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THE EFFECT OF CURRENCY IN CIRCULATION OUTSIDE BANKS ON THE CONSUMER PRICE INDEX IN ALGERIA DURING THE PERIOD (1990–2024)

Abstract: This study measures and analyzes the impact of currency in circulation outside the banking system on the consumer price index (CPI) in Algeria over a 35-year period spanning 1990 to 2024. An econometric model was estimated within the Autoregressive Distributed Lag (ARDL) cointegration framework, selected for its suitability in handling time series data of this length. The CPI was employed as the dependent variable, while currency in circulation outside the banking system, the velocity of money, and the aggregate wage bill were incorporated as explanatory variables. Both short-run and long-run relationships among these variables were subsequently estimated and examined.

The results confirm the existence of a long-run equilibrium relationship between the CPI and the explanatory variables within the Algerian economy. Specifically, a 1% increase in currency in circulation outside the banking system, the velocity of money, and the aggregate wage bill is associated with increases in the CPI of approximately 2.48%, 3.23%, and 0.55%, respectively. Additionally, a one-unit shock to any of the explanatory variables produces an effect that persists for approximately 12 months before the system reverts to its long-run equilibrium.

Keywords: currency in circulation outside banks, velocity of money, wage bill, Consumer Price Index, Algeria, ARDL model.

Introduction

The consumer price index (CPI) represents a fundamental measure for estimating and monitoring changes in the general price level and its prevailing trends. It is widely used by statisticians as a tool for tracking price movements and generating forward-looking projections across various time horizons.

The relationship between the quantity of money in circulation and the general price level has long attracted considerable attention in economic thought. From the early contributions of Cantillon, Hume, and Fisher, through the Cambridge School and the Keynesian tradition, to the modern monetarist school, these intellectual traditions, despite their theoretical divergences, have converged in affirming both the existence and the significance of this relationship.

Against the backdrop of the rapid economic transformations characterising the contemporary global landscape, particularly in developing economies, the study of currency circulating outside the banking system has gained growing importance. This importance extends beyond understanding the dynamics of inflation and economic growth to encompass a critical assessment of the effectiveness of monetary policy and the capacity of central banks to regulate aggregate economic activity. Accordingly,

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this study examines the impact of currency in circulation outside the banking system, as shaped by prevailing monetary policy orientations, on the CPI over the period 1990 to 2024.

Literature Review

Reviewing the existing body of literature reveals that domestic studies specifically addressing currency in circulation outside the banking system have been relatively scarce. However, the broader topic of money supply has attracted substantial scholarly attention from both Algerian and international researchers, who have examined this subject in relation to a wide range of macroeconomic variables. The prevailing consensus among researchers affirms the existence of a positive relationship between money supply, across its various aggregates, and the consumer price index.

In this regard, Boucekkine et al. (2021)[1] found that the money demand function in Algeria is stable with respect to both M1 and M2, suggesting that these two aggregates can serve as reliable instruments in the formulation of effective monetary policy. By contrast, the currency demand function was found to exhibit comparatively lower stability, attributable to the significant size of the informal economy and the pervasive reliance on cash-based transactions.

Al-Ghalibi (2008)[2] concluded that currency in circulation outside banks (CIC) in Spain is the monetary aggregate that most significantly affects the consumer price index within the selected sample of developed countries, which also includes Canada and Japan. In the same vein, Eggon (2020)[3] found that the narrow money supply (M1) has a positive effect on inflation, a result similarly reached by Umeora (2010)[4] in his study on the impact of monetary policy on the inflation rate in Nigeria during the period 1985–2019, using the VAR model.

The research team led by Georgantopoulos (2012)[5], Alam (2016)[6] and Prasetyo (2018)[7] conducted studies which investigated how M2 money supply affects the Consumer Price Index in Cyprus, India, and Indonesia. Research findings showed that money supply (M2) and consumer price index maintain a positive connection during short periods but this relationship becomes weaker when looking at longer time frames in India. The study conducted by Nakhate (2022)[8] focused on studying how broad money supply (M3) and the Consumer Price Index in India changed during the COVID-19 pandemic. The research

[1] **Boucekkine, R. et al.** Long-run Stability of Money Demand And Monetary Policy: The Case Of Algeria. *The Journal of Economic Asymmetries*, vol. 24, 2021, e00217, https://doi.org/10.1016/j.jeca.2021.e00217

[2] **Al-Ghalbi, A. H. J., S.K. Al-Jubouri.** The Impact of Money Supply Measures on Some Macroeconomic Variables in a Sample of Developed Countries. *Al Ghari Journal of Economic and Administrative Sciences*, vol. 2 (10), 2008, pp. 7–35. https://doi.org/10.36325/ghjec.v2i10

[3] **Henry, E. A., A.M. Sabo.** Impact of Monetary Policy on Inflation Rate in Nigeria: Vector Autoregressive Analysis. *Bullion*, vol. 44 (4), 2020, 6, pp. 77–90. https://doi.org/10.33429/0331-7919.1046

[4] **Umeora, C. E.** Effects of Money Supply and Exchange Rates on Inflation in Nigeria. *Journal of Management and Corporate Governance*, vol. 02, 2010, pp. 73–87. Available at: https://www.cenresinjournals.com/wp-content/uploads/2020/03/page-73-87-226.pdf

[5] **Georgantopoulos, A. G., Tsamis, A. D.** The Interrelationship Between Money, Prices and Government Expenditures and Economic Growth: A Causality Analysis for the Case of Cyprus. *International Journal of Economic Sciences and Applied Research*, vol.5 (3), 2012, pp. 115–128. Available at: https://hdl.handle.net/10419/114573

[6] **Alam, M. Q., M.S. Alam**. The Determinants of Inflation in India: The Bounds Test Analysis. *International Journal of Economics and Financial Issues*, vol. *6*(2), pp. 544–550. Available at: https://www.econjournals.com/index.php/ijefi/article/view/2019

[7] **Prasetyo, A. S.** Determinants of Demand for Money and the Velocity of Money in Indonesia. *Journal of Developing Economies,* vol. 3(2), 2018, pp. 65–79. https://doi.org/10.20473/jde.v3i2.10464

[8] **Nakhate, V., Kumar, D.** Cointegration and Causal Relationship Between Money Supply (M3), the Wholesale Price Index (WPI), and the Consumer Price Index (Combined) During the Pre-Pandemic and Peak Pandemic Periods in India: An Empirical Study. *Academy of Marketing Studies Journal*, vol. 26(6), 2022, pp. 1–6. Available at: https://www.researchgate.net/publication/374155777_COINTEGRATION_AND_CAUSAL_RELATIONSHIP_BETWEEN_MONEY_SUPPLY_M3_WHOLESALE_PRICE_INDEX_WPI_AND_CONSUMER_PRICE_INDEX_COMBINED_DURING_PRE_AND_PEAK_PANDEMIC_IN_INDIA_AN_EMPIRICAL_STUDY

findings showed that broad money supply (M3) produces a statistically significant positive impact on the consumer price index which follows Fisher's equation of exchange. The research conducted by Chekouri et al. (2023)[9] used the Wavelet Analysis to examine the relationship between money supply and inflation in Algeria from 2010 to 2019, the results showed strong links between money supply M2 and inflation in both the short and long run, which support both the traditional and modern quantity theories of money.

In opposition to the conclusions drawn from the previously cited research, the investigation conducted by Al-Ghalibi (2008)[10], entitled "The Effect of Money Supply Measures on Selected Macroeconomic Variables in a Sample of Developed Countries" determined that the broad money supply (M2) and currency in circulation (CIC) lacked any significant influence on Canada's Consumer Price Index from 1985 to 2001. Likewise, in Japan, during the same temporal framework, no discernible impact was identified regarding the broad money supply (M3) or currency in circulation (CIC) on the consumer price index.

This study draws its significance from the quantity theory of money, which posits that the velocity of money is relatively stable in the short run and that changes in the money supply exert a direct effect on the general price level, under the assumption that real output remains fixed at full employment.

Although this relationship is theoretically tractable through Fisher's equation of exchange, it is subject to considerable complexity in the short run. Notable variation exists in the strength and clarity of this relationship across different time horizons, as well as across developing, emerging, and advanced economies. This complexity renders any automatic assumption of such a relationship in the Algerian context empirically unwarranted. Moreover, the majority of existing studies, with the notable exception of Boucekkine et al. (2021)[11], have not assigned adequate analytical weight to currency in circulation outside the banking sector, that is, money in its most liquid physical form comprising banknotes and coins. Addressing this gap constitutes a central contribution of the present study.

A further methodological limitation lies in the considerable variation in findings regarding the relationship between the CPI and its principal determinants, including money supply, wages, exchange rates, and financial development, across different country contexts. This cross-country heterogeneity implies that results obtained in one national setting (Japan) cannot be mechanically extrapolated to Algeria. It is, therefore, necessary to conduct a country-specific investigation covering the period from 1990 to 2024, employing techniques capable of capturing short-run and long-run dynamic responses while rigorously testing for structural stability and potential breakpoints.

Theoretical Framework

Extensive intellectual debate has surrounded the conceptual definition of money supply. The term gained considerable momentum following Irving Fisher's seminal publication on purchasing power in 1911, and the discussion evolved substantially through the writings of the Cambridge School and Keynesian theory.

Basic Concepts of Money Supply

The quantity theory of money developed by Irving Fisher (1911) constitutes the theoretical foundation for understanding the relationship between the quantity of money in circulation and the price level, as expressed through the celebrated equation of exchange: MV = PY. According to this theory, the velocity of money is assumed to be relatively stable in the short run, and changes in the money supply are held to exert a direct effect on the general price level, on the assumption that real output remains fixed at full employment. [12]

The money supply comprises a set of components known as monetary aggregates, classified according to their degree of liquidity. The narrow money supply (M1) encompasses currency in circulation

[9] **Chekouri**, **S et al.** Money Supply and Inflation in Algeria: Wavelet Based Analysis. *Les Cahiers Du Cread*, vol. 39(3), 2023, pp. 27–51. https://doi.org/10.4314/cread.v39i3.2

[10] **Al-Ghalbi, A. H. J., Al-Jubouri, S. K.** Op. cit.

[11] **Boucekkine, R. et al.** Op. cit.

[12] **Dimand, R. W.** Irving Fisher and the Quantity Theory of Money:The Last Phase, *Journal of the History of Economic Thought,* vol. 22(3), 2000, pp. 329–348. https://doi.org/10.1080/10427710050122549

outside the banking system and demand deposits denominated in the national currency. The broad money supply (M2) includes M1 plus time deposits in Algerian dinars and deposits held by residents in foreign currencies. M3 extends M2 to incorporate treasury securities subscribed to by private individuals and non-banking institutions. M4 further adds negotiable certificates of deposit to M3.[13]

***Consumer Price Index*:**

The Consumer Price Index (CPI) represents a crucial economic metric, particularly adept at evaluating fluctuations in purchasing power, as it gauges alterations in the prices of commodities and services acquired by consumers across varying temporal spans.[14] The CPI can be articulated as a mechanism for assessing temporal variations in the costs of particular goods and services typically procured by the majority of households. The categories and specifications of the goods and services encompassed within the CPI basket, along with their respective quantities, are established during the base year.[15]

The National Office of Statistics in Algeria uses the consumer price index to determine the national inflation rate. The organization releases its statistical data through annual reports, quarterly reports, and monthly reports which use a base year that results from analyzing essential data including population census records. These occur every ten years. The Consumer Price Index in Algeria contains 261 items which distribute across 791 varieties that experts selected through their analysis of yearly expenses and their assessment of item frequency and market relevance. These varieties receive weights based on their yearly spending figures from 2000, which serves as the base year for calculation, whereas 2001 functions as the reference year to calculate the index. The United Nations System of National Accounts from 1970 provides guidelines which determine how consumed goods and services should be organized into different groups and subgroups, and individual items accordingly.[16]

Methods and Data

The primary objective of this study is to analyze and quantify the impact of currency in circulation outside the banking system, as shaped by prevailing monetary policy orientations, on the consumer price index (CPI). This objective is pursued through two main lines of inquiry: first, measuring the effect of currency outside the banking system on the CPI over the period from 1990 to 2024; and second, formulating appropriate policy recommendations aimed at reducing the volume of currency circulating outside the banking system in Algeria. The study relies on annual data for all variables, sourced from the World Bank and the Bank of Algeria, covering the same period.

The study adopts a dual methodological approach. A descriptive dimension is employed to review the existing literature and situate the findings within the relevant theoretical frameworks. This is complemented by a quantitative dimension, in which an econometric model is constructed to examine the empirical relationships among the study variables.

To identify the most relevant economic determinants of the CPI, the study employs the bounds testing approach to cointegration developed by Pesaran (1997), Shin and Song (1998), and Pesaran et al. (2001), which integrates autoregressive models with distributed lag structures. The Autoregressive Distributed Lag (ARDL) framework is selected as the most appropriate method for achieving the objectives of this study for several reasons. It enables the simultaneous estimation of short-run and long-run relationships within a single equation, allows for the identification of which explanatory variables exert a significant influence in the short run, the long run, or both, and facilitates the measurement of the magnitude of those effects. In addition, the ARDL approach is particularly well-suited to small samples, offering an advantage over alternative cointegration techniques when working with limited time series data.[17]

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[13] **Bakhouche, A.** Money Demand in Algeria. Savings and Development, vol. 30(3), 2006, pp. 221–246. Available at: https://www.jstor.org/stable/25830932

[14] **Walsh, C. L.** *Monetary Theory and Policy*. (5th edition). London: The MIT Press, 2017, p. 561.

[15] **Umeora, C. E.** Op. cit.

[16] **Office for National Statistics (ONS).** Consumer Prices Index, 2019. Available at: https://www.ons.dz/IMG/pdf/ipc_novembre2019-2.pdf [Accessed: 05 April 2026].

[17] **Afzal, M. et al.** Openness, Inflation and Growth Relationships in An Application of ARDL Bounds Testing Approach. *Pakistan Economic and Social Review*, vol. 51(1), 2013, pp. 13–53.

Results and Discussion

Identifying the model variables constitutes the first step in specifying the study model. Based on economic theory and the information available from previous studies, the dependent variable is defined as the consumer price index, denoted by CPI. The independent (explanatory) variables are specified as follows: currency in circulation outside banks as a component of the money supply, denoted by CIC; the velocity of money circulation, denoted by V; and the wage bill variable, denoted by PROLL.

Accordingly, the linear model of the study is specified as follows:

$$CPI_t = f(CIC_t, V_t, PROLL_t)$$

It is worth noting that adjustments were made to the study data by applying the logarithmic transformation instead of the linear form. The purpose of this transformation is that variables in their logarithmic form, that is, elasticities, are more appropriate and easier to interpret, in addition to ensuring a degree of homogeneity among the data of the variables used in the model. Accordingly, the study model becomes as follows:

$$\ln CPI_t = f(\ln CIC_t, \ln V_t, \ln PROLL_t)$$

Testing the Stationarity of Time Series:

The stationarity of time series is a crucial prerequisite for the implementation of the ARDL methodology, as these series must exhibit stationarity at either their level, their first difference, or a combination of both. To evaluate this condition, the Augmented Dickey-Fuller (ADF) test is utilized, which relies on the following two hypotheses:

– Null hypothesis: the time series are non-stationary, implying the presence of a unit root.

– Alternative hypothesis: the time series are stationary, signifying the absence of a unit root.

Analysis of Table 1 reveals that all variables analyzed attain stationarity upon taking the first difference, I(1), as evidenced by probability values falling below 5 percent in each instance, regardless of whether a constant, a constant combined with a trend, or neither is included. Therefore, the null hypothesis is dismissed, and the alternative hypothesis is upheld, indicating the non-existence of a unit root. Given that all variables are integrated of order I(1), the ARDL methodology is applicable.

Table 1. Results of the Stationarity Test

UNIT ROOT TEST RESULTS TABLE (ADF)
Null Hypothesis: the variable has a unit root

		At Level			
		LNCPI	LNCIC	LNV	LNPROLL
With Constant	t-Statistic	-1.8768	-1.7478	-0.9488	-1.6104
	Prob.	***0.3388***	***0.3990***	***0.7591***	***0.4662***
		n0	n0	n0	n0
With Constant & Trend	t-Statistic	-1.9656	-1.8686	-3.6020	-1.0453
	Prob.	***0.5986***	***0.6486***	***0.0446***	***0.9232***
		n0	n0	**	n0
Without Constant & Trend	t-Statistic	0.2727	-0.5004	-1.1146	1.7593
	Prob.	***0.7592***	***0.4920***	***0.2350***	***0.9787***
		n0	n0	n0	n0
		At First Difference			
		d(LNCPI)	d(LNCIC)	d(LNV)	d(LNPRO...
With Constant	t-Statistic	-5.2667	-4.7194	-6.2599	-3.4289
	Prob.	***0.0001***	***0.0006***	***0.0000***	***0.0170***
		***	***	***	**
With Constant & Trend	t-Statistic	-5.1782	-5.4036	-6.1496	-3.6368
	Prob.	***0.0010***	***0.0006***	***0.0001***	***0.0418***
		***	***	***	**
Without Constant & Trend	t-Statistic	-5.3350	-4.7858	-6.2489	-2.1727
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0307***
		***	***	***	**

Source: EViews 12 software output

***Optimal Lag Selection for the Model*:**

The optimal lag length was determined using the Akaike Information Criterion (AIC), evaluating the top 20 model specifications to identify the most suitable econometric model for the study variables. As shown in Figure 1, the ARDL(3,4,4,0) specification emerges as the best-fitting model among the 500 candidate models estimated.

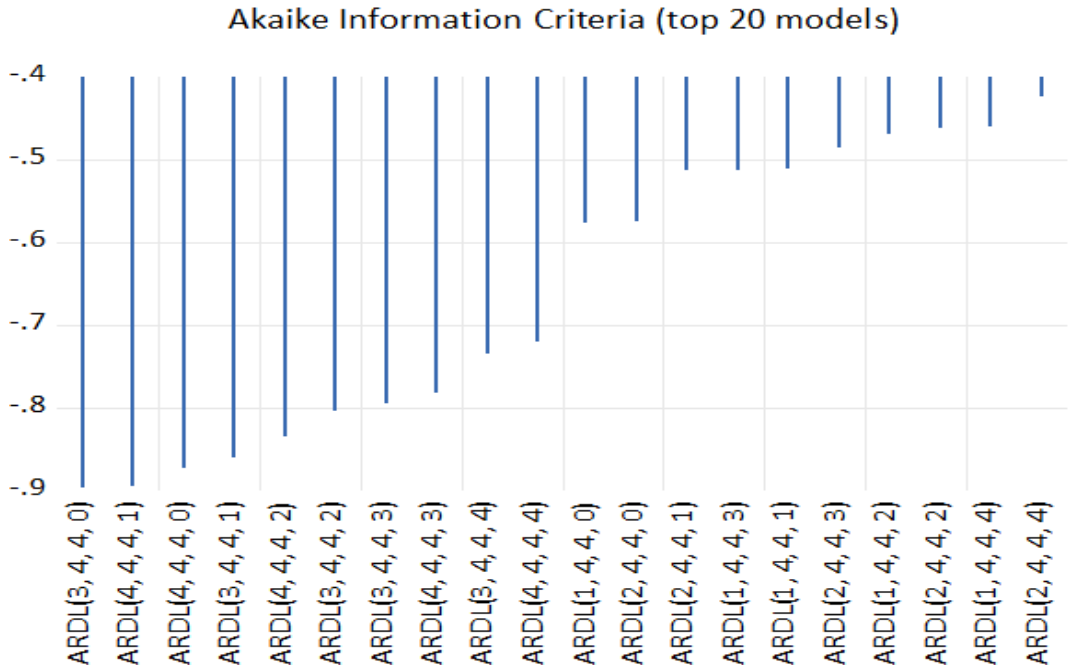

Figure 1. Normal Distribution Test of the Residual Series

Source: EViews 12 software output

The study model needs the following specification for its development:

$$\Delta \ln CPIt = C0 + \sum_{i=1}^{3} \propto 1 \, \Delta \ln CPIt\text{-}1 + \sum_{i=1}^{4} \propto 2 \, \Delta \ln CICt\text{-}1 + \sum_{i=1}^{4} \propto 3 \Delta \ln Vt\text{-}1 + \beta 1 \ln CPIt\text{-}1 + \beta 2 \ln CICt\text{-}1 + \beta 3 \ln Vt\text{-}1 + \beta 4 \ln PROLL\, t\text{-}1 + \varepsilon t$$

Where: Δ denotes first differences; C0 represents the constant term; t denotes the time trend; εt is the random error term; α1, α2, α3 are the short-run coefficients; and β1, β2, β3, β4 are the long-run coefficients.

Cointegration Test

The Bounds Test for cointegration is utilized to investigate the long-term association among the variables through the Fisher test methodology. Given that the critical values do not conform to conventional distributions, they are evaluated against the critical values established by M. Hashem Pesaran et al. (2001). This approach does not necessitate that the variables share the same order of integration; instead, it can be applied to variables characterized by differing orders of integration (1). The null hypothesis H0 posits the absence of a long-run relationship among the variables under study, while the alternative hypothesis H1 asserts the presence of such a long-term relationship, which is tested in the following manner:

$$H0 : \beta 1 = \beta 2 = \beta 3 = \beta 4 = 0$$
$$H1 : \beta\, 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq 0$$

According to the findings delineated in Table 2, the Fisher statistic value F-statistic = 25.31885 surpasses both the lower and upper critical thresholds across all levels of significance (10 percent, 5

percent, 2.5 percent, and 1 percent). Consequently, it can be inferred that a long-term cointegration relationship is present among the variables examined in the study.

Table 2. Cointegration Test According to the ARDL Methodology

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	25.31885	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Eviews 12 software output

Estimation of the Long-Run Relationship

Subsequent to the validation of a persistent cointegration association among the variables under investigation, the coefficients indicative of the long-term relationships may be calculated, as demonstrated in the ensuing table:

Table 3. Estimation of the Long-Run Relationship

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCIC	2.484358	0.219240	11.33169	0.0000
LNV	3.234820	0.436831	7.405197	0.0000
LNPROLL	0.549625	0.113136	4.858070	0.0002
C	8.695968	1.081492	8.040716	0.0000
EC = LNCPI - (2.4844*LNCIC + 3.2348*LNV + 0.5496*LNPROLL +8.6960)				

Source: EViews 12 software output.

The estimation results of the long-run connection between the dependent variable and independent variables demonstrate the presence of:

– A statistically significant positive relationship is established between LNCPI and LNCIC over the long run, confirmed by a p-value of 0.0000, which falls well below the 5% significance threshold. Specifically, a 1% increase in currency in circulation outside the banking system is associated with an approximately 2.48% rise in the consumer price index. This elasticity, which exceeds unity, indicates that the consumer price index is highly sensitive to changes in currency circulating outside the banking system. This finding is consistent with the quantity theory of money and can be interpreted within the Algerian context as a reflection of the largely unregulated cash transactions conducted by households and firms outside the formal banking sector, which translate rapidly into direct demand for goods and services. This demand-related pressure is compounded by the limited responsiveness of the domestic productive apparatus to rising demand, a finding that aligns with the results of Boucekkine. The relative scarcity of numerous commodities following import restrictions further corroborates this interpretation, generating dual inflationary pressures on the consumer price index in a manner analogous to a multiplier effect.

– A statistically significant positive relationship is also identified between LNCPI and LNV over the long run, confirmed by a p-value of 0.0000. A 1% increase in the velocity of money is associated with an approximately 3.23% rise in the consumer price index, indicating considerable price sensitivity to

monetary circulation dynamics (velocity of money). This result can be attributed to a widespread erosion of confidence in savings, prompting households to shift toward rapid consumption through the purchase of goods as a hedge against currency depreciation. Given the limited availability of investment instruments, elevated gold prices, and only marginal household participation in real estate investment, monetary holdings are channeled directly into consumption expenditure, thereby accelerating price increases. This explains why the price elasticity with respect to the velocity of money exceeds that associated with the monetary aggregate itself, a finding that departs from standard predictions of economic theory.

– A statistically significant positive relationship is further observed between LNCPI and LNPROLL over the long run, confirmed by a p-value of 0.0002. A 1% increase in the aggregate wage bill is associated with an approximately 0.55% rise in the consumer price index. This relatively low elasticity reflects a demand-pull inflation mechanism, whereby wage increases raise household income, stimulate consumption, and exert upward pressure on prices, though the elasticity remains below unity. Given the relatively stable pace of wage growth in Algeria, the economy appears to be far from a wage-price spiral. The weak elasticity can be explained in part by the extensive government subsidies applied to widely consumed basic commodities, including milk, sugar, cooking oil, coffee, and bread, which in economic theory correspond to the concept of inferior or necessity goods. These subsidies attenuate the pass-through of wage increases to consumer prices. Additionally, a portion of the demand effect generated by wage growth leaks into imports rather than domestic price inflation.

Taken together, these findings suggest that inflationary pressures in Algeria are primarily of a behavioral monetary nature, driven by excess liquidity outside the banking system and heightened monetary circulation dynamics sustained by consumption expenditure in an environment of scarce investment alternatives, rather than by wage-driven inflation.

***Estimation of the Short-Run Relationship and the Error Correction Model*:**

The concluding phase of the ARDL framework encompasses the Error Correction Model (ECM), which facilitates the assessment of the short-term interrelations among the variables under investigation. The findings of this analysis are illustrated in Table 4:

Table 4. Estimation of the Short-Run Relationship and the Error Correction Model

ARDL Error Correction Regression
Dependent Variable: D(LNCPI)
Selected Model: ARDL(3, 4, 4, 0)
Case 2: Restricted Constant and No Trend
Date: 03/30/26 Time: 12:51
Sample: 1990 2024
Included observations: 31

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCPI(-1))	0.141019	0.072783	1.937522	0.0705
D(LNCPI(-2))	0.249659	0.073678	3.388535	0.0037
D(LNCIC)	-0.612328	0.356003	-1.720008	0.1047
D(LNCIC(-1))	-2.722310	0.412380	-6.601453	0.0000
D(LNCIC(-2))	-1.365496	0.381213	-3.581975	0.0025
D(LNCIC(-3))	-2.035188	0.361017	-5.637373	0.0000
D(LNV)	-0.070663	0.232960	-0.303329	0.7655
D(LNV(-1))	-2.511896	0.381146	-6.590379	0.0000
D(LNV(-2))	-2.487820	0.277632	-8.960853	0.0000
D(LNV(-3))	-2.114184	0.330361	-6.399608	0.0000
CointEq(-1)*	-1.065004	0.084662	-12.57946	0.0000

R-squared	0.912639	Mean dependent var	0.005107
Adjusted R-squared	0.868958	S.D. dependent var	0.328002
S.E. of regression	0.118736	Akaike info criterion	-1.152413
Sum squared resid	0.281963	Schwarz criterion	-0.643579
Log likelihood	28.86241	Hannan-Quinn criter.	-0.986546
Durbin-Watson stat	1.733403		

Source: Outputs of the EViews 12 Program.

The error correction model results indicate that all variables examined in this study are statistically significant. In the short run, the Consumer Price Index (CPI) in Algeria is influenced by the currency circulation rate outside banking institutions, the velocity of money, and wage expenditure. Moreover, the error correction term (ECT) carries a negative sign and is statistically significant at the 1% level, with an estimated coefficient of −1.065004. This implies that the CPI requires approximately 1/1.065004 ≈ 0.94 years, equivalent to roughly 342 days, to correct short-run disequilibrium and converge toward its long-run equilibrium path. Accordingly, any deviation of the CPI from its equilibrium value at period (t−1) is corrected by approximately 106% within the subsequent period (t).

Regarding model fit, the coefficient of determination (R^2) stands at 0.9126, reflecting a high degree of goodness-of-fit. The included explanatory variables collectively account for 91.26% of the total variation in the CPI, while the remaining 8.74% is attributed to factors not captured by the model, which are absorbed into the stochastic error term.

Diagnostic Tests of the Model

To validate the selected model based on the Akaike Information Criterion (AIC), a series of residual diagnostic tests were conducted, as detailed below.

***Normality of Residuals*:** The Jarque-Bera test was applied to assess whether the residuals follow a normal distribution. As shown in Figure 2, the p-value associated with the Jarque-Bera statistic exceeds 0.05, indicating that the null hypothesis of normality cannot be rejected at the 5% significance level. The residuals are therefore normally distributed, satisfying the normality assumption at the 95% confidence level.

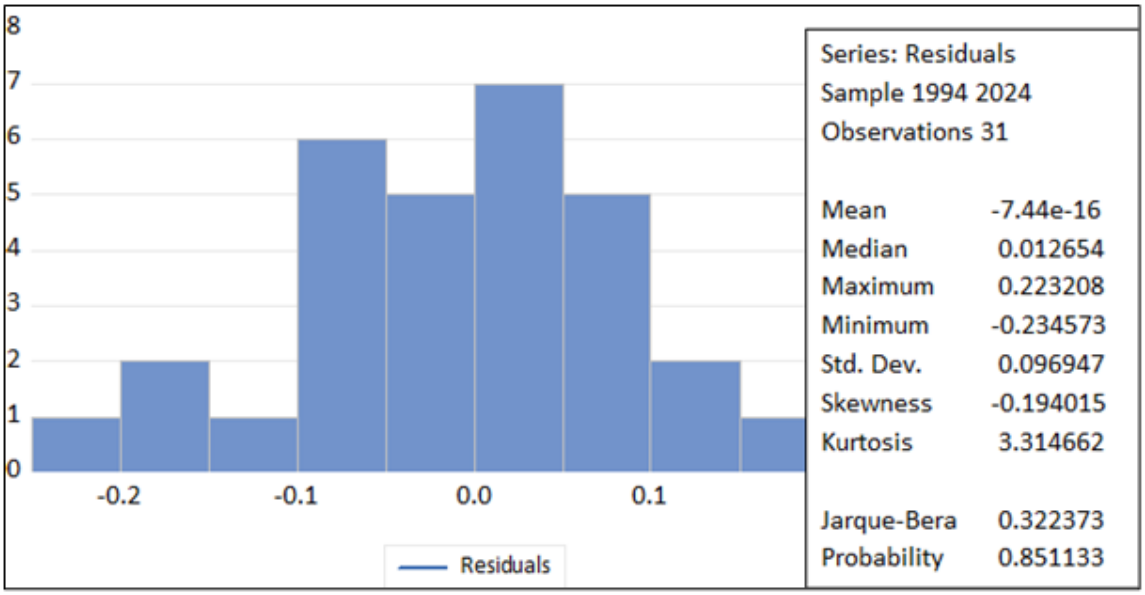

Figure 2. Normal Distribution Test of the Residual Series

Source: EViews 12 software output

***Serial Correlation of Residuals and Heteroskedasticity*:**

To test for serial correlation of the residuals and heteroskedasticity, we rely on the Breusch–Pagan–Godfrey test, which is primarily based on the Lagrange Multiplier statistic, as well as the ARCH test, which performs an autoregressive test of first-order variances. This is undertaken to test the null hypothesis of homoskedasticity. The estimation results of both tests are presented in Table 5. The reported results indicate that the F-statistic probabilities in both the Breusch–Pagan–Godfrey and ARCH tests exceed 5%, leading us to accept the null hypothesis, namely that the variances of the residuals are not time-dependent. Accordingly, it can be concluded that the model is largely free from statistical problems.

Table 5. Test of Serial Correlation of Residuals and Heteroskedasticity

Test	F-statistic	Prob
Heteroskedasticity Test: Breusch-Pagan-Godfrey	1.733269	F(14,16) 0.1453
Heteroskedasticity Test: ARCH	0.257720	F(1,28) 0.6157

Source: Output from EViews 12 software.

***Testing the Stability of the Model Structures*:**

In order to ascertain that the data utilized in this investigation remain unaffected by any structural alterations, the Cumulative Sum of Recursive Residuals test (CUSUM) is implemented. This test is regarded as one of the most pivotal in the domain, as it elucidates two fundamental elements: the detection of any structural shifts within the data and the extent of coherence between long-term and short-term parameters. The structural integrity of the estimated parameters is validated when the CUSUM test graph resides within the critical limits at a significance threshold of 5% (2).

From Figures 2 and 3, it becomes evident that the CUSUM test statistic, indicated by a median line, remains within the critical limits (upper and lower bounds) at the 5% significance threshold, thereby affirming the stability of the model and the consistency of its parameters.

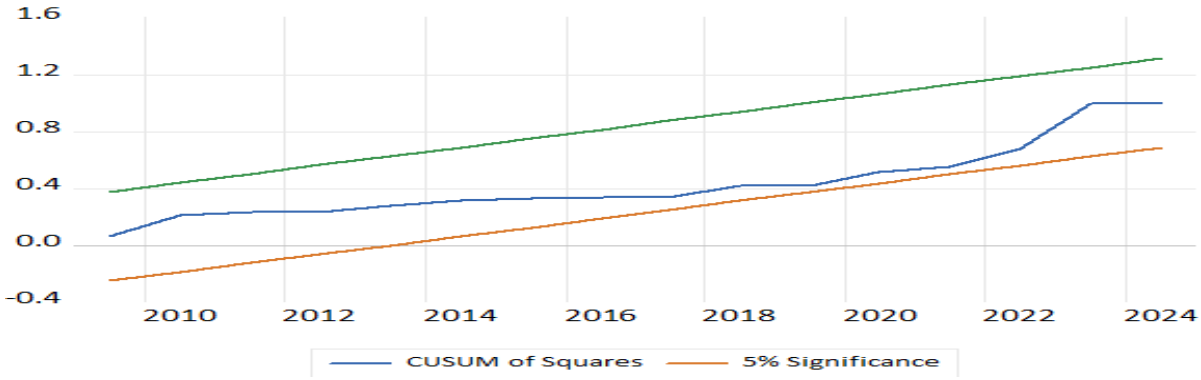

Figure 3. Results of the Structural Stability Test for (**ARDL- ECM**) Model

Source: EViews 12 software output

Conclusion

This study investigates the impact of currency circulation outside the banking system on the Consumer Price Index (CPI) in Algeria. An econometric model was developed to capture the responsiveness of the CPI to currency outside banks, money velocity, and the wage bill, drawing on statistical data and official reports covering the period 1990 to 2024. To this end, the study employs the Autoregressive Distributed Lag (ARDL) framework. The findings reveal that all three explanatory variables, namely currency outside banks, money velocity, and wage payments, exhibit a statistically significant positive relationship with the CPI. Furthermore, the study finds that a one-unit shock to any of the explanatory variables produces an effect that persists for approximately 12 months before the system begins reverting to its long-run equilibrium.

Based on these findings, the study recommends that policymakers seek to moderate the rate of CPI growth by reducing the volume of currency circulating outside the banking system and decreasing the significant size of the informal economy, as well as limiting the pervasive reliance on cash-based transactions and encouraging the expansion of deposits across all categories. This calls for broader financial literacy initiatives, with particular emphasis on banking and savings culture. Additionally,

Islamic banks should be encouraged to activate and promote financial products that are compatible with the social and cultural practices prevailing in Algerian society.

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