

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

فعالية السياسات النقدية وسعر الصرف في الجزائر في ظل الصدمات النفطية: تحليل

باستخدام نموذج ARDL (1990–2023)

Dr. MOUSLI Abdenadir

Abderrahmane Mira University, Bejaia, Laboratory of Economics and Development, (Algeria), abdenadir.mousli@univ-bejaia.dz

Received: 05/07/2025

Accepted: 24/09/2025

Published: 30/09/2025

Abstract:

This study aims to assess the effectiveness of monetary and exchange rate policies in Algeria in responding to oil shocks, within a context of strong dependence on hydrocarbons. Covering the period from 1990 to 2023, and using the ARDL model, the study analyzes the short and long-term relationships between the dinar exchange rate and a set of macroeconomic variables: money supply, interest rate, credit to the economy, foreign exchange reserves, and oil prices. The findings show that traditional monetary instruments have a limited impact on the exchange rate due to structural rigidities in the Algerian economy. Conversely, oil prices exert a significant influence, highlighting the country's persistent external vulnerability. Credit to the economy plays a stabilizing role in the medium term. The study concludes that the effectiveness of these policies is constrained by weak macroeconomic coordination and the dominance of the rentier model. It recommends ambitious structural reforms focused on economic diversification and strengthening the autonomy of the central bank.

Keywords: Exchange rate; Monetary policy; External shocks; Algerian economy; ARDL Model.

JEL Classification Codes : F31 ; E52 ; C32.

ملخص:

تهدف هذه الدراسة إلى تقييم فعالية السياسات النقدية وسعر الصرف في الجزائر في مواجهة الصدمات النفطية، وذلك في سياق يتميز باعتماد قوي على المحروقات. تغطي الدراسة الفترة الممتدة من 1990 إلى 2023، وتستخدم نموذج ARDL لتحليل العلاقات القصيرة والطويلة الأجل بين سعر صرف الدينار ومجموعة من المتغيرات الاقتصادية الكلية، منها: الكتلة النقدية، سعر الفائدة، القروض الموجهة للاقتصاد، احتياطات الصرف، وأسعار النفط. تُظهر النتائج أن الأدوات النقدية التقليدية لها تأثير محدود على سعر الصرف بسبب الجمود الهيكلي في الاقتصاد الجزائري، في حين أن أسعار النفط تمارس تأثيراً كبيراً، مما يبرز هشاشة الوضع الخارجي للبلاد. وتلعب القروض الموجهة للاقتصاد دوراً استقرارياً على المدى المتوسط. وتخلص الدراسة إلى أن فعالية هذه السياسات تظل محدودة بسبب ضعف التنسيق الكلي وهيمنة النموذج الريعي، وتوصي بإصلاحات هيكلية طموحة تركز على تنويع الاقتصاد وتعزيز استقلالية البنك المركزي.

كلمات مفتاحية: سعر الصرف؛ السياسة النقدية؛ الصدمات الخارجية؛ الاقتصاد الجزائري؛ نموذج ARDL

تصنيفات JEL : F31 ، E52 ، C32

Introduction:

Corresponding author: MOUSLI Abdenadir, e-mail: abdenadir.mousli@univ-bejaia.dz

In recent decades, economies that are heavily dependent on natural resource exports, particularly hydrocarbons, have become increasingly vulnerable to external shocks, especially fluctuations in international oil prices. Algeria is a textbook case of such vulnerability, as its economy remains predominantly rent-based, relying mainly on the export of oil and gas to generate foreign exchange earnings, accumulate reserves, and ensure macroeconomic stability. These oil price fluctuations have historically had a considerable impact on the country's trade balance, foreign reserves, monetary liquidity, and ultimately the nominal exchange rate of the Algerian dinar.

In an attempt to reduce this exposure and maintain macroeconomic stability, Algerian authorities have resorted to various monetary and exchange rate policy instruments. However, their actual effectiveness in absorbing oil shocks and stabilizing the dinar remains a matter of debate, particularly in an institutional context characterized by limited central bank independence, weak policy coordination, and a productive sector dominated by oil rent mechanisms.

Accordingly, this study aims to empirically assess the role of monetary and exchange rate policies in Algeria in managing external oil shocks and influencing the nominal exchange rate in a sustainable manner, taking into account the country's structural and institutional constraints.

Study Problem: This study seeks to answer the following central research question: *To what extent have monetary and exchange rate policies been effective in stabilizing the Algerian dinar in the face of oil price shocks?*

Study Hypotheses: To answer this question, the study tests the following three hypotheses:

- Traditional monetary policy instruments have a limited impact on the exchange rate due to Algeria's structural economic constraints.
- Oil price fluctuations have a significant effect on the exchange rate of the Algerian dinar, indicating strong external dependence.
- The lack of coordination between monetary and exchange rate policies weakens the country's ability to absorb external shocks effectively.

Study Objectives: The main objectives of the study are as follows:

- To assess the evolution of monetary and exchange rate policy tools in Algeria in the context of oil price volatility.
- To measure the short- and long-term relationships between the dinar exchange rate and key macroeconomic variables, including money supply, interest rates, domestic credit, foreign reserves, and oil prices.
- To evaluate the capacity of these policies to mitigate external shocks and stabilize the exchange rate.
- To identify the structural and institutional factors that limit the effectiveness of these economic policies in Algeria.

Importance of the Study: This study is of considerable importance for several reasons. First, exchange rate stability is a key factor in preserving investor confidence, managing inflation, and ensuring external balance in open economies. In Algeria's case, the strong dependence on

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

hydrocarbon revenues makes the economy particularly sensitive to oil shocks, which complicates monetary and exchange rate management. Second, the study contributes to policy debates by proposing evidence-based insights into the limitations and potential of Algeria's macroeconomic governance, especially in terms of diversifying policy tools and reducing dependence on oil rents.

Methodology: To empirically analyze these dynamics, the study uses the Autoregressive Distributed Lag (ARDL) modeling approach, which is suitable for estimating relationships involving variables with mixed integration orders ($I(0)$ and $I(1)$) and small samples. The model investigates both short-run and long-run effects of selected macroeconomic variables on the nominal exchange rate of the Algerian dinar using annual time series data from 1990 to 2023. The empirical analysis was conducted using EViews software.

Previous Studies: Several empirical studies have examined the relationship between oil shocks, monetary policy, and exchange rate dynamics in oil-exporting countries. For example:

- Berument et al. (2010) investigated the effects of oil price shocks on trade balances and exchange rates in oil-exporting economies and found significant long-run impacts.
- Korhonen and Juurikkala (2009) analyzed the correlation between oil prices and real exchange rates in OPEC countries and observed a strong link between rising oil prices and real exchange rate appreciation.
- Mohanty and Klau (2004) highlighted the limits of conventional monetary policy tools in emerging economies, particularly those dependent on commodity exports.
- Ali et al. (2017) explored the effectiveness of monetary policies in oil-rich developing countries, finding that structural and institutional factors often constrain policy outcomes.

While these studies offer valuable insights, few have focused specifically on the Algerian context, integrating local data and institutional features into the analysis. This study seeks to fill that gap by applying a robust econometric model to Algerian data and proposing policy-relevant conclusions tailored to the country's unique economic structure.

1- Theoretical and Institutional Framework of Monetary and Exchange Rate Policies

The analysis of the relationship between monetary policy and the exchange rate falls within a rich theoretical framework, marked by major conceptual developments and significant heterogeneity in economic contexts. This relationship is all the more relevant in developing countries such as Algeria, where structural, institutional, and external constraints heavily affect the effectiveness of economic policies. This section examines the main theoretical foundations for understanding the interactions between monetary policy and exchange rate regimes, distinguishing three main approaches: traditional models, modern approaches centered on expectations, and heterodox perspectives.

1-1 Traditional models: differentiated effectiveness depending on the exchange rate regime

One of the most classical analytical frameworks for studying the interaction between monetary policy and the exchange rate is the Mundell-Fleming model. Developed in the early 1960s, this model extends the IS-LM framework to an open economy (Fleming, 1962; Mundell,

1963). It highlights the differentiated impact of monetary policies depending on whether the country adopts a fixed or floating exchange rate regime.

Under a fixed exchange rate regime, monetary policy is largely ineffective. Any attempt to stimulate the economy through lower interest rates or increased money supply is quickly offset by central bank intervention, which is forced to buy or sell foreign currency to maintain parity. This mechanism neutralizes the expected effect of the policy, rendering it ineffective.

Conversely, under a floating exchange rate regime, monetary policy regains a degree of effectiveness. A reduction in interest rates leads to capital outflows, which causes a depreciation of the national currency. This depreciation improves export competitiveness, strengthens external demand, and supports growth. Thus, the exchange rate channel becomes a significant lever for stimulating aggregate demand. However, the effectiveness of this mechanism depends heavily on financial openness, capital mobility, and price flexibility, which are not always present in emerging economies.

1-2 Modern approaches: expectations, credibility, and monetary transmission

From the 1980s onward, the limitations of traditional models led to the emergence of new approaches that emphasize agents' expectations and the credibility of public policies. The foundational work of Lucas (1976) introduced the concept of rational expectations, in which economic agents form their expectations based on coherent models that integrate anticipated monetary policies. The debate between rule-based and discretionary policies, as theorized by Kydland and Prescott (1977), highlighted the importance of time consistency and credibility in ensuring monetary policy effectiveness.

Within this framework, three main transmission channels can be identified. The interest rate channel operates through financial asset arbitrage. A reduction in the policy rate makes assets denominated in the national currency less attractive, leading to capital flight and a depreciation of the exchange rate. The expectations channel plays a decisive role: if agents anticipate controlled inflation and consistent monetary policy, speculative movements are contained, and the exchange rate becomes more stable. Finally, the credit channel acts on aggregate demand: lower interest rates stimulate credit, thus boosting consumption and investment, which increases imports and pressure on foreign currency.

Clarida, Galí, and Gertler (1999) emphasize that central bank credibility and transparency of its objectives are essential for stabilizing expectations and maintaining confidence in the currency. However, in emerging economies such as Algeria, these channels are weakened by structural factors: fiscal dependence, limited central bank independence, and dollarization of the economy. The limited autonomy of monetary authorities reduces the effectiveness of traditional instruments, and the lack of public confidence in the national currency disrupts the transmission of monetary signals.

1-3 Heterodox approaches: structural constraints and limited effectiveness in underdevelopment contexts

Post-Keynesian approaches, particularly in the context of developing countries, provide a critical reading of classical mechanisms. These schools of thought emphasize the importance of structural constraints such as weak financial markets, economic informality, and dependence on raw materials, which significantly reduce the effectiveness of monetary policy (Taylor, 1991; Palley, 2009).

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

In these economies, monetary policy cannot be analyzed independently of the institutional context. Low banking penetration, limited access to credit, and the dominant role of public banks reduce the effect of changes in the policy rate. Similarly, the absence of a developed financial market prevents the diversification of monetary instruments and reduces the opportunities for monetary regulation.

Algeria displays several of these characteristics. Credit to the economy is largely controlled by public banks, which are not very responsive to monetary signals. The capital market remains underdeveloped, and the creeping dollarization of the economy through savings, transactions, or accounting practices undermines the effectiveness of the national currency. Moreover, monetary communication suffers from a lack of clarity, which prevents the formation of coherent expectations.

In such a context, a reduction in the policy rate does not necessarily lead to credit stimulation or a depreciation of the dinar. The transmission channels are blocked, and isolated monetary policy does not allow for the stabilization of either domestic demand or the exchange rate. This observation calls for a broader structural reform, combining prudent monetary policies with sustained efforts in economic diversification, financial development, and institutional consolidation.

2- Institutional Framework and the Evolution of Monetary and Exchange Rate Policies in Algeria

Monetary stability and exchange rate management are fundamental levers of economic policy, particularly in economies heavily dependent on natural resources like Algeria. Since the reforms initiated in the 1990s, the country has attempted to adapt its institutional framework and monetary policy instruments to the requirements of a market economy, while preserving a degree of state control. This section examines the major transformations in the institutional framework, the evolution of the exchange rate regime, and the dynamics of monetary policy, highlighting the persistent tensions between formal autonomy, functional dependency, and structural vulnerabilities.

2-1 An Incomplete Institutional Reform: Between Proclaimed Independence and Actual Dependence

Since the economic reforms initiated in the 1990s, in a context of post-socialist transition and structural adjustment programs negotiated with the IMF, Algeria has undertaken a partial modernization of its economic policy instruments. At the heart of this process lies the redefinition of the role and prerogatives of the Bank of Algeria, particularly through Law 90-10 and then Law 03-11 of August 26, 2003, which assigned the institution the mission of preserving monetary stability, regulating the money supply, and defending the value of the dinar (Bank of Algeria, 2003).

On paper, these reforms established the operational autonomy of the central bank from the executive power, in line with international standards. However, in practice, this autonomy remains largely nominal. The monetary authority remains subject to the budgetary imperatives of the state, in an institutional environment characterized by centralized decision-making and a lack of transparency in public policy formulation.

The episode of non-conventional financing from 2017 to 2019 illustrates this functional dependency: to compensate for the depletion of foreign exchange reserves, the Bank of Algeria massively injected liquidity through monetary financing, exacerbating inflationary pressures (International Monetary Fund [IMF], 2018).

Although Article 6 of Law 03-11 states that the Bank must ensure the internal and external stability of the currency, the absence of a credible operational framework, combined with the dominance of fiscal policy, limits its effectiveness. The central bank responds to the Treasury's needs rather than acting as an autonomous player in macroeconomic stabilization.

2-2 The Evolution of the Exchange Rate Regime: Between Reactive Adjustments and Dependency on Hydrocarbon Revenues

Algeria's exchange rate regime is based on a managed float system, in which the official exchange rate is determined by the Bank of Algeria based on foreign exchange reserves and the terms of trade, primarily dictated by hydrocarbon revenues.

During the 2000s, the abundance of external resources allowed the Bank of Algeria to maintain a relatively stable dinar parity, which helped contain inflation but led to an overvaluation of the real exchange rate (Benachenhou, 2006). This overvaluation harmed the price competitiveness of non-oil sectors and reinforced the structural dependency on rent.

From 2014 onwards, the collapse in oil prices led to a contraction in foreign currency earnings, forcing the Bank to gradually depreciate the dinar to avoid a balance of payments crisis. This process of controlled devaluation, though inevitable, fueled inflationary tensions and eroded household purchasing power (Bouaziz & Chemam, 2021).

2-3 Monetary Policy: Between Structural Prudence and Cyclical Easing

Historically, Algerian monetary policy has been characterized by cautious management, especially during periods of financial abundance. Between 2005 and 2013, the Bank of Algeria implemented a sterilization policy of liquidity surpluses using conventional instruments such as reserve requirements, open market operations, and bank placements with the central bank (Bank of Algeria, 2015).

The 2020 health crisis, coupled with falling oil prices, led to a policy shift. The Bank adopted accommodative measures: the policy rate was reduced to 3%, the reserve requirement ratio was lowered to 2%, and refinancing facilities were expanded (Bank of Algeria, 2020). These measures aimed to mitigate the recessionary effects of the crisis and support banking liquidity.

However, their actual impact remained limited due to the weakness of the productive base, the high concentration of credit in large public enterprises, and the lack of trust in the national currency among economic actors.

2-4 Monetary Dualism and the Parallel Currency Market: Symptoms of Structural Imbalances

Algeria's monetary system is characterized by a dual structure: a tightly regulated official foreign exchange market and a growing parallel market. This dualism stems from the dinar's non-convertibility, limited official access to foreign currency, and restrictions on capital flows, which drive economic agents to the informal market to meet their currency needs (Benabdallah, 2023).

The persistent and often wide gap exceeding 50% between the official and parallel exchange rates distorts economic behavior, fosters dollarization of private savings, and erodes

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

trust in the dinar. The parallel market increasingly influences price formation for imported goods, thereby weakening the transmission of monetary and fiscal policies.

This situation highlights deeper structural imbalances: a chronic mismatch between foreign currency supply and demand, institutional inefficiencies in allocation mechanisms, and a general lack of confidence in formal regulatory frameworks. As long as this dualism persists, it will continue to support informal financial circuits, erode fiscal control, and limit Algeria's integration into global financial systems.

2-5 Interactions Between Monetary Policy Instruments and Exchange Rate Volatility: Structurally Hindered Effectiveness

Although the Bank of Algeria formally disposes of conventional monetary policy tools such as the policy rate, reserve requirements, and open market operations their practical effectiveness is limited by structural rigidities, weak institutional coordination, and persistent dependence on oil revenues.

The interest rate channel proves largely ineffective. The dominance of public banks, administrative control over lending rates, and the population's preference for real assets or foreign currencies undermine the responsiveness of credit to policy signals (Ammi & Labidi, 2023). Consequently, the policy rate loses its role as a macroeconomic anchor.

The exchange rate, meanwhile, is more responsive to Brent oil price fluctuations than to domestic monetary policy, reflecting a lack of a credible nominal anchor. Efforts to sterilize excess liquidity during oil booms have shown only temporary effectiveness, often neutralized by chronic fiscal imbalances and monetary financing.

Empirical analyses (Bouklia-Hassane & Lahouel, 2021) confirm a strong correlation between oil revenues and the real exchange rate, relegating monetary policy to a secondary role. The weight of external constraints foreign exchange reserves, trade balance, and import capacity continues to dictate the scope of macroeconomic policy.

In a context marked by implicit dollarization, dual monetary circuits, and a dominant parallel foreign exchange market, the Bank of Algeria operates within a restricted margin of maneuver, limiting its ability to influence exchange rate volatility or inflation sustainably.

3- Presentation and Graphical Analysis of the Variables Used

3-1 Selection of Variables

The exchange rate, as a central indicator of external competitiveness and macroeconomic balance, is influenced by a complex set of economic, monetary, and financial factors. In rentier economies, particularly those dependent on hydrocarbons like Algeria, theoretical and empirical literature has extensively examined the identification of its main determinants.

The choice of explanatory variables in this study is based on insights drawn from several empirical studies conducted on countries with similar economic structures. Among these, Koranchelian (2005) highlights the determining role of oil prices, money supply, and productivity in the evolution of the real exchange rate in Algeria, emphasizing its particular sensitivity to oil shocks. Aghion et al. (2009), for their part, show that in economies with low financial development, exchange rate volatility is amplified, notably through the channels of domestic credit and monetary stability. Coudert, Couharde, and Mignon (2008) emphasize the

importance of inflation and monetary credibility in anchoring exchange rate expectations, particularly in emerging countries.

Two studies specifically focused on Algeria also confirm the relevance of the selected variables. Lekkam Boudjelal (2016) underscores the strong correlation between the exchange rate, oil prices, foreign exchange reserves, and the balance of payments, while Djed Labsis (2014) highlights the joint influence of monetary policy, trade balance, and net external position.

Based on these references, and considering the availability of data from the Bank of Algeria and international sources, the variables selected for this study are as follows: **ER (Exchange rate)**: dependent variable, measuring the value of the Algerian dinar relative to a reference currency. **OILP (Oil prices)**: reflects the main source of foreign currency for the Algerian economy. **M2 (Money supply)**: indicator of monetary policy and domestic liquidity. **DC (Domestic credit)**: measures the level of internal financing and pressure on the national currency. **INF (Inflation rate)**: provides information on price stability and internal imbalances. **IR (Interest rate)**: variable representing the orientation of monetary policy conducted by the Bank of Algeria. **TB (Trade balance)**: indicates the country's ability to generate external surpluses or deficits.

These variables capture the key real, monetary, and external dimensions likely to influence the exchange rate dynamics in Algeria. Their selection is based both on a solid theoretical foundation and on recurring empirical validation in comparable contexts.

3-2 Graphical Analysis of the Series Used

3-2-1 Exchange Rate Trends

The exchange rate is a fundamental macroeconomic indicator, particularly for Algeria, whose economy is highly reliant on hydrocarbon exports and thus exposed to global market volatility. Over the last three decades, Algeria has experienced a sustained depreciation of its national currency, reflecting both internal structural weaknesses and external shocks.

In the 1990s, the Algerian dinar depreciated rapidly under the structural adjustment programs implemented with the support of the International Monetary Fund. The exchange rate rose from 8.96 DZD/USD in 1990 to 75.26 DZD/USD by the year 2000 representing an 89% loss in value in just one decade. This decline coincided with low oil prices, which constrained foreign exchange inflows and put strong pressure on the dinar.

A period of relative stability followed in the early 2000s. Between 2000 and 2008, the dinar slightly appreciated, moving from 75.26 to 64.57 DZD/USD. This trend was supported by a surge in oil prices, which peaked near \$100 per barrel in 2008. As a result, Algeria accumulated significant foreign reserves, restored macroeconomic stability, and temporarily strengthened its currency.

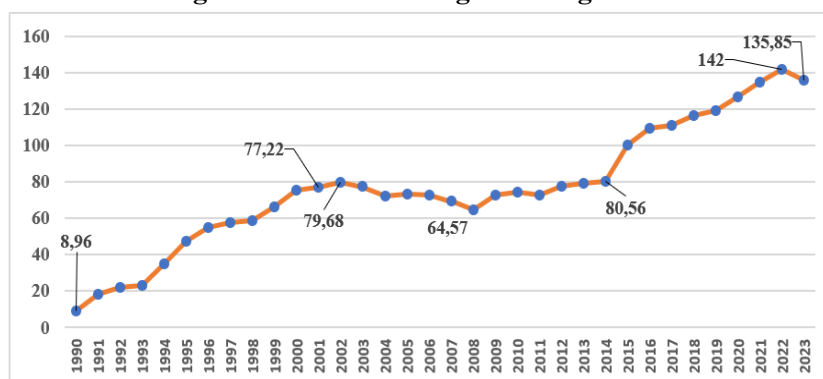
However, this positive trend reversed starting in 2009. The dinar resumed its depreciation a pattern that worsened after 2014 when global oil prices collapsed sharply. Between 2014 and 2020, the exchange rate rose from 80.56 to 126.83 DZD/USD, indicating a 57% depreciation over six years. This deterioration was compounded by rising fiscal and current account deficits, and the adoption of non-conventional financing in 2017, which expanded the money supply without corresponding foreign exchange coverage fueling inflation and accelerating the dinar's decline.

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

From 2021 onward, the exchange rate appears to have stabilized around 135 DZD/USD. This relative stability can be attributed to a rebound in oil prices, stricter control over imports, and more cautious management of foreign exchange reserves. A slight appreciation was even observed in 2023, linked to tighter monetary policy and inflation containment efforts. However, this stabilization remains fragile and depends heavily on future oil price trends.

These long-term trends are illustrated in Figure 1, which shows the evolution of the Algerian dinar exchange rate against the US dollar over the period 1990–2023.

Fig (1): Evolution of the Algerian Dinar Exchange Rate Against the US Dollar (1990–2023)



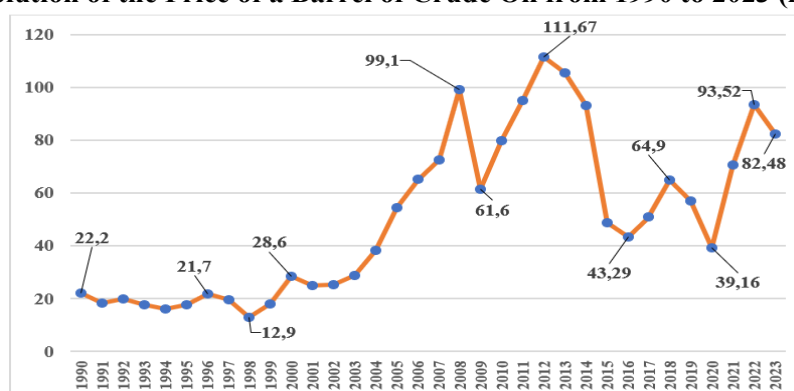
Source: Compiled by the author based on data from the Bank of Algeria

3-2-2 Evolution of Oil Prices

The evolution of oil prices is of strategic importance in analyzing the trajectory of the Algerian dinar's exchange rate. As a rent-based economy that relies heavily on hydrocarbon exports, Algeria sees the value of its currency closely correlated with fluctuations in crude oil prices on international markets. Indeed, the country's ability to build foreign exchange reserves, balance its payments, stabilize its budget, and defend its national currency largely depends on oil price levels.

An examination of Figure 2, which traces the annual average price of a barrel of crude oil between 1990 and 2023, helps shed light on the major phases of this relationship and better understand the chronic exchange rate instability observed in Figure 1.

Fig (2): Evolution of the Price of a Barrel of Crude Oil from 1990 to 2023 (in US dollars)



Source: Compiled by the author based on OPEC data

Between 1990 and 1998, oil prices remained low and relatively stable (ranging between 12 and 22 dollars per barrel) in a context of global overproduction and weak demand. The lowest point was reached in 1998 (12.9 USD/barrel) due to the Asian financial crisis. For

Algeria, this period was marked by a severe economic crisis: a drop in export revenues, budgetary pressures, recourse to the IMF, and the launch of structural adjustment programs.

From 1999 to 2008, a bullish phase in oil prices began often referred to as the "golden age of oil" peaking at 99.1 USD/barrel in 2008. Strong demand from emerging countries, geopolitical tensions, and OPEC's supply strategy supported this increase. Algeria took advantage of this period to clean up its public finances, accumulate reserves, and launch ambitious infrastructure programs. However, no real economic diversification was initiated.

The period from 2009 to 2013 saw a recovery in prices despite the global financial crisis. After hitting a low of 61.6 USD/barrel in 2009, prices rose again to over 111 USD/barrel in 2012, supported by monetary policies, recovering demand, and tensions in oil-producing countries. Algeria continued its social and investment policies, but structural vulnerabilities began to emerge.

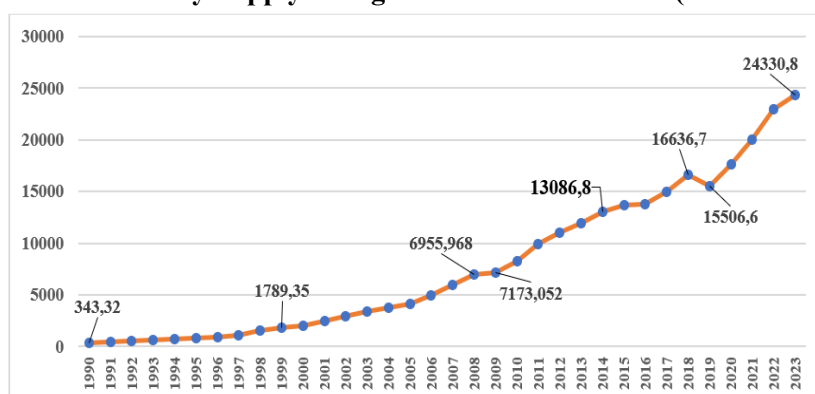
From 2014 onward, prices fell sharply and sustainably, driven by the boom in US shale oil production and OPEC's strategy of maintaining supply. In 2016, the average price dropped to 43.29 USD, then to 39.16 USD in 2020 during the COVID-19 pandemic. The Algerian economy suffered a major shock: falling foreign exchange reserves, widening budget deficits, shrinking fiscal space, and rising unemployment.

Finally, the years 2021–2023 saw a relative rebound in prices. In 2022, the barrel reached 93.52 USD due to the war in Ukraine. In 2023, it slightly declined to 82.48 USD as supply and demand normalized. For Algeria, this increase provided temporary budgetary relief but did not resolve the structural vulnerabilities of an economic model still heavily dependent on hydrocarbons.

3-2-3 Evolution of the M2 Money Supply

The M2 money supply is a key indicator of the liquidity available within an economy. In Algeria, it includes currency in circulation, demand deposits, and time deposits, thereby representing the total financial resources available to economic agents. An analysis of Figure 3 reveals a continuous expansion of M2 between 1990 and 2023, reflecting economic policy choices, the evolution of the hydrocarbon sector, and changes within the national banking system.

Fig (3): Evolution of the Money Supply in Algeria from 1990 to 2023 (in billions of DZD)



Source: Compiled by the author based on data from the Bank of Algeria

Between 1990 and 1999, M2 increased from approximately 343 to 1,790 billion dinars. This moderate growth occurred within the context of initial structural reforms adopted following the economic crisis of the early 1990s. Under the structural adjustment program supported by the IMF, several measures were implemented: banking sector reform, credit

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

liberalization, and modernization of the monetary framework. The sharp increase between 1994 and 1996 can be attributed notably to the devaluation of the dinar, exchange rate adjustments, and the reorganization of the financial sector, which broadened the monetary base and introduced more flexible but also more exchange-sensitive management.

The period from 2000 to 2008 saw a significant acceleration: M2 tripled to nearly 7,000 billion dinars. This trend was mainly driven by the surge in oil prices, which generated substantial foreign exchange revenues. These resources allowed the state to pursue an expansionary fiscal policy based on public investment, social transfers, and subsidies. The Bank of Algeria adopted an accommodating stance in the context of external surpluses. However, this monetary growth, driven by exogenous factors, was not matched by a corresponding strengthening of the national productive base.

Between 2009 and 2014, the money supply doubled again to reach 13,000 billion dinars. This phase unfolded in a globally unstable environment, marked by the aftermath of the 2008 financial crisis. Although liquidity continued to increase, certain limits became apparent: difficulties in channeling funds into productive investment, rising inflationary pressures, and low returns on projects financed by public spending. The growing gap between the money supply and real output revealed a structural imbalance, exacerbated by the weakness of the national productive sector.

The period from 2015 to 2023 recorded an even faster growth of M2, which reached 24,330 billion dinars in 2023. This increase is largely attributed to the use of non-conventional financing beginning in 2017, following the fall in oil prices in 2014. Faced with the depletion of budgetary resources, the authorities directly injected liquidity to finance the public treasury. This policy, combined with low interest rates and an expansion in domestic credit, inflated the money supply. However, the lack of a corresponding increase in national production heightened the risks of inflation, external imbalances, and depreciation of the dinar.

3-2-4 Evolution of Credit to the Economy

Credit to the economy is a vital indicator of financial intermediation and economic dynamism. It reflects the volume of financing extended by banking institutions to enterprises, households, and public administrations, providing insights into monetary policy orientation, liquidity conditions, and overall market confidence.

In Algeria, the evolution of credit over the period 1990–2023 displays a general upward trend, although marked by distinct phases influenced by public policy directions, the oil market cycle, and institutional reforms. As shown in Figure 4, the volume of credit expanded significantly, moving from 246.9 billion DZD in 1990 to nearly 10,698 billion DZD in 2023.

During the early 1990s, credit growth was volatile, particularly in 1993 when it dropped to 220 billion DZD. This stagnation occurred in the wake of financial liberalization and the restructuring of a banking sector that was still in its infancy. However, from 1997 to 2008, credit experienced a notable acceleration, driven by rising oil revenues and a public recovery strategy centered on infrastructure and housing investments. By the end of this phase, credit had surpassed 2,600 billion DZD.

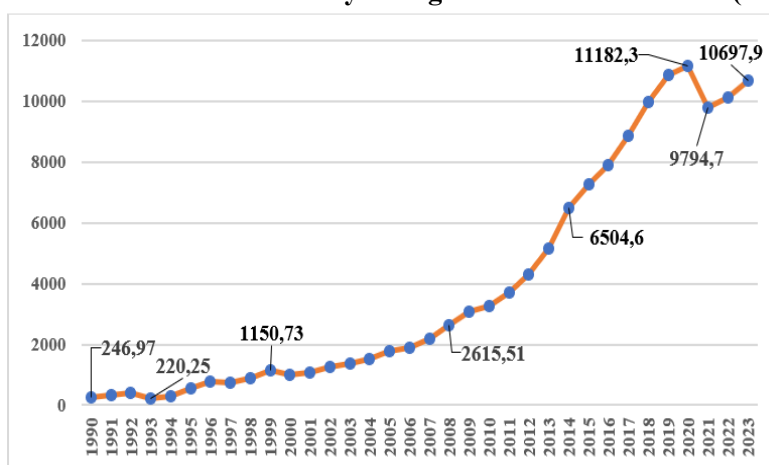
Between 2009 and 2014, this momentum continued, with credit levels exceeding 6,500 billion DZD. Government support programs targeting entrepreneurship and small businesses

(such as ANSEJ, CNAC, and ANGEM) played a key role in this expansion, contributing to financial inclusion.

Starting in 2015, the economic context became more constrained. Falling oil prices and tighter public finances led banks to adopt a more cautious approach. Although credit growth persisted reaching nearly 10,700 billion DZD in 2023 its pace slowed, especially between 2016 and 2018.

Despite these challenges, the trend remains upward, indicating a sustained effort to use credit as a tool to support investment. Nonetheless, structural issues persist, such as the concentration of loans in the real estate and public sectors, weak repayment capacity in certain segments, and limited impact on long-term, inclusive development. The effectiveness of credit thus remains closely linked to the robustness of the banking system, fiscal soundness, and the ability to channel funds toward productive, growth-enhancing sectors.

Fig (4): Evolution of Credit to the Economy in Algeria from 1990 to 2023 (in billions of DZD)

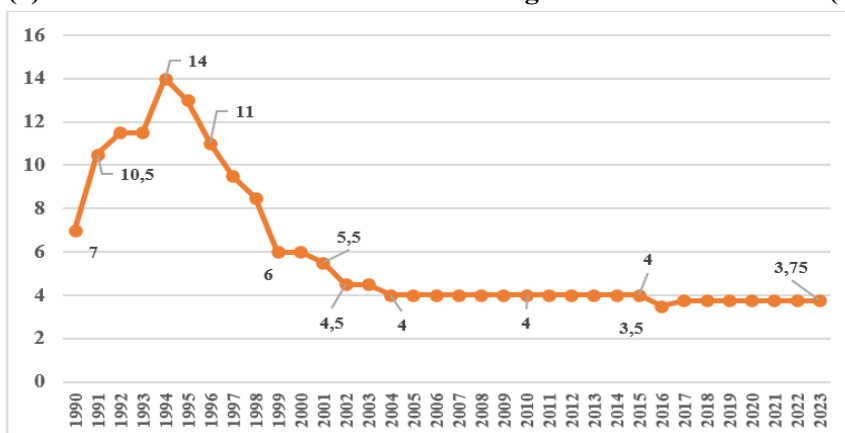


Source: Compiled by the author based on data from the Bank of Algeria

3-2-5 The Evolution of the Rediscount Rate

The rediscount rate, a core instrument of the Bank of Algeria's monetary policy, reflects the cost at which commercial banks access central bank liquidity. As shown in **Figure 5**, its evolution signals the broader stance of monetary policy and helps shape credit conditions and market expectations within a changing macroeconomic environment.

Fig (5): Evolution of the rediscount rate in Algeria from 1990 to 2023 (in %)



Source: compiled by the author based on data from the Bank of Algeria

Between 1990 and 2023, the rediscount rate in Algeria followed a generally downward trend, reflecting a shift from a tight monetary policy to a more accommodative approach. In the

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

early 1990s, in a context of high inflation and economic transition, the Bank of Algeria adopted a restrictive stance, raising the rate to 14% in 1994 to contain inflation and strengthen the currency.

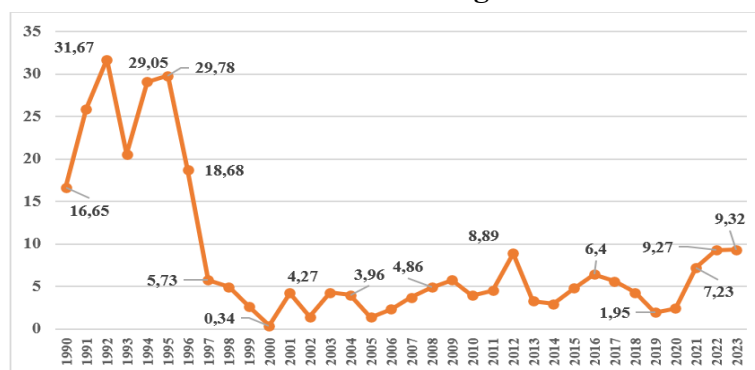
From 1996 onwards, with an improved macroeconomic framework, the rate began to decrease progressively: 11% in 1996, 6% in 1999, then stabilization at this level in 2000. The objective was to encourage recovery through more accessible credit. In the 2000s, the increase in oil revenues and abundant liquidity allowed for continued easing: 5.5% in 2001, 4.5% in 2002, then 4% from 2004. This stability aimed to support investment and growth while keeping inflation under control.

From 2010 to 2016, the rate remained unchanged at 4%, reflecting a cautious policy despite signs of economic slowdown. In 2016, in response to falling oil prices and budgetary tensions, it was lowered to 3.75%, a level maintained until 2023, in order to support economic activity in a context of limited public resources.

3-2-6 The Evolution of the Inflation Rate

The inflation rate is a key macroeconomic indicator that measures the general and sustained increase in consumer prices. It reflects imbalances between overall supply and demand, changes in production costs, economic policies, and both internal and external shocks experienced by an economy. In Algeria, between 1990 and 2023, the evolution of the inflation rate highlights contrasting economic cycles, marked by periods of high inflationary pressure, followed by phases of relative stability, before a recent resurgence in price increases.

Fig (6): Evolution of the inflation rate in Algeria from 1990 to 2023 (in %)



Source: compiled by the author based on data from the Bank of Algeria

In the early 1990s, Algeria went through a severe inflationary crisis. Between 1990 and 1995, inflation reached very high levels, peaking at 31.67% in 1992, in a context of budgetary imbalances, monetary financing of the deficit, and a difficult transition to a market economy. In 1994 and 1995, the rate remained close to 30%, reflecting macroeconomic instability.

From 1996 onwards, thanks to structural reforms and a stricter monetary policy, the economy entered a stabilization phase. Inflation dropped to 18.68% in 1996, then to 5.73% in 1997, reaching 0.34% in 2000.

During the 2000s, inflation remained largely under control (between 1% and 5%), in a context of growing oil revenues and budgetary discipline. Some moderate increases were observed, notably in 2003 (4.27%), 2004 (3.96%) and 2008 (4.86%), linked to the rise in global prices.

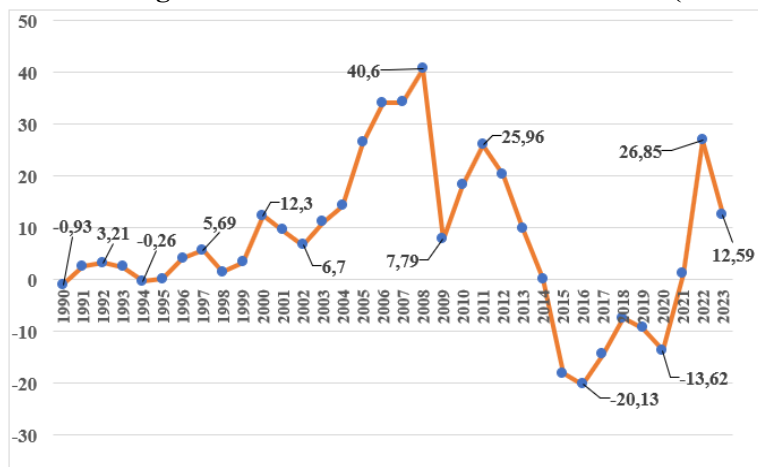
After 2010, inflation began to rise again: 8.89% in 2012, driven by increased wages, consumption and social transfers. It remained moderate thereafter, but reached 6.4% in 2016 due to budgetary imbalances and the depreciation of the dinar.

Between 2017 and 2020, a period of calm was observed (1.95% in 2019), before a new surge starting in 2021: 7.23% in 2021, 9.27% in 2022, and 9.32% in 2023. This increase can be explained by a combination of external factors (rising global prices, the pandemic, war in Ukraine) and internal factors (dinar depreciation, rising production costs, pressure on essential goods).

3-2-7 The Evolution of the Trade Balance

The trade balance, which measures the difference between the value of exports and that of imports of goods, is a fundamental indicator of a country's ability to generate external surpluses. Figure 7, which illustrates the evolution of Algeria's trade balance over the period 1990–2023, clearly reflects the country's dependence on hydrocarbons, the sensitivity of its external trade to oil price fluctuations, and the structural limitations of its productive base.

Fig (7): Evolution of Algeria's Trade Balance from 1990 to 2023 (in billions of USD)



Source: Compiled by the author based on data from the Bank of Algeria

The 1990s were marked by economic instability and a gradual opening of the Algerian economy. The trade balance experienced fluctuations: a slight deficit in 1990, modest surpluses between 1991 and 1993, and a return to deficit in 1994. These variations reflected external financing difficulties in a context of structural reforms. From 1996 onwards, an improvement became apparent due to the recovery of hydrocarbon exports, with a surplus of 5.69 billion DZD recorded in 1997.

Between 2000 and 2008, the trade balance fully benefited from the rise in oil prices, with record surpluses (up to 40.6 billion DZD in 2008). This period highlights the strong dependence on hydrocarbons, which accounted for more than 95% of foreign exchange earnings, concealing the weakness of non-hydrocarbon exports.

The 2008 crisis reduced surpluses (7.79 billion DZD in 2009), but they rose again until 2011. From 2013, the balance began to weaken, eventually turning into a deficit in 2015 (-18.08 billion DZD), worsened in 2016 (-20.13 billion DZD), due to the fall in oil prices and the high level of imports.

From 2017 to 2020, deficits persisted despite attempts to curb imports, reflecting the structural weakness of non-hydrocarbon exports. In 2021, the balance returned to surplus (+1.17 billion DZD), then jumped in 2022 (+26.85 billion DZD), before stabilizing at 12.59 billion DZD in 2023. This recovery, driven by the increase in oil prices and better import control, remains, however, cyclical and vulnerable to the volatility of energy markets.

4- Methodology and Model Specification

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

In a context of strong dependence on oil revenues, the Algerian economy remains vulnerable to external shocks, particularly those related to fluctuations in global energy markets. This instability raises the question of the effectiveness of monetary and exchange rate policies in achieving macroeconomic stabilization, particularly their influence on the evolution of the dinar exchange rate.

4-1 Model Specification

To empirically study these relationships, the Autoregressive Distributed Lag (ARDL) model developed by Pesaran et al. (2001) has been adopted. This choice is justified by several reasons: its capacity to simultaneously estimate both short-term and long-term relationships, its flexibility in the presence of variables integrated at different orders (I(0) or I(1)), and its relevance to the unstable and unbalanced context of the Algerian economy.

The ARDL framework thus makes it possible to assess the real impact of monetary and exchange rate policies on the exchange rate, while identifying the main transmission channels. The specified empirical model is expressed as follows: $ER = f(OILP, M2, DC, IR, INF, TB)$. To facilitate coefficient interpretation and improve the statistical properties of the model, a logarithmic transformation was applied to all strictly positive variables. The trade balance, which contains negative values for certain years, was kept in level form. Its coefficient is therefore interpreted in terms of marginal effect, not elasticity.

The final functional form of the estimated ARDL model is as follows:

$$\begin{aligned} \text{Log } ER = & \alpha + \beta_1 \text{Log } PP + \beta_2 \text{Log } M2 + \beta_3 \text{Log } CRED + \beta_4 \text{Log } INF + \beta_5 \text{Log } TR \\ & + \beta_6 TB + \varepsilon \end{aligned}$$

Where: α : constant, ε : error term. The coefficients β_i measure the effect of each explanatory variable on the exchange rate in both the short and long term.

4-2 Stationarity Test of the Time Series

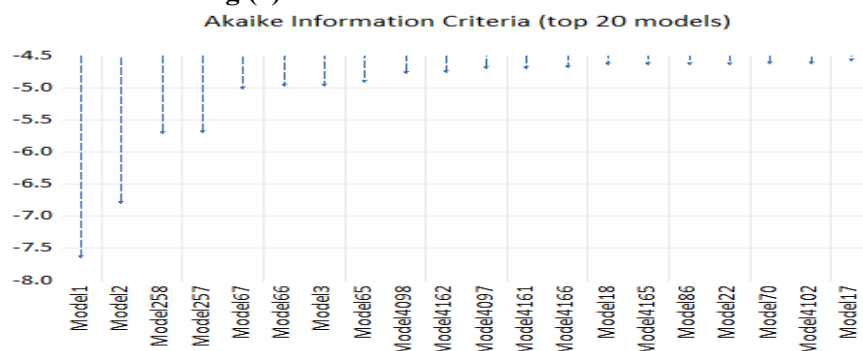
To correctly interpret the results and avoid spurious regressions, it is essential to verify beforehand the stationarity of the time series used in the model. To this end, the Augmented Dickey-Fuller (ADF) test was applied. The results obtained (see Table 1 in Appendix 1) indicate that the LER and LM2 series are stationary in level (integrated of order zero), while the variables LOILP, LDC, LINF, LIR, and TB are stationary in first difference (integrated of order one). It is important to note that none of the series is integrated of order two, which satisfies the conditions required for applying the ARDL cointegration model. This methodological framework therefore allows the study of long-term relationships between variables with different orders of integration.

4-3 Multivariate Analysis of the Model Variables

In the following, we proceed with the estimation of the ARDL model concerning the impact of monetary policies on the exchange rate, followed by the application of the "Bounds Test" for cointegration. Before that, it is necessary to determine the optimal number of lags to include in the model in order to avoid any specification error. For this purpose, econometricians recommend using information criteria such as the Akaike Information Criterion (AIC) or the Schwarz Criterion (SC), which select the best combination of lags by minimizing their respective values among a set of twenty possible configurations. According to the results from

the EViews 12 software, the optimal ARDL model selected is: ARDL (4, 3, 3, 3, 3, 3), corresponding to the lowest AIC value.

Fig (8): Akaike Information Criterion



Source: constructed by the author from the EViews 12 output

4-3-1 Estimation of the Autoregressive Distributed Lag (ARDL) Model

After identifying the optimal number of lags, the ARDL model can be estimated. This estimation is a crucial preliminary step before applying the Bounds Test, which will verify the existence or absence of a long-term relationship among the model variables. The estimation results are presented in Table 2 (see Appendix 2).

The analysis of the estimated coefficients shows that, in most cases, the associated Student statistics exceed the critical value of 1.96, indicating their significance at the 5% level. In the short run, the exchange rate (ER) appears to be positively influenced by the lagged values of its own past levels, as well as by the lagged variations in oil prices, money supply (M2), credit to the economy, inflation rate, rediscount rate, and the trade balance.

The quality of the model fit is remarkable: the coefficient of determination (R^2) reaches 99.99%, suggesting that almost all the variation in the exchange rate is explained by the selected explanatory variables. Moreover, the Fisher statistic, which exceeds its critical value at the 5% level, confirms the overall validity of the model and the robustness of the estimations.

4-3-2 Results of the Cointegration Test (Bound Test)

Once the model is estimated, the next step is to verify the existence of a long-term relationship between the variables under study. To do this, we apply the ARDL Bounds Testing approach to determine whether the variables move together over the long term.

Table (1): Results of Pesaran's Cointegration Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	31.26282	10%	2.12	3.23
k	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43

Source: Author's calculations based on EViews 12 results

In our case, the results of the bounds cointegration test show that the F-statistic ($F = 31.26$) exceeds the upper bound of the critical values at the 5% significance level (see Table 3). This confirms the existence of a long-term relationship between the exchange rate (ER) and the explanatory variables used in this study.

4-3-3 Interpretation of the Short-Term Relationship

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

To examine the short-term dynamics among the model's variables, we used the Error Correction Model (ECM), whose results are presented in Table 4 (see Appendix 3). The economic interpretation derived from the ARDL model highlights a complex dynamic structure between the exchange rate (ER) and the main macroeconomic variables, structured around four interrelated logics: internal monetary persistence, the lagged effect of external shocks, the stabilizing role of real variables, and the temporal asymmetry of the trade balance.

The exchange rate exhibits a marked self-reinforcing dynamic. An inertia effect is observed, as indicated by the positive coefficient at the second lag ($D(LE(-2)) = 0.39$, $p = 0.04$), suggesting a continuation of past fluctuations. In contrast, the first and third lag coefficients are negative ($D(LE(-1)) = -0.52$, $p = 0.02$; $D(LE(-3)) = -3.88$, $p = 0.01$), indicating the existence of correction mechanisms aimed at restoring short-term equilibrium. This combination of contradictory effects reflects a non-linear adjustment of the foreign exchange market, oscillating between inertia and punctual correction, likely linked to monetary interventions or fiscal adjustments.

Regarding oil shocks, the effects of oil prices (LOILP) on the exchange rate manifest with a delay. The immediate ($D(LOILP) = -0.19$, $p = 0.03$) and one-period lagged ($D(LOILP(-1)) = -0.18$, $p = 0.04$) coefficients are negative, indicating that oil price increases do not result in an immediate appreciation of the dinar. This lag may stem from delays in converting oil revenues, budgetary decisions, or monetary sterilization mechanisms. It is only at the second lag that the effect becomes positive and significant ($D(LOILP(-2)) = 1.08$, $p = 0.01$), reflecting a delayed gain likely linked to a gradual improvement in the balance of payments or an inflow of foreign currency.

The money supply (LM2) significantly and positively affects the exchange rate across all periods considered: immediately ($D(LM2) = 1.56$, $p = 0.01$), at the first lag ($D(LM2(-1)) = 4.50$, $p = 0.01$), and at the second lag ($D(LM2(-2)) = 1.40$, $p = 0.01$). This liquidity expansion contributes to the short-term depreciation of the dinar, due to a mismatch between growing money supply and limited supply of goods and foreign exchange. This imbalance induces inflationary pressures and encourages capital outflows. The persistence of this effect indicates inefficiencies in monetary transmission channels within the Algerian economic context.

Bank credit to the economy (LDC) plays a stabilizing role. Its effects are negative and significant across all periods considered ($D(LDC) = -2.73$, $p = 0.01$; $D(LDC(-1)) = -0.50$, $p = 0.01$; $D(LDC(-2)) = -0.92$, $p = 0.01$), highlighting the positive impact of productive financing on exchange rate stabilization. By boosting local production and reducing import needs, credit improves the trade balance and supports appreciation of the dinar. However, the slow manifestation of these effects suggests that the benefits of credit are more medium-term in nature.

Inflation (LINF) also has a cumulative and significant effect on the depreciation of the dinar. The immediate ($D(LINF) = 0.12$, $p = 0.01$), first-lag ($D(LINF(-1)) = 0.35$, $p = 0.01$), and second-lag ($D(LINF(-2)) = 0.37$, $p = 0.01$) coefficients confirm this trend. Inflation weakens purchasing power, stimulates imports, and exerts sustained pressure on the foreign exchange market. This outcome reflects strong inflationary inertia and limited effectiveness of stabilization policies.

The rediscount rate (LIR) shows mixed effects. It is positively correlated with the exchange rate immediately ($D(LIR) = 0.26, p = 0.08$) and at the first lag ($D(LIR(-1)) = 0.57, p = 0.03$), but its effect becomes negative at the second lag ($D(LIR(-2)) = -1.32, p = 0.02$). This ambivalence can be explained by a dual dynamic: initial encouragement of savings followed by a delayed impact on consumption and investment, within a context of limited financial depth.

The trade balance (TB) influences the exchange rate significantly and asymmetrically in the short term. An immediate deterioration in the trade balance exerts depreciatory pressure on the dinar ($D(TB) = -0.006, p = 0.02$), while an improvement at the first lag tends to appreciate it ($D(TB(-1)) = 0.03, p = 0.01$). This lag reveals a temporal asymmetry: deficits have an immediate effect, whereas surpluses generate a slower impact. The second lag ($D(TB(-2)) = 0.002, p = 0.06$), which is weakly significant, suggests moderate persistence linked to transmission delays between trade flows and monetary adjustments.

Finally, the error correction term ($cointEq(-1)$) is highly significant (coefficient = $-3.085, p = 0.01$), indicating a very rapid adjustment speed. The exchange rate corrects 308.5% of the deviation from the long-term equilibrium within a single period, reflecting the robustness of the cointegration mechanism and the presence of a structural relationship among the model's variables.

4-3-4 Interpretation of the Long-Term Relationship

The results of the long-run equation presented in Table 5 (see Appendix 4) show that only the trade balance (TB) has a statistically significant effect (at the 10% level, $p = 0.09$) on the exchange rate in the long term. The negative coefficient (-0.02) indicates that a sustained improvement in the trade balance, i.e., an increase in trade surpluses tends to appreciate the dinar, while a prolonged deficit contributes to its structural depreciation. This result underscores the crucial role of trade flows in determining the long-term exchange rate, in line with foreign exchange supply and demand dynamics.

In contrast, the other variables do not appear significant in the long run. Several economic explanations may account for this absence of effect:

Oil prices (LOILP): Although the Algerian economy is heavily dependent on hydrocarbons, the long-term effect of oil prices on the exchange rate may be dampened by adjustment mechanisms such as stabilization policies, foreign exchange reserves, or monetary sterilization. Additionally, the volatility of oil prices limits their structural impact and makes their influence more short-term in nature.

The money supply (LM2), although expansionary in the short term, sees its effect fade over time. In the long run, the evolution of the exchange rate may be neutralized by economic growth, adjustments in relative prices, or monetary policy, which explains the absence of a significant and lasting relationship.

Bank credit (LDC), despite its stabilizing role in the short term, may fail to produce a direct effect on the exchange rate in the long run in the absence of structural transformation of the productive sector. If credit mainly fuels consumption or imports, its effect becomes neutral or ambiguous in the long term.

Inflation (LINF) may see its impact on the exchange rate absorbed over time through adjustments in relative prices, monetary policy responses, and market expectations. The real exchange rate adjusts accordingly, thereby mitigating the direct relationship with nominal inflation.

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

The **rediscount rate (LIR)** may have an insignificant long-term effect due to the limited depth of financial markets in Algeria, capital controls, or a structural preference for non-productive savings. Moreover, international capital arbitrage often a source of sensitivity to interest rates is limited in the case of Algeria.

4-3-5 Model Validation Tests

In order to verify the robustness of the estimated results, it is essential to subject the model to a series of diagnostic tests, focusing in particular on the autocorrelation of residuals, heteroskedasticity, the normality of errors, and the stability of coefficients.

Table (2): Diagnostic Test Results on Residuals

Test	Value	P-value
Heteroskedasticity (ARCH)	3.94	0.06
Heteroskedasticity (Breusch-Pagan-Godfrey)	0.10	0.99
Autocorrelation (Breusch-Godfrey)	0.65	0.82
Normality (Jarque-Bera)	18.40	0.00
Stability (Ramsey RESET, Fisher)	0.26	0.79

Source: Author's calculations based on EViews 12 results

To conclude our analysis, a series of econometric tests was conducted to evaluate the robustness of the estimated ARDL model. These tests examine the quality of residuals (heteroskedasticity, autocorrelation, normality), as well as the stability of the model's coefficients, in order to confirm the overall validity of the specification.

The results show that the hypothesis of heteroskedasticity is rejected, both in the ARCH test ($p\text{-value} = 0.06 > 5\%$) and in the Breusch-Pagan-Godfrey test ($p\text{-value} = 0.99 > 5\%$), indicating that the residuals exhibit constant variance. Regarding autocorrelation, the Breusch-Godfrey test yields a $p\text{-value}$ of 0.82, which is significantly above the 5% threshold, leading us to accept the hypothesis of error independence.

On the other hand, the Jarque-Bera normality test gives a $p\text{-value}$ of $0.00 < 5\%$, suggesting that the residuals do not follow a normal distribution. Finally, the Ramsey RESET (Fisher) test indicates a $p\text{-value}$ of 0.79, allowing us to conclude that the model is stable overall.

In sum, despite a slight deviation from normality, the other diagnostic results confirm the robustness and reliability of our ARDL model.

Furthermore, the results from the CUSUM and CUSUM of Squares tests (see Appendix No. 05) show that the recursive residuals remain within the 5% confidence bands. This indicates that the model's coefficients are stable over time, which leads us to accept the hypothesis of structural stability throughout the study period.

Conclusion:

This study aimed to assess the effectiveness of Algeria's monetary and exchange rate policies in mitigating the impact of oil shocks over the period 1990–2023, using the ARDL model. In an economy structurally dependent on hydrocarbons, these instruments represent key levers of macroeconomic regulation though their effectiveness is constrained by institutional rigidities and weak policy coordination.

The findings reveal that the conduct of monetary and exchange rate policy in Algeria operates within a framework marked by limited central bank autonomy, poor alignment among macroeconomic policies, and the persistence of a rent-based model. The empirical analysis

confirms significant short- and long-term relationships between the dinar exchange rate and key variables such as money supply, oil prices, inflation, credit to the economy, and foreign reserves.

Specifically, money supply expansion contributes to currency depreciation in the short term, reflecting inflationary pressures and inefficient monetary transmission. Oil prices exert a delayed but substantial influence on the exchange rate, confirming Algeria's vulnerability to external shocks. Meanwhile, credit to the economy appears to play a stabilizing role in the medium term, by supporting productive activity and easing exchange rate pressures. Inflation, however, further accelerates the loss of currency value, revealing shortcomings in the current regulatory mechanisms.

These results confirm that traditional monetary instruments have limited effectiveness in a poorly diversified and rentier economic system, that oil price fluctuations have a strong influence on the exchange rate, and that the lack of coordination between monetary and exchange rate policies undermines shock absorption capacity.

In light of these findings, the study recommends strengthening central bank independence, improving macroeconomic policy coordination, and accelerating structural reforms to diversify the economy and reduce reliance on hydrocarbon revenues. Enhancing inflation control tools and supporting productive credit channels could also contribute to better monetary outcomes.

Future research could further explore the asymmetric effects of oil shocks using nonlinear or structural models, or conduct comparative studies with other hydrocarbon-exporting countries to identify best practices in policy governance. Ultimately, reinforcing the effectiveness of monetary and exchange rate policies in Algeria requires not only technical adjustments but a broader economic transformation based on production, resilience, and long-term strategic vision.

Bibliography list :

- Achy, L. (2022). *Monnaie et marché parallèle en Algérie : causes et implications*. Revue Maghrébine d'Économie.
- Aghion, P., Bacchetta, P., Rancière, R., & Rogoff, K. (2009). *Exchange rate volatility and productivity growth: The role of financial development*. Journal of Monetary Economics, 56(4), 494–513. <https://doi.org/10.1016/j.jmoneco.2009.03.015>
- Ali, S., Iqbal, J., & Khan, M. A. (2017). *Oil prices and exchange rate volatility: Evidence from oil-importing and oil-exporting countries*. Energy Economics, 66, 399–407. <https://doi.org/10.1016/j.eneco.2017.06.004>
- Ammi, C., & Labidi, M. (2023). *La transmission de la politique monétaire en Algérie : limites et perspectives*. Revue Économie et Développement.
- Banque d'Algérie. (2003). *Loi n° 03-11 relative à la monnaie et au crédit*. Journal Officiel de la République Algérienne.
- Banque d'Algérie. (2015–2023). *Rapports annuels*. <https://www.bank-of-algeria.dz>
- Benabdallah, Y. (2023). *Algérie 1962–2022. Les contradictions du processus d'édification d'une économie nationale*. HAL. <https://hal.science/hal-04180869>
- Benachenhou, A. (2006). *L'économie algérienne : réformes et inerties*. Casbah Éditions.
- Benachenhou, A. (2006). *Politiques économiques et dépendance extérieure en Algérie*. OPU.

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

- Berument, H., Ceylan, N. B., & Mustafayev, A. (2010). *The impact of oil price shocks on the balance of trade and real exchange rates in oil-exporting countries*. Journal of Policy Modeling, 32(5), 623–639. <https://doi.org/10.1016/j.jpolmod.2010.05.003>
- Bouaziz, M., & Chemam, M. (2021). *Chocs externes et vulnérabilités macroéconomiques en Algérie*. Revue Économique et Financière, 16(2), 33–56.
- Bouaziz, S., & Chemam, K. (2021). *Le taux de change réel et la compétitivité externe de l'Algérie*. Revue de Sciences Économiques.
- Boudjelal, L. A. (2016). *Gestion du taux de change et ajustement de la balance des paiements : Cas de l'Algérie* [Thèse de doctorat, Université Mohamed Ben Ahmed Oran 2]. Thèses Algérie. <https://theses-algerie.com/2841669100855180/>
- Clarida, R., Galí, J., & Gertler, M. (1999). *The science of monetary policy: A New Keynesian perspective*. Journal of Economic Literature, 37(4), 1661–1707.
- Coudert, V., Couharde, C., & Mignon, V. (2008). *Does inflation targeting anchor nominal expectations? Evidence from long-term interest rates*. Économie Internationale, 116(4), 71–96. <https://doi.org/10.3917/ecoi.116.0071>
- Fleming, M. J. (1962). *Domestic financial policies under fixed and floating exchange rates*. IMF Staff Papers, 9(3), 369–379.
- FMI. (2018). *Algérie : consultation au titre de l'article IV*. IMF Country Report No. 18/168.
- IMF. (2023). *Algeria Country Report*. International Monetary Fund.
- Koranchelian, T. (2005). *The equilibrium real exchange rate in a commodity exporting country: Algeria's experience*. IMF Working Paper No. 05/135. <https://doi.org/10.5089/9781451861606.001>
- Korhonen, I., & Juurikkala, T. (2009). *Oil prices and real exchange rates in oil-exporting countries*. Emerging Markets Finance and Trade, 45(3), 5–20. <https://doi.org/10.2753/REE1540-496X450301>
- Kydland, F. E., & Prescott, E. C. (1977). *Rules rather than discretion: The inconsistency of optimal plans*. Journal of Political Economy, 85(3), 473–491.
- Labsis, D. (2014). *Détermination, évaluation et gestion du taux de change : analyse à l'équilibre de long terme pour un pays en développement exportateur de pétrole : le cas de l'Algérie* [Thèse de doctorat, EHES]. <https://theses.fr/2014EHES0164>
- Mohanty, M. S., & Klau, M. (2004). *Monetary policy rules in emerging market economies: Issues and evidence*. BIS Working Papers No. 149. <https://www.bis.org/publ/work149.htm>
- Mundell, R. A. (1963). *Capital mobility and stabilization policy under fixed and flexible exchange rates*. Canadian Journal of Economics and Political Science, 29(4), 475–485.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). *Bounds testing approaches to the analysis of level relationships*. Journal of Applied Econometrics, 16(3), 289–326.
- Saucier, P. (2010). *Évaluation des politiques de change dans les pays exportateurs de pétrole : Une application au cas de l'Algérie* [Thèse de doctorat, Université d'Orléans]. HAL Open Science. <https://tel.archives-ouvertes.fr/tel-00588648>
- Taylor, L. (1991). *Income distribution, inflation, and growth: Lectures on structuralist macroeconomics*. MIT Press.

Appendices:

1. Table (1): Unit Root Test Results (ADF Test)

Variables	ADF Test at Level	ADF Test at First Difference
-----------	-------------------	------------------------------

	T- statistic	Model 3		Model 2		Model 1	Model 1 Or Model 2	Order of Integration
		T ADF	T trend	T ADF	T const	TADF	TADF	
LER	Calculated T	-2,47	2,71	-6,19	6,77	-	-	I(0)
	Critical T	-3,58	2,81	-2,95	2,56	-	-	
LOILP	Calculated T	-2,01	1,65	-1,13	1,26	0,61	-5,32	I(1)
	Critical T	-3,55	2,81	-2,95	2,56	-1,95	-1,95	
LM2	Calculated T	-0,84	0,20	-3,74	5,44	-	-	I(0)
	Critical T	-3,58	2,81	-2,95	2,56	-	-	
LDC	Calculated T	-2,51	2,15	-1,25	1,78	3,13	-2,59	I(1)
	Critical T	-3,56	2,81	-2,95	2,56	-1,95	-1,95	
LINF	Calculated T	-2,53	-0,40	-2,62	2,19	-1,24	-7,89	I(1)
	Critical T	-3,55	2,81	-2,95	2,56	-1,95	-1,95	
LIR	Calculated T	-1,52	-0,41	-2,34	1,80	-1,04	-2,55	I(1)
	Critical T	-3,58	2,81	-2,96	2,56	-1,95	-1,95	
TB	Calculated T	-2,05	-0,27	-2,07	1,12	-1,74	-5,46	I(1)
	Critical T	-3,58	2,81	-2,95	2,56	-1,95	-1,95	

Source: Prepared by the author based on results from EViews 12.

2. Table (2): ARDL Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LER(-1)	-2.610405	0.584951	-4.462605	0.1403
LER(-2)	0.924991	0.403607	2.291808	0.2619
LER(-3)	-4.286383	1.055119	-4.062465	0.1537
LER(-4)	3.886693	0.889934	4.367389	0.1433
LOILP	-0.191558	0.060705	-3.155557	0.1954
LOILP(-1)	1.087188	0.237614	4.575436	0.1370
LOILP(-2)	1.268319	0.368037	3.446169	0.1798
LOILP(-3)	-1.085784	0.209972	-5.171080	0.1216
LM2	1.567019	0.309055	5.070349	0.1240
LM2(-1)	1.042171	0.204476	5.096782	0.1233
LM2(-2)	-3.097953	0.639541	-4.844026	0.1296
LM2(-3)	-1.403036	0.553868	-2.533159	0.2394
LDC	-2.736441	0.613036	-4.463750	0.1403
LDC(-1)	3.804472	0.827252	4.598930	0.1363
LDC(-2)	-0.416012	0.054682	-7.607789	0.0832
LDC(-3)	0.924158	0.235526	3.923810	0.1589
LINF	0.122541	0.030927	3.962302	0.1574
LINF(-1)	0.351278	0.081617	4.304012	0.1453
LINF(-2)	0.018713	0.022420	0.834675	0.5572
LINF(-3)	-0.373416	0.079982	-4.668759	0.1343
LIR	0.267567	0.153071	1.747999	0.3308
LIR(-1)	-0.566146	0.212000	-2.670501	0.2281
LIR(-2)	-1.904959	0.625552	-3.045244	0.2020
LIR(-3)	1.327852	0.274331	4.840332	0.1297
TB	-0.006188	0.002592	-2.387105	0.2526
TB(-1)	-0.026345	0.005678	-4.639736	0.1351
TB(-2)	-0.030019	0.007784	-3.856705	0.1615
TB(-3)	-0.002126	0.001750	-1.214536	0.4385
C	14.78903	3.309365	4.468842	0.1401
R-squared	0.999960	Mean dependent var		4.385945
Adjusted R-squared	0.998846	S.D. dependent var		0.327429
S.E. of regression	0.011122	Akaike info criterion		-7.627626
Sum squared resid	0.000124	Schwarz criterion		-6.273136
Log likelihood	143.4144	Hannan-Quinn criter.		-7.194313
F-statistic	897.5985	Durbin-Watson stat		3.165232
Prob(F-statistic)	0.026390			

Source: Results output from EViews 12.

3. Table (3): Error Correction Model (ECM) Estimation

The Effectiveness of Monetary and Exchange Rate Policies in Algeria under Oil Shocks: An ARDL Analysis (1990–2023)

ECM Regression				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.78903	0.375842	39.34907	0.0162
D(LER(-1))	-0.525297	0.022851	-22.98758	0.0277
D(LER(-2))	0.399694	0.028896	13.83222	0.0459
D(LER(-3))	-3.886690	0.115096	-33.76904	0.0188
D(LOILP)	-0.191558	0.011294	-16.96059	0.0375
D(LOILP(-1))	-0.182535	0.013281	-13.74444	0.0462
D(LOILP(-2))	1.085784	0.032733	33.17063	0.0192
D(LM2)	1.567019	0.043430	36.08109	0.0176
D(LM2(-1))	4.500989	0.128770	34.95366	0.0182
D(LM2(-2))	1.403036	0.037864	37.05486	0.0172
D(LDC)	-2.736441	0.069579	-39.32841	0.0162
D(LDC(-1))	-0.508146	0.014003	-36.28870	0.0175
D(LDC(-2))	-0.924158	0.020556	-44.95887	0.0142
D(LINF)	0.122541	0.002885	42.47276	0.0150
D(LINF(-1))	0.354703	0.010439	33.97882	0.0187
D(LINF(-2))	0.373416	0.011015	33.89951	0.0188
D(LIR)	0.267567	0.034788	7.691402	0.0823
D(LIR(-1))	0.577107	0.027717	20.82125	0.0306
D(LIR(-2))	-1.327852	0.056281	-23.59308	0.0270
D(TB)	-0.006188	0.000238	-26.03489	0.0244
D(TB(-1))	0.032145	0.000958	33.56677	0.0190
D(TB(-2))	0.002126	0.000217	9.774685	0.0649
CointEq(-1)*	-3.085107	0.078824	-39.13922	0.0163

Source: Results output from EViews 12.

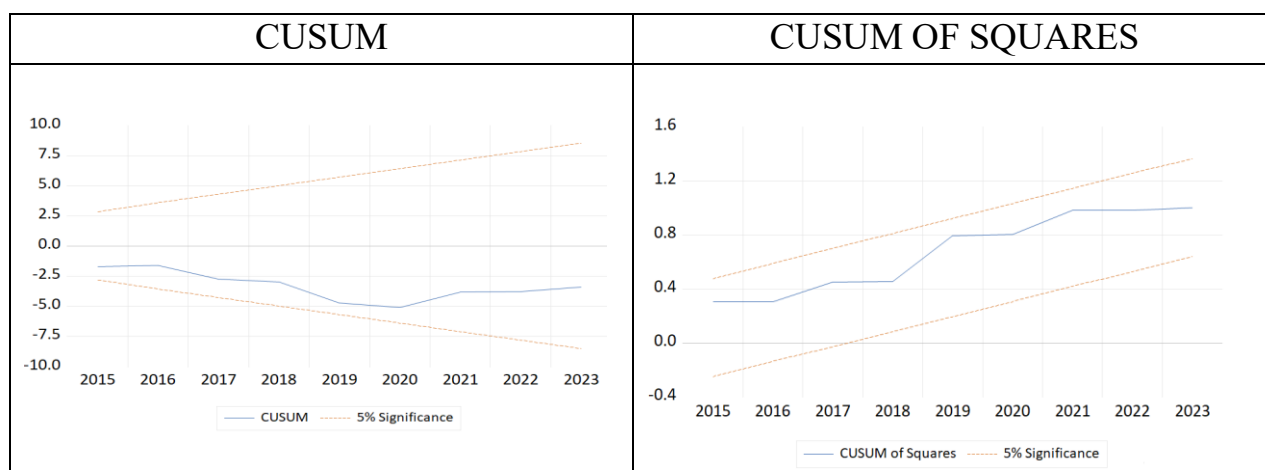
4. Table (4): Long-Run Relationship Estimation

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOILP	0.349474	0.109126	3.202489	0.01927
LM2	-0.613204	0.172135	-3.562345	0.01742
LDC	0.510899	0.084696	6.032178	0.01046
LINF	0.038610	0.013069	2.954385	0.02078
LIR	-0.283843	0.087768	-3.234012	0.01909
TB	-0.020964	0.003048	-6.877640	0.0919

EC = LER - (0.3495*LOILP - 0.6132*LM2 + 0.5109*LDC + 0.0386*LINF - 0.2838*LIR - 0.0210*TB)

Source: Results output from EViews 12.

5. Fig (1): CUSUM and CUSUM of Squares Test Results for Stability



Source: Results output from EViews 12