

Econometric Analysis of the Impact of Economic Policy Instruments on GDP in Algeria: An ARDL Approach within the IS–LM–BP Framework

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Abstract: This study aims to analyze the impact of economic policy instruments—namely government spending, money supply, and the exchange rate—on Algeria’s gross domestic product (GDP) during the period 2000–2024. The analysis employs the ARDL model to estimate both short- and long-term relationships, anchoring the results within the theoretical framework of the IS–LM–BP model.

The findings indicate the existence of a long-term equilibrium relationship among the variables. Both government spending and the money supply have a positive and statistically significant impact on growth, whereas the exchange rate shows a limited effect. The error correction term demonstrates the economy’s capacity to return to equilibrium following short-term shocks. These results affirm the effectiveness of fiscal and monetary policies in stimulating growth, while underscoring the necessity of enhancing external sector stability to achieve sustainable macroeconomic equilibrium.

Keywords: Economic growth; Fiscal policy; Monetary policy; Exchange rate; Algeria

JEL Codes: C32 ; E52 ; E62.

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Introduction:

Economic growth is a fundamental pillar of societal welfare and development. Its drivers and impediments remain central to economic research and policy-making. In the face of mounting challenges confronting developing economies—chief among them external volatility, dependence on natural resources, and a fragile real sector—the need has emerged to understand how the three main tools of economic policy—fiscal policy, monetary policy, and exchange rate management—interact within a comprehensive framework, as expressed in modern classical models, notably the IS–LM–BP model.

This study delves into the complex dynamics shaping Algeria’s GDP trajectory by analyzing the influence of three key economic levers: government spending, money supply, and the exchange rate. To this end, the research employs an advanced econometric methodology—namely the Autoregressive Distributed Lag (ARDL) model—to dissect both short- and long-term relationships among these variables and to offer quantitative insights that enhance our understanding of the real drivers of growth.

In addition to the econometric analysis, the study integrates its findings into the well-established theoretical framework of the Mundell–Fleming model—represented by the IS–LM–BP curves. This theoretical mapping not only bridges the gap between theory and practice but also provides a comprehensive explanation of how fiscal and monetary policies interact and

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respond to external sector dynamics in determining overall macroeconomic equilibrium. Through this holistic approach, the study aspires to contribute meaningfully to the academic literature and to bolster policymakers' ability to design more effective economic tools that ensure stability and promote long-term growth. Accordingly, this study poses a central research question:

Problem Statement:

How do economic policy instruments (government spending, monetary policy, and exchange rate policy) interact with GDP in Algeria during the period 2000–2024, and to what extent can the ARDL model explain this dynamic within the theoretical framework of the IS–LM–BP model?

Hypothesis:

The three economic policy instruments—government spending, monetary policy, and exchange rate policy—have a statistically significant impact on Algeria's GDP during the period 2000–2024. Furthermore, the ARDL model is capable of accurately capturing this relationship in both the short and long term within the IS–LM–BP framework, reflecting the structural interaction between economic policies and macroeconomic activity in Algeria.

Literature Review

Reviewing previous literature is a foundational element of any scientific research, as it provides the theoretical and empirical groundwork upon which the current study is built. Numerous studies have explored the relationship between economic policy and economic growth, whether through modern models or within a comprehensive macroeconomic theoretical framework. Below is a summary of the most relevant studies related to the subject of this paper:

- *Jawad, Quadri, and Ali (2011)* (Jawaid, Qadri, & Ali, 2011, pp. 133-138) conducted an econometric study on the Pakistani economy for the period 1989–2009, employing cointegration techniques and the Error Correction Model (ECM) to analyze the impact of fiscal and monetary policies, as well as trade openness, on economic growth. The results indicated a positive and statistically significant relationship, both in the short and long term, between government spending and money supply on GDP, while the effect of international trade was statistically insignificant. The study concluded that monetary policy was more effective than fiscal policy in stimulating growth. These findings underscore the relevance of the IS–LM–BP model in explaining growth dynamics.
- *Ahmed and Sulaiman (2011)* (Suliman & Ahmed, 2011, pp. 68-79) conducted an econometric study on the Sudanese economy covering the period 1960–2005. The study applied Granger causality tests and cointegration analysis to examine the relationships among real GDP, money supply, and the price level. It revealed a unidirectional causality from GDP to prices and from money supply to prices, but no direct long-term causality between GDP and money supply. However, the cointegration analysis confirmed a long-term equilibrium relationship among the three variables, supporting the significance of monetary policy in the long run. These results reinforce the fundamental assumptions of the IS–LM–BP model, suggesting a weak short-term relationship between the LM curve and GDP, while highlighting the structural long-term impact of money supply on overall macroeconomic equilibrium.

- *Nguyen (2019)* (Nguyen, 2019) investigated the Vietnamese economy from 1991 to 2009 using the ARDL model. The study found a long-run equilibrium relationship between real effective exchange rate (REER) fluctuations and economic growth. The results showed that high exchange rate volatility negatively affects economic performance, whereas strategic devaluations can enhance growth. These findings validate the practical implications of the IS–LM–BP model, where exchange rate fluctuations negatively impact GDP, shifting the BP curve and highlighting the importance of external stability in achieving macroeconomic balance.
- *Waleed Laaib* (Laaib, 2016) conducted an analytical study titled “An Analytical Study on the Effectiveness of Economic Policies in the Algerian Economy Using the IS–LM–BP Model during the Period 1990–2015.” The study aimed to estimate the IS–LM–BP equations using Algerian economic data to analyze general equilibrium across the goods and services market, the money market, and the external sector. The results showed that monetary policy was relatively ineffective in influencing GDP, while fiscal policy demonstrated greater effectiveness. This reflects Algeria’s reliance on government spending as a key driver of economic output. These findings support the theoretical foundations of this study and emphasize the importance of flexible econometric tools such as the ARDL model to better understand the dynamic relationships between economic policies and aggregate output.
- *Redha Bouchnefa (2019)* (Bouchnefa, 2025) authored a study titled “Macroeconomic Equilibrium in the Algerian Economy: An Econometric and Analytical Study (1990–2024)” using the IS–LM–BP model. The study addressed the issue of achieving equilibrium among the three main markets—goods and services, money, and the external sector. It found that overall equilibrium could be attained at high output levels consistent with predefined interest rates, though this was accompanied by undesirable levels of inflation. The researcher concluded that stabilizing the balance of payments and the Algerian dinar’s exchange rate through well-considered monetary policies is essential for achieving macroeconomic equilibrium and controlling inflation. This study underscores the interactive role of the three economic policy tools as described by the IS–LM–BP model, thereby enhancing the analytical value of the current study, which employs the ARDL model to estimate actual quantitative relationships between these instruments and GDP.

The foregoing review shows that most studies have focused either on the theoretical or the empirical dimension in isolation. In contrast, the current study seeks to integrate dynamic econometric analysis using the ARDL model with the theoretical framework of the IS–LM–BP model, specifically in the context of the Algerian economy. This study is distinctive in that it combines three principal drivers of economic activity—government spending, monetary policy, and exchange rate policy—in a unified analysis. This comprehensive treatment has not been adequately addressed in prior Algerian literature, particularly in light of the shifting policy responses to external shocks. As such, the study holds significant research value.

Theoretical Framework of the IS–LM–BP Model

The IS–LM–BP model is a key theoretical tool used to analyze macroeconomic equilibrium in open economies through the interaction of the three primary markets. The IS curve represents the goods and services market and is influenced by fiscal policy; the LM curve represents the money market and is influenced by monetary policy; and the BP curve, which represents the balance of payments, reflects the external sector and is influenced by exchange rate dynamics.

Model Assumptions

The model is based on the following assumptions: (Khagarijan College, 2025)

1. The economy is small and open to the global market.
2. Tax rates are uniform across all countries.
3. Investors face no political risk.
4. The trade balance depends solely on income and the exchange rate.
5. There is free movement of capital, and all financial assets are considered homogeneous substitutes. The only risk faced by investors is market regulation, meaning that money demand depends solely on income and the exchange rate.
6. The model provides a short-run analysis, assuming that prices are fixed.

Model Structure

The IS–LM–BP model represents an extension of the basic Keynesian model to include the analysis of open economies. It is divided into the following components:

Equilibrium in the Goods and Services Market – The IS Curve

Definition of the IS Curve

The IS curve represents equilibrium in the goods and services market. It illustrates the set of combinations between interest rates and output levels at which planned spending equals income. In other words, the IS curve shows combinations of interest rates and output levels where the goods and services market is in equilibrium. (Dornbusch, Fischer, & Startz, 2011)

The IS curve is negatively sloped because a rise in the interest rate reduces investment spending, thereby lowering aggregate demand and reducing the equilibrium income level. The steepness of the IS curve depends on the sensitivity of investment to changes in interest rates: the more responsive investment is to interest rate changes, the more vertical the curve becomes; conversely, lower sensitivity leads to a flatter curve.

The IS equation is generally expressed as:

$$Y = \alpha (A_0 - b i - \pi e)$$

Where:

- α is the multiplier of autonomous spending
- A_0 is autonomous expenditure
- b is the sensitivity of investment to interest rate changes
- i is the interest rate
- π is the sensitivity of imports to changes in the exchange rate
- e is the exchange rate

The IS curve is influenced by fiscal policy. For example, an increase in government spending or a reduction in taxes raises aggregate demand, shifting the IS curve to the right and

increasing the equilibrium output level—an expansionary fiscal policy. The reverse applies to contractionary fiscal policy.

- **Increased government spending → IS curve shifts right → higher output → higher interest rate → negative effect on investment**

Definition of the LM Curve

The LM curve represents equilibrium in the money market. It shows combinations of income and interest rates where real money supply equals money demand:

$$M/P = L(r, Y) \text{ (Mankiw, 2009)}$$

Where:

- **M/P** is the real money supply
- **L** is the demand for money

The LM curve has a positive slope, reflecting the direct relationship between income and interest rates (Dornbusch, Fischer, & Startz, Macroeconomics, 2011). The steepness of the curve depends on the responsiveness of money demand to income and interest rates. High responsiveness results in a flatter curve; low responsiveness leads to a steeper one.

The general form of the LM equation is:

$$YLM = \frac{1}{k} \frac{Ms}{Po} + \frac{h}{k} i$$

Where:

- **k** is the sensitivity of money demand to income
- **h** is the sensitivity of money demand to interest rate changes

The LM curve is influenced by monetary policy. For instance, an increase in the money supply shifts the LM curve to the right, reducing interest rates, which stimulates investment and aggregate demand, thereby increasing output—an expansionary monetary policy.

- **Increased money supply → LM curve shifts right → lower interest rate → higher output (potentially inflationary)**

External Balance – The Balance of Payments Curve (BP)

The BP curve is the third component of the Mundell-Fleming model and represents the combinations of output levels at which the balance of payments is in equilibrium—that is, when the current account equals the capital account: **NX = BK**

Definition of the BP Curve

The BP curve depicts the possible combinations of national income (Y) and interest rates (i) at which the balance of payments is balanced—meaning that net exports plus net capital flows equal zero (Joseph & VanHoose, 2010, p. 432). The BP curve can take various shapes depending on capital mobility (Malak, 2001, p. 151): it is generally upward sloping, vertical under complete capital controls, and horizontal under perfect capital mobility. Its general form is:

$$BP = NX(Y, E) + BK(i, i^*) = 0$$

Where:

- **NX** (current account) depends on domestic income and the exchange rate; $NX = X - M$ (trade balance)
- **BK** (capital account) depends on the interest rate differential between domestic and foreign rates; $BK = U_i - V$

- i^* is the global interest rate
- U is the sensitivity of capital flows to interest rate differentials
- V is the autonomous component of capital flows (not interest rate-sensitive)

From this, it follows that: $BP = NX + BK$

The BP curve is directly affected by the exchange rate. A depreciation of the domestic currency can improve the trade balance by increasing exports and reducing imports, shifting the BP curve to the right. Conversely, an appreciation in the real exchange rate may lead to external imbalances, particularly in economies with weak export performance.

– **Exchange rate changes → affect exports and imports → affect balance of payments**

Macroeconomic Equilibrium in an Open Economy

Macroeconomic equilibrium in an open economy is achieved when both internal equilibrium—defined as the intersection of the IS and LM curves—and external equilibrium—defined as the intersection among the IS, LM, and BP curves—are realized. This combined equilibrium serves as the fundamental reference point for the formulation of integrated macroeconomic policies.

I. Analysis, Interpretation, and Discussion of the Study's Results

1. Variables and Model Used in the Study

This analysis is based on annual data for a set of macroeconomic variables in the Algerian economy * covering the period from 2000 to 2024. The study investigates the impact of government spending (fiscal policy), money supply (monetary policy), and the exchange rate of the Algerian dinar against the US dollar on gross domestic product (GDP), within the framework of the open economy IS–LM–BP model. The model is structured according to the following general functional form:

$$GDP = f(G, M2, E)$$

The study employs the Autoregressive Distributed Lag (ARDL) model due to its flexibility in handling variables that are integrated of order $I(0)$ and $I(1)$, and its suitability for analyzing both short- and long-term relationships in long time series data.

The econometric specification of the model is as follows:

$$GDP = c + \beta_1 G + \beta_2 M2 + \beta_3 E$$

Where:

- **Dependent variable:** Gross Domestic Product (GDP)
- **Independent variables:** These are the explanatory variables that influence the dependent variable:
 - G : Government spending
 - $M2$: Money supply
 - E : Exchange rate

2. Estimation of the ARDL Model

2.1. Stationarity Analysis of Study Variables

*. Actual data on public expenditure were used for the period from 2000 to 2022. The values for public expenditure in 2023 and 2024 were estimated based on the average annual growth rate of public expenditure during the previous period. Therefore, these two values are considered estimates and are used for the purpose of completing the time series and analyzing the overall trend

Assessing the stationarity of variables is a crucial preliminary step before estimating econometric models, as it helps avoid the issue of spurious regression that often affects time series data. The Augmented Dickey-Fuller (ADF) test was employed to determine whether the time series variables are stationary and free of unit roots. Table (01) presents the results of the unit root test for all variables used in the study.

Table 1: ADF Unit Root Test Results for the Study Variables

	Augmented Dickey-Fuller (ADF) test						
Decision	First difference			Level			
	Without constant and trend	constant and general trend	Fixed only	Without a constant or direction	constant and general trend	Fixed only	Variables
I(1)	-3.0328 Prob=0.0041 ***	-4.0665 Prob=0.0207 ***	-4.0201 Prob=0.0055 ***	3.8320 Prob=0.9998	-2.4730 Prob=0.3367	1.1054 Prob=0.9963	GDP
I(1)	-6.8001 Prob=0.0041 ***	-4.0665 Prob=0.0207 ***	-4.0201 Prob=0.0055 ***	2.8982 Prob=0.9982	-3.6718 Prob=0.0488	0.5138 Prob=0.9836	G
I(1)	-4.7883 Prob=0.0000 ***	-6.5697 Prob=0.0001 ***	-6.2692 Prob=0.0000 ***	2.2123 Prob=0.9913 ***	-2.7455 Prob=0.2293 ***	-0.3508 Prob=0.9759	M2
I(1)	-2.9485 Prob=0.0051 ***	-3.4681 Prob=0.0670 *	-3.2932 Prob=0.0272 **	2.2873 Prob=0.9927	-2.2484 Prob=0.4430	0.4537 Prob=0.9811	T_change

Source: Prepared by the researcher based on Eviews13 outputs

According to the ADF test results shown in Table (01), all variables are non-stationary at level I(0), as all probability values (Prob) exceed the 5% statistical significance threshold. Therefore, the stationarity test was repeated at the first difference. The results showed that all variables became stationary at the first difference, i.e., I(1), which leads to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_1), confirming that the time series achieve stationarity after first differencing. Since all variables in the study are stationary at the same order, I(1), these preliminary results validate the application of the Autoregressive Distributed Lag (ARDL) model, which is well-suited for handling a mixture of I(0) and I(1) variables.

To estimate the ARDL model, the following steps were undertaken:

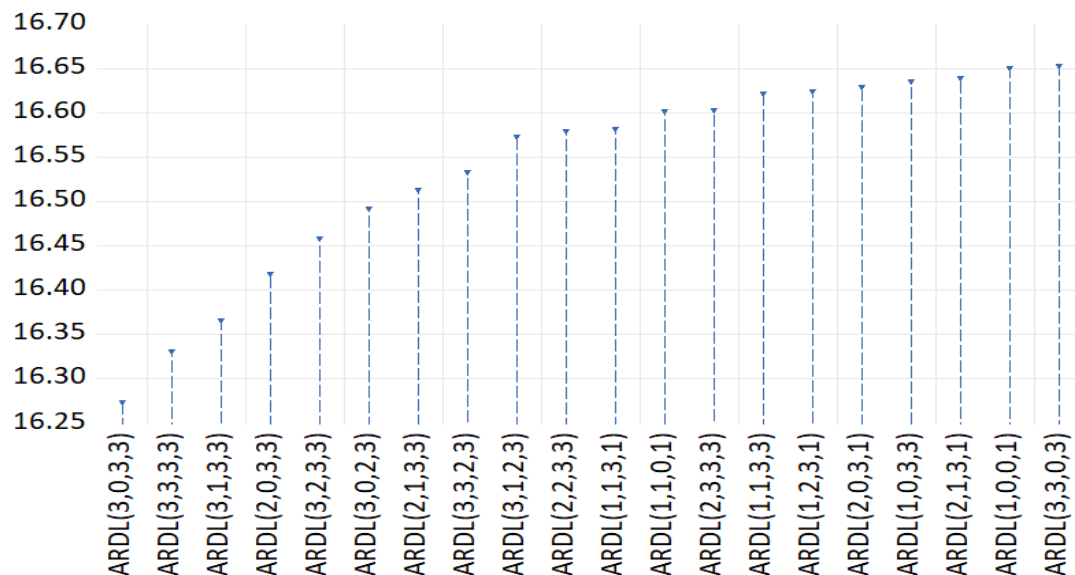
2.2. Selection of the Optimal Lag Length

Before estimating the ARDL model, it is necessary to determine the optimal lag length to ensure the selection of the most appropriate specification. Choosing suitable lags enhances the accuracy and quality of the results. The ARDL approach automatically selects the optimal lag structure from among all possible combinations. Based on the Akaike Information Criterion (AIC), the optimal model was determined as ARDL (3,0,3,3), as shown in the table and figure below:

Table 2: Optimal ARDL Model Based on AIC

Model Selection Criteria Table
Dependent Variable: GDP
Date: 07/05/25 Time: 10:03
Sample: 2000 2024
Included observations: 21

Model	LogL	AIC*	BIC	HQ	Specification
49	-157.870021	16.273335	16.919944	16.413666	ARDL(3,0,3,3)
1	-155.474631	16.330917	17.126744	16.503632	ARDL(3,3,3,3)
33	-157.832760	16.365025	17.061373	16.516150	ARDL(3,1,3,3)
113	-160.387967	16.417902	17.014772	16.547438	ARDL(2,0,3,3)
17	-157.797732	16.456927	17.203014	16.618847	ARDL(3,2,3,3)
53	-161.156886	16.491132	17.088002	16.620668	ARDL(3,0,2,3)
97	-160.385714	16.512925	17.159534	16.653256	ARDL(2,1,3,3)
5	-158.589090	16.532294	17.278382	16.694214	ARDL(3,3,2,3)
37	-161.012388	16.572608	17.219217	16.712939	ARDL(3,1,2,3)
81	-160.074196	16.578495	17.274843	16.729620	ARDL(2,2,3,3)
163	-164.095114	16.580487	17.077879	16.688434	ARDL(1,1,3,1)
175	-167.308419	16.600802	16.948976	16.676364	ARDL(1,1,0,1)
65	-159.320152	16.601919	17.348007	16.763839	ARDL(2,3,3,3)
161	-162.512633	16.620251	17.217121	16.749787	ARDL(1,1,3,3)
147	-163.549264	16.623739	17.170870	16.742481	ARDL(1,2,3,1)
115	-164.599299	16.628505	17.125896	16.736451	ARDL(2,0,3,1)
177	-163.661894	16.634466	17.181597	16.753207	ARDL(1,0,3,3)
99	-163.699681	16.638065	17.185196	16.756806	ARDL(2,1,3,1)
191	-168.826195	16.650114	16.948549	16.714882	ARDL(1,0,0,1)

Akaike Information Criteria (top 20 models)

Figure 1: Top 20 ARDL Lag Structures According to AIC

Source: Prepared by the researcher based on Eviews13 outputs

2.3. Bounds Testing for Cointegration

To test the existence of a long-run cointegrating relationship among the variables, the bounds testing approach was employed using the Wald test.

The bounds test results led to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_1), confirming the existence of a cointegrating relationship among the model's variables. This implies that the variables move together in the long run. Specifically, the calculated F-statistic was **5.3999**, which exceeds the upper critical bound ($I(1)$)

at the 5% significance level. This indicates that GDP, government spending, money supply, and the exchange rate of the Algerian dinar against the US dollar all exhibit long-run co-movement, despite potential short-term fluctuations. These findings support the hypothesis of a structural link between fiscal policy, monetary policy, exchange rate policy, and aggregate economic activity in Algeria during the study period.

The results reveal a shared long-run equilibrium among the variables, reflecting the co-movement of the IS, LM, and BP curves toward achieving overall macroeconomic equilibrium in Algeria. This highlights the structural interdependence among the goods and services market, the money market, and the external sector in light of the adopted economic policies.

2.4. Estimating Long-Run Model Parameters

After confirming the existence of a long-run equilibrium relationship via the bounds test, the next step was to estimate the long-run coefficients. The results are presented in Table (03):

Table 3: Estimation Results of Long-Run Coefficients

Result	Calculated F-statistic		
Acceptance of the alternative hypothesis: There exists a cointegration relationship (the existence of a long-term equilibrium relationship).	5.3999		Model
	Lower bound	Upper bound	Critical Values
	2.676	3.586	At significance level 10%
	3.272	4.306	At significance level 5%
	4.614	5.966	At significance level 1%

Source: Prepared by the researcher based on Eviews13 outputs

The output from Eviews13, as presented in Table (03), shows that both government spending (G) and broad money supply (M2) are statistically significant at the 1% level. In contrast, the exchange rate variable (T_change(-1)) is only marginally significant at the 10% level, which is not considered statistically significant within the scope of this study, as the accepted threshold is 5%.

The long-run results indicate a positive relationship between government spending and GDP: a 1% increase in government spending leads to a 1.38% increase in GDP. Similarly, there is a positive long-run relationship between GDP and the lagged money supply (M2): a 1% rise in M2 results in a 1.004% increase in GDP.

These findings demonstrate the effectiveness of both fiscal and monetary policies in stimulating long-term economic growth in Algeria, in line with the theoretical predictions of the IS–LM model. The positive and statistically significant relationship between government spending and GDP reflects the role of fiscal policy in shifting the IS curve to the right—particularly relevant in Algeria, where public spending is a key growth driver. Furthermore, the positive association between money supply and GDP supports the LM curve’s theoretical premise: monetary expansion reduces real interest rates, encouraging investment and shifting the LM curve to the right, thereby boosting aggregate demand.

As for the exchange rate, the results indicate a weak statistical significance, suggesting that its long-term impact on growth is unclear or unstable. This may be attributed to external market volatility or major global economic shocks during the study period, such as the 2014 oil price crisis, the COVID-19 pandemic in 2020, and the Russia-Ukraine war.

Estimation of the Error Correction Model (ECM) – Short-Term Dynamics

Following the previous steps, the next stage involves applying the Error Correction Model (ECM) to estimate the short-term parameters of the GDP function and its independent variables in Algeria during the study period.

Table 4: Estimation Results of the Error Correction Model (Short Term)

☐ Cointegrating Specification

Deterministics: Rest. constant (Case 2)
CE = GDP(-1) - (1.377938*DEP + 1.004594*M2(-1) - 50.500494 *T_CHANGE(-1) + 4229.353384)

☐ Cointegrating Coefficients

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
DEP	1.377938	0.318775	4.322602	0.0005
M2(-1)	1.004594	0.230895	4.350861	0.0004
T_CHANGE(-1)	-50.50049	35.19420	-1.434910	0.1695
C	4229.353	2220.356	1.904808	0.0739

Note: * Coefficients derived from the CEC regression.

Source: Prepared by the researcher based on Eviews13 output

$$DGDP = 0.33DGDP(-1) - 0.47DGDP(-2) + 0.52DM2 - 0.72DM2(-1) - 0.32DM2(-2) - 200DT_change - 131DT_change(-2)$$

As shown in the table above, the coefficient of the error correction term (ECM) is negative and statistically significant, confirming the existence of a short-term equilibrium relationship among the study variables. The error correction coefficient is estimated at **-1.16**, and it is statistically significant with a **P-value = 0.0000**. This coefficient represents the speed at which short-term deviations are corrected toward long-term equilibrium. On average, the adjustment process takes about ten months to restore equilibrium ($1 / 1.16 = 0.86 * 12 \approx 10$ months). This reflects the dynamic responsiveness of the Algerian economy to fiscal, monetary, and exchange rate policy interventions.

All independent variables are statistically significant at the 1% and 5% levels. The signs of their coefficients vary, indicating both positive and negative relationships, as follows:

The results show that short-term GDP fluctuations are influenced by its past values. Specifically, a 1% increase in GDP in the previous year leads to a 0.33% increase in the current year, reflecting a positive relationship. In contrast, a 1% increase in GDP two years earlier results in a 0.47% decline in current GDP, indicating a negative lagged effect.

Moreover, there is a statistically significant positive relationship between the current year's money supply and GDP, where a 1% increase in money supply results in a 0.52% increase in GDP. However, the lagged values of money supply show a negative impact: a 1% increase in money supply one or two years earlier leads to a decline in GDP by approximately 0.31% to 0.72%.

Regarding the exchange rate, the results reveal a statistically significant inverse relationship between GDP and the exchange rate for both the current year and two years prior.

A 1% increase in the exchange rate leads to a decrease in GDP ranging between 131 and 200 units.

The short-term ECM results affirm a meaningful relationship between Algeria's GDP and the instruments of economic policy, consistent with the theoretical framework of the IS–LM–BP model. The positive relationships with government spending and money supply confirm the effectiveness of fiscal and monetary policies in shifting the IS and LM curves to the right. Conversely, the inverse relationship with the exchange rate highlights the negative influence of external sector volatility, which shifts the BP curve in a direction that constrains growth. These findings affirm that Algeria's economy is responsive to economic policy tools but remains vulnerable to external shocks.

Model Stability Test

To verify model stability, the CUSUM and CUSUM of Squares tests were applied. These tests check for structural stability and whether long-term and short-term parameters are consistent. Model stability is confirmed if the plotted lines remain within the 5% critical bounds. The figures below show that both the CUSUM and CUSUM of Squares plots lie within the 5% confidence bounds.

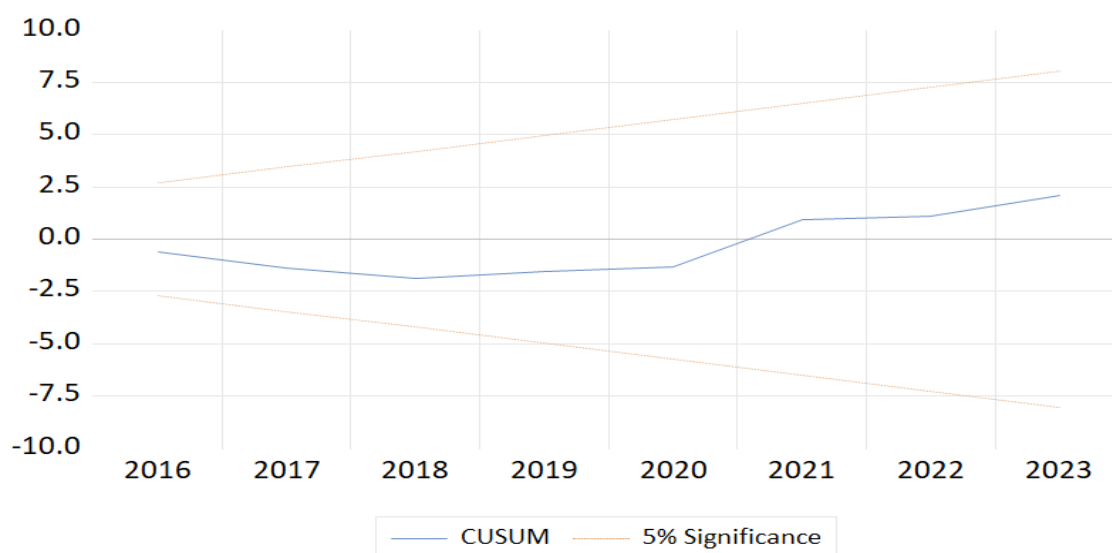


Figure 2: CUSUM Test Plot

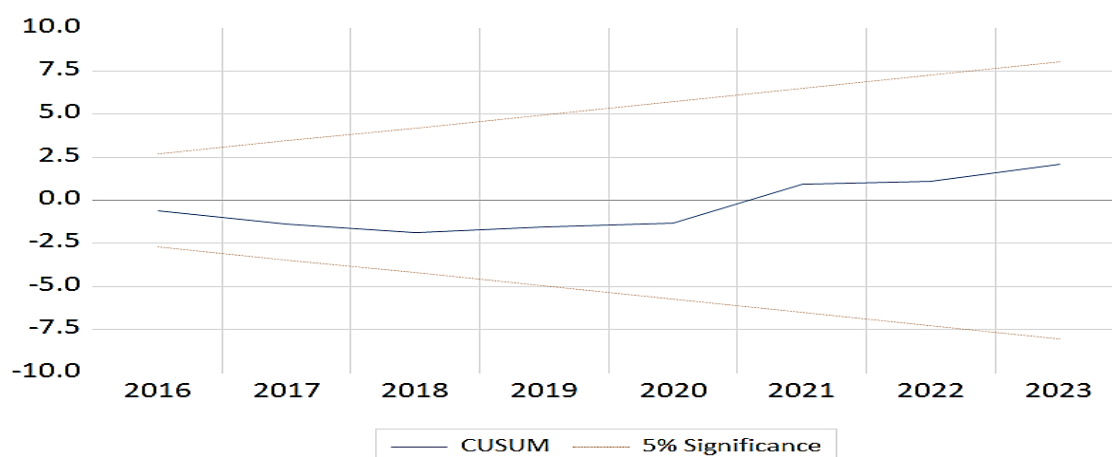


Figure 3: CUSUM of Squares Test Plot

Source: Prepared by the researcher based on Eviews13 output

The graphs indicate that the model's estimated coefficients are structurally stable over the study period, as the test statistics fall within the critical boundaries at the 5% significance level. Thus, both CUSUM tests confirm that the model is stable, and there are no structural breaks during the period analyzed. This supports the validity of the short- and long-term relationships and confirms the suitability of applying the IS–LM–BP model.

Model Diagnostic Tests

To validate the robustness of the estimated model, several diagnostic tests were conducted:

– Test for Autocorrelation of Residuals

To detect any presence of autocorrelation in the error terms, the **Breusch-Godfrey Serial Correlation LM Test** was employed. This test is highly effective in identifying higher-order autocorrelation. The results are displayed in the table below:

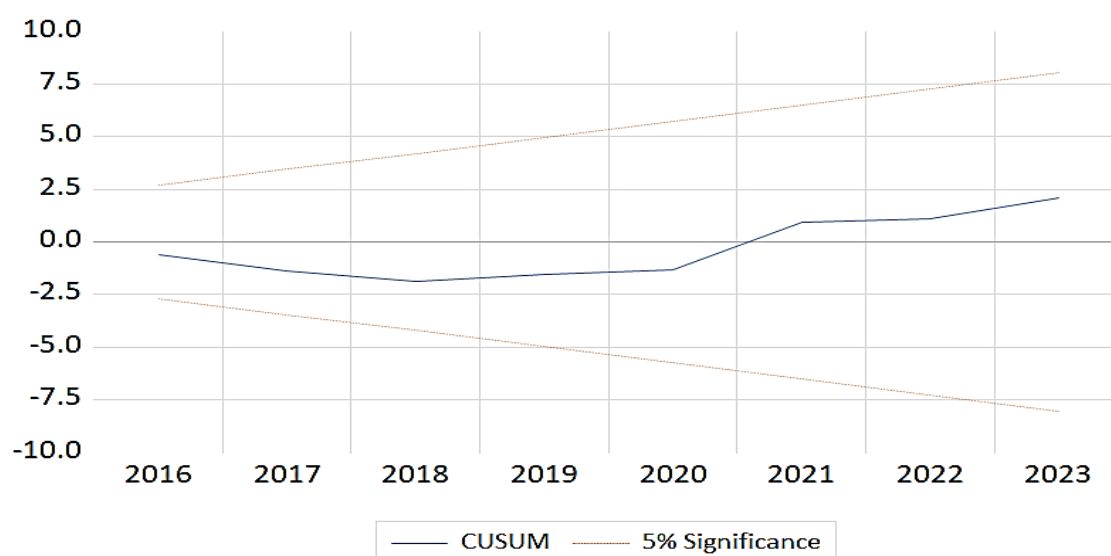


Figure 4: Results of the Breusch-Godfrey Serial Correlation LM Test

Source: Extracted from Eviews13

The table shows that the calculated **F-statistic is 0.457**, with a **probability of 0.6533**, which exceeds the 5% significance level. Therefore, the null hypothesis of no autocorrelation is accepted, and the alternative hypothesis is rejected.

This indicates that the model is free from autocorrelation problems, thereby enhancing the credibility and reliability of the statistical results obtained. Such statistical robustness supports the application of the results to the IS–LM–BP model. The absence of autocorrelation suggests that the dynamic response of GDP to government spending (IS), money supply (LM), and exchange rate (BP) has been accurately captured without distortions from serial correlation.

– Heteroskedasticity Test: ARCH Test

To examine the potential issue of heteroskedasticity in the model's residuals, the ARCH test was applied, which is among the most widely used tests for detecting conditional variance instability in time series data.

Table 5 : Results of the ARCH Heteroskedasticity Test

Breusch-Godfrey serial correlation LM test			
F-statistic	0.488	Prob.F(1,18)	0.4936
Obs*R-squared	0.528	Prob.Chi-square(1)	0.4673

Source: Extracted from Eviews13

The calculated F-statistic is **0.488**, with a corresponding probability of **0.4936**, which exceeds the 5% significance level. Based on this result, the null hypothesis is accepted, indicating that the residual variance is constant and that there is no evidence of heteroskedasticity in the model.

– Normality Test: Jarque-Bera Test

This test was used to determine whether the residuals follow a normal distribution, which is essential for evaluating the quality of the model. As shown in the figure below, the **Jarque-Bera statistic has a probability of 0.817** and **probability value = 0.66**, both greater than the 5% significance threshold. Consequently, the calculated value is less than the critical value, leading to acceptance of the null hypothesis that the residuals are normally distributed. This outcome supports the statistical soundness and equilibrium of the model.

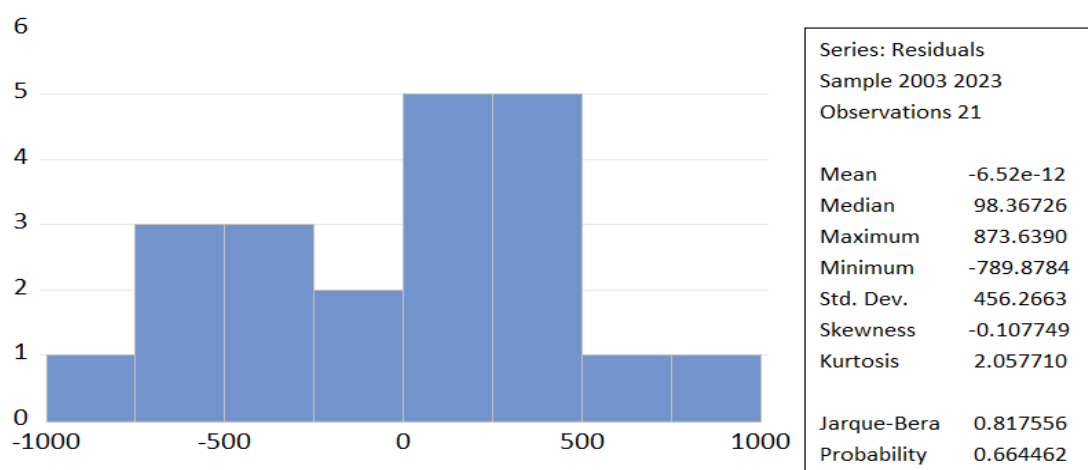


Figure 5: Results of the Normality Test for Residuals

Source: Extracted from Eviews13

Based on the various diagnostic test results, it is evident that the estimated model exhibits stable coefficients, no autocorrelation, no heteroskedasticity, and normally distributed residuals. These indicators confirm the model's quality and its suitability for analysis and interpretation.

Application of the Study's Results to the IS–LM–BP Framework

Having completed the estimation of the ARDL model and the analysis of both long-run and short-run relationships between GDP and the explanatory variables (government spending, money supply, and exchange rate), and following successful diagnostic testing, the results can now be interpreted within the theoretical framework of the IS–LM–BP model:

- The statistically significant positive relationship between GDP and government spending in both the long and short term demonstrates the effectiveness of fiscal policy in stimulating aggregate demand. This reflects a rightward shift of the IS curve, particularly relevant in an economy like Algeria's, where public expenditure plays a critical role in driving growth.
- The positive relationship between GDP and money supply confirms the role of monetary policy in supporting economic activity by encouraging investment and expanding expenditure. This contributes to a rightward shift of the LM curve, both in the short and long term.
- In contrast, the inverse relationship between GDP and the exchange rate of the Algerian dinar against the US dollar points to a weak interaction with the external sector. A depreciation of the national currency negatively impacts growth due to increased import costs and limited economic diversification. This negative dynamic is reflected in a leftward shift of the BP curve, indicating constrained growth and limited external balance capabilities.
- Furthermore, diagnostic tests such as **CUSUM**, **ARCH**, **Jarque-Bera**, and **Breusch-Godfrey** confirm the structural stability of the estimated model and the absence of significant econometric issues, enhancing the credibility of the findings and supporting their application to the IS–LM–BP model.

Accordingly, the results suggest that Algeria's economy during the period 2000–2024 is responsive to both fiscal and monetary policy instruments. However, it remains vulnerable to external shocks that impact exchange rate stability and the balance of payments. This underscores the need for deeper coordination among the three policy areas—fiscal, monetary, and exchange rate—to achieve a sustainable equilibrium across the IS, LM, and BP curves.

II. Conclusion

The results of this study, through the estimation of the ARDL model and its application within the IS–LM–BP framework, reveal that the Algerian economy between 2000 and 2024 was significantly influenced by the effectiveness of fiscal and monetary policies in stimulating economic growth. In contrast, the exchange rate exhibited a negative effect, highlighting the vulnerability of the external sector to shocks. The diagnostic tests confirmed the structural stability of the model and the reliability of the results.

The positive relationship between government spending and money supply on one hand, and gross domestic product on the other, underscores the importance of these policies as key instruments for boosting aggregate demand and supporting economic activity. Conversely, the

inverse relationship between the exchange rate and GDP reveals structural challenges stemming from heavy reliance on imports and limited economic diversification—particularly the dependence on oil exports. This negatively affects external balance and emphasizes the need for more flexible strategies to withstand external shocks. Accordingly, a coordinated approach involving fiscal, monetary, and trade policies is essential for achieving comprehensive and sustainable macroeconomic equilibrium.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. **Enhance Fiscal Policy Effectiveness:** Redirect government spending toward sustainable productive sectors to shift the IS curve toward a true long-term equilibrium.
2. **Refine and Growth-Orient Monetary Policy:** Monitor the money supply and interest rates to ensure stability in the money market and foster domestic investment without triggering inflationary pressures.
3. **Reassess Exchange Rate Policy:** Adopt a more flexible exchange rate regime while reducing reliance on imports and exports by promoting local production to help stabilize the BP curve.
4. **Strengthen Coordination among Fiscal, Monetary, and Exchange Rate Policies:** Aim to achieve a sustainable internal and external macroeconomic balance, particularly during external crises such as oil price volatility or geopolitical tensions.
5. **Adopt Advanced Econometric Models:** Utilize models such as VAR, SVAR, or Panel Data techniques to analyze the impact of short-term economic shocks, providing decision-makers with accurate forecasting tools for crisis management.

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