Using the ARDL Model to Estimate the Relationship Between Algeria's Foreign Exchange .Reserves and the Balance of Payments from March 2013 to December 2023

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Abstract:

This study aims to investigate the impact of the balance of payments on foreign exchange reserves in Algeria during the period from 2013 to 2023. To achieve this objective, a descriptive analytical approach was employed in the theoretical aspect of the study, while the practical aspect involved conducting a cointegrating study based on the ARDL model to understand the relationship between the variables. The study concluded that there is a long-term positive relationship between the balance of payments and foreign exchange reserves, where each unit change in the balance of payments leads to a change in foreign exchange reserves.

Keywords: Balance of payments, foreign exchange reserves, Algeria, ARDL model.

Jel Classification Codes : C22, F10, F40

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1. Introduction:

The balance of payments is a fundamental economic tool for understanding the macroeconomic status of any country by monitoring the flow of goods, services, capital, and transfers. In Algeria, the balance of payments is of significant importance due to the economy's substantial reliance on hydrocarbon exports as a primary source of hard currency. Consequently, it directly affects foreign exchange reserves. This leads to the following research question: **To what extent does the balance of payments affect foreign exchange reserves in Algeria between 2013 and 2023?**

Sub-Questions:

To address the main research question, the following sub-questions have been formulated:

- What is meant by the balance of payments? What are its key determinants?
- Is there a relationship between the value of foreign exchange reserves and the value of the balance of payments in Algeria?

Research Hypotheses:

To answer this research issue, the following hypotheses have been formulated:

- The balance of payments is a record that shows the total commercial and financial transactions of a country with the rest of the world, with the exchange rate being one of its key determinants.
- There is a short-term positive relationship between the value of foreign exchange reserves and the value of the balance of payments.

The objectives of this study are:

- To analyse the relationship between the balance of payments and foreign exchange reserves in Algeria.
- To highlight the determining factors for the optimal level of foreign exchange reserves in Algeria.
- To propose some recommendations that may contribute to achieving stability in foreign exchange reserves in the future.

2. The Nature of the Balance of Payments

Economic relations between countries involve the exchange of goods and services and the movement of cash and financial assets. Therefore, each country records its international transactions in a ledger called the balance

of payments to understand its economic relationship with the world.

2.1 Definition of the Balance of Payments:

There are various definitions of the balance of payments, including the following:

- **First Definition:** It is defined as a systematic accounting record of all economic transactions between residents of a country and non-residents over a specific time period, usually one year. Monetary policy is used to address imbalances in the balance of payments and restore equilibrium by changing both the money supply and the exchange rate. (Najat, 2022)
- **Second Definition:** The International Monetary Fund defines the balance of payments as a record based on double-entry bookkeeping, covering statistics for a specific time period regarding changes in the components or value of a country's assets due to interactions with other countries, or due to individual migration and changes in the value or components of gold and special drawing rights held, and obligations toward the rest of the world. (tagrare, Salimhella, & Salomibenzema, 2022)
- **Third Definition:** The balance of payments can be defined as a statistical statement or accounting record where all commercial, financial, and monetary transactions that take place between residents of a country and their counterparts abroad are recorded over a specific time period, usually one year. (Fatih, 2023)

From the various definitions mentioned above, it can be concluded that the balance of payments is a record reflecting the financial and trade flows between a country and the outside world over a specific time period. This record contributes to understanding the impact of external transactions on a country's economic status and serves as a basis for analyzing economic policies and making appropriate decisions to maintain the balance of those flows.

2.2 Importance of the Balance of Payments:

The importance of the balance of payments is manifested in the following points: (Aida & noureddienmehrez, 2021)

- It assists policymakers in directing national affairs, such as adopting a specific exchange rate policy, whether to raise or lower it.
- It allows for forecasting the evolution of the country's economic situation (exchange rates, sources of foreign currency).

- It illustrates the external position of the national economy and contributes effectively to managing the national economy by providing data for the country under study. It also opens avenues for economic decision-makers to adopt policies compatible with the economic situation.
- It demonstrates the commercial standing and economic strength of the country under study; the share of the country in foreign trade gives its currency weight in settling international payments based on its share of external trade.
- The balance of payments is considered a mirror of the national economy's condition, as it contains data that explains and assesses economic phenomena related to the global economy. Its status reflects the necessary policies to correct imbalances.
- It helps determine the nature and extent of the economic relationships of the country with the rest of the world.

2.3 Characteristics of the Balance of Payments:

The balance of payments is distinguished by its nature as an accounting tool, characterized by several features, which can be summarized as follows:

Table N°1: Characteristics of the balance of payments

Characteristics	Explanation
External Economic Transactions	It includes only external economic transactions, whether immediate or deferred.
Residents	A resident is defined as someone who has permanent residency in a country, excluding visitors such as tourists, foreign students, and diplomats.
Natural and Legal Persons	Residents can be either individuals or institutions, such as banks and corporations.
Residence Status	This is based on residency rather than nationality. A foreign resident is considered a resident even if their nationality is different.
International Transactions	Transactions between residents of different countries are recorded as international transactions, regardless of nationality.
Recording on the Credit Side	Any transaction that results in an inflow of foreign currency is recorded on the credit side (e.g., exports, loans, and remittances).
Recording on the Debit Side	Any transaction that results in an outflow of foreign currency is recorded on the debit side (e.g., imports, loan repayments, and remittances).

Source: (Musadia, 2019)

2.4 Determinants of the Balance of Payments

The final balance of payments is influenced by several economic and financial factors, such as domestic production, inflation levels, interest rates, and exchange rates. These factors contribute to determining the difference between receipts and payments. The most important of these are as follows: (reference)

A. **Domestic Output**: An increase in domestic output contributes to satisfying the needs of residents and directing surpluses for export, while a decrease in output leads to reliance on foreign products, negatively impacting the balance of payments in the current account.

B. **Real Interest Rate**: High domestic interest rates attract capital inflows, whereas lower rates lead to capital flowing out to more attractive financial centers, positively affecting the balance of payments in direct proportion to interest rates.

C. **Exchange Rate**: The exchange rate affects the competitiveness of local products; when it rises, foreign products become more preferred. The currency market is influenced by the supply and demand of currencies resulting from transactions in the balance of payments.

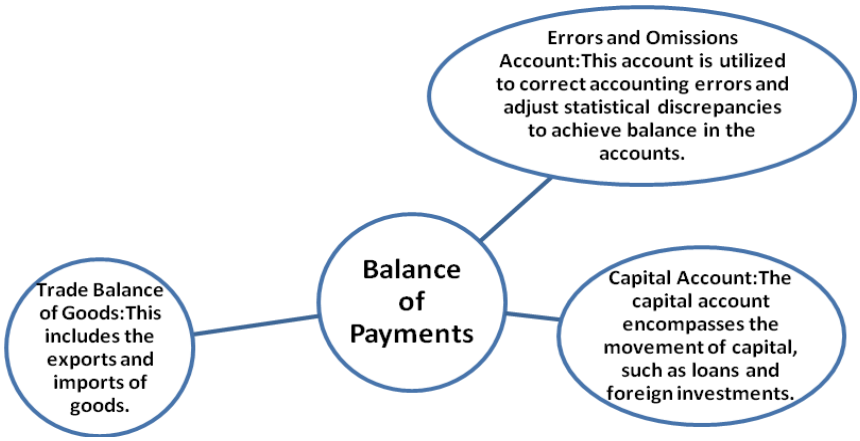
D. **External Debt**: Foreign financing contributes to enhancing investment and growth in developing countries, thereby improving the balance of payments, provided that the volume of financing exceeds payments resulting from interest and principal repayments. However, as external debt increases, servicing this debt becomes a major reason for persistent deficits in the current account, turning borrowing from a temporary solution into a factor that increases the deficit, leading to a vicious cycle.

E. **Inflation**: It raises local prices compared to foreign prices, leading to a decrease in exports and an increase in imports due to the attractiveness of foreign goods. This negatively impacts the current account and reduces the value of balance of payments assets compared to its liabilities.

2.5 Componentsof the Balance of Payments

The balance of payments is divided into three main sections:

Fig N° 1: Balance of payments



Source :(Prepared by the researchers)

2.5Nature and Causes of Balance of Payments Imbalance and Mechanisms

Imbalance of the Balance of Payments

According to the double-entry accounting mechanism used when recording transactions in the balance of payments, the balance of payments is balanced from an accounting perspective. However, the imbalance occurs in certain sections of the balance, and usually, there is a deficit in the current account, as it is the largest account whose deficit causes harm to the national economy, affecting the value of the local currency in the exchange market. There are several causes for this deficit, the most important of which are: (Zakaria, 2022)

- **Incorrect Valuation of the Local Currency Exchange Rate**: There is a close relationship between the exchange rate and the balance of payments, as the exchange rate must reflect the true value of the local currency, since this affects the demand for the local currency.
- **Cyclical Causes**: Economic imbalance is linked to cycles in a capitalist economy. During periods of recession, production and imports decrease, leading to a surplus, while during periods of inflation, production and consumption increase and prices rise, resulting in increased imports and imbalances.
- **Structural Causes**: Dependency on one or two primary commodities affects the balance of payments equilibrium, as the demand for these commodities is influenced by multiple factors. The structure of foreign trade plays an important role in stabilizing the balance.

- **Emergency Conditions**: These are unpredictable factors that may lead to a balance of payments imbalance, such as natural disasters, wars, or the emergence of new, cheaper manufacturing technologies.

3.Foreign Exchange Reserves

Foreign exchange reserves support the stability of the national economy, enabling the state to withstand economic fluctuations and global crises in a volatile economy

3.1 Definition of Foreign Exchange Reserves:

There are various definitions and concepts related to foreign exchange reserves. Among these definitions, we find:

- Foreign exchange reserves are defined as "all generally accepted and unconditioned international means of payment available for settling international payments." (Nabil, 2022)
- The International Monetary Fund (IMF) defines foreign exchange reserves as external assets at the disposal of the monetary authorities and under their control, to meet the financing needs of the balance of payments or to intervene in foreign exchange markets to influence the exchange rate or for other related purposes. (Rabah & Nadira, 2023)
- International reserves are referred to as those assets that governments wish to hold as they are widely accepted in international transactions. (Fawzi & din, 2021)

From the above definitions, it can be said that foreign exchange reserves consist of assets held by the monetary authority, which has full control over them to use them during times of balance of payments deficits or to intervene in the foreign exchange market to avoid imbalances that might affect its economic and social policies.

3.2 Causes and Importance of Building Foreign Exchange Reserves

Official foreign exchange reserves enhance confidence in a country's ability to meet its obligations, support monetary management policies and exchange rates, and maintain liquidity. The reasons for building these reserves vary between countries, including mitigating economic shocks, confronting instability, and ensuring the continuity of sources for meeting short-term obligations. Other reasons include:

- Using reserves as a cover for the issued local currency, a practice that was prevalent during the gold standard until the collapse of the Bretton Woods system.
- Implementing monetary policy and controlling the trends of local currency exchange rates through intervention in currency markets to maintain a target margin between local interest rates and foreign currency interest rates.

There are also several advantages to holding foreign exchange reserves, including:

- Increasing the state's ability to respond to crises, acting as a safeguard against balance of payments deficits.
- Covering currency issuance in operations aimed at maintaining exchange rate stability.
- Supporting the local currency in international markets.

3.3 Components of Foreign Exchange Reserves

According to another classification provided by the International Monetary Fund's Balance of Payments Manual, foreign exchange reserves consist of: (Safia, 2020)

- **Monetary Gold**: The importance of gold lies in its ability to withstand crises and wars, as it outperforms stocks, bonds, and currencies that may lose value during periods of global distress. Therefore, the share of gold in international reserves is increased as a precaution against exchange rate volatility.
- **Foreign Currency Reserves (Key Currencies)**: Key currencies refer to strong convertibility national currencies that enjoy general acceptance beyond their national borders. They are accepted by creditors and debtors alike and are primarily used for the international pricing of products, goods, and commodities that are in high demand and traded globally.
- **Special Drawing Rights (SDRs)**: The SDR system came into effect on January 21, 1969, and consists of book-entry loans created by the IMF to assist its members on an optional basis. SDRs are considered legal reserve assets that allow holders to obtain convertible currencies from member countries with sound reserves, rather than from IMF resources.
- **Reserve Tranche at the IMF**: The debts of the IMF to member countries consist of SDRs and hard currencies, which member countries can draw upon immediately from their reserves. These debts may also arise from countries with sound financial positions selling their currencies through the IMF, allowing it to assist countries facing balance of payments deficits.

4. Econometric Study of the Impact of the Balance of Payments on Foreign Exchange Reserves in Algeria

This section is dedicated to analysing the relationship between the balance of payments and foreign exchange reserves in Algeria for the period from 2013 to 2023. To conduct this study, the Autoregressive Distributed Lag (ARDL) model has been utilized.

4.1 ARDL Model: (Autoregressive Distributed Lag Model)

The ARDL model is a dynamic model that employs the bounds testing approach as an alternative for cointegration in the presence of a single cointegration vector and one dependent variable. One of its key features is that it explains the dependent variable based on the lagged values of the independent variables alongside previous values of the dependent variable, following the bounds testing methodology for cointegration proposed by Pesaran, Shin, and Smith in 2001. The model takes the following form:

$$y_t = \delta + \delta_0 x_t + \delta_1 x_{t-1} + \delta_2 x_{t-2} + \cdots + \delta_q x_{t-p} + v_t$$

1. Hypotheses of the ARDL Model

1.1. To apply the ARDL model, the time series constituting the model must be stationary at levels I(0), I(1), or a combination of both. This model cannot be applied if the series is stationary at level I(2).

Null Hypothesis (H0): The presence of a unit root, if the calculated t-statistic is less than the critical t-value in absolute terms, meaning the significance level is greater than 0.05, indicating that the series is non-stationary.

Alternative Hypothesis (H1): The absence of a unit root, if the calculated t-statistic is greater than the critical t-value in absolute terms, meaning the significance level is less than or equal to 0.05, indicating that the series is stationary.

Foreign Exchange Reserves Series

Table N°2 : stability of original series

Stability of Original Series					
Variables	**Lag Order**	**Model**	**Tφ**	**t-tabulated**	**Probability at 5%**
RCH	**9**	**Trend and intercept**	**0.299605**	**3.520787-**	**0.9980**
	9	**Intercept**	**2.075631-**	**2.933158-**	**0.2551**
	9	**None**	**2.598565-**	**1.948886-**	**0.0106**
First Difference Series					
Variables	**Lag Order**	**Model**	**Tφ**	**t-tabulated**	**Probability at 5%**
DRCH	**9**	**Trend and intercept**	**4.078314-**	**3.520787-**	**0.0134**
	9	**Intercept**	**3.219225-**	**2.933158-**	**0.0258**
	9	**None**	**2.679384-**	**1.948886-**	**0.0086**

Source: Prepared by the Researchers, Based on Outputs from EViews 13

From the table above, we observe that the original series is non-stationary, as the calculated t-statistic is less than the critical t-value in absolute terms, indicating acceptance of the null hypotheses for all models (Trend and intercept, intercept, none), which implies the presence of a unit root.

In contrast, the first difference series is stationary, as the calculated t-statistic is greater than the critical t-value in absolute terms, indicating acceptance of the alternative hypotheses for all models (Trend and intercept, intercept, none), which suggests the absence of a unit root.

- **Balance of Payments Series:**

Table N°3 : stability of original series

Stability of Original Series					
Variables	**Lag Order**	**Model**	**Tφ**	**t-tabulated**	**Probability at 5%**
RCH	**9**	**Trend and intercept**	**2.881689-**	**3.518090-**	**0.1783**
	9	**Intercept**	**2.150763-**	**2.931404-**	**0.2267**
	9	**None**	**1.714018-**	**1.948686-**	**0.0818**
First Difference Series					
Variables	**Lag Order**	**Model**	**Tφ**	**t-tabulated**	**Probability at 5%**
DRCH	**9**	**Trend and intercept**	**8.176529-**	**3.520787-**	**0.0000**
	9	**intercept**	**8.213414-**	**2.933158-**	**0.0000**
	9	**none**	**8.317035-**	**1.948886-**	**0.0000**

Source: Prepared by the Researchers, Based on Outputs from EViews 13.

From the table above, we observe that the original series is non-stationary because the calculated t-statistic is less than the critical t-value in absolute terms, indicating acceptance of the null hypotheses for all models (6, 5, 4), which implies the presence of a unit root.

Conversely, the first difference series is stationary, as the calculated t-statistic is greater than the critical t-value in absolute terms, indicating acceptance of the alternative hypotheses for all models (6, 5, 4), suggesting the absence of a unit root.

1.2. The sample size should be greater than or equal to 30 observations, as the ARDL model relies on forming multiple lag periods for the dependent variable and the independent variables (n-p), which reduces the degrees of freedom (df). The sample for this study is estimated at 43 observations.

1.3. The error correction term in the short-term model should be negative and significant, following confirmation of a long-term relationship through the bounds test.

Table N°4 : ECM Regression

ECM Regression
Case 2: Restricted Constant and No Trend

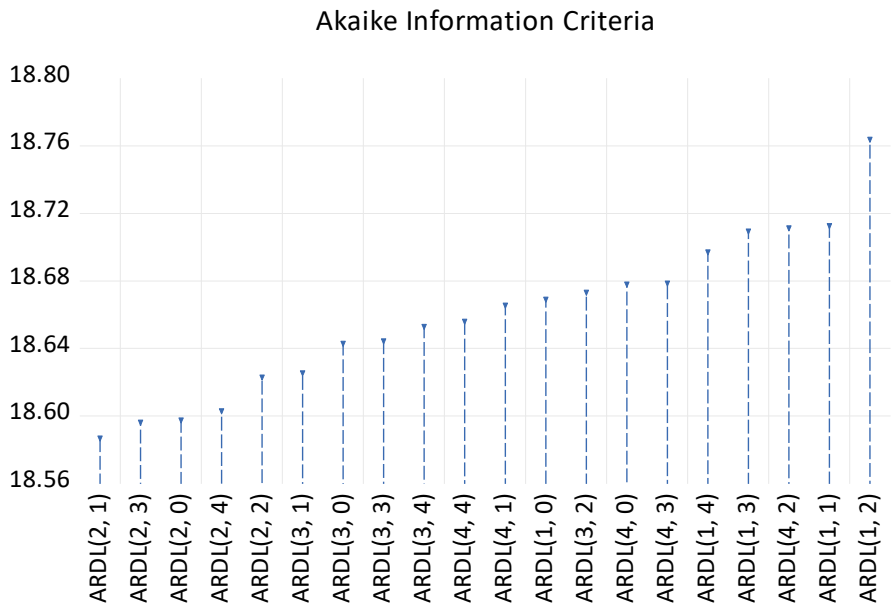
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DRCH(-1))	-0.394597	0.134663	-2.930262	0.0058
D(DBP)	1244.286	161.8811	7.686414	0.0000
CointEq(-1)*	-0.143745	0.025878	-5.554745	0.0000

Source: Prepared by the Researchers, Based on Outputs from EViews 13.

From the table above, we observe that the value of the error correction parameter is estimated at -0.143745, which is negative and also statistically significant, fulfilling the condition necessary for applying the ARDL model.

1-4- Reliance on the lowest AIC criteria to determine lag periods for the ARDL model. Estimation of the lag period and the optimal ARDL model according to the AIC criterion:

Fig N° 2:



Source: Prepared by the researchers, based on the outputs of Eviews 13.

From the figure above, we note that the ARDL (2,1) model is the optimal model for estimating the phenomenon, based on the lowest AIC criterion.

1-5- Absence of autocorrelation and the absence of homoscedasticity regarding the residuals of the ARDL model.

1-5-1- Testing for the absence of autocorrelation among the errors (residuals): H0: There is no autocorrelation among the errors, meaning the significance level is greater than 0.05. **H1**: There is autocorrelation among the errors, meaning the significance level is less than or equal to 0.05.

Table N°5 : Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	0.045619	Prob. F (2,34)		0.9555
Obs*R-squared	0.109728	Prob. Chi-Square (2)		0.9466
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Date: 03/03/25 Time: 22:05				
Sample: 2013Q4 2023Q4				
Included observations: 41				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRCH(-1)	0.106403	0.584956	0.181899	0.8567
DRCH(-2)	-0.083426	0.516549	-0.161507	0.8727
DBP	6.064320	183.0994	0.033120	0.9738
DBP(-1)	-139.0967	783.0899	-0.177625	0.8601
C	69.39856	546.8676	0.126902	0.8998
RESID(-1)	-0.126796	0.5997	-0.211428	0.8338

		12		
RESID (-2)	0.001482	0.302919	0.004891	0.9961
R-squared	0.002676	Mean dependent var		-7.43E-13
Adjusted R-squared	-0.173322	S.D. dependent var		2309.897
S.E. of regression	2502.080	Akaike info criterion		18.64188
Sum squared resid	2.13E+08	Schwarz criterion		18.93445
Log likelihood	-375.1586	Hannan-Quinn criter.		18.74842
F-statistic	0.015206	Durbin-Watson stat		1.969319
Prob(F-statistic)	0.999982			

Source: Prepared by the researchers, based on the outputs of Eviews 13.

From the table above, we observe that the value of F is estimated at 0.015206, and its significance value is estimated at 0.999982, which is greater than the critical value of 0.05. Therefore, we accept the null hypothesis H0, indicating the absence of autocorrelation among the errors.

1-5-2- Testing for the absence of homoscedasticity:

H0: There is no homoscedasticity, meaning the residuals are homoscedastic; the significance level is greater than 0.05.

H1: There is homoscedasticity, meaning the significance level is less than or equal to 0.05.

Table N°6 : Heteroskedasticity Test : ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.090102	Prob. F(1,38)	0.7657
Obs*R-squared	0.094620	Prob. Chi-Square(1)	0.7584

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/03/25 Time: 22:11
Sample (adjusted): 2014Q1 2023Q4
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5479159.	1526779.	3.588704	0.0009
RESID^2(-1)	-0.048657	0.162099	-0.300170	0.7657

R-squared	0.002365	Mean dependent var	5223916.
Adjusted R-squared	-0.023888	S.D. dependent var	7925854.
S.E. of regression	8019962.	Akaike info criterion	34.68147
Sum squared resid	2.44E+15	Schwarz criterion	34.76592
Log likelihood	-691.6294	Hannan-Quinn criter.	34.71200
F-statistic	0.090102	Durbin-Watson stat	1.990877
Prob(F-statistic)	0.765684		

Source: Prepared by the researchers, based on the outputs of Eviews 13.

From the table above, the value of F is estimated at 0.090102, and its significance value equals 0.7657, which is greater than the critical value of 0.05. Thus, we accept the null hypothesis H0, indicating that the residuals are homoscedastic.

1-6- The parameters of the ARDL model must be statistically significant.

2- Estimation of the short-term ARDL model:

Table N°7 : Dependent Variable : DRCH

Dependent Variable: DRCH			
Method: ARDL			
Date: 03/03/25 Time: 21:45			
Sample (adjusted): 2013Q4 2023Q4			
Included observations: 41 after adjustments			
Maximum dependent lags: 4 (Automatic selection)			
Model selection method: Akaike info criterion (AIC)			

Dynamic regressors (4 lags, automatic): DBP				
Fixed regressors: C				
Number of models evalulated: 20				
Selected Model: ARDL (2, 1)				
Note: final equation sample is larger than selection sample				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DRCH (-1)	0.461658	0.157641	2.928536	0.0059
DRCH (-2)	0.394597	0.147263	2.679535	0.0110
DBP	1244.286	177.0123	7.029373	0.0000
DBP (-1)	404.1320	266.8684	1.514349	0.1387
C	-448.9811	470.7512	-0.953755	0.3466
R-squared	0.767528	Mean dependent var		-2945.421
Adjusted R-squared	0.741698	S.D. dependent var		4790.791
S.E. of regression	2434.845	Akaike info criterion		18.54700
Sum squared resid	2.13E+08	Schwarz criterion		18.75598
Log likelihood	-375.2136	Hannan-Quinn criter.		18.62310
F-statistic	29.71433	Durbin-Watson stat		2.005141
Prob(F-statistic)	0.000000			

Source: Prepared by the researchers, based on the outputs of Eviews 13.

From the table above, we observe the following:

- The model takes the form ARDL (2,1), which is the model for calculating the lag period as demonstrated previously.
- There is a direct short-term relationship between the value of the foreign exchange reserve balance and its previous value, estimated at 0.461658, which is significant.
- There is a direct short-term relationship between the value of the foreign exchange reserve balance and its value from the second previous period, estimated at 0.394597, which is significant.
- There is a direct short-term relationship between the value of the foreign exchange reserve balance and the balance of payments, estimated at 1244.286, which is significant; meaning every one-unit change in the balance of payments leads to a change in the foreign exchange reserve balance of 1244.286 in the short term.
- The value of the constant is estimated at -448.9811, meaning if the budget balance equals zero, the foreign exchange reserve balance equals -448.9811.
- The value of the coefficient of determination is estimated at 0.767528, indicating that the model explains 76.75% of the variations in the foreign exchange reserve balance.

3- Testing for long-term relationships:

H0: There is no long-term relationship if the calculated F is less than the tabulated F at a significance level of 0.05.

H1: There is a long-term relationship if the calculated F is greater than the tabulated F at a significance level of 0.05.

Table N°8 :F-Bounds test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	9.743746	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
Actual Sample Size	41	Finite Sample: n=45		
		10%	3.19	3.73
		5%	3.877	4.46
		1%	5.607	6.193
		Finite Sample: n=40		
		10%	3.21	3.73
		5%	3.937	4.523
		1%	5.593	6.333

From the table above, we observe that the calculated F value equals 9.743746, while the tabulated F at a significance level of 0.05 equals 4.16; thus, the calculated F is greater than the tabulated F. Therefore, we reject

the null hypothesis and accept the alternative hypothesis, indicating the presence of a long-term relationship between the dependent variable, which is the balance of payments, and the independent variable, which is the budget deficit.

Table N°9 : Levels Equation

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBP	11467.69	7796.145	1.470943	0.1500
C	-3123.465	2648.511	-1.179329	0.2460

EC = DRCH - (11467.6885*DBP - 3123.4653)

Long-term Equation for the ARDL Model:

Table N°10 :Levels Equation

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBP	11467.69	7796.145	1.470943	0.1500
C	-3123.465	2648.511	-1.179329	0.2460

EC = DRCH - (11467.6885*DBP - 3123.4653)

Short-term Equation:

DRCH = 0.461658167376*DRCH (-1) + 0.394597303687*DRCH (-2) + 1244.28551602*DBP + 404.131965355*DBP (-1) - 448.981051671

Long-term Equation:

D(DRCH) = -0.143744528937*(DRCH (-1) - (11467.68849962*DBP (-1) - 3123.46532414))

From the table above, we observe a long-term relationship between the balance of payments and the foreign exchange reserve balance. Every one-unit change in the balance of payments leads to a change in the foreign exchange reserve balance of 11467.68 in the long term, indicating a direct relationship that is not statistically significant.

Resultsofstudy:

-The study confirmed a positive long-term relationship between the balance of payments and foreign exchange reserves in Algeria (2013–2023).

-Short-term dynamics: Lagged values of foreign exchange reserves (1- and 2-period lags) also showed significant positive impacts (coefficients: 0.462 and 0.395, respectively).

-Long-term equilibrium: A 1-unit change in the balance of payments resulted in an 11,467.68-unit change in reserves, though this relationship was not statistically significant.

-Model Validation: ARDL (2,1) was selected as the optimal model.

-Algeria's foreign exchange reserves are highly sensitive to balance of payments fluctuations, emphasizing the need to:

-Diversify the economy beyond hydrocarbons.

-Stabilize exchange rates and manage external debt.

-Maintain adequate reserves to buffer against economic shocks.

-The ARDL model effectively captured the dynamic relationship, highlighting Algeria's reliance on balance of payments stability for reserve adequacy. Strategic policy interventions are recommended to sustain reserve levels and mitigate external vulnerabilities.

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