

The Implications of Official and Parallel Exchange Rate Convergence on Foreign Trade in Algeria: An Econometric Analysis (1999–2024)

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Abstract:

This study seeks to analyze the impact of the persistent disparity between the official and parallel exchange rates on Algeria's foreign trade performance over the period 1999–2024. To address the research problem, a rigorous quantitative approach was employed, utilizing the Autoregressive Distributed Lag (ARDL) model to analyze the dynamic relationship between the dual exchange rate differential and the trade balance. The study hypothesizes that a significant and sustained gap between the two rates negatively impacts foreign trade by severely distorting economic agents' incentives. This distortion, in turn, encourages illicit practices such as the under-invoicing of exports and the over-invoicing of imports. The empirical findings suggest that effectively narrowing this differential or fully unifying the exchange rates would foster transparency, mitigate informal market distortions, and positively contribute to improving the trade balance performance and enhancing overall macroeconomic stability. Consequently, the paper recommends adopting a more flexible and market-reflective exchange rate policy, promoting transparent management and unification of the exchange market, and implementing comprehensive structural reforms to bolster economic diversification and effectively combat inflation.

Keywords: Official Exchange Rate, Parallel Exchange Rate, Foreign Trade, Exports, Imports.

Jel Classification Codes: F31, F14, O11.

The Implications of Official and Parallel Exchange Rate Convergence on Foreign Trade in Algeria: An Econometric Analysis (1999–2024).

1. INTRODUCTION

The exchange rate occupies a central place in the economic priorities of nations, as it represents one of the most important macroeconomic variables. It plays a pivotal role in shaping a country's monetary policy, serving as a vital indicator of economic stability and being influenced by numerous macroeconomic factors. Countries strive to adopt policies that ensure the stability of their domestic currency against foreign currencies, given the direct implications for export competitiveness, import costs, and domestic inflation levels.

In many developing economies especially those that rely heavily on natural resources as a primary source of fiscal revenue, state-imposed restrictions on exchange rates often lead to the emergence of parallel foreign exchange markets alongside the official one, creating a price gap that may result in profound economic distortions.

Algeria, as a rent-based economy dependent on oil and gas exports, represents a prominent example of countries facing challenges stemming from the presence of an active parallel exchange market. The divergence between the official exchange rate, set by the central bank, and the parallel market rate, determined by informal supply and demand dynamics, generates incentives for illicit commercial practices and undermines transparency and efficiency in foreign trade transactions. It also leads to substantial discrepancies between recorded economic revenues and the potential revenues that could contribute to the country's gross output.

This situation raises key questions regarding how this exchange rate gap affects the performance of Algeria's foreign trade and the extent to which economic policies can reconcile the two rates to achieve the desired stability.

In this research paper, we seek to examine the impact of aligning or reconciling, the parallel and official exchange rates on Algeria's foreign trade. The core research problem can therefore be formulated as follows:

1.1 Research Problem:

How has the gap between the official and parallel exchange rates affected Algeria's foreign trade, particularly the trade balance, during the period 1999–2024?

1.2 Research Hypothesis:

As a provisional answer to the fundamental research problem, the following hypothesis is formulated:

The existence of a significant and sustained differential between the official and parallel exchange rates in Algeria is hypothesized to have a material and adverse impact on the trade balance during the 1999–2024 periods, resulting in consequences that are challenging to manage.

1.3 Significance of the Study:

The significance of this research paper is grounded in three key dimensions:

- **Scientific Contribution:** This study contributes to enriching the economic literature on the ramifications of dual exchange rate regimes by providing an empirical analysis of the Algerian case (1999–2024). It offers valuable insights into understanding the relationship between the exchange rate differential and foreign trade, specifically detailing the causal mechanisms through which it influences the behavior of economic agents.
- **Field and Policy Relevance:** The paper provides an in-depth analysis of the differential's impact on export and import performance. It furnishes empirical evidence and actionable proposals designed for policy-makers to formulate strategies that effectively narrow the

gap, foster transparency, support exchange market stability, enhance national competitiveness, and attract foreign direct investment.

- **Socio-Economic Implications:** The research clarifies the repercussions of exchange rate stability on domestic prices, consumer purchasing power, and production costs. Furthermore, it highlights the potential effect of exchange rate unification in achieving overall economic stability, improving the well-being of individuals and businesses, and effectively curbing imported inflation rates.

1.4 Research Objectives

This study is mandated to achieve the following objectives:

- Identify the core components and ramifications of the official and parallel exchange markets in Algeria.
- Analyze the impact of the disparity between the official and parallel exchange rates on Algeria’s foreign trade and the broader economy.
- Propose targeted economic policies aimed at narrowing the exchange rate differential, achieving economic stability, and effectively channeling the implicit financial gains from rate convergence toward increasing Gross Domestic Product (GDP).

1.5 Review of Previous Studies

Reviewing the relevant prior literature is an essential step to delineate the research gap and correctly frame the current study. Below is a comparative table summarizing four key studies related to our topic:

Author and Study Title	Study Objectives	Methodology and Key Findings	Critique of the Study
Habeb et al. (2024): "The Impact of Parallel Exchange Rate Fluctuations on the Trade Balance (Exports, Imports) in Iraq during the Period 2004-2022"	The study aimed to analyze the impact of parallel exchange rate fluctuations on exports and imports, and to determine the speed of the trade balance's response to changes in the parallel rate.	This study relied on the VAR model . Results indicated a direct relationship between the exchange rate and exports (devaluation of the Dinar increases exports) and an inverse relationship between the exchange rate and imports (appreciation of the Dinar increases imports).	The time period (2004–2022) includes multiple exceptional events, such as war and political crises, which were not addressed as control variables, potentially compromising the accuracy of the results. Furthermore, the near-total reliance of the Iraqi economy on oil was not deeply discussed as a primary determinant of exports, and several other variables were ignored.
Farhan et al. (2020): "Assessing the Performance of the Parallel Market Exchange Rate on Some Macroeconomic Variables: An Applied Study in the Iraqi Economy for the Period 2003-2015"	The study sought to evaluate the performance of the parallel market exchange rate and its influence on select economic variables, and to identify the causal relationship among these variables.	The study utilized the VECM model . Findings indicated a cointegration relationship among the parallel exchange rate, the US Dollar rate, Foreign Direct Investment (FDI), inflation, foreign trade, and GDP. However, this long-run relationship was not achieved with GDP, private sector imports, FDI, and non-oil exports.	The time frame (2003–2015) is marked by severe political and security instability in Iraq, which may affect the credibility and generalizability of the findings. Additionally, the near-total dependence on oil exports (98.4%) makes the examined economic variables more sensitive to external shocks than to exchange rate fluctuations themselves.
Si Mohamed	The article aimed to	The study adopted the	The study primarily focused

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Author and Study Title	Study Objectives	Methodology and Key Findings	Critique of the Study
&Bouteldja (2020): "Parallel Exchange Rate Premium and the Balance of Payments"	measure the impact of the parallel exchange rate premium on the Balance of Payments (BOP) in Algeria, differentiating between the positive and negative effects of the premium on the BOP balance.	NARDL model. It concluded that the presence of a parallel exchange rate negatively affects the BOP, with an absence of symmetry in the effects of positive and negative shocks to the parallel exchange rate premium and real exchange rate misalignment on the BOP balance in the long run. An increase in the negative series leads to a rise in the BOP, while the positive series of the parallel exchange rate premium results in a negative impact. In the short run, the study found that a positive shock to the premium has a negative effect on the BOP, while a negative shock has a positive effect.	on the econometric aspect but did not deeply address the mechanisms of transmission of the effect from the parallel market to the Balance of Payments.
Oyetayo et al. (2024): "Analysis of Trade Effects of Parallel Exchange Rate in Nigeria"	The study aimed to analyze the effects of the parallel market exchange rate on international trade movements in Nigeria, with a specific focus on distinguishing between oil and non-oil exports and imports.	The study employed the ARDL model. Results indicated that short-run dynamics of aggregate exports are negatively and significantly affected by the parallel exchange rate. Conversely, aggregate imports were positively affected by the devaluation of the parallel exchange rate. The study suggested that parallel exchange rate devaluation harms exports, particularly non-oil exports. It also confirmed that non-oil imports respond continuously and with a lag to parallel exchange rate changes.	The study suffers from fundamental issues in variable selection, as crucial variables like global oil prices were neglected. The extremely slow adjustment speed for exports (0.05% monthly, requiring 15 years for full adjustment) strongly suggests a model misspecification, reflecting the absence of important explanatory variables or an unresolved internal problem, which weakens the reliability of the results.

– **Positioning of the Current Research Paper relative to Prior Studies:**

This paper focuses specifically on the implications of the convergence between the official and parallel exchange rates on foreign trade (exports and imports) in Algeria during the period 1999–2024. Building upon the theoretical and methodological frameworks of

previous studies, particularly those that adopted time series models such as **ARDL** and **NARDL**, this research distinguishes itself by concentrating on analyzing the transmission mechanisms through which the exchange rate differential influences the behavior of commercial economic agents. Furthermore, it aims to provide evidence-based policy recommendations derived from the empirical findings and relevant international experiences pertinent to the research topic.

1.6 Research Paper Structure

This research paper is structured into an Introduction, two main Chapters (or Axes), methods and materials, results and discussion and a Conclusion.

2. Theoretical Framework on the Impact of the Exchange Rate Differential on Foreign Trade

The exchange rate is considered a core macroeconomic variable that directly establishes the linkages between domestic and international prices. It serves as a vital instrument of economic policy, fundamentally influencing trade flows by incentivizing exports and effectively managing imports.

2.1 Components of the Official and Parallel Exchange Rates

The parallel, or informal, exchange market refers to a distinct system for trading foreign currencies where the exchange rate is freely determined solely by the unregulated forces of supply and demand. This autonomous interaction results in a specific, market-clearing equilibrium rate for the parallel market. Conversely, the exchange rate in the official market is explicitly set by the decision of the monetary authorities (typically the Central Bank), which may choose to peg the local currency to a basket of foreign currencies. (Mounsef, 2016-04-01) The fundamental distinctions between the two markets are clarified in the table below:

Table 1: Key Differences between Official and Parallel Exchange Markets

Feature	Official Exchange Market	Parallel Exchange Market
Price Determination	Fixed or managed by the Central Bank.	Dynamically determined by uncontrolled market forces of supply and demand.
Reference	Pegged to or managed against a basket of foreign currencies.	Often centered on a single, major foreign currency (e.g., USD or Euro) actively traded in the market.
Regulation	Subject to state monetary policies and strict regulatory oversight.	Operates outside the formal regulatory framework, though governed by informal conventions and the influence of dominant market participants.
Relevance	Represents the core framework for national monetary policy.	Serves as a complement or alternative to the official market, particularly during periods of economic strain. In some countries, it constitutes the primary channel for foreign trade financing, contributing over 50 percent of invested capital.

Source: Prepared by the Researchers based on Economic Literature.

The parallel exchange market emerges due to several primary factors, most notably:

- **Restrictive Exchange Rate Policies:** The parallel market arises directly from the adoption of exchange rate controls, particularly when the Central Bank monopolizes foreign currency transactions and imposes stringent regulatory restrictions. This occurs chiefly when the bank fails to meet all legitimate demand for hard currency in the official market, forcing economic agents to seek alternative sources. (Belkacem Rahali, 2018-12-31)

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- **Foreign Trade Restrictions:** Imposing constraints on international trade, such as import quotas or bans on certain goods, limits access to foreign currency through official channels, pushing traders toward the informal market.
- **Capital Control Measures:** Restrictions on capital flows entering and exiting the country can contribute to widening the differential between official and parallel exchange rates, especially if these controls are ineffective or imperfect. (Ahmed, 2020-03-30)
- **High Inflation:** In many developing nations, foreign currency is viewed as a safe haven asset to preserve purchasing power amidst soaring inflation rates. Rising inflation erodes the local currency's value, thereby increasing demand for foreign currencies and fueling the parallel market.
- **Macroeconomic Disequilibria:** Parallel markets frequently emerge as a response to major macroeconomic imbalances facing developing economies, where official prices fail to reflect economic reality.
- **Lack of Confidence:** Distrust in the official banking system or the stability of economic policies can drive individuals and businesses to engage in the parallel market, particularly when reliable or transparent information about official market performance is unavailable. (Benlekhal, 2024-12-02)

The difference between the parallel and official exchange rates is known as the "parallel market premium," calculated as follows:

$$\text{Premium} = \frac{\text{Parallel Rate} - \text{Official Rate}}{\text{Official Rate}}$$

When this premium is substantial and persistent, the economy's price levels often gravitate toward reflecting the parallel market exchange rate, rendering the official rate less significant in determining the true prices of goods and services. (Najeeb, 2019–2020)

2.2 The Impact of the Exchange Rate Differential on Foreign Trade and Macroeconomic Variables

The exchange rate differential is a major economic factor that directly influences a country's foreign trade through its effect on the values of exports and imports. Defined as the disparity between the official exchange rate and the rate prevailing in the parallel market, this differential causes shifts in the relative cost of domestic and foreign goods, consequently shaping the decisions of both importers and exporters.

2.1. The Impact of the Official Exchange Rate on Exports and Imports

On Exports:

- **Local Currency Devaluation (Increase in Official Exchange Rate):** When the local currency devalues against foreign currencies, locally produced goods for export become cheaper and significantly more competitive in international markets. This boosts the attractiveness of these products and stimulates external demand, thereby enhancing the nation's foreign currency earnings. However, the effectiveness of this positive impact is contingent upon several factors, notably the extent of reliance on imported raw materials and intermediate goods essential for domestic production. Should the cost of these crucial imported inputs rise, the beneficial effect of devaluation on net exports may be substantially limited.
- **Local Currency Appreciation (Decrease in Official Exchange Rate):** Conversely, local currency appreciation renders exports substantially more expensive in foreign markets, diminishing their competitiveness and leading to a decline in external demand. This

reduction in foreign demand can increase the supply available in the domestic market, potentially contributing to a moderation of local prices. (Abdelaziz, 2013-12-31)

On Imports:

- **Local Currency Devaluation (Increase in Official Exchange Rate):** This scenario raises the cost of imported goods when converted into the local currency, which in turn curbs demand for them and encourages domestic consumers to substitute them with local products. While this effect typically contributes to an improvement in the trade balance, it may not apply uniformly across all import categories. In economies heavily dependent on essential imports, such as capital goods and raw materials, the increased cost of these necessary inputs raises overall production burdens, potentially leading to an exacerbation of the trade deficit.
- **Local Currency Appreciation (Decrease in Official Exchange Rate):** Conversely, local currency appreciation makes imported goods relatively cheaper. This stimulates increased demand for imports, encompassing both consumer and capital goods. Furthermore, the reduced cost of importing essential raw materials and equipment directly contributes to lowering the overall production costs for local manufacturers. (Ahmed, 2020-03-30)

2.2 Economic Impact of the Parallel Exchange Rate on Algerian Exports and Imports

On Exports:

The parallel exchange rate in Algeria, which is consistently higher than the official rate, serves as a powerful incentive for the phenomenon of **Trade Misinvoicing**. This practice is defined as the deliberate manipulation of the value, volume, or quality of goods in international commercial transactions, primarily aimed at the illicit transfer of funds across borders.

In the context of exports, Algerian exporters exploit the rate differential through a strategy known as **Under-invoicing exports**. This entails reporting a value significantly below the actual price of the exported goods. This manipulation allows the exporter to sell the undeclared portion of the foreign currency proceeds on the parallel market at the higher informal rate, thereby augmenting their profits illegally.

This practice generates several detrimental outcomes, the most significant of which are:

- **Hard Currency Drain:** The state's official channels are deprived of the foreign currency revenues that should have been remitted.
- **Loss of Government Revenue:** The public treasury incurs substantial losses in tax revenues and customs duties, which are calculated based on the falsely declared, lower value. (Karima, 2020-06-30)
- **Over-invoicing exports:** Exporters may occasionally resort to this strategy to benefit from specific government export subsidies or incentives. In such instances, the exporter purchases the necessary foreign currency from the parallel market (to cover the difference between the actual proceeds and the inflated declared value) and surrenders it to the Central Bank, which ultimately distorts the official export figures. (Sari Hassoun Salah Eddine, 2024-03-08)

On Imports:

The exchange rate differential between the official and parallel markets leads to severe distortions in the behavior of importers, which negatively impacts foreign trade and depletes the nation's foreign exchange reserves. These distortions typically manifest in two main patterns:

- **Over-invoicing imports:** In scenarios where the parallel exchange rate premium exceeds the customs duties rate, importers tend to inflate the declared value of their imports (**Over-invoicing imports**). The objective of this maneuver is to secure the full inflated

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transaction value in hard currency from official banks at the subsidized exchange rate. The difference between the true and the inflated value is then sold on the lucrative parallel market to achieve illegal supplementary profits. This practice not only contributes to the inefficient depletion of official foreign exchange reserves but also constitutes a significant illicit financial outflow from the economy.

- **Under-invoicing imports:** Conversely, when the exchange rate differential is less than the customs duties rate, importers may resort to declaring a reduced value for their imports (**Under-invoicing imports**). The primary goal is to minimize the payable customs duties and tariffs, with the gap between the declared and actual value of the imports being financed using funds obtained from the parallel market.

3.2 Structural Effects and Arbitrage

These pervasive practices introduce **structural distortions** into Algeria's foreign trade statistics, meaning that the official figures fail to accurately reflect the true volume and composition of commercial flows. This lack of data integrity severely hampers the effective formulation of evidence-based economic policies. Furthermore, the persistent exchange rate differential creates readily available **Arbitrage** opportunities, whereby individuals exploit the price discrepancies between the two markets to realize risk-free profits. Arbitrage involves the near-simultaneous buying and selling of the same asset in different markets, a process that requires speed of execution and whose windows of opportunity are typically short-lived. (Ibrahim, July 2023)

4.2 Other Macroeconomic Implications of the Exchange Rate Differential

In addition to its direct impact on foreign trade, the existence of a substantial and sustained parallel exchange market generates broader repercussions across the macro-economy : (Jonas, 2018)

- **Inflation:** The appreciation of the parallel market exchange rate contributes to an escalation of imported inflationary pressures, particularly affecting the pricing of imported goods. Furthermore, Central Banks may be compelled to increase the money supply to compensate for losses incurred from official foreign exchange operations, thereby fueling structural inflation over the long term.
- **Economic Growth and Investment:** Exchange rate divergence obstructs economic growth by causing significant resource misallocation. Investment capital is frequently channeled toward rent-seeking sectors that benefit solely from the rate discrepancies, rather than being directed toward the most productive sectors of the economy. This multi-rate uncertainty also severely discourages Foreign Direct Investment (FDI) and diminishes the economy's overall appeal to global investors.
- **Government Revenues:** Widespread trade mis-invoicing and invoice manipulation result in substantial losses in public revenues derived from taxes and customs duties. This fundamentally restricts the government's fiscal capacity to finance essential public services and crucial development projects.
- **Corruption:** The persistent exchange rate differential establishes powerful incentives for corruption and illicit financial activities. This systematically erodes transparency and governance standards, thereby ensuring the perpetuation of economically inefficient systems. (Boubaker, 2020-12-28)

3. Dynamics of the Trade Balance and the Exchange Rate Differential and International Experiences in Exchange Rate Unification

3.1 Dynamics of the Trade Balance and the Exchange Rate Differential (1999–

2024)

Algeria experienced noticeable fluctuations in both its trade balance and exchange rate dynamics during the 1999–2024 period, which can be visually observed through an analysis of "Curve 1," representing the evolution of the Trade Balance, the Exchange Rate Differential (Premium), Gross Domestic Product (GDP), and Crude Oil Price (PP).

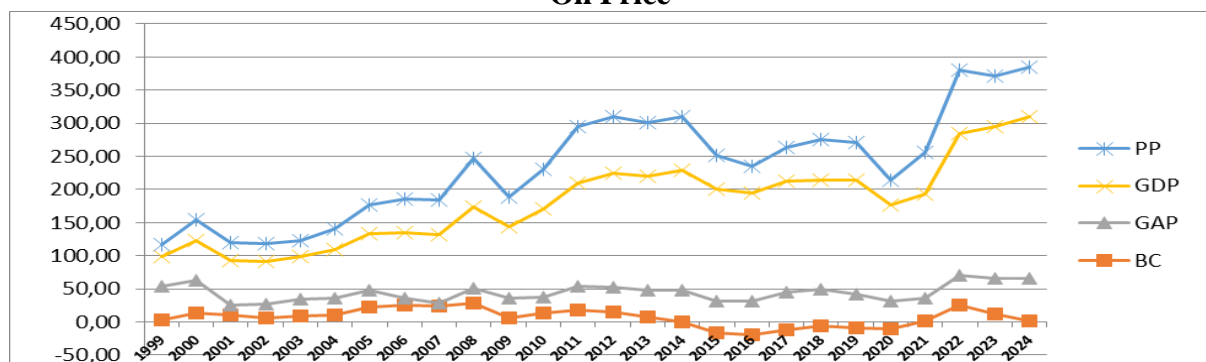
During the 1999–2004 period, the exchange rate differential remained relatively stable, fluctuating between 50% and 25%. This indicated a degree of convergence between the official and parallel rates, supported by acceptable oil revenue flows. Subsequently, the differential experienced a marked decline, reaching its lowest level in 2007 (below 5.15%), coinciding with the major oil boom and a significant increase in hard currency reserves. This outcome bolstered the Central Bank's capacity to finance imports at the official rate and consequently reduced the necessity for the parallel market. Over the same interval, the trade balance recorded a surplus in most years, driven by soaring hydrocarbon revenues, particularly post-2004, and peaking in 2008. Gross Domestic Product (GDP) also sustained continuous growth during this phase, with the cumulative growth rate reaching 169% for the period.

The 2008 Global Financial Crisis precipitated worldwide economic disequilibrium, and the exchange rate differential began widening once more. The premium gradually climbed from 21.58% in 2008 to 48.22% in 2014. Concurrently, the drop in oil prices in 2014 contributed to the depletion of foreign reserves and increased recourse to the parallel market. In parallel with these shifts, the trade balance began its gradual decline, entering a deficit starting in 2014. GDP, affected by the crisis, declined by 12% in 2009 compared to 2008, and the cumulative growth rate for this phase stood at 67%, marking a clear deceleration compared to the preceding period.

Following the collapse of oil prices in 2015, the differential sustained its expansion, reaching 55.64% in 2018. The trade balance entered a persistent deficit, which intensified reliance on the parallel market to finance imports amidst tightening official bank funding. GDP growth rates also significantly declined, dropping by 9% during the 2014–2018 period.

The differential temporarily narrowed to 42.87% in 2020 and 35.20% in 2021, coinciding with the COVID-19 pandemic and associated lockdown measures, along with a decrease in oil prices. However, following the economic recovery and a relative improvement in oil prices, the gap rebounded sharply, reaching 63.99% in 2024. This latest surge indicates a near-total decoupling between the official and parallel rates, reflecting the persistence of bank restrictions and the strong resurgence of the informal black market.

Curve 1: Evolution of the Trade Balance, Exchange Rate Differential, GDP, and Crude Oil Price



Source: Prepared by the Researchers using EXCEL software

Generally, the analysis of these chronological trends reveals a clear inverse

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relationship between the exchange rate differential and the trade balance. When the gap narrowed (e.g., 2005–2008), the trade balance improved. Conversely, as the differential widened starting in 2014, the trade balance deteriorated into a deficit. This evidence empirically supports the hypothesis that the exchange rate differential negatively impacts foreign trade performance by distorting transaction prices, increasing import costs, and curtailing export incentives.

3.2 International Experiences in Exchange Rate Unification

International experiences offer multiple models and valuable lessons for Algeria in addressing the dual exchange rate problem and its repercussions on foreign trade.

• The Turkish Experience in Exchange Market Unification

Turkey initiated comprehensive economic reforms in 1980 with the explicit goal of fully unifying the foreign exchange market. These reforms encompassed a strategic series of gradual measures aimed at market liberalization and bolstering the economy's overall competitiveness.

Turkey's Exchange Rate Policy Measures:

- **Currency Devaluation:** In January 1980, the Turkish Lira was devalued against the US Dollar by 33%, with the exchange rate increasing from 47.1 Lira to 70 Lira per dollar.
- **Exchange Rate Liberalization:** Turkey systematically dismantled the prevailing system of multiple exchange rates. By 1981, all specific (special) exchange rates were completely eliminated.
- **Market Flexibility:** In July 1985, the Turkish Central Bank began allowing commercial banks to determine their own spot exchange rates. However, this measure was swiftly modified in March 1986, requiring banks to operate within a tight 1% margin relative to the Central Bank's pre-determined rate.
- **Daily Fixation System:** In August 1988, the Central Bank broadened participation in the daily determination of the official exchange rate, allowing commercial banks, financial institutions, and other private entities to participate through an interbank market fixation mechanism.

Turkey's Foreign Trade Policy Measures:

- **Trade Liberalization:** Turkey adopted a clear policy direction towards liberalizing imports by easing the strict licensing regime and pre-deposit requirements. This was deliberately aimed at fostering the growth of an economy oriented toward foreign trade.
- **Export Support:** The government provided diverse and comprehensive incentives to exporters, including subsidized loans and tax exemptions. These measures significantly contributed to attracting foreign currency through legitimate channels and thereby undermined the parallel market.

Results of the Reforms:

These combined fiscal and monetary reforms successfully absorbed the parallel currency market and achieved full exchange market unification in Turkey. Economic reports indicate a dramatic reduction in the official-parallel exchange rate differential, with the "parallel exchange premium" decreasing sharply from 16% in 1980 to 3% in 1985, and further dropping to 2% by 1995, before effectively vanishing entirely by 2000.

• Evolution of Exchange Rate Policy in Egypt

Egypt has witnessed significant transformations in its exchange rate policies, moving from a fixed peg system that prevailed for decades toward more flexible regimes. From the issuance of Law No. 163 of 1957 concerning Banks and Credit until 2003, Egypt maintained a

relatively fixed exchange rate system, implementing periodic currency devaluations to reflect its competitiveness (El-Maati, 2024).

During the 1990s, the Central Bank focused on achieving price stability by targeting the growth of the money supply (M2), which successfully reduced inflation rates from approximately 20% to below 10%. Furthermore, in 1987, the government implemented an Economic Reform Program in collaboration with the International Monetary Fund (IMF) and the World Bank. This program included a devaluation of the Egyptian Pound by about 25%, alongside crucial foreign exchange market reforms and trade liberalization measures (Qasim, October 2024).

In February 1997, the exchange rate regime shifted from an adjustable peg to a managed float system, which led to the Pound depreciating to EGP 3.4 per USD, while foreign exchange reserves simultaneously rose to over \$20 billion. In January 2001, the Central Bank adopted a crawling peg system, followed by consecutive devaluations of the Pound in January 2002, reaching EGP 4.5 per USD, and subsequently EGP 6.3 by December 2004, coupled with continuous Central Bank interventions aimed at maintaining exchange rate stability (Ibrahim, July 2023).

During the period between 2001 and 2003, foreign exchange reserves faced sharp fluctuations, ranging between \$14.1 billion and \$12.5 billion, and the Pound lost approximately 20% of its value. In 2005, the Central Bank adopted a medium-term inflation targeting policy, which resulted in a slight and relatively stable depreciation of the Pound, concurrently with a steady increase in foreign reserves that surpassed \$33 billion.

In 2011, Egypt experienced severe economic pressures that led to a sharp decline in foreign exchange reserves, dropping from \$36 billion to \$11.6 billion, and a consequent depreciation of the Pound. In December 2012, the Central Bank practically moved toward floating the Pound through currency auctions, resulting in further depreciation against major currencies (El-Maati, 2024).

Coinciding with these developments, the Central Bank launched the interbank foreign exchange market in December 2004, with the explicit goal of unifying the official and parallel markets, and proceeded to eliminate several transaction restrictions. Following a period of relative official exchange rate stability, the Central Bank once again moved towards a more flexible policy stance.

In 2016, Egypt implemented a comprehensive Economic Reform Program in collaboration with the International Monetary Fund (IMF). This program was founded upon several key pillars, most notably (Rahouma, January 2025):

- **Enhancing Exchange Rate Flexibility:** Aimed at boosting export competitiveness and improving the balance of payments.
- **Contractionary Monetary Policy and Fiscal Rationalization:** To curb inflation and ensure public debt sustainability.
- **Strengthening Social Safety Nets:** Through increased expenditure on cash transfers.
- **Structural Reforms:** To achieve sustainable economic growth and create employment opportunities.

- **The Nigerian Experience in Exchange Rate Management**

In its quest to manage the foreign exchange market, Nigeria has undergone fundamental transformations in its monetary policies over decades. These policies have consistently oscillated between fixed exchange rate systems and more flexible regimes, as monetary authorities sought to find the appropriate balance for achieving market stability.

The Historical Evolution of Nigeria's Exchange Rate Regimes

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- **The Era of Fixed Regimes (1970s and Early 1980s):** Nigeria initially implemented a fixed exchange rate system, which provided apparent stability but substantially limited the economy's capacity to adjust to external shocks.
- **The Phase of Multiple Rates and Floating (Mid-1980s to Mid-1990s):**
 - A dual exchange rate system was adopted, which resulted in two distinct prices for foreign currency: an official rate and a secondary market rate.
 - Nigeria introduced the Dutch Auction System (DAS) in 1987, aiming to enhance the efficiency of foreign currency allocation.
 - This period also saw the implementation of various systems, including the Interbank Foreign Exchange Market (IFEM) and a managed/regulated float system, in an effort to strategically blend market flexibility with governmental intervention (Abdou, 2005).
- **The Shift Towards Full Floating (2015 and 2023):**
 - In 2015, the "Investors' and Exporters' (I&E)" FX window was launched to facilitate foreign currency access for these specific market segments.
 - These efforts culminated in Nigeria's re-adoption of a full floating exchange rate regime in 2023, reflecting a clear policy shift towards allowing autonomous supply and demand forces to determine the currency's value.

Challenges and Implications: Duality and Speculation in Nigeria

Despite this comprehensive array of policies, all these regimes encountered significant challenges characterized by persistent exchange rate duality and intensive speculative activities. These challenges contributed to the proliferation of the parallel (or black) market, where the differentials between the official and parallel rates were substantial, strongly incentivizing illicit practices such as exchange rate arbitrage (Olaide, 2022).

4.METHODS AND MATERIALS:

To achieve the stated objectives and empirically test the proposed hypothesis, this study necessitates a rigorous econometric methodology for analyzing the relationship between the official and parallel exchange rate differential and Algeria's foreign trade performance over the specified period (1999–2024). Time series analysis will be applied to relevant macroeconomic data, with a specific emphasis on selecting an appropriate econometric model capable of capturing both short-run dynamics and the long-run equilibrium relationships among the variables. This study relies on annual time series data covering the 1999–2024 periods, representing several key macroeconomic variables.

Parallel exchange rate statistics were sourced from Najeeb Qamash's study (1964–2018) and from a study by Issawi Riad and Mohamed Hani for the years 2019 to 2023, while data for 2024 was obtained from the "ChangeDA" application. Data for the official exchange rate, exports, and imports were collected from the Bank of Algeria's database for the 1999–2022 period and its 2024 reports. Oil prices were obtained from the OPEC basket, and Gross Domestic Product (GDP) from the World Bank.

The variables employed in this research paper are:

- **TOF (Official Exchange Rate):** The official exchange rate, measured in local currency.
- **TPF (Parallel Exchange Rate):** The informal/parallel market exchange rate, measured in local currency.
- **EX (Exports):** The value of total exports, measured in Euros (€).
- **M (Imports):** The value of total imports, measured in Euros (€).
- **BC (Trade Balance):** The balance of trade, calculated as Exports minus Imports $EX - M$.

- **PREMIUM (Gap):** The Exchange Rate Differential Premium, calculated as:

$$GAP = (TPF - TOF) \setminus TOF.$$
- **GDP (Gross Domestic Product):** Total GDP at current prices in local currency, converted to Euros (€).
- **PP (Petroleum Price):** The price of crude oil, based on the OPEC organization.

5. RESULTS AND DISCUSSION :

The objective of the econometric analysis is to estimate the impact of the parallel market exchange rate premium on the Trade Balance. Prior to commencing the model estimation, it is essential to conduct stationary tests on the data to ensure the reliability of the results and to select the optimal econometric model.

5.1 Model Specification

Based on guidance from previous relevant studies, the proposed functional relationship for the Trade Balance (BC) for this paper is specified as follows:

$$BC=f(GAP, GDP, PP)$$

Where:

- **BC:** The Trade Balance (Dependent Variable).
- **GAP:** The Parallel Exchange Rate Differential Premium (Key Independent Variable).
- **GDP:** Gross Domestic Product (Control Variable).
- **PP:** Crude Oil Price (Control Variable).

5.2 Unit Root Tests

The Augmented Dickey-Fuller (ADF) test was applied to all variables at a 5% significance level ($\alpha=0.05$) to determine whether the time series contain a unit root (i.e., whether they are non-stationary).

Table 2: ADF Test Results at 5% Significance Level

At Level					
MODEL	Test	BC	GAP	GDP	PP
Constant	ADF values	-1.9231	-1.3113	-0.2996	-2.2550
	Prob. values	0.3169	0.6080	0.9118	0.1934
Constant & Trend	ADF values	-2.2563	-3.5822	-1.8724	-2.6217
	Prob. values	0.4406	0.0575	0.6385	0.2745
NO Constant & NO Trend	ADF values	-1.7207	-0.2385	2.1682	-0.1059
	Prob. values	0.0806	0.5902	0.9906	0.6373
At First Difference					
Constant	ADF values	-4.5885	-4.3923	-4.2851	-4.9229
	Prob. values	0.0014	0.0022	0.0028	0.0007
Constant & Trend	ADF values	-4.4832	-4.6975	-4.2332	-4.7995
	Prob. values	0.0083	0.0052	0.0141	0.0044
NO Constant & NO Trend	ADF values	-4.6968	-4.4798	-3.6561	-5.2513
	Prob. values	0.0000	0.0001	0.0008	0.0000

Source: Prepared by the Researchers using EViews software

Based on the results in Table 2, all variables (PP, GDP, GAP, BC) are non-stationary at level (i.e., their probability values exceed 0.05% across all level specifications). However, all variables achieve stationary after taking the first difference, as their corresponding probability values are below 0.05%. This result signifies that all variables are integrated of order one I (1). This specific finding validates the use of the **Autoregressive Distributed Lag (ARDL)**

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methodology, as it robustly accommodates variables integrated at different orders I (0) or I (1), unlike traditional co integration methods. This methodological flexibility is highly crucial for accurately capturing the dynamic response of foreign trade to exchange rate fluctuations, in addition to the model's extensive use in comparable prior studies.

5.3 Estimation of the Autoregressive Distributed Lag (ARDL) Model

The model was estimated using the Ordinary Least Squares (OLS) method. The ARDL (4, 4, 2, 3) model was selected as the optimal specification based on the Akaike Information Criterion (AIC).

The Coefficient of Determination (R-squared) indicates that approximately 99.66% of the variations observed in the Trade Balance (BC) can be explained by the independent variables included in the model, which signifies a superior level of goodness-of-fit.

Furthermore, the F-statistic value of 85.75766 confirms that the model, taken as a whole, is statistically significant.

Table 3: Autoregressive Distributed Lag (ARDL) Model ARDL(4, 4, 2, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
BC(-1)	0.054900	0.222003	0.247294	0.8145
BC(-2)	0.409149	0.186266	2.196580	0.0794
BC(-3)	-0.731222	0.264920	-2.760164	0.0398
BC(-4)	-0.276653	0.093121	-2.970879	0.0311
GAP	-0.397356	0.136756	-2.905582	0.0336
GAP(-1)	0.182481	0.151457	1.204834	0.2822
GAP(-2)	-0.453608	0.159252	-2.848362	0.0359
GAP(-3)	-0.021038	0.068396	-0.307595	0.7708
GAP(-4)	-0.087956	0.064575	-1.362079	0.2313
GDP	0.120447	0.053324	2.258782	0.0735
GDP(-1)	0.125013	0.104681	1.194221	0.2860
GDP(-2)	-0.466342	0.103606	-4.501117	0.0064
PP	0.439732	0.070404	6.245801	0.0015
PP(-1)	-0.324867	0.090561	-3.587283	0.0158
PP(-2)	0.044365	0.137314	0.323089	0.7597
PP(-3)	0.400274	0.173252	2.310361	0.0689
C	33.20126	6.349282	5.229136	0.0034
R-squared	0.996629	Mean dependent var	6.608338	
Adjusted R-squared	0.985841	S.D. dependent var	14.45175	
S.E. of regression	1.719660	Akaike info criterion	3.985980	
Sum squared resid	14.78615	Schwarz criterion	4.829058	
Log likelihood	-26.84578	Hannan-Quinn criter.	4.184584	
F-statistic	92.38229	Durbin-Watson stat	2.299307	
Prob(F-statistic)	0.000044			

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

Source: Prepared by the Researchers using EViews software

Impact of Exchange Rate Differential (GAP):

The coefficient associated with the exchange rate differential indicates that a one-unit increase in the GAP leads to a reduction in the Trade Balance (BC) by approximately 0.39 units. This result strongly confirms the direct, negative impact of the exchange rate differential on the Trade Balance. It is further observed that the adverse effect of the differential persists across several lagged periods, signifying that the impact of distortions originating from the parallel market is not merely instantaneous but accumulates and compounds over time.

Lagged Trade Balance (BC(-n)):

The lagged periods of the dependent variable BC(-n) exhibit varying positive and negative effects. This signifies a strong carry-over (auto-genous) effect from the Trade

Balance's performance in previous periods onto its current value, which suggests significant persistence and inertia in the Trade Balance's overall dynamics.

Impact of Gross Domestic Product (GDP):

The contemporary coefficient for GDP is found to be statistically insignificant. However, we observe that an increase in Gross Domestic Product positively influences the Trade Balance, with this positive effect persisting for one lagged period (GDP (-1)). Nevertheless, in the longer term (GDP (-2)), GDP is negatively associated with the Trade Balance, potentially reflecting increased demand for imports as the economy expands.

Impact of Oil Price (PP):

The contemporary coefficient for the oil price (PP) is positive and statistically significant. This finding confirms that elevated oil prices directly and immediately boost the Trade Balance surplus through increased export revenues, an intuitive and highly expected outcome in a rentier economy like Algeria's. There is also a delayed negative effect (PP (-1)), followed by subsequent positive effects (PP (-2) and PP (-3)), reflecting the complex, dynamic response and adjustment of the Trade Balance to global oil price volatility over different time horizons.

5.4 ARDL Cointegration Test (Bounds Test):

Following the estimation of the optimal ARDL model, the Bounds Test is applied to ascertain the existence of a robust long-run co integration relationship among the variables, which is crucial for distinguishing between short-term dynamics and long-term equilibrium:

Table 4: Bounds Test Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	12.05607	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Finite Sample: n=35				
Actual Sample Size	22	10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
Finite Sample: n=30				
		10%	2.676	3.586
		5%	3.272	4.306
		1%	4.614	5.966

Source: Prepared by the Researchers using EViews software

By comparing the calculated F-statistic value with the critical values in the table, we observe that the calculated F-statistic is greater than all upper bound values (I (1)) at every conventional significance level. Based on this finding, we reject the null hypothesis (H₀) and accept the alternative hypothesis (H₁), which confirms the existence of a stable long-run equilibrium relationship (co integration) among the variables.

5.5 Estimation of the ARDL Long-Run Relationship:

Having confirmed the existence of co integration among the variables, and consequently a stable long-run relationship, this relationship can now be formally estimated.

Table 5: Long-Run Relationship Estimators

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ARDL Long Run Form and Bounds Test
 Dependent Variable: D(BC)
 Selected Model: ARDL(4, 4, 2, 3)
 Case 2: Restricted Constant and No Trend
 Date: 10/05/25 Time: 10:20
 Sample: 1999 2024
 Included observations: 22

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	33.20126	6.349282	5.229136	0.0034
BC(-1)*	-1.543825	0.285235	-5.412460	0.0029
GAP(-1)	-0.777477	0.241060	-3.225242	0.0233
GDP(-1)	-0.220883	0.102556	-2.153782	0.0838
PP(-1)	0.559504	0.231303	2.418928	0.0602
D(BC(-1))	0.598726	0.298681	2.004562	0.1013
D(BC(-2))	1.007875	0.304272	3.312414	0.0212
D(BC(-3))	0.276653	0.093121	2.970879	0.0311
D(GAP)	-0.397356	0.136756	-2.905582	0.0336
D(GAP(-1))	0.562602	0.207285	2.714151	0.0421
D(GAP(-2))	0.108994	0.083522	1.304969	0.2487
D(GAP(-3))	0.087956	0.064575	1.362079	0.2313
D(GDP)	0.120447	0.053324	2.258782	0.0735
D(GDP(-1))	0.466342	0.103606	4.501117	0.0064
D(PP)	0.439732	0.070404	6.245801	0.0015
D(PP(-1))	-0.444639	0.243983	-1.822418	0.1280
D(PP(-2))	-0.400274	0.173252	-2.310361	0.0689

* p-value incompatible with t-Bounds distribution.

Source: Prepared by the Researchers using EViews software

Lagged Trade Balance (BC(-n)): The coefficient associated with the lagged Trade Balance serves as the Error Correction Mechanism (ECM) coefficient within the long-run relationship model. Its negative and statistically significant value unequivocally affirms the existence of a long-run equilibrium relationship and indicates that any deviation from this equilibrium path is corrected over time.

Lagged Exchange Rate Differential (GAP(-1)): The negative sign of the exchange rate differential coefficient implies that the GAP exerts a detrimental long-term effect on the Trade Balance. This finding suggests that the persistent and continued expansion of the differential leads to a sustained deterioration of the Trade Balance in the long run.

Lagged Oil Price (PP(-1)): The oil price coefficient indicates a positive long-term impact on the Trade Balance, which firmly reaffirms the deep-seated structural dependence of the Algerian economy on hydrocarbon revenues.

Lagged Gross Domestic Product (GDP(-1)): The negative coefficient suggests that the long-term effect of Gross Domestic Product on the Trade Balance may be complex, indirect, or that its primary influence is realized over the short term or through other transmission channels.

5.6 Estimation of the ARDL Short-Run Relationship (Error Correction Model - ECM):

The short-run relationship is estimated using the Error Correction Model (ECM), which is specifically designed to measure the speed of dynamic adjustment required by the model to re-establish the long-term equilibrium following a shock.

Table 6: Short-Run Relationship Estimation

ARDL Error Correction Regression
 Dependent Variable: D(BC)
 Selected Model: ARDL(4, 4, 2, 3)
 Case 2: Restricted Constant and No Trend
 Date: 10/05/25 Time: 10:38
 Sample: 1999 2024
 Included observations: 22

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BC(-1))	0.598726	0.111347	5.377136	0.0030
D(BC(-2))	1.007875	0.104023	9.688991	0.0002
D(BC(-3))	0.276653	0.060475	4.574664	0.0060
D(GAP)	-0.397356	0.063257	-6.281646	0.0015
D(GAP(-1))	0.562602	0.095017	5.921060	0.0020
D(GAP(-2))	0.108994	0.043205	2.522730	0.0530
D(GAP(-3))	0.087956	0.036145	2.433420	0.0591
D(GDP)	0.120447	0.033059	3.643429	0.0149
D(GDP(-1))	0.466342	0.056450	8.261208	0.0004
D(PP)	0.439732	0.038485	11.42611	0.0001
D(PP(-1))	-0.444639	0.059524	-7.469932	0.0007
D(PP(-2))	-0.400274	0.059067	-6.776563	0.0011
CointEq(-1)*	-1.543825	0.148209	-10.41656	0.0001
R-squared	0.993730	Mean dependent var	-0.211779	
Adjusted R-squared	0.985369	S.D. dependent var	10.59679	
S.E. of regression	1.281759	Akaike info criterion	3.622344	
Sum squared resid	14.78615	Schwarz criterion	4.267051	
Log likelihood	-26.84578	Hannan-Quinn criter.	3.774217	
Durbin-Watson stat	2.299307			

* p-value incompatible with t-Bounds distribution.

Source: Prepared by the Researchers using EViews software

The estimation results for the short-run parameters indicate that the error correction term CointEq(-1) is significant and negatively signed, with an estimated value of -1.54. This negative and significant value confirms that there is a correction mechanism working to restore the trade balance to its long-run equilibrium after any short-term shocks.

Since the absolute value of the error correction coefficient (1.54) is greater than 1, the model indicates an excessive correction speed (over-adjustment). This may be explained by sharp and rapid changes in the trade balance in response to shocks arising from the exchange rate gap and oil prices, pushing the economy to overshoot the equilibrium point before returning to it.

Immediate Effects: Most first-difference variables represent immediate effects, including:

D(GAP): The coefficient is negative and significant, meaning that widening the gap leads to decreased competitiveness and thus trade balance distortion.

D(BC(-2)): The coefficient is significant; previous trade performance affects current conditions. This may reflect the continuation of previous contracts or market confidence.

D(GDP(-1)): The coefficient is positive and significant, indicating a positive impact of GDP with a one-period lag.

D(PP): The PP coefficient is significant, confirming the immediate positive effect of oil prices, due to Algeria's rentier economy.

5.7 Diagnostic Tests:

– **ErrorTests:** To verify the assumptions related to the errors of the obtained model, we will use the tests shown in the table below:

Table 7: Diagnostic Tests

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Autocorrelation Test for Errors

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.679360	Prob. F(2,3)	0.2150
Obs*R-squared	14.10405	Prob. Chi-Square(2)	0.0009

Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.232139	Prob. F(16,5)	0.4416
Obs*R-squared	17.54912	Prob. Chi-Square(16)	0.3510
Scaled explained SS	0.357729	Prob. Chi-Square(16)	1.0000

Normality Test for Errors

Normality Test: Jarque-Bera

Jarque-Bera	1,51488	Probability	0,468865
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Source: Prepared by the Researchers using EViews software

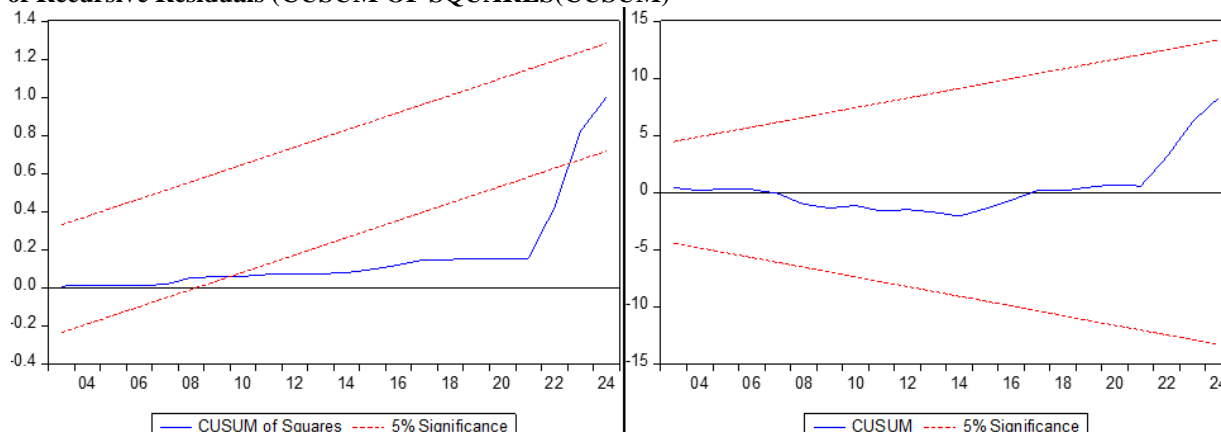
The Breusch–Godfrey Serial Correlation LM Test indicates the presence of serial correlation in the errors, given that the probability (p-value) associated with the Chi-Square statistic is less than 5%.

Conversely, the Heteroskedasticity Test (for non-constant variance) leads to the acceptance of the null hypothesis. Consequently, we confirm the existence of homoscedasticity in the error terms (i.e., the variance of the residuals is homogeneous). Furthermore, the Jarque–Bera Normality Test confirms that the errors follow a normal distribution, as its probability value is greater than 5%. Collectively, these results suggest that the errors exhibit the characteristics of white noise despite the presence of serial correlation.

- Model Stability Test

To rigorously ensure the stability of the estimated model, we utilize two key diagnostic plots: the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUM OF SQUARES). These are highly efficient tools for revealing the presence of any structural breaks in the data and for assessing the consistency and stability of the long-run parameters relative to the short-run parameters.

Figure 8: Cumulative Sum of Squares) Figure 9: Cumulative Sum of Recursive Residuals of Recursive Residuals (CUSUM OF SQUARES(CUSUM)



Source: Prepared by the Researchers using EViews software

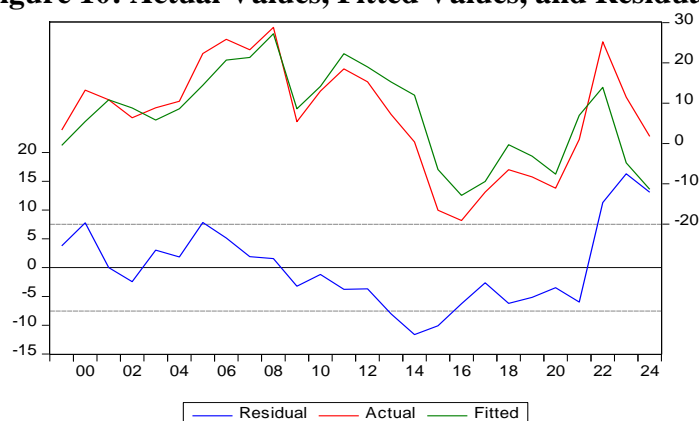
Generally, the analysis confirms the structural stability of the model and the coherence between the long-run and short-run parameters. This conclusion is maintained despite the

CUSUM OF SQUARES plot marginally crossing the critical bounds towards the end of the sample period (approximately 2009–2022). While this divergence suggests a relative instability in the model's variance during the final phase, the consistency observed allows us to conclude that the model's coefficients are fundamentally stable, thereby validating the congruence between the short-term and long-term estimation results.

– **Model Goodness-of-Fit**

To rigorously assess the model's performance and accuracy, it is imperative to visually compare the actual values of the dependent variable against the model's dynamically predicted (fitted) values.

Figure 10: Actual Values, Fitted Values, and Residuals



As observed in Figure 10, the estimated (fitted) values closely track the actual values. This convergence confirms the high quality of the estimated model and its robustness for empirical interpretation and analysis.

Based on the preceding diagnostic assessments, the ARDL(4,4,2,3) model has successfully passed all relevant econometric tests, with the exception of serial correlation and the marginal instability noted in the CUSUM OF SQUARES plot. Consequently, the model is deemed acceptable for inference from economic, statistical, and econometric standpoints, providing relatively reliable economic interpretations.

5.7 Results of the Main Hypothesis Test

Based on the econometric analysis performed using the Autoregressive Distributed Lag (ARDL) model on time series data for the Trade Balance, the Exchange Rate Differential (GAP), Gross Domestic Product (GDP), and Oil Price (PP) for the period 1999–2024, we can test the paper's main hypothesis:

It is assumed that the existence of a significant and sustained differential between the official and parallel exchange rates in Algeria is hypothesized to have a material and adverse impact on the trade balance during the 1999–2024 periods.

The empirical results confirm this hypothesis unequivocally:

- **Short-Run Direct Impact:** As shown in the ARDL estimation results (Table 3), the current coefficient for the exchange rate differential (GAP) is statistically significant and negative. Specifically, a one-unit expansion of the exchange rate differential is estimated to cause a reduction in the Trade Balance by approximately 0.39 units. This provides strong evidence for the immediate, adverse effect of the differential on the Trade Balance.
- **Persistence of Adverse Effects:** Crucially, the negative effect of the exchange rate differential extends across multiple lagged periods. This strongly indicates that the distortions generated by the parallel market are not merely instantaneous shocks; instead,

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their impact accumulates and persists over time, systematically contributing to the deterioration of the Trade Balance.

- **Long-Run Equilibrium Impact:** The long-run relationship estimators (Table 5) confirm the negative and statistically significant value of the lagged $GAP(-1)$ coefficient. This finding demonstrates that the exchange rate differential has a detrimental and material effect on the Trade Balance in the long term, implying that the continued widening of the gap leads to sustained trade balance deterioration.
- **Short-Run Dynamics (ECM):** The short-run estimation (Table 6) further confirms that instantaneous changes in the exchange rate differential ($D(GAP)$) have a highly significant negative impact on the Trade Balance in the short term.

Conclusion: The empirical results conclusively affirm that the exchange rate differential between the official and parallel markets has a material and negative impact on Algeria's Trade Balance, thereby supporting the main hypothesis of this research paper.

5.8 General Economic Analysis of the Findings

Based on the core econometric results, the following analytical insights can be drawn:

- **Exchange Rate Differential and Trade:** The finding that the exchange rate differential negatively and significantly affects the Trade Balance in both the short and long run aligns perfectly with the paper's theoretical postulates and critical literature. It confirms that the dual exchange rate system distorts commercial incentives, encourages informal practices (such as trade misinvoicing), harms overall macroeconomic performance, and results in lost revenue opportunities for the state.
- **Persistence of Oil Dependence:** The oil price (PP) remains the most significant explanatory variable for foreign trade fluctuations in Algeria. This result underscores the economy's limited diversification and its excessive structural reliance on hydrocarbon revenues. Any volatility in global oil prices is reflected immediately and substantially in the Trade Balance performance.
- **Dual Effect of Economic Growth:** Economic growth (GDP) exhibits a dual effect on the Trade Balance: it is marginally positive in the short run but becomes negative in the long run. This suggests that while initial growth may stabilize trade, sustained expansion eventually leads to a larger demand for imports (consumer and capital goods), ultimately widening the trade deficit.
- **Correction Mechanism:** The existence of a strong correction mechanism (the ECM coefficient) indicates that the Algerian economy rapidly responds to deviations from the long-run Trade Balance equilibrium. However, this high sensitivity might also suggest an over-reaction or inherent fragility in the economy's response to external shocks.

6. CONCLUSION

This research paper addressed the implications of converging the official and parallel exchange rates on Algeria's foreign trade performance during the 1999–2024 periods. We reviewed the theoretical framework governing the components of official and parallel exchange markets, the underlying causes for the persistent differential between them, and the specific mechanisms through which this disparity influences exports and imports particularly through prevalent trade misinvoicing practices such as under- and over-invoicing. We also provided a comparative analysis of diverse international experiences (Turkey, Egypt, and Nigeria) in managing this critical issue, drawing valuable policy lessons from their transitions.

Based on both the theoretical review and the rigorous econometric analysis, the key findings of this research paper are summarized as follows:

1. **Negative Impact of the Exchange Rate Differential:** The study confirms that the existence of a substantial and sustained differential between the official and parallel exchange rates in Algeria has a significant and adverse impact on the Trade Balance. This gap strongly incentivizes exporters toward under-invoicing their shipments and importers toward over-invoicing their purchases to exploit the lucrative parallel market premium.
2. **Persistent Oil Dependence:** The empirical results demonstrated that the price of crude oil remains the primary and most significant driver of Algeria's Trade Balance, underscoring the enduring reliance on hydrocarbon revenues and the limited success of economic diversification efforts.
3. **Long-Run Equilibrium:** A stable, long-run equilibrium (cointegration) relationship was established between the Trade Balance, the exchange rate differential, oil price, and Gross Domestic Product (GDP), along with a rapid error correction mechanism that adjusts for deviations from this long-term balance.
4. **Hypothesis Validation:** These findings fully align with the paper's initial hypothesis and strongly support the critical economic literature which highlights the detrimental effects of multiple exchange rate systems on foreign trade and the resultant depletion of official foreign exchange reserves.
5. **Monetary Policy Ineffectiveness:** The research highlights the limited efficacy of the traditional monetary policy tools currently used (primarily exchange rate control) in managing the economy, necessitating their replacement with more effective instruments given the pervasive influence of the parallel economy.
6. **Lessons from International Experience:** The international case studies revealed that successful exchange rate unification almost always requires a comprehensive package of reforms that extends beyond monetary policy. These must include structural, commercial, and financial reforms, alongside concerted efforts to boost transparency and confidence in the formal banking system, as well as strengthening the integration and synergy between monetary and fiscal policy tools for achieving overall economic success.

Research Paper Recommendations

Based on the core findings derived from this research paper, the following strategic recommendations are proposed for Algeria to effectively narrow the exchange rate differential and enhance the stability of its foreign trade:

1. **Adopt a More Flexible and Realistic Exchange Rate Policy:** The Bank of Algeria should commit to a gradual process of moving the official exchange rate toward a market-reflective level that better reflects true supply and demand dynamics, drawing on Turkey's experience of gradual liberalization. This necessitates reducing discretionary interventions in rate determination and allowing market forces to play a more substantial role.
2. **Enhance Transparency and Unify the Exchange Market:** Efforts must be focused on integrating the official and parallel markets through transparent mechanisms, such as developing a fully operational interbank foreign exchange market, similar to the model adopted in Egypt. Simultaneously, unnecessary restrictions on current account payments and international transfers should be lifted.
3. **Implement Comprehensive Structural Reforms:** Any exchange rate reforms must be synchronized with a broader package of structural economic reforms, including:
 - **Foreign Trade Liberalization:** Easing import restrictions and streamlining export procedures to diminish the incentives for engaging in informal and illicit trade practices (as successfully implemented by Turkey).

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- **Diversification of Income Sources:** Reducing the economy's over-reliance on hydrocarbon revenues by actively supporting non-oil productive sectors and encouraging Foreign Direct Investment (FDI). This strategy will increase hard currency flows through official channels.
- **Inflation Control:** Adopting a contractionary monetary policy focused on effectively controlling inflation, as high inflation rates invariably increase demand for foreign currency as a store of value (safe haven).
- **Building Trust in the Banking System:** Taking concrete actions to bolster public confidence in official banks as the primary, reliable channel for foreign currency transactions, thereby minimizing recourse to the parallel market.
- 4. **Review Export and Import Support Policies:** Government subsidies for exports and customs duties should be re-evaluated to prevent their exploitation for misinvoicing practices. These policies should be tied to clear and measurable performance criteria to ensure their integrity and effectiveness.

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