, namely the liquidity recovery tool and the facilities of interest-bearing deposits, which allowed the absorption of excess liquidity effectively and the control of inflation, thus supporting monetary stability more. The strategy adopted by the Bank of Algeria did not reach the expected level of effectiveness in achieving economic growth due to several internal and external reasons that were a barrier to the ability of monetary policy to achieve its objectives.

1.1. The research main problem

This study seeks to examine and quantify the effects of monetary policy on the economic growth rates in Algeria?

1.2. The research main hypothesis

This analysis assumes that Algeria achieved economic growth between 1997 and 2022 due to its monetary policy interventions.

1.3. Research objectives

The main objectives of this research are to comprehend monetary policy, explore its impact and role in promoting economic growth, and analyze the relationship between monetary policy and economic expansion.

1.4. Research importance

The significance of the research stems from the investigation into highly crucial matter topics, which are:

- Monetary policy can stimulate economic growth, leading to increased productivity, job creation, greater incomes, and the advancement of global education, which fosters a varied and globally competitive workforce.
- Monetary policy measures include modifying interest rates and bank reserve requirements.

1.5. Research method

To test our study's central proposition, we will analyze the impact of monetary policy on the rate of economic expansion. The analyzed variables, obtained from International Monetary Fund statistics, display different magnitudes. To tackle this issue, we have implemented logarithmic transformations on all variables. The dataset spans from 1997 to 2022, comprising a sample size of 50 observations.

2. Theoretical Framework

2.1. Monetary policy

One weapon of macroeconomic policy is monetary policy (Walsh, 2017), as it emerged with the emergence of central banks and developed through various theories that concerned the study of money, as the latter is the focus of monetary policy work, and it is closely related to the economic reality of the country in terms of its durability and ability to face internal and external shocks, planned goals.

2.1.1. Monetary Policy Objectives:

Monetary authorities seek to achieve a number of objectives through monetary policy, as there is broad agreement that the main and ultimate objectives of monetary policy are almost the same as economic policy objectives.

2.1.1.1 Achieving stability in the general level of prices:

Maintaining price stability is a crucial goal of monetary policy for every country. This involves preventing and addressing inflation while also addressing the risk of economic depression. The monetary authority is responsible for minimizing fluctuations in the price level, as price stability greatly influences economic activity and key economic indicators. (Hashad, 1994).

This objective is achieved through the continuous intervention of the monetary authority to influence the flow of income through rational and continuous management of the money supply (Ali, 1988), and the control of bank credit, because the change in prices leads to serious damage to the category of creditors and for the benefit of civilians, which leads to a bad distribution of wealth between the two parties (Ajami, 2009).

In fact, the resort of monetary policy to address the problem of stable price levels means that there is a close relationship between the money supply and the level of prices with the stability of other factors, and Friedman stressed in the Economic Committee of the US Congress in 1959 that it is difficult to control domestic prices without controlling the rate of increase in the amount of money, and that no country in the world was able to overcome the problem of inflation without resorting to reducing the rate of increase in the amount of money (Hamid, 1997).

Various developed countries have recently tended to entrust the central bank with the main task of maintaining price stability and giving it autonomy in managing monetary policy in the appropriate manner to achieve this goal.

2.1.1.2 Achieving full employment:

Keep the unemployment rate low, usually between 3 and 5 percent, so that society can achieve full employment and maximize its economic resources.(Qader, 2020), and reducing unemployment is done by increasing effective demand through the monetary authorities increasing the money supply, so interest rates decrease, so businessmen accept investment, so employment increases in the national economy, and thus consumption increases, so income rises.

2.1.1.3 Achieving high economic growth rates (Wahed, 1993):

This goal is linked to the achievement of full employment, as economic growth alone is able to absorb the increase or surplus in the labor element, and the task of monetary policy here is to influence the credit rate through credit expansion in the money supply so that it can reach the starting stage that puts the economy on the path of rapid growth (Hamid, 1997, p. 277), but there are other non-monetary factors that must be available to achieve this high rate, such as the availability of natural resources and qualified manpower, and the existence of political and social conditions Therefore, the role of monetary policy must work in coordination with these factors, Furthermore, it is crucial to adopt appropriate fiscal policies that are in line with monetary policy's objectives. It is crucial to emphasize that the preferred rate of growth should effectively enhance society's general welfare rather than prioritizing the highest growth rate that solely benefits a particular group while disregarding others (Hamid, 1997, p. 276).

Achieving an optimal growth rate is necessary to ensure a minimum standard of living for members of society (Shabra, 1992, p. 49), and enables the state to take positions on international issues without being subjected to economic pressures, which have become the most important means to achieve political goals.

2.1.1.4 Achieving external balance:

The balance of payments of a country is a "regular record of all its economic transactions with the outside world in a given year" (Salvador, 1998, p. 123), and these transactions result in the import case that the price of goods and services is paid abroad, and the volume of money paid is recorded on the payment side, or the price of goods and services is collected in the case of exporting abroad and the volume of money collected is recorded on the input side.

The two sides of the balance of payments are often not equal, as there may be a surplus or a deficit that the State seeks to avoid using many means, including encouraging exports and restricting imports.

The deficit requires a monetary policy that avoids inflationary pressures that raise the prices of domestic goods, which leads to a weakening of their competitive power with the prices of foreign goods, so other countries refrain from importing them, Importers from within the country want to bring goods from other countries into the country to sell them for less than the prices of goods made there, so the balance of payments deficit increases, and the sound monetary policy here is to follow a deflationary policy to limit the rise in prices, by

withdrawing part of the money supply using monetary policy tools (Ali B. B., 2016, p. 133).

2.1.2 Factors that contribute to the effectiveness of monetary policy:

The efficacy of monetary policy in any country and under any economic system depends on a set of factors and conditions represented in the following :(Salvador, 1998, p. 205)

- Setting goals accurately due to the conflict of many of the objectives set, the more clear and specific the goal, the more effective the monetary policy .
- The flexibility of the productive apparatus to the changes that occur on economic variables, especially monetary ones.
- The degree of savings and banking awareness of the various economic agents .

The structure of economic activity: the position of the public and private sectors, the government's policy towards productive enterprises, the volume of foreign trade in the world market, and therefore the freedom of trade and price elasticity.

• Investment strategy: This refers to the overall plan for investing, taking into account factors such as the current investment climate, the mobility of money, the incentives offered to both domestic and international investors, and how investment decisions are influenced by changes in interest rates.

• The choice of exchange rate system is a determining factor, as monetary policy has a more significant effect on economies with flexible exchange rates than fixed ones. The degree of independence bestowed upon the Central Bank from governmental interference is paramount. Increased autonomy of the monetary authority allows for greater independence, hence improving the efficiency and efficacy of monetary policy. Developing the monetary system with its various components, whether the institutions that operate in it or the laws that govern it and the policies followed, which enables the Central Bank to control the size of the monetary mass and the activities of commercial banks.

• Finding the necessary institutions and appropriate mechanisms to mobilize adequate savings and direct them towards priority investments (Afar, 1979, p. 310).

Take the necessary preventive measures to avoid falling into monetary imbalances, which negatively affect the course of economic activity and the distribution of resources, and then take appropriate monetary policies whenever the economic situation so requires.

• The state of parallel market activity, as the less activity of this market, the more it is possible to control the economy and thus activate monetary policy.

• Availability of an effective information system: as monetary policy affects all markets through its impact on the amount of money (Al-Sadiq & others, 1996, p. 29), and from this point of view monetary policy designers must have comprehensive and detailed knowledge of the status of the economy in its various markets and the nature of its imbalances and potential.

2.2 Economic growth

Economic growth is a process in which real income is increased cumulatively and continuously over an extended period of time (a quarter of a century) so that this increase is greater than the rate of population growth (Pierre Robert, 2010, p. 02), while providing productive and social services, protecting renewable resources from pollution, and preserving non-renewable resources from depletion. When the economy of a country gets bigger over time, that's called economic growth . Gross Domestic Product (GDP) is the

overall amount of goods and services that an economy makes. It is often used to figure out how big an economy (Ali B. B., 2003, p. 7), When examining economic growth, two perspectives must be evaluated: nominal and real. Nominal economic growth pertains to the augmentation in the monetary worth of commodities and services as time progresses. Changes in both the amount of things and services made and their prices are included. Economists usually talk about "real" economic growth, which means only improvements in the amount that is made, so price changes don't have an impact. It better shows how much a country is making at a certain point in time compared to other times.

3. Literature review:

Extensive research has focused on the influence of monetary policy on economic growth. The current debate surrounding Monetary Policy highlights the importance of truth in promoting economic expansion. Although there is a wealth of literature on the subject, the impact of monetary policy on economic growth remains a topic of discussion, even though it is still considered an essential component of successful growth strategies.

(Abdalkrim Bouyaakoub,2017) This study aims to Examining how monetary policy affected GDP growth from 1990 to 2014 is the primary objective of this research. This is achieved by the application of VAR, an econometric model first suggested by SIMS (1989). Our econometric estimation findings reveal that the model's variables are not cointegrated. Additionally, the Granger causality test was used to differentiate between external variables (such as the exchange rate and the amount of credit extended to the economy) and endogenous variables (such as "economic growth"). Lastly, the VAR results from the models indicate that monetary policy is a factor in the evolution of growth in Algeria. Although the impact of lending and exchange rates on economic growth is less volatile in the near run, they both make better contributions in the intermediate and long run.

(Fatiha Talahite, 2023) This study examines the influence that Monetary Policy has had on the acceleration of economic growth in Algeria over the course of the period (1999–2019). The Federal Reserve Rate (FRR) played a pivotal role in Algeria's monetary policy throughout the twenty years that Bouteflika was in power on the Algerian government. Despite the fact that it worked in conjunction with the task that was allocated to the BA, the primary focus was on inflation targeting at the risk of causing a shortage of liquidity. First and foremost, the legitimacy of the state as the manifestation of the nation is the foundation upon which it is built. The failure of monetary and financial policy can be attributed to a crisis of confidence, which is the primary cause of the failure, in addition to technical and ideological choices.

(Messaoudi Malika,2024) This study Try to guess how the country's fiscal and monetary measures will affect its economic growth. We utilised the Vector Auto regression (VAR) model in this research. This is a strong analytical tool that lets us look at the causes and effects of changes in financial and monetary factors, such as the exchange rate, money supply, and government spending. We also aimed to comprehend how fiscal and monetary policy impacted economic growth in Algeria. To accomplish this objective, we employed data extracted from the World Bank's World Development Indicators (WDI), covering the period from 1980 to 2022. Based on the generated estimations, monetary policy has a more

significant influence on Algeria's economic growth than fiscal policy. The statistical analysis supports these estimations, aligning with economic theory and empirical facts.

4. Econometric specification and methodology

4.1. Econometric methodology

In order to measure and analyze the impact of Monetary policy on economic growth in Algeria, a Multiple linear regression model was used, which is considered to show this impact, and that the values of the variables to be studied, which we took from the statistics of the International Monetary Fund (are heterogeneous in size, we have entered the logarithm on all variables, these data are hexagonal data for the period from 1997 to 2022, i.e. the sample size used is 50 observations.

Table 1. Definition of the variables employed in this investigation

Variable name	Variable definition
Money mass	Increased money supply increases liquidity, lowers interest rates, and boosts investment.
GDP	denoted by (PIB), and by entering the Nibarian logarithm becomes "LPIB", data taken from World Bank data base and IMF statistics
Credit	Lower interest rates encourage unprofitable businesses to produce. Producers increase production when consumer and collective demand rise.
The ratio of total deposits to the money supply	It is represented by (lpm), and the ratio of deposits to the money supply in a country can be used to measure monetary progress.
Ratio of total deposits to GDP	deposits are a good indicator of the banking system's efficacy in the economy because the most important liabilities make up a large part of the GDP. We represent it as (LPG).

Source: Compiled by the authors using data from the World Bank and IMF databases.

4.1.1 Empirical Results and Discussion

4.1.1.1 Unit roots test :

A crucial requirement for simultaneous integration tests is that the time series demonstrate uniform stability. With this stability, a simultaneous integration relationship between variables can be constructed. To evaluate stability, we utilize the Augmented Dickey-Fuller (ADF) test to detect single roots.

In order to perform the Augmented Dickey-Fuller (ADF) test on each variable, we utilize the Ordinary Least Squares (OLS) approach to estimate the three fundamental models for each variable. The ADF test is based on the following hypotheses:

$$H_0 = \phi_j = 1$$

$$H_1 = \phi_j < 1$$

1. When the null hypothesis H_0 is accepted, it means that there is only one root present in the time series, which indicates instability. We employ the Ordinary Least Squares (OLS) technique to calculate the value of $j\hat{\theta}$ in the three models, resulting in $j\hat{\theta}$. This figure is subject to the Student's distribution. If the estimated $j\hat{\theta}$ value is greater than the crucial value obtained from the Student's distribution table, we can conclude that the null hypothesis H_0 is valid, suggesting the existence of a single root.
2. However, suppose the computed $j\hat{\theta}$ value is less than the critical value obtained from the student distribution table. In that case, we reject the null hypothesis, accept the alternative hypothesis, and confirm the chain's stability.

4.1.1.2 Dickie Fuller Rookie Test "ADF" (1997-2022)

Using EVIEWS we get the following results:

Table 2. ADF Test

Variable	Calculated value " $j\hat{\theta}$ ADF (t.)"	Degree of delay "Lag Mic"	Prob-RU (R) .probability
LM2	-1,212891	8	[0,6573]
Lpib	0.692175	3	[0,9905]
Lcrd	-1.847447	0	[0.6609]
Lpm	-0.037972	6	[0,9485]
Lpg	-0. 695824	7	[0,9655]

Source: Author's computation (extracted from EViews13)

The results from the analysis conducted using the software "Eviews 13.0" show that the calculated "ADF. t. $\hat{\theta}$ " value exceeds the critical values from the tables at significance levels of 10%, 5%, and 1%. Furthermore, it shows a greater likelihood of a single root at all levels of significance, resulting in the acceptance of the null hypothesis. Therefore, all factors analyzed in the study are considered to be unstable. In order to restore stability, we employ the technique of first-degree differencing (1).

Table 3 ADF Test Second degree.

.Second degree 2 nd différence critical values				
%10 ; %5 ; %1	(Prob)	Calculated value " $j\hat{\theta}$ ADF (t.)"	Degree of delay Lag Mic"	Variable
(-1,61) (-1,95) (-2,64)	[0.0000]	-10.14069	0	LM2
	[0,0001]	-14.51171	0	Lpib
	[0,0000]	-3.529284	0	Lcrd
	[0,0000]	-8.193486	0	Lpm

	[0,0000]	-10.64970	0	Lpg
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The results shown in Table (2), which were obtained using Eviews, demonstrate: We can then conclude that the null hypothesis is false because all series are stable. This means that at every level of importance, the time series of every variable are integrated to a second-order degree.

$$.lpib.lcrd.lp,.lpg.lm2 \rightarrow CI(1) \quad 1\% \quad 5\% \quad 10\%$$

4.1.1.3 Simultaneous Integration Test:

Firstly, we determine the variables' lag order using both the AIC criterion and the Schwartz criterion. Afterwards, we proceed to carry out the simultaneous integration test (TOUFIK, 2024, p. 27).

4.1.1.3.1 Determination of the degree of delay:

The recommended lag order is the first lag order (-3) based on the results of both the AIC test and the Schwartz test. This lag order is chosen because it is not possible to compute the tests beyond this point (TOUFIK, 2024, p. 30), mainly due to the restricted sample size available from 1997 to 2022.

4.1.1.3.2 Cointegration test

After verifying that the initial requirement of equal-degree variable stability is met, we estimate the long-term relationships using the Ordinary Least Squares (OLS) approach. Afterward, we do the Johansen Cointegration test to analyze the long-term correlation. We utilize the Johansen eigenvalue and maximum likelihood ratio tests to ascertain the level of simultaneous integration.

The Johansen test is dependent on the estimation of the subsequent model. Therefore, by employing EVIEWS and doing both the Johansen Test for Greater Eigenvalue and the Max-Eigenvalue test, our objective is to determine a concurrent integration relationship among the variables under study in the long term (LM2, Lpib, Lcrd, Lpm, Lpg).

H₀: Lack of a co-integration relationship.

H₁: Having a mutual integration relationship.

4.1.1.4 Model estimation:

The relationship can be estimated in its standard form as follows (BOURBONNAIS & Régis, 2015, p. 281):

$$pib = \alpha_0 + \alpha_1 m2 + \alpha_2 crd + \alpha_3 pm + \alpha_4 pg$$

Table 4: Concurrent Integration Rank Test (Johansen Test) Using Eviwes.

Date: 04/25/23 Time: 09:48

Sample (adjusted): 1997 2022

Included observations: 50 after adjustments

Assumption of trend: a linearly determined trend

Series: LPIB LM2 LPM LCRD LPG

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesize		Trace	0.05	
No. of	Eigenvalue	Statistic	Critical	Prob.**
None *	1.000000	679.2279	69.81889	0.0001

At most 1 *	0.482698	58.87688	47.85613	0.0033
At most 2 *	0.356623	31.19347	29.79707	0.0343
At most 3	0.209273	12.67045	15.49471	0.1275
At most 4	0.064687	2.808721	3.841466	0.0938

At 0.05 significance, the trace test implies 3 cointegrating

* indicates that the hypothesis is rejected at the 0.05 level.

**MacKinnon-Haug-Michelis (1999) p-values

Table (4) yields the following results:

Hypothesis (1):

$r=0$ The calculated result for the "Max-Eigenvalue" (679.2279) is greater than the crucial value at the 5% significance level (69.81889). Thus, we refute the null hypothesis H_0 and embrace the alternative hypothesis H_1 , signifying the existence of a concurrent integration relationship.

Hypothesis (2):

$r=1$ The calculated result (58.87688) is more than the critical value at the 5% significance level, which is (47.85613). Therefore, we reject the null hypothesis H_0 and accept the alternative hypothesis H_1 , which suggests the existence of a concurrent integration relationship.

Hypothesis (3):

$r=2$ The calculated number (31.19347) exceeds the critical value at the 5% significance level, which is (29.79707). Therefore, we reject the null hypothesis H_0 and accept the alternative hypothesis H_1 , indicating the existence of a mutual integration relationship. Therefore, according to the results presented in Table (4), there are three simultaneous integration relationships among the variables, with a significance level of 5%. We will test all possible scenarios to determine the correlations between the analyzed variables: $lpib$, $lm2$, $lcrd$, lpm , and lpg .

4.1.1.4.1 Test for concurrent integration using the "Granger" method:

To find the three simultaneous integration relationships, we utilize the "Granger" test, which is performed on the residuals (residuals of the suggested equations). As a result, we were able to infer the following three relationships:

The first relationship examined is between gross domestic product (GDP) and money supply, precisely the $Lpib$ - $LM2$ measure.

Using the "Granger" test and the "Eviews" program, the following result was obtained:

Table 5: Granger test of co-integration between (GDP and monetary mass)

<i>P-Value</i>	<i>ADF</i>	<i>"Lag Mic"</i>	<i>"Résiduels"</i>
[0,9825]	-0,012536	3	$e_t = ALPB_t - LM_t$

The table clearly shows that the estimated ADF value exceeds the critical value, indicating a greater likelihood [0.9825] at the 1% significance level. Therefore, we reject the null hypothesis H_0 and accept H_1 , which suggests simultaneous integration between [$Lpib$ - $LM2$].

The second relationship examines the correlation between the Gross Domestic Product (GDP) and the ratio of gross deposits to GDP, represented as $LPIB$ - LPG .

After conducting the 'Granger' test, a statistical tool used to determine causality between two variables, using the 'Eviews' software, a popular choice for econometric analysis, the following result was obtained:

Table 6: Granger test of the interdependence between GDP and the ratio of total deposits to GDP

P-Value	ADF	"Lag Mic "	"Résiduels "
[0,9712]	-0,05326	3	$e_t = ALpib_t - Lpg_t$

By the table we reject H_0 and accept H_1 . That is, there is a simultaneous integration between GDP and the ratio of total deposits to GDP.

Third Relationship: GDP and Credit [LCRD;LPIB]:

Using the Granger test and Eviews, we get the following:

Table 7: Granger Test for Co-Integration between GDP and Credit [LCRD;LPIB]

P-Value	ADF	"Lag Mic "	"Résiduels "
[0,918765]	-0,15695	1	$e_t = ALpib_t - Lcrd_t$

Thus, we refute the null hypothesis H_0 and embrace H_1 , signifying the presence of simultaneous integration between GDP and credit. We have effectively discovered three concurrent integration relationships in the long run by utilizing the "Granger" test on the remaining equations suggested in the model.:

1. Relationship of integration between GDP and monetary mass [Lpib-LM2]
2. A common complementarity relationship between GDP and the ratio of total deposits to GDP: [LPIB-LPG]
3. Complementary relationship between GDP and credit [LCRD;LPIB]

4.1.1.4.2 Causal Relationship Test:

Our objective is to evaluate the causal linkages between all the variables studied (lpib.lm2.lcrd.lpm.lpg) using the "Granger" approach. Our goal is to ascertain the causal relationship between variables, namely if one variable influences another, whether it is a unidirectional effect from the first variable to the second, a unidirectional influence from the second variable to the first, or a simultaneous mutual influence. In order to examine causal linkages, it is crucial that all variables used are equally stable.

First case:

Table 8: Selection of "Granger" causality between GDP and monetary mass [Lpib-LM2]

Pairwise Granger Causality Tests			
Date: 04/26/23 Time: 16:47			
Sample: 1997 2022			
Lags: 0			
Null Hypothesis:	Obs	F-Statistic	Prob.
LM2 does not Granger Cause LPIB	50	1.13425	0.3326
LPIB does not Granger Cause LM2		1.79289	0.9123

We can see from the table that the values (F): (1.13425) and (1.79289) are the largest tabular values at the level of %1 and %5, and using the probability [0.3326] is greater at the level of %1, thus rejecting the null hypothesis, that is, the existence of a causal relationship between the two variables, meaning there is a causal relationship from the differential of D(Lpib) to the differential of D(Lm2). As for the second relationship, we also note that the probability of [0.9123] is greater at the level of 1% and 5%, and from it there is a causal relationship in both directions.

Second case:

Table 9: Selection of "Granger Causalité" between GDP and Gross Deposits to GDP Ratio: [LPIB-LPG]

Pairwise Granger Causality Tests

Date: 04/26/23 Time: 17:05

Sample: 1997 2022

Lags: 0

Null Hypothesis:	Obs	F-Statistic	Prob.
LPG does not Granger Cause LPIB	50	4.00552	0.9266
LPIB does not Granger Cause LPG		0.00943	0.9906

Based on the data presented in the table for the first connection, it is clear that the F value [4.00552] is above the standards for statistical significance at both the 1% and 5% levels. Therefore, we refute the null hypothesis, showing a causal connection between the two variables. The probability value [0.9906] in the second connection, measured from the differential [Lpg] to the differential [Lpib], above the significance level of 1%, resulting in the rejection of the null hypothesis. This indicates a causal connection between GDP and the proportion of total deposits to GDP, suggesting that causality exists in both directions.

Third case:

Table 10: Selection of Granger causality between GDP and credit [LCRD;LPIB]

Pairwise Granger Causality Tests

Date: 04/26/23 Time: 18:10

Sample: 1997 2022

Lags: 0

Null Hypothesis:	Obs	F-Statistic	Prob.
LCRD does not Granger Cause LPIB	50	17.3144	0.9912
LPIB does not Granger Cause LCRD		2.30217	0.9142

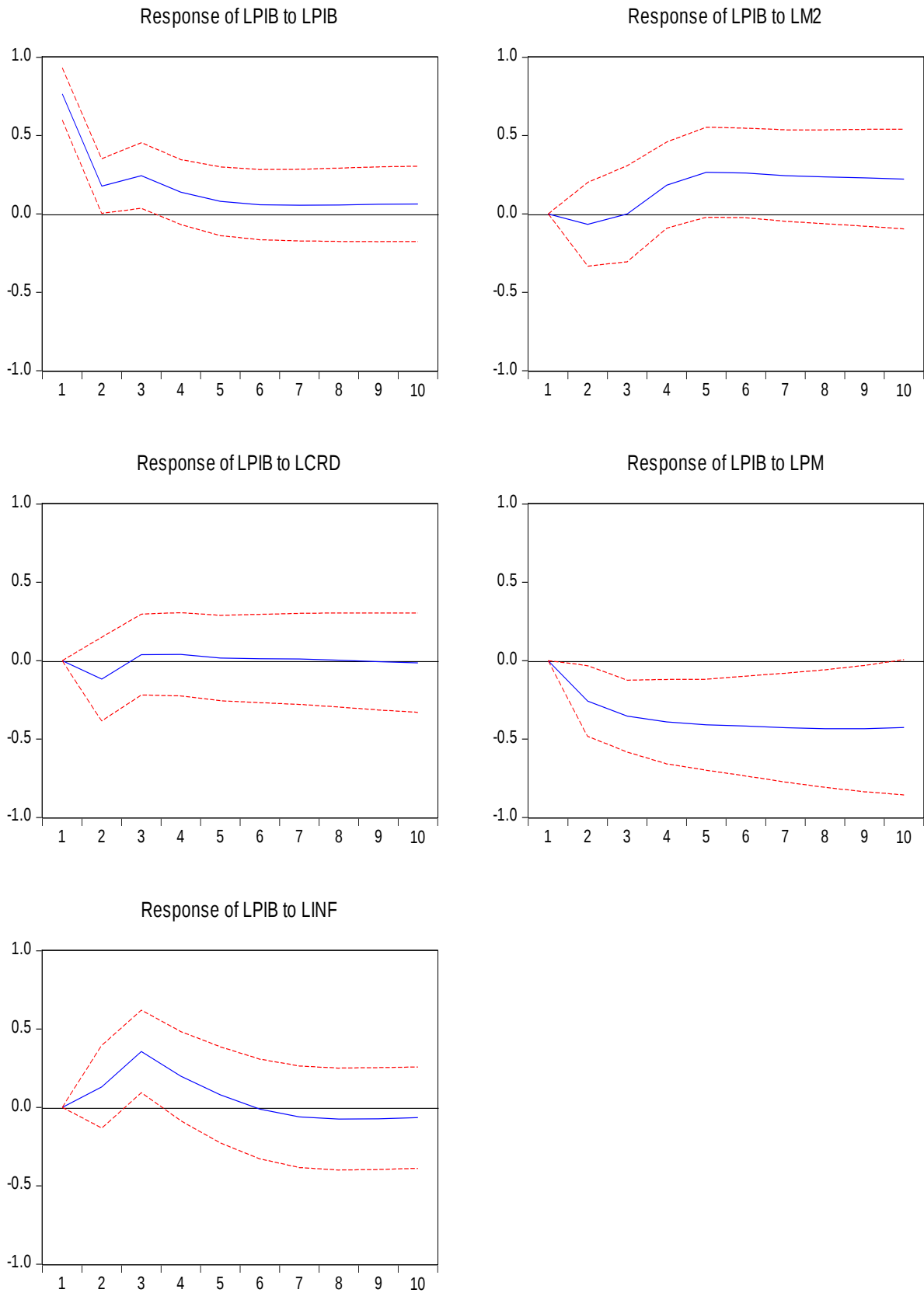
The table demonstrates a reciprocal cause-and-effect relationship.

4.1.1.4.3 Examination of response functions.:

The "Granger" causality test demonstrates a relationship between the variables. In order to demonstrate this correlation, we calculate response functions for each of the variables (lpib.lm2.lcrd.lpm.lpg). Through the analysis of response function shapes, we may observe

the specific influence of changes in the GDP variable on monetary policy variables in Algeria.

Response to Cholesky One S.D. Innovations ± 2 S.E.



4.1.1.4.4 Standard model estimation:

The impact of Algeria's monetary policy on the country's economic growth throughout the period (1997–2022)

The results of the econometric analysis of the impact of independent variables on GDP at constant prices in Algeria indicated the following:

Table 11: model estimation

LPIB

Method: Least Squares

Date: 04/27/23 Time: 08:29

Sample: 1997 2022

Included observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2	25.39608	23.98781	1.058708	0.2962
LCRD	15.62978	17.46511	0.894914	0.3763
LPM	3.231364	61.16888	0.052827	0.9581
LPG	56.77777	59.09676	0.960759	0.3426
C	2011.663	1715.184	1.172855	0.2480
R-squared	0.169866	Mean dependent var	208.1084	
Adjusted R-squared	0.125532	S.D. dependent var	1350.236	
S.E. of regression	1367.365	Akaike info criterion	17.38580	
Sum squared resid	72917786	Schwarz criterion	17.58855	
Log likelihood	377.4877	Hannan-Quinn criter.	17.46099	
F-statistic	0.732361	Durbin-Watson stat	1.050272	
Prob(F-statistic)	0.575425			

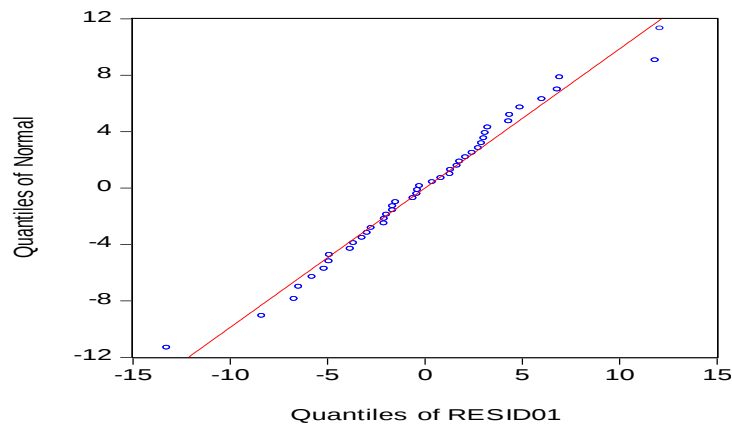
Hence, the estimated equation becomes as follows:

$$lpib = 2011.66 + 25.39lm2 + 15.62lcrd + 3.23lpm + 56.77lpg$$

5. RESULTS AND DISCUSSION

The coefficient of determination (R2) indicates that the independent variables, such as monetary mass, credit, the ratio of total deposits to the money supply, and the ratio of total deposits to GDP, were responsible for explaining 16.98% of the changes in Algeria's GDP at constant prices. The remaining 86.02% of changes in GDP were ascribed to additional variables that were not included in the model.

Fig.1: Propagation of model residues



6. CONCLUSION

This study investigates the impact of monetary policy factors on economic growth, as measured by gross domestic product (GDP). The impact is evaluated and measured by assessing monetary policy variables such as monetary mass, credit, the ratio of deposits to the money supply, and the ratio of total deposits to GDP. The study used a joint integration technique to examine the long-term relationship between these variables, uncovering their primary level of integration. By employing the "Granger" test, which examines residuals from proposed equations, three concurrent integration correlations were detected.

A common integration relationship between GDP and monetary mass [Lpib-LM2] and between GDP and the ratio of total deposits to GDP: [LPIB-LPG] and finally between GDP and credit [LCRD;LPIB]

Upon examination, it was discovered that growth and monetary policy indicators in Algeria are reciprocally connected. The standard model and related measures, like the modified coefficient of determination, were used to find that changes in monetary policy variables only explain 16.98% of the changes in Algeria's economic growth. This implies that monetary policy restricts economic growth in Algeria due to the country's economic structure. Algeria is considered a rentier economy that primarily depends on changes in oil prices. The table demonstrates a reciprocal cause-and-effect relationship.

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