

The instruments of monetary policy in Algeria and the efficacy of the policy rate - Approach by the ARDL model (1990-2022) –

أدوات السياسة النقدية في الجزائر وفعالية معدل إعادة الخصم باستخدام نموذج
(2022-1990) ARDL

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Abstract:

The focus of this research is on the relationship between policy rates and price stability in Algeria employing the ARDL approach and utilizing quarterly data from the first quarter of 1990 to the last quarter of 2022. The econometric analysis has confirmed the effectiveness of the policy rate by indicating that there is indeed a significant long-term relationship between the two variables, but this relationship is positive.

This counter-intuitive result is confirmed by the evolution of the policy rate and inflation in the same direction overall in Algeria, and can also be explained by other factors that cited in our article.

Keywords: the monetary policy, instruments, the policy rate, price stability, the ARDL model.

Jel Classification Codes : E52, E63, E4, C22, C52

ملخص :

مادختساب، رناز جلا في راعسلأ رارقتسا و (مصخلا قداعل لدعم) تساييلا رعدن ييد تقلاعل على لعة ساردلا هذه زكرت ARDL، 2022 إلى تد 1990 ن مقيونس عبر تانايب إلى أدانتسا

نير يغتملا نيد قلاذ تاذ دملأ قليوط تقلاعل عقلاب لكانه و مصخلا قداعل لدعم قيلاعف قيدا صتقلاا تساردلا تدكأ دقو ، ماجتلا س فني ف مخصتلاو مصخلا قداعل لدعم وطة اهدكا قيهيدبلا ريغلا قجيتتلا هذه و . قيباجيل تقلاعل هذه نكل ىرخأ ل ماع ل لاخ ن ماهر يسفت أضيا نكميو ، رناز جلا في ف ماع ل كشتبم التطرق إليها في مقالنتا .

كلمات مفتاحية: ج ذومذ ARDL، راعسلأ رارقتسا ، مصخلا قداعل لدعم تاولدلا ، قيدقنلا تساييلا

تصنيف JEL: E52، E63، E4، C22، C52.

Introduction

Monetary policy has generated considerable discussion within the economic community, particularly during the last century, which witnessed an unprecedented dynamic in the global economy. "It is regarded as a collection of measures designed to affect the financing conditions of the economy. Its main objective is to maintain price stability (monetarist approach), but it can also promote growth and full employment (Keynesian approach)" (Artus & Virard, 2010). To contribute to the achievement of economic policy objectives, the central bank has an operational arsenal called "monetary policy instruments," classified based on the level of development, financial structure, and financing methods of the economy (market financing or banking system) into two categories: direct instruments and indirect instruments. Generally, direct instruments are used in debt-dependent economies, where the primary source of financing for businesses and households is bank credit, while monetary policies in market economies rely much more on indirect instruments.

In Algeria, marked by the introduction of law 90-10 and the adoption of a stabilization and structural adjustment program, a monetary policy worthy of the name begins to take shape, becoming more restrictive and resembling monetarist rules where inflation targeting has taken precedence over the fight against unemployment (CNES, 2005). Thus, the formulation of monetary policy is facilitated by the mobilization of indirect instruments, through the establishment of a series of rates, including the determination of the rediscount rate. became necessary.

Our objective in this work is to assess the role of the policy rate, defined as the rediscount rate, as a tool of monetary policy in Algeria. and to observe its negative or positive effect on price variation, in order to determine the impact of monetary policy.

This leads us to articulate our research question as follows: What is the impact of the policy rate on price stability during the period from 1990 to 2022?

By adopting a monetarist perspective, we propose to verify the following hypothesis and we believe that: The rediscount rate is a significant variable and has a negative effect on price variation. However, before proceeding, it is essential to first offer a theoretical overview of the monetary policy instruments utilized by the Bank of Algeria. Following this, we will use the ARDL modeling approach, which will be applied to our study sample. Finally, we will present the results obtained and their interpretations to address our problem.

I. Literature Review:

1. Instruments of Monetary Policy:

In order to fulfill its objectives, the central bank has a series of monetary policy instruments, which are variables that are directly or indirectly under its control.

1.1. Direct Control Instruments:

These instruments have direct and rapid effects on the monetary aggregate counterparts. According to F. Mishkin, "it is a system of limits and regulations where monetary authorities act directly on the amount of credit granted to the economy through credit control and selectivity" (Mishkin, 2010).

This category of instruments directly affects the amount of credit granted to the economy by regulatory means, controlling the source of monetary creation. However, the disintermediation of economic financing has rendered this instrument obsolete.

1.2. Indirect Control Instruments:

In this second category, the central bank aims to influence banking liquidity in order to impact short-term interest rates and the capacity of banks to create money (Bank of France, 2006). This type of instrument restricts banking liquidity through the following measures: the rediscount policy, open market operations, and reserve requirements.

2. Monetary Policy Instruments in Algeria (1990-2022):

In reality, it was during the 1990s, with the adoption of the stabilization and structural adjustment program that authorities began to implement a credible monetary policy. As confirmed by Yacine BOUMGHAR, we can only refer to the presence of a monetary policy in the context of economic analysis sense with the advent of law 90-10 on money and credit (Boumghar, 2004). In the following section, we will analyze the main instruments used by the Bank of Algeria from 1990 to the present.

2.1. Monetary Policy Instruments in Algeria from 1990 to 1999:

After 1990, the banking system resembled a "debt-dependent economy" (Ilmane, 2006), where most economic financing was through bank credit and characterized by structural illiquidity, making it entirely dependent on the central bank. The instruments used included: rediscount rate ceilings, debtor interest rates, and credit controls for restructured public companies.

2.1.1. Interest Rate and Rediscount Rate Ceilings:

With the new reform and the prevailing inflationary context, establishing a restrictive monetary policy aimed at reducing money demand and curbing inflation was necessary. The Bank of Algeria implemented a series of rates to regulate banking rates and guide its interventions. During the stabilization and structural adjustment program, and following the deregulation deliberation of the Money and Credit Council dated April 9, 1994 (Instruction N°16-94, 1994), the Bank of Algeria aims to establish market mechanisms: interest rates are determined by the interaction of supply and demand in the capital market, and the rediscount rate, which is the refinancing rate for commercial banks with the central bank, constitutes the main rate set by the Bank of Algeria, guiding all market rates.

The data in the table below show two different trends in the evolution of interest and rediscount rates (Ministry of Finance, 2000) :

Table 1. Evolution of the Rediscount Rate and Interest Rates (1990-1999)

	oct-91	Apr-94	Dec-95	Dec-96	Dec-97	Dec-98	Dec-99
Rediscount Rate (%)	11,5	15	14	13	11	9,5	8,5
Creditor Rates (%)	déc-16	16,5-18	16,5-18	16,5-18	8,5-12	8,5-12	8,5-10
Debtor Rates (%)	15-20	18-25	19-24	17-21,5	sept-13	8,5-12,5	8,5-11,3

Source: (Ministry of Finance, 2000), Economic and Financial Situation.

The first period is characterized by a significant increase in interest rates during 1991-1995, similar to the rediscount rates, which reached a maximum of 15% in 1994; this trend also applies to the interest rates charged by commercial banks in their intermediation functions. This reflects a restrictive monetary policy aimed at limiting the volume of credit granted by banks and encouraging the mobilization of public savings.

At the conclusion of the macroeconomic stabilization and structural adjustment program, the monetary authorities reduced the rediscount rate to 9.17% in 1999, which further decreased to 6% in 2000 to promote a recovery in non-inflationary growth. Creditor rates of banks increased until 1997, then stabilized in the following two years before decreasing. The role of rediscount ceilings, as a monetary policy instrument, will gradually be reassessed in terms of its reduction.

2.1.2. Credit Control:

Maintaining a direct control instrument through credit control was also necessary. It was strictly capped by the provisions of Law 90-10 related to money and credit.

Credits granted to the economy positively increased during 1994 and 1996, with a growth rate of (+107%), but decreased by (-26%) in 1998 due to rising interest rates, which led to a transformation of demand deposits into time deposits. The monetary policy had the effect of drying up liquidity and reducing public treasury debt to public banks.

On the other hand, in activating the indirect instruments of monetary policy, Law 90-10 also provided for other instruments considered indirect, notably: Open market. However, in reality, these instruments were not well not handled correctly.

2.2. Monetary Policy Instruments in Algeria from 2000 onward:

To reduce overall excess liquidity and prevent inflationary risks, the Bank of Algeria resorted, starting in early 2001, to the traditional instrument of mandatory reserves. However, since this was clearly insufficient to absorb an adequate portion of the bank liquidity available in the interbank money market, the Bank of Algeria had to turn to other instruments: direct liquidity absorption and deposit facilities.

2.2.1. Mandatory Reserves:

Defined in 2001 in response to the excess liquidity situation and redefined in 2004 by regulation No. 04-02 of March 4, 2004, mandatory reserves constitute a particular institutional instrument of monetary policy aimed at creating deposits by banks with the Bank of Algeria to monthly cover the level of regulatory mandatory reserves.

The Central Bank maintained an upward trend in mandatory reserve rates during 2004 to maintain stability in the excess liquidity of the money market. The following table illustrates the changes in mandatory reserves between 2001 and 2022.

Table 2. Evolution of Mandatory Reserves in Billions of DA (2001-2022)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Amount of MR	44	123	127	157	172	186	272	395	395	494	570
Rate of MR (%)	4,25	6,25	6,25	6,5	6,5	6,5	6,5	8	8	9	9
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Amount of MR	754	891	1 024	1 091	889	1 476	1 239	1 157	695	1 383	1 893
Rate of MR (%)	11	12	12	12	8	4	8	10	3	2	2

Source: (Bank of Algeria, 2014, 2018, 2022), Statistical Bulletins of the Bank of Algeria.

To strengthen the reduction of excess liquidity, the Bank of Algeria increased the mandatory reserve rate to 6.25% in 2002, up from 4.25% the previous year.

During the period from 2004 to 2007 (Bank of Algeria, 2006), mandatory reserves proved to be an effective instrument in absorbing excess liquidity (remunerated at 1.75% in 2004, decreasing to 1% in 2005), increasing from 6.5% during this period to 8% in 2008 and then to 9% in December 2010, aimed at further reducing this liquidity surplus; the balance reached 569.86 billion DA in 2011. The mandatory reserve rate was raised to 11% in mid-May 2012 to support the role of monetary policy in controlling inflation. This measure was effective, as the amount of mandatory reserves increased from 754.10 billion DA in 2012 to 891.39 billion DA in 2013, then to 1,023.96 billion DA in 2014, after the rate was raised to 12% in mid-May 2013. After the 2014 crisis, the mandatory reserve rate remained unchanged at 12% until May 2017, when it decreased to 8%, then to 4% in 2017, before being increased to 8% again in 2018. Accordingly, the mandatory reserve rate was reduced from 3% to 2% as of February 15, 2021, to enhance banks' financing capacities as part of the national policy for economic recovery and diversification.

Mandatory reserves cannot serve as a final liquidity adjustment instrument since their rate remains constant for extended periods, and adjustments occur in small increments to absorb excess liquidity. However, as this was evidently insufficient to sterilize a large enough proportion of bank liquidity available in the interbank money market prior to 2014, the Bank of Algeria had to resort to other instruments (Bellal, 2010) direct liquidity absorption and deposit facilities.

2.2.2. Liquidity Absorption and Deposit Facilities:

Liquidity absorption through tender operations represented a second active instrument chosen by the Central Bank to sterilize excess liquidity.

This instrument is obviously much more flexible than mandatory reserves, as it can be adjusted on a day-to-day basis. Moreover, participation in liquidity absorption operations is not

mandatory, allowing each bank to consider its own liquidity situation. The liquidity absorption instrument succeeded in absorbing a substantial amount of money from its introduction in 2002 until 2014. The remuneration for liquidity absorption¹ (liquidity for seven days since April 2002, for three months since August 2005, and for six months since January 2013) allowed the Bank of Algeria to encourage the placement of as many idle resources as possible.

Additionally, Instruction No. 04-2005 of June 14, 2005, enabled the implementation of the remunerated deposit facility, which refers to deposits at the Central Bank for 24 hours (Instruction No.04-05, 2005).The following table represents the evolution of these two instruments.

Table 3. Evolution of Liquidity Amount, Liquidity Absorption, and the Share of Deposit Facility in Liquidity Absorption in Billions of Dinars (2002-2018)

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Amount of Liquidity	169	623	638	732	1,147	2,001	2,846	2,447	2,550
Amount of Liquidity Absorption	130	250	400	450	450	1,100	1,100	1,100	1,100
Balance of Deposit Facility	/	/	/	50	457	471	1,400	1,022	1,017

Year	2011	2012	2013	2014	2015	2016	2017	2018
Amount of Liquidity	2,845	2,876	2,673	2,731	1,833	821	1,381	1,482
Amount of Liquidity Absorption	1,100	1,350	1,350	1,350	700	/	/	/
Balance of Deposit Facility	1,258	838	480	469	153	/	/	/

Source: (Bank of Algeria, 2005, 2010, 2014, and 2017), Annual Reports on Economic and Monetary Development in Algeria.

Liquidity Absorption: To better control the evolution of monetary aggregates and thus control inflation, the Bank of Algeria intensified its interventions by increasing the amounts of liquidity absorbed from 129.7 billion dinars in 2002 to 400 billion dinars in 2004. Starting in mid-June 2007, the total amount of liquidity absorption was adjusted to 1,100 billion dinars to absorb more liquidity. The amount of liquidity absorption remained unchanged from 2008 to 2011. In April 2012, the amount of liquidity absorption was adjusted and set at 1,350 billion dinars to address the acceleration of inflation rates.

In 2015, the significant drop in oil prices and the resulting high deficit in the overall balance of payments led to a decrease in bank liquidity, falling from 2,730.9 billion dinars at the end of 2014 to 1,832.6 billion dinars at the end of 2015, a decline of nearly 33%.

Consequently, the Bank of Algeria lowered the liquidity absorption thresholds and, in 2016, suspended this instrument as well as the remuneration of the deposit facility.

¹ From the end of 2003 to 2009, the recorded amounts rose from 230 to 1,100 billion dinars. In 2004 and 2005, they represented about one-quarter of bank credit.

Deposit Facility: The Bank of Algeria employed the remunerated deposit facility, where the balance reached 456.7 billion dinars by the end of 2006. As a result, the share of the remunerated deposit facility in absorbing excess liquidity reached 24% in December 2006. Its role strengthened in 2008, registering a rate of 49% in December, indicating that this instrument became more effective as an active monetary policy tool. However, starting in 2009, under the impact of an external shock, banks experienced a decrease in their cash surplus, leading to a significant contraction of this instrument's role, which dropped to 27% compared to 2008, but it increased significantly in 2011 to reach 53%. The period from 2012 to 2018 saw a slowdown in the use of the remunerated deposit facility, because the excess liquidity was absorbed by the liquidity absorption instrument.

II. Empirical Approach: The Effectiveness of the Key Rate and its Impact on Price Stability in Algeria from 1990 to 2022:

The aim of this research is to empirically evaluate the role of the key rate as a monetary policy instrument in Algeria. This entails evaluating its effectiveness and impact on price stability since the year 1990.

1. Variable Nomenclature and Data Presentation:

The variables selected for this empirical exploration are:

Independent Variable: The key rate (TXD), which serves as an indicator closely related to the nature of the monetary policy in place. It indicates the criteria established by the central bank for accessing liquidity. In this study, the key rate is defined as the rediscount rate in quarterly data.

Dependent Variable: The Consumer Price Index (IPC), which is an indicator describing the price evolution of a basket of goods and services between two periods (Blanchard & Cohen, 2004). It is utilized to assess inflation.

We use quarterly data from 1990 to 2022. All variables are logarithmically transformed to avoid issues of heteroscedasticity.

The mathematical representation of the model is: $IPC = F(TXD)$ and the economic model in logarithmic form can be expressed as:

$$LIPC = \alpha_1 + \alpha_2 \cdot D(LTXD) + \alpha_3 \cdot (LTXD) + \varepsilon$$

Where:

α_1 : represents the constant;

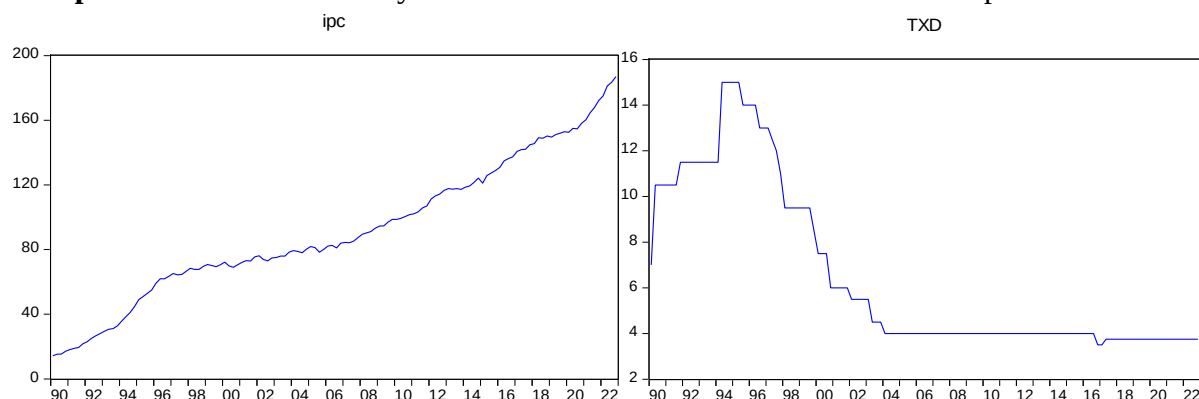
α_2 : the weighting coefficient representing short-term dynamics;

α_3 : the weighting coefficient representing long-term dynamics;

ε : represents the residuals of the equation.

The changes in these variables are illustrated in the following graphs:

Graph 1. Evolution of the key rate and the Consumer Price Index over the period 1990-2022



Source: Created using EVIEWS 10 software

A visual inspection of the graphs indicates that the key rate in Algeria during the study period went through three stages:

With the new reform and the inflationary context prevailing after 1990, the establishment of a restrictive monetary policy aimed at reducing money demand and correcting inflation was necessary. The Bank of Algeria established a series of rates to manage banking rates, and guide its intervention, including the rediscount rate, which reached a maximum of 15% in 1995. This was intended to reduce the inflation rate, which peaked in 1992 and 1995 (31.7% and 29.8%, respectively), resulting from the price liberalization policy. This reflects a restrictive monetary policy aimed at limiting the volume of loans granted by banks and promoting the mobilization of public savings.

At the end of the macroeconomic stabilization program and structural adjustment, the monetary authorities reduced the rediscount rate to 9.17% in 1999. This rate continued to decline to 4.5% in 2003, as a result of a decrease in the inflation rate in Algeria, which fell from 18.7% in 1996 to 4.3% in 2003. This aimed to encourage non-inflationary growth. After that year, the rediscount rate remained stable until 2016 at 4%, and currently stands at 3.75%, to improve the financial situation of banks.

Before any econometric treatment, and to determine whether there is a long-term relationship between the key rate and price stability, it is essential to ensure the stationarity of the selected variables. This is necessary to avoid spurious relationships and to choose the appropriate model.

2. Robustness Tests:

2.1. ADF Stationarity Test:

By applying the Augmented Dickey-Fuller unit root test, the results are as follows:

Table 4. Results of the stationarity and integration test (ADF)

Variables		Level			First Difference			Order of Integration
		Intercept	Trend and intercept	None	Intercept	Trend and intercept	None	
LTXD	critical values 5%	-2,88358	-3,44480	-1,94325	-2,88375	-3,44476	-1,94330	I(1)
	t-statistic	-0,47646	-1,91136	-1,02778	-13,55208	-13,47545	-13,31461	
	Prob.*	0,89100	0,64300	0,27250	0,00000	0,00000	0,00000	
LIPC	critical values 5%	-2.88505	-3.44676	-1.943449				I(0)
	t-statistic	-1.11541	-4.178 03	0.926862				
	Prob.*	0.7083	0.0064	0.9 050				

Source: Calculations obtained by the author using EViews 10 software

We observe that the variable (LTXD) is stationary in first difference, meaning it is stationary at order (1). The variable (LIPC) is stationary at level, meaning it is stationary at order (0). We reject the null hypothesis H_0 ; thus, we can conclude that these variables do not possess unit roots are thus stationary. Based on the above and the stationarity results of the variables, we may conclude that the ARDL² model is appropriate. The following steps will be adopted to extract the relationship between the variables (Kibala Kuma, 2018).

Before presenting the long-term relationship model, an ARDL bounds cointegration test must be conducted to validate the relevance of the proposed model.

2.2. ARDL Bounds Cointegration Test:

The cointegration test will allow us to identify a potential the long-term relationship among the variables. The equation will be assessed through the ARDL Bounds Testing method developed by (Pesaran, Shin, & Smith, 2001). The results can be summarized in the table below:

Table 5. Cointegration Test Results (Bounds)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	23.38842	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
Finite Sample: n=80				
Actual Sample Size	129	10%	3.113	3.61
		5%	3.74	4.303
		1%	5.157	5.917

² Auto Regressive Distributed Lag: This model is characterized by its ability to account for the temporal dynamics in explaining a variable, thereby enhancing forecasts and the effectiveness of policies

Source: Calculations obtained by the author using EVIEWS 10 software

The results of the test confirm the presence of a cointegration relationship within the series under study: the Fisher value of 23.38 exceeds all the upper and lower bound values.

This affirms that the variable rediscount rate explains the variable Consumer Price Index, and also results in the rejection of the null hypothesis while supporting the alternative hypothesis.

This enables the estimation of its long -term effects on the Consumer Price Index (IPC).

2.3. Correlation Test:

A correlation test is performed on the study variables to determine if there is a relationship between them.

Table 6. Correlation Test Results

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.749724	Prob. F(2,120)	0.4747
Obs*R-squared	1.592013	Prob. Chi-Square(2)	0.4511

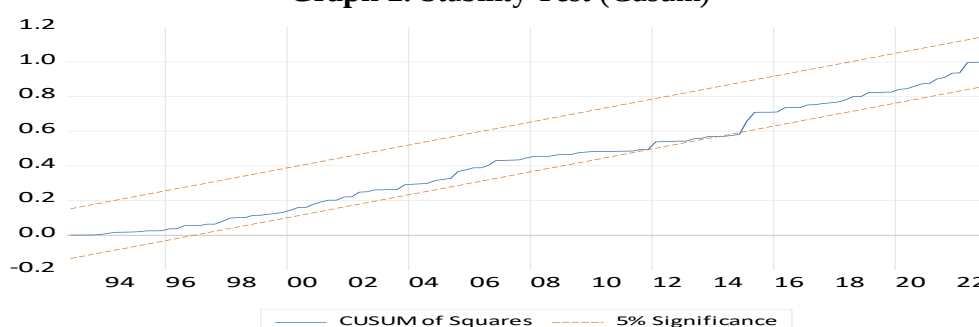
Source: Calculations obtained by the author using EVIEWS 10 software

The correlation study (Breusch-Godfrey LM) shows that the probability level of a test, similar to any chi-square, reaches an estimated value of 0.4511, which is above the significance level established in the study (0.05), confirming that there is no issue with autocorrelation in the model. The Fisher significance threshold of 0.4747 further supports this.

2.4. Model Stability Test:

To evaluate the stability of the equation in our study, we can apply the Cusum stability test as outlined below:

Graph 2. Stability Test (Cusum)



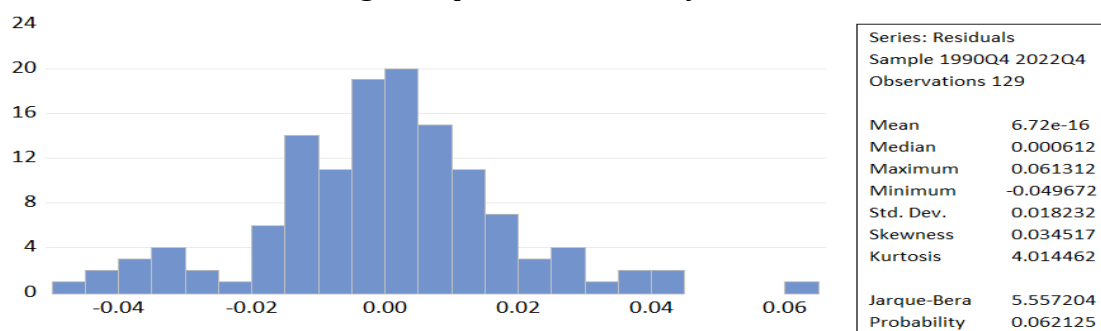
Source: Prepared by the author using EVIEWS 10 software.

The stability test of the model also yields satisfactory results: the curve does not exit the band. Therefore, we can conclude that the model is stable throughout the period from 1990 to 2022 and is even reliable for making forecasts.

2.5. Jarque-Bera Normality Test:

This is a hypothesis test that seeks to determine whether the data follows a normal distribution.

Fig1. Jarque-Bera Normality Test



Source: Prepared by the author using EVIEWS 10 software.

Based on the results obtained, it is observed that the Jarque-Bera test has a probability of 0.062, which is greater than 0.05 (5%). This suggests that the residuals follow a normal distribution, supporting the acceptance of the null hypothesis regarding the normality of the error terms or residuals.

2.6. Heteroscedasticity Test:

Heteroscedasticity refers to a condition in which the variances of the residuals for the variables under examination are unequal.

Table 7. Heteroscedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	0.025730	Prob. F(1,126)	0.8728
Obs*R-squared	0.026133	Prob. Chi-Square(1)	0.8716

Source: Calculations obtained by the author using the EVIEWS 10 software.

Based on the obtained results, we observe that the probability of the ARCH test is 0.8716, which is greater than 5%. This means that we accept the null hypothesis of homoscedasticity of the residuals or error terms, indicating that there is no heteroscedasticity in the model.

Moreover, considering the previous tests, namely: stationarity of variables, bounds cointegration, correlation, model stability over the period from 1990 to 2022, indicating no heteroscedasticity and the presence of normality in the errors., the model was well specified. Since these hypotheses are validated.

3. Model Estimation Tests:

3.1. Test of the Error Correction Coefficient and Return to Equilibrium:

Prior to estimating the model, we will showcase the results of the error correction coefficient. And recall, which is a prerequisite for accepting or rejecting the model. The coefficient,

referred to as the strength of recall to equilibrium, must be both significant, systematically negative, and between 0 and 1 in absolute value.

Table 8. Test of the Error Correction Coefficient and Return to Equilibrium

ARDL Cointegrating And Long Run Form				
Dependent Variable: LIPC				
Selected Model: ARDL(2, 3)				
Date: 03/12/23 Time: 07:45				
Sample: 1990Q1 2022Q4				
Included observations: 129				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIPC(-1))	0.152147	0.079597	1.911478	0.0583
D(LTXD)	0.081579	0.037529	2.173751	0.0317
D(LTXD(-1))	-0.054547	0.047729	-1.142844	0.2553
D(LTXD(-2))	0.129619	0.028929	4.480636	0.0000
CointEq(-1)	-0.013417	0.005214	-2.573153	0.0113

Source: Calculations obtained by the author using EViews 10 software.

Indeed, the model estimation shows that the error correction coefficient is negative (-0.013) and significant, with a probability of 0.01, confirming its statistical significance. Thus, short-term errors can be corrected within one year to return to the equilibrium position. Therefore, there is a convergence toward the equilibrium value, ensuring an error correction mechanism.

3.2. ARDL Model Estimation Test:

The long-term relationship equation can be estimated at these levels, as shown in the following table:

Table 9. Model Estimation Test Results

Dependent Variable: LIPC				
Method: ARDL				
Date: 03/12/23 Time: 08:03				
Sample (adjusted): 1990Q4 2022Q4				
Included observations: 129 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): LTXD				
Fixed regressors: C				
Number of models evaluated: 20				
Selected Model: ARDL(2, 3)				
Note: final equation sample is larger than selection sample				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LIPC(-1)	1.138730	0.080559	14.13536	0.0000
LIPC(-2)	-0.152147	0.079597	-1.911478	0.0583
LTXD	0.081579	0.037529	2.173751	0.0317
LTXD(-1)	0.003219	0.052785	0.060985	0.9515
LTXD(-2)	0.054547	0.047729	1.142844	0.2553
LTXD(-3)	-0.129619	0.028929	-4.480636	0.0000
C	0.060403	0.031299	1.929856	0.0559
R-squared	0.998880	Mean dependent var	4.411868	
Adjusted R-squared	0.998825	S.D. dependent var	0.544777	
S.E. of regression	0.018675	Akaike info criterion	-5.070518	
Sum squared resid	0.042549	Schwarz criterion	-4.915334	
Log likelihood	334.0484	Hannan-Quinn criter.	-5.007464	
F-statistic	18133.62	Durbin-Watson stat	2.030175	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

Source: Calculations obtained by the author using EViews 10 software

It is noteworthy that the Fisher value was estimated at 18133.62 with a probability of 0, confirming the significance of the model in terms of the independent variable's ability to explain the dependent variable. Additionally, the Durbin-Watson coefficient is approximately 2,

indicating proper identification of the studied equation. It is also noteworthy that the coefficient of determination reached a value of 0.998, which confirms that the key rate can explain the Consumer Price Index up to 99%.

3.3. ARDL Model Results Test:

The table below provides us with the long-term coefficients, as the variables were more significant in the long term compared to the short term:

Table 10. Long-Term Coefficient Estimation Results

ARDL Cointegrating And Long Run Form

Dependent Variable: LIPC

Selected Model: ARDL(2, 3)

Date: 03/12/23 Time: 08:05

Sample: 1990Q1 2022Q4

Included observations: 129

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIPC(-1))	0.152147	0.079597	1.911478	0.0583
D(LTXD)	0.081579	0.037529	2.173751	0.0317
D(LTXD(-1))	-0.054547	0.047729	-1.142844	0.2553
D(LTXD(-2))	0.129619	0.028929	4.480636	0.0000
CointEq(-1)	-0.013417	0.005214	-2.573153	0.0113
Cointeq = LIPC - (0.7249*LTXD + 4.5019)				

Source: Calculations obtained by the author using EVIEWS 10 software

The table and the mathematical equation above indicate a positive and significant long-term relationship between the two variables (with a probability less than 5%), and the formulation includes a constant of 4.5019, which is statistically significant. The long-term equation can be rewritten with the estimated coefficients as follows:

$$LIPC = 0.7249LTXD + 4.5019$$

4. Econometric and Economic Interpretation of the Results:

Before interpreting the variables, we recall that according to economic literature, the key rate has a negative effect on price variation. Overall, rediscount policy is employed to decrease inflation: raising the rediscount rate, and consequently the discount rate, influences the upward movement of the debtor interest rate.

This process discourages the demand for bank credit that generates money, which results in a reduction of the money supply and, consequently, a decrease in inflation rate. This implies that a decrease in the rediscount rate produces effects contrary to the former.

Nevertheless, in Algeria, the rediscount rate and inflation have typically moved in the same manner, which was confirmed by our study in which the rediscount rate had a positive impact on price stability, resulting in a 1% increase in the discount rate leading to a 0.72% increase in the Consumer Price Index (CPI). Although this effect was not confirmed in theoretical studies,

this result aligns with that of Fisher³. In his book "Appreciation and Interest," published in 1896, he contrasted interest rates to changes in wholesale prices in seven countries and found that interest rates are high when prices rise and low when prices fall. Fisher noted lags of up to 30 years, indicating that the influence of price variations on interest rates occurs slowly and takes a long time to fade (Fisher, 1896). According to J. Durand and G. Prat, it is from this result that the author believes he can explain the positive correlation between r (rediscount rate) and P (prices) (Durand & Prat, 2009).

Furthermore, in order to stop rising prices, the central bank generally raises interest rates, thus reinforcing the initial effect. In the second case, this rise in interest rates can result in a reduction in credit demand. Banks, then in a situation of excess reserves, will be incentivized to lower interest rates, which will result in a resurgence of expansion.

This counterintuitive result can also be explained by the structural overliquidity of the Algerian banking system (before 2014), which prompted the central bank to develop additional tools. Banks no longer rely on the central bank, and the money market becomes off-bank, which is why the key rate remained fixed at 4% for 13 years from 2004 to 2016, eventually dropping to 3.75% in 2018 until 2022.

Conclusion:

Algeria is regarded as one of the nations that has tasked its central bank with the responsibility of meeting the objectives of monetary policy, employing various instruments such as the rediscount rate and credit controls. In addition to these instruments, and in order to reduce overall excess liquidity, especially before 2014, and to prevent inflationary risk, the Bank of Algeria resorted, starting in early 2001, to the traditional instrument of mandatory reserves, direct liquidity absorption, and deposit facilities.

At the end of this analysis, we noted that the key rate is one of the most important indirect instruments for the monetary authority in Algeria in addressing economic imbalances. However, its effect was not at the desired level; its flexibility and adaptability have made it a manageable tool for achieving the objectives of monetary policy.

The results of our study show a positive and significant impact of the key rate on price stability, clearly establishing that these two variables have generally evolved in the same direction. Although this counterintuitive effect has been confirmed by Fisher in relation to the Gibson Paradox, indicating that the correlation can be positive between the rediscount rate and prices due to lags of up to 30 years, this relative inefficiency could also be explained by the availability of excess liquidity, especially before 2014, which has become a structural phenomenon for the Algerian economy due to high hydrocarbon prices, which weaken the effectiveness of this instrument in regulating the growth of the money supply and, as a result, in managing inflation rates. This has led the central bank to develop other instruments.

In the same vein, the analysis also highlights the predominant role of oil prices, whereby Algerian economic policy continues to rely mainly on hydrocarbons and has not seized this favorable situation to make productive investments to improve its non-hydrocarbon GDP and become a solid and diversified economy. The weakness of investment (particularly private

³ Fisher saw an explanation for this phenomenon in the slow adjustment of interest rates to price changes.

investment) in the Algerian economy also reflects the insensitivity of these objectives to variations in the interest rate.

Furthermore, considering the long periods of stability experienced by the rediscount rate, its stabilization period reached 13 years, from 2004 to 2016, and 7 years from 2017 to the present, we can say that this tool has not been technically utilized to fulfill its role in addressing monetary imbalances.

In this regard, monetary authorities should consider reactivating this instrument, not only to diversify the indirect instruments of monetary policy but also to make it flexible again, in order to keep pace with the changes and requirements of the targeted monetary policy.

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