

***Exchange Rate and Oil Price Volatility as Determinants of Inflation in Algeria :
New Evidence Using Structural Break Cointegration (1970–2023)***

تقلبات سعر الصرف وأسعار النفط كعوامل محددة للتضخم في الجزائر: أدلة جديدة باستخدام التكامل المشترك
للمقاطع الهيكلية (1970–2023)

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Abstract: This study represents an attempt to analyze the longrun relationship between the exchange rate, oil prices, and domestic inflation in the Algerian economy over the period from 1970 to 2023. To achieve this, a range of econometric techniques were employed, notably stability tests and cointegration tests that account for the presence of structural breaks within the data. The findings indicate that the variables under consideration satisfy the conditions of stationarity, despite the presence of multiple structural breaks. Furthermore, the results of the cointegration test with structural breaks reveal the existence of a longrun equilibrium relationship, with 1997 identified as a key structural break point. The estimation results of the longrun relationship show a statistically significant relationship between inflation, the exchange rate, and oil prices in Algeria characterized by a positive effect. These findings offer new insights and highlight the importance of adopting effective exchange rate policies aimed at maintaining acceptable price levels, while taking into account the fluctuations in oil prices due to their crucial role in Algeria's economic structure.

Keywords: Inflation, Exchange Rate, Oil Prices, Algerian Economy, Structural Breaks.

JEL Classification Codes :E31, F31, C3

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1. Introduction

Price stability is one of the most important objectives of macroeconomic policy and is considered a key indicator of economic stability. Achieving acceptable and controlled levels of inflation is evidence of efficient economic performance. Large fluctuations in prices can have numerous negative effects on the macroeconomic level, extending to purchasing power through the deterioration of the currency's value due to continuous price increases, which means the erosion of real wages. It can also impact monetary stability, which is a crucial factor in steering economic activity and a fundamental pillar for creating a favorable environment for both domestic and foreign investment. Economic history tells us that Algeria has suffered from the consequences of this phenomenon, particularly during the 1990s, when the Algerian economy witnessed continuous increases and sharp fluctuations in prices that reached record levels, which negatively affected many macroeconomic indicators.

From this perspective, the importance of maintaining price stability becomes evident, which necessarily calls for a thorough study of the factors influencing it. In this context, exchange rate policy stands out as a fundamental and effective pillar in steering macroeconomic policy in the right direction. The exchange rate serves as a primary channel through which external shocks are transmitted to the domestic economy. where sharp fluctuations in exchange rates and their resulting impacts on various aspects of the economy have long been a decisive factor in maintaining economic balance both internally and externally especially in developing economies like Algeria, which is highly open to global markets. On another note, if we look at the structure of the Algerian economy, we find that the dominance of the hydrocarbons or energy sector in exports still persists, accompanied by a clear weakness in the productive base. This situation places the Algerian economy in a position where it inevitably faces the consequences and repercussions of fluctuations in energy prices in general, and oil prices in particular, which negatively affects its internal stability and increases its vulnerability to external shocks.

Building on the above discussion, the contours of the research problem in this study become evident. This study seeks to measure the impact of exchange rate fluctuations and oil price volatility on domestic inflation levels in Algeria, particularly in light of the current state of the national economy and the ongoing debate surrounding the effectiveness of exchange rate policy and the role of oil prices in influencing domestic price stability. Where the relationship between these variables continues to attract considerable attention in the economic literature, given their direct implications for overall macroeconomic stability. Based on the foregoing, this study aims to answer the following central research question:

Is exchange rate and oil price volatility a decisive factor in determining domestic inflation levels in the Algerian economy in the long run?

To answer this question, we can break it down into several sub-questions as follows:

What is the nature of the relationship between the exchange rate, oil prices, and inflation in the long run?

Is there evidence of a longrun equilibrium relationship between the exchange rate, oil prices and inflation in Algeria?

To what extent do the exchange rate and oil prices play a role in explaining inflation volatility in light of the current economic situation?

Based on the main research question and sub-questions, we propose the following hypotheses:

There is a positive and statistically significant between exchange rate fluctuations, oil prices and inflation in Algeria in the long run.

There is a long run equilibrium relationship between the exchange rate, oil prices, and inflation rates in Algeria with a structural break.

This study holds significant importance due to the nature of the topic it addresses, shedding light on the relationship between three key macroeconomic variables that have long been the focus of both researchers and policymakers. This is due to the vital role played by both exchange rates and oil prices in shaping economic policies and their direct impact on inflation rates especially in a rent-based economy that heavily depends on oil revenues, such as the Algerian economy. The study aims to provide a deeper understanding of the relationship between exchange rate fluctuations, oil prices, and domestic inflation, as well as the mechanisms through which they affect economic stability. This will contribute to supporting policymakers with scientific outputs that assist in formulating and steering monetary and fiscal policies toward achieving higher levels of economic stability and sustainable economic growth.

2. Theoretical Framework and Previous Studies

In this section of the study, we focus on analyzing the relevant literature, where numerous studies have extensively examined the relationship between inflation, exchange rates, and oil prices. It has been found that there are several key mechanisms that explain how exchange rate fluctuations are transmitted to the general price level. These mechanisms include direct effects or channels through energy prices and essential goods, as well as indirect effects such as import prices, wage formation, and profit margins (Jongrim , Stocker, & Hakan, 2020, p. 03).

The Purchasing Power Parity (PPP) theory also provides a theoretical framework for understanding the relationship between inflation rates and exchange rates. When the inflation rate in one country rises relative to another country, this means that goods and services in the country with higher inflation become relatively more expensive. As a result, the competitiveness of its exports decreases. Conversely, the demand for relatively cheaper imports increases. This shift in the export and import structure reflects in the form of reduced demand for the local currency, leading to a depreciation of its value against foreign currencies, i.e., an increase in the exchange rate. This ultimately leads to higher import costs, thus exacerbating inflationary pressures and increasing the general price level, particularly in countries that heavily rely on importing essential goods. Moreover, if the exporting countries also experience high inflation levels, the cost of imported goods rises further, leading to what is known as "imported inflation" (Alieu , 2019, p. 263). The latter has become a key channel for transmitting inflation effects to local prices, especially in highly open economies such as Algeria.

(Krugman, Maurice, & Melitz, 2012, p. 453) affirm that, according to the Relative Purchasing Power Parity theory, the rate of change in the exchange rate between two currencies over a certain period should align with the difference in inflation rates between the two countries during that period. Within this growing theoretical momentum to understand the relationship between exchange rates and inflation, several empirical studies have emerged, seeking to analyze the nature of this relationship. These studies have yielded varying results, due to differences in the economic context studied, as well as variations in the methodology and econometric models used in the analysis. In a recent study by (ROMANUS , 2024), which examines the Tanzanian

economy over the period from 1981 to 2018, using an Error Correction Model and Granger Causality Test, it was found that there is a relationship between the inflation rate and the exchange rate in Tanzania both in the short and long run. This was further confirmed by the results of the causality test. The study recommended the need to control inflation levels through the use and implementation of appropriate fiscal and monetary policies. It also emphasized the importance of maintaining inflation levels to promote sustainable economic growth in Tanzania.

In another recent study conducted by (Murat & Ayhan , 2023) the researchers aimed to examine the short and longterm relationship between exchange rates and inflation in five emerging economies, often referred to as the "Fragile Five," namely Brazil, Turkey, India, Indonesia, and South Africa. The study relied on monthly data from January 1990 to December 2020. The results revealed the existence of a long term equilibrium relationship between exchange rates and inflation rates in all the countries under study. Additionally, the study found an important conclusion that the long-term effect of exchange rates on inflation differs from country to country. Specifically, exchange rates did not have a statistically significant impact on inflation in Brazil, Turkey, and India, whereas a significant and clear effect of exchange rates on inflation was recorded in Indonesia and South Africa

Another study by (Dzul & Hooi , 2021) explored the asymmetric effects of oil prices and exchange rates on inflation in three Southeast Asian countries: Indonesia, Malaysia, and Thailand. The findings revealed that, across all countries studied, increases in oil prices exerted a greater influence on the Producer Price Index (PPI) than on the Consumer Price Index (CPI). Moreover, the study highlighted that exchange rate appreciation plays a significant role in affecting both CPI and PPI in these countries. Similarly, (Sanam & Fetullah , 2017) examined the Iranian economy to assess the impacts of money supply and exchange rates on inflation. Their results demonstrated a positive relationship between both variables and inflation, with the money supply emerging as the most significant factor in explaining fluctuations in the inflation rate

(Besnik , Paul , Agron , & Ariana , 2016) also concluded, through their study on the case of Balkan countries, which aimed to assess the extent to which fixed exchange rate regimes affect inflation outcomes, that exchange rates are the primary driver of inflationary pressures. The study recommended the necessity of carefully evaluating the potential advantages and disadvantages of adopting a flexible exchange rate regime in small open economies. In a separate study (Phuc , Nguyen, Jen, & Tarlok , 2014) examined the relationship between different exchange rate regimes and inflation in Vietnam during the period 1992–2010. Using the Generalized Method of Moments (GMM) approach, the study ultimately confirmed the notion that persistent inflation in the Vietnamese economy stems from the adoption of a flexible exchange rate regime.

As for the channels through which oil prices affect inflation, they depend on several factors, most notably whether a country is an oil exporter or importer. The revenue channel, as well as the exchange rate, are considered important factors in transmitting the impact of oil price fluctuations to domestic prices in oil-exporting countries. The contributions of James D. Hamilton are regarded as pioneering works in this field, with one of his most renowned studies being the one conducted in 1983, which is considered among the first studies to examine the relationship between oil prices and overall economic activity (Hamilton, 1983). This study is viewed as a starting point for many researchers in the literature of macroeconomics and energy,

through the examination of the impact of oil prices on various macroeconomic indicators such as growth, unemployment, inflation, and economic stability.

In continuation of this, many studies have emerged that focus on the impact of oil price transmission. One such study is that of (Hooker, 2002), which applied to the U.S. economy and examined the question of whether oil price shocks have inflationary effects within the Phillips Curve framework, while considering asymmetry, nonlinearity, and structural breaks. The study reached an important conclusion that changes in oil prices before 1980 significantly and directly contributed to core inflation. However, after 1980, the effect of oil price changes on core inflation became very limited, or nearly nonexistent.

In another recent study by (Elsherif, 2024), quarterly data was used to examine the dynamic impact of oil price shocks on inflation in the OAPC countries over the period from 1990 to 2022. The study found a significant positive impact of oil prices on inflation in the countries under study, with variations in the magnitude, persistence, and overall effect. The study attributed these differences to the exchange rate regimes adopted, the structure of monetary policy, and the degree of openness to global markets.

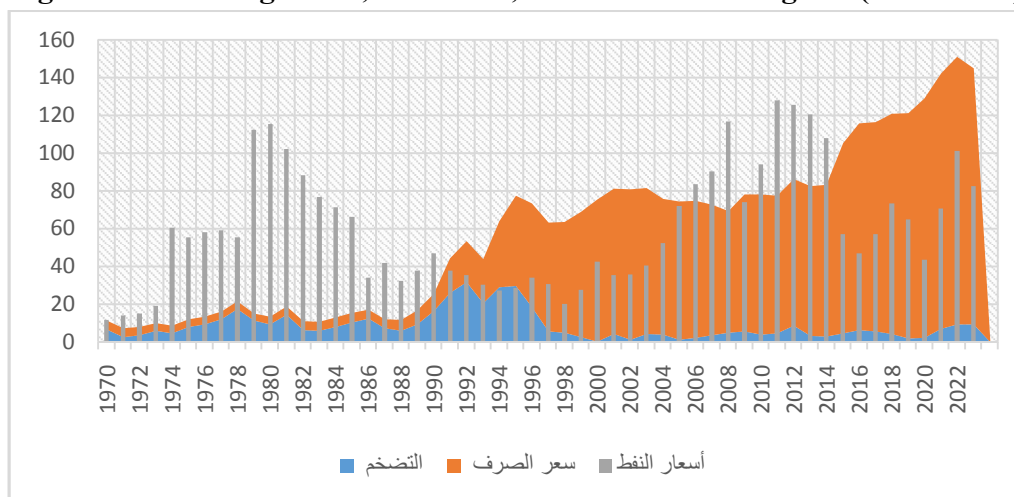
(Miguel & Jorge, 2025) also investigated how global energy price fluctuations affect firms' expectations in Uruguay, using monthly data from October 2009 to December 2023 and applying several econometric techniques, such as panel models and impulse response functions. The study found a statistically significant relationship between global energy price shocks and inflation expectations among firms in Uruguay, and that inflation expectations are strongly linked to domestic energy pricing policies.

(David, Mukhriz Izraf, & Ido, 2023) focused on examining the interaction between oil price shocks and inflation, taking into account the repercussions of the COVID-19 pandemic in the Association of Southeast Asian Nations (ASEAN). The study relied on a robust dataset of monthly data covering the period from 1987 to 2022. The findings indicated that oil-specific demand shocks as well as aggregate demand shocks have a significant impact on inflation in Malaysia, Singapore, Thailand, the Philippines, and Japan. The study also revealed that inflation responds asymmetrically to oil price shocks and that the COVID-19 pandemic is the main driver of the inflationary effects of these shocks.

In another study (Kamal, Franklin, & Hem, 2025) measured the impact of oil price fluctuations on several macroeconomic variables namely: real GDP, inflation, and the real exchange rate in a sample of Eastern European countries: Bulgaria, the Czech Republic, and Hungary. The main finding of the study indicated that the effects of oil price shocks vary across countries. While there was a clear impact of these shocks on real GDP in some countries, such as Hungary, the effects of oil price shocks were more pronounced on inflation and the real exchange rate in other countries, specifically Bulgaria and the Czech Republic.

3. Trends of Inflation in Algeria: An Overview of the Period 1970–2023

The exchange rate, oil prices, and inflation are considered key macroeconomic indicators. In Algeria, these indicators have undergone significant changes and structural shifts, influenced by the evolution of the economic environment and numerous internal and external factors including oil shocks, changes in economic policies, and various monetary reforms. The following figure illustrates the developments of the aforementioned variables over time.

Figure 01. Exchange Rate, Oil Prices, and Inflation in Algeria (1970–2023)

Source : Compiled by the researcher

In this section, we aim to examine the evolution of inflation in Algeria during the period under study (1970-2023), focusing on the main trends and the key factors influencing it. This will be done by linking these developments to the characteristics of the economic environment and its key milestones, particularly those related to exchange rate developments and oil prices. Based on this, we can distinguish the following periods:

The period from 1970 to 1989: The economic policy direction in Algeria during this period was based on a centralized planning system. During these years, the economic strategies aimed at boosting national economic growth required massive financial resources. This led the public authorities to adopt a policy of monetary issuance, as it was seen as the only way to provide the necessary funding to drive development, given the shortage of domestic savings to finance the required investments. Consequently, inflation rates experienced steady growth, rising from 6.5% in 1970 to a peak of 17.52% in 1978. Despite some improvement at the beginning of the 1980s, when inflation rates saw a slight decline, this trend did not last. Inflation rose again significantly in the second half of the 1980s, particularly in 1986, in parallel with the oil shock, reaching an inflation rate of about 12%.

The period from 1990 to 1999: This phase was crucial in the history of the Algerian economy, marked by numerous economic and political developments due to the security crises as well as the ongoing restructuring efforts that affected most sectors of the national economy as part of the shift towards a market economy. Additionally, the various economic reform programs adopted by Algeria in the early 1990s under the supervision of the International Monetary Fund played a significant role in rebuilding the economic structure. Most economic indicators saw a decline during this period, such as the exchange rate, which steadily decreased from 8.95 in 1990 to 66.57 in 1999, coupled with the continued decline in oil prices, the primary source of state revenue. As a result, inflationary pressures intensified, and living standards worsened, with inflation reaching a record high of 31.66% in 1992.

The period from 2000 to 2014: The difficult situation of the national economy during the previous phase began to improve during this period, which was marked by a rise in oil prices surpassing the \$120 mark, contributing to the restoration of the economy to the right path. As a result, several development programs were implemented at the macroeconomic level.

Consequently, inflation rates saw a significant decline starting from the year 2000, remaining relatively balanced and stable, reaching their lowest level during this period at 1.4% in 2005.

The period from 2015 to 2023: This period can be characterized as a phase of renewed inflationary pressures. During this time, the inflation rate fluctuated between increases and decreases, largely due to the decline in global oil prices, which resulted in a depreciation of the Algerian dinar. Moreover, monetary expansion through money printing and the financing of the government deficit further exacerbated inflationary pressures. These dynamics were accompanied by rising prices of food and services, driven by a decline in purchasing power. As a result, the inflation rate stood at 4.78% in 2015, rose to 6.4% in the following year, and exceeded 9% in both 2022 and 2023.

4. Methodology

In order to examine the impact of exchange rate fluctuations and oil price volatility on domestic inflation in Algeria, and to build an econometric model that contributes to analyzing and understanding the nature of the relationship between the variables under study and obtaining statistically significant results, this study relies on a set of time series analysis techniques, while avoiding delving into complex econometric details. The nature of this analysis requires following a specific methodology consisting of a series of sequential steps.

Pierre Perron, renowned for his pioneering contributions to unit root testing and structural breaks in time series analysis, was the first to introduce the concept of structural breaks through his seminal study "The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis" (Perron, 1989). Perron argued that ignoring such structural shocks could lead to misleading results when examining the stationarity of time series data. Subsequently, Zivot and Andrews were the first to systematically address the idea of structural breaks in time series and introduced their well-known test (Zivot & Andrews, 1992) to detect the presence of a unit root in time series data while allowing for one unknown structural break in the dataset. This is the test that will be employed in the current study.

After determining the order of cointegration for each variable, the next step involves examining the longrun equilibrium relationship between the variables by applying the test proposed by (Gregory & Hansen, 1996). This test serves as an effective methodological tool for analyzing longterm relationships between economic variables, especially in cases where potential structural breaks caused by external shocks or fundamental shifts in the economic environment are incorporated into the analysis. It is worth noting that this test includes four different models. The first model assumes that the structural break affects only the intercept. In the second model, it is assumed that the structural break influences the intercept in the presence of a deterministic time trend. In the third model, the effect of the structural break extends to both the intercept and the coefficients of the independent variables. Meanwhile, in the fourth model, the structural break affects the intercept, the deterministic trend, as well as the coefficients of the independent variables. These models can be expressed as follows :

$$\begin{aligned}
 \text{(C)} y_t &= \mu_1 + \mu_2 D_t + \beta x_t + \mu_t \\
 \text{(C/T)} y_t &= \mu_1 + \mu_2 D_t + \beta x_t + \gamma_t + \mu_t \\
 \text{(C/S)} y_t &= \mu_1 + \mu_2 D_t + \beta_1 x_t + \beta_2 (x_t \times D_t) + \mu_t \\
 \text{(C/S/T)} y_t &= \mu_1 + \mu_2 D_t + \beta_1 x_t + \beta_2 (x_t \times D_t) + \gamma_t + \mu_t
 \end{aligned}$$

Where Y_t is the dependent variable, X_t is the vector of independent variables, μ_t is the error term, and D_t is a dummy variable that takes the value 0 before the structural break and the value 1 after it, i.e :

If we are able to establish a stable longterm equilibrium relationship between the exchange rate, oil prices, and inflation, the next step involves estimating the long- and short-run parameters. In this context, it is important to note that there are some cointegration regression techniques, such as the Fully Modified Ordinary Least Squares (FMOLS) method and the Dynamic Ordinary Least Squares (DOLS) method, which are efficient and allow us to obtain accurate estimates of the long-run relationship parameters. Finally, the results will be analyzed and discussed. Since every econometric study requires a minimum amount of data, this study relies on an annual dataset for the period from 1970 to 2023. The data for inflation and exchange rates were obtained from the World Bank's national accounts, while the oil price data was sourced from the Statistical Review of World Energy

5. Results and Discussion

In accordance with the methodology previously outlined, the first step consists of testing the stationarity properties of the variables under study to ascertain whether they are stationary at levels or after first differencing, following a transformation into natural logarithms. The goal of this procedure is to reduce variance and achieve homogeneity across the data. As a preliminary stage, we employed two commonly used unit root tests, as recommended by Enders : Dickey & Fuller and Phillips & Perron test.

The results obtained, as shown in Tables 1 and 2, indicate that the three variables are integrated of order one. By comparing the computed value for each test with the critical value from the table, we can easily conclude that the three variables are not stationary at the level. However, after taking the first differences, all the variables become stationary at the 5% significance level.

Table 01.Dickey & Fuller Test results

Variable	Level		FirstDifference	
	Intercept	Intercept&Trend	Intercept	Intercept&Trend
Exchange Rate	-0.46	-2.31	-4.4*	-4.41*
Oil Price	2.81-	-2.68	-6.90*	-6.89*
Inflation	-3.12	-3.35	-9.57*	-9.49*
Critical Values				
1%	-3.56	-4.14	-3.56	-4.14
5%	-2.91	-3.50	-2.91	-3.50

(**) ,(*)Statistically significant at the 1% and 5% levels, respectively.

Source : Compiled by the researcher using Eviews

Table 02.Phillips & Perron Test results

Variable	Level		FirstDifference	
	Intercept	Intercept&Trend	Intercept	Intercept&Trend
Exchange Rate	-0.46	-2.31	-4.4*	-4.41*
Oil Price	-2.81	-2.68	-6.89*	-6.89*
Inflation	-3.12	-3.35	-9.57*	-9.49*
Critical Values				
1%	-3.56	-4.14	-3.56	-4.14
5%	-2.91	-3.50	-2.91	-3.50

(**) ,(*)Statistically significant at the 1% and 5% levels, respectively.

Source : Compiled by the researcher using Eviews

What can be criticized about this type of stationarity tests is that they do not take into account the possibility of structural breaks. The presence of such characteristics in the data may affect the results of traditional unit root tests, leading to a bias towards failing to reject the null hypothesis. This is confirmed by Perron, who argues that most macroeconomic time series do not actually contain a unit root, but instead appear to do so only as a result of large shocks that the economy may experience.

Therefore, in the next step, we relied on another test that is relatively more recent compared to its predecessors, which focuses on the existence of an unknown structural break that is extracted directly from the data without being predetermined. This is the Zivot & Andrews test. Through this test, we aim to verify whether the behavior of some of the time series under study differs in terms of stationarity properties when structural breaks are taken into account. The results obtained are presented in the following table.

Table 03. Zivot & Andrews Test results

Variable	Models		
	I	II	III
Exchange Rate	-5.58*	-2.99	-5.96*
Break date	1991	1997	1991
Oil Price	-3.64	-3.03	3.53
Break date	1986	1996	2004
Inflation	-6.01*	-4.85*	-5.95*
Break date	1997	1997	1997
Critical Values			
5%	-4.93	-4.42	-5.08

*Acceptance of the null hypothesis at the 5% significance level.

Source : Compiled by the researcher using Eviews

In this context, we test the null hypothesis, which posits that the series contains a unit root with the presence of a structural break. This hypothesis is rejected only when the test statistic exceeds the critical values at the desired significance level for the three models. In the first

model, a structural break is present in the intercept only; in the second model, the break occurs in the trend; while in the third model, the structural break is present in both the intercept and the trend. Referring to the results presented in the table above, it appears that the null hypothesis cannot be rejected for the inflation and exchange rate series, as the computed ZA test statistics are lower than the critical values at the 5% significance level. This indicates that both the inflation and exchange rate series are stationary with the presence of a structural break corresponding to the years 1991 and 1997. These years coincided with significant events that marked the trajectory of economic policy in Algeria, starting with the transition to a free market economy and the subsequent implementation of various economic reform programs in collaboration with the International Monetary Fund (IMF). These reforms played a pivotal role in reshaping the country's economic structure. All of these factors strongly support the argument that these years are valid candidates to represent structural breakpoints.

These results allow us to proceed to the next stage, which involves analyzing the longterm interactions between the variables under study and checking for the presence of a stable relationship among them. It is important to note that the non-stationarity of the time series does not necessarily imply the absence of a long-term relationship between the variables. In this context, we rely on the test mentioned earlier, the Gregory & Hansen (1996) test, which is distinguished by its ability to detect the existence of a cointegrating relationship between I(1) integrated variables while allowing for the presence of a single unknown structural break. This makes it more accurate and suitable compared to traditional tests in such cases.

The application of the test to the study variables according to the four models led to the discovery of a long-term equilibrium relationship between the exchange rate, oil prices, and inflation, particularly for the first and second models. The calculated values of the test statistics (ADF, Zt, and Za) were significant at the 5% level. This indicates the rejection of the null hypothesis of no cointegration and the acceptance of the alternative hypothesis, which suggests the existence of a long-term equilibrium relationship between the variables. As for the dates of the structural breaks, they ranged between 1996 and 1998, with the year 1997 standing out as a year of structural transformation. The results are shown in Table 4 below.

Table 04. Gregory & Hansen Test results

Model	ADF	TB	Zt	TB	Za	TB
C	-6.29*	1998	-7.22*	1997	-54.03*	1997
C/ T	-7.21*	1997	-7.28*	1997	-54.07*	1997
C/S	3.55	1998	-7.28*	1997	54.27	1997
C/S/T	-6.96*	1996	-7.03*	1996	-52.03	1996

* Indicates that there is cointegration at the 5% significance level

TB: Indicates the date of the structural break.

Source : Compiled by the researcher using Stata.

Based on this, and given that cointegration has been established, understanding the longterm relationship coefficient between the variables under study is crucial. To obtain optimal estimates for the cointegrating regression, we relied on the Fully Modified Ordinary Least Squares (FMOLS) method as well as the Dynamic Ordinary Least Squares (DOLS) method. It is

worth mentioning that we used the estimation results of the second model from the models proposed in the Gregory & Hansen methodology. This model allows for a break in both the intercept and the trend, making it more comprehensive than the first model. Additionally, a dummy variable was added to account for structural changes or structural breaks, which takes the value of 0 before the break date (i.e., before 1997) and the value of 1 afterward, along with a trend.

Table 05. FMOLS & DOLS Estimation Results

Variable	FMOLSDOLS			
	Coefficient	t-statistic	Coefficient	t-statistic
Exchange Rate	0.51	2.55*	0.77	2.97*
Oil Price	0.44	2.72*	0.75	4.03*
D ₁₉₉₇	-2.87	-9.06*	-3.49	-6.58*
Trend	0.01	0.88	0.005	0.29
C	-0.50	-0.65	-2.08	-2.29*

*Significant at the 1% level.

Source :Compiled by the researcher using Eviews

The estimation results according to both methods were close and consistent in terms of the sign and magnitude of the estimated coefficients, aligning with what is expected for the Algerian economy. These results indicate that the exchange rate has a positive effect on inflation in the long run at the 1% significance level. The same applies to the impact of oil prices, which also had a positive relationship with inflation in the long run at the 1% significance level. These findings are consistent with the conclusions of several studies that have focused on the impact of exchange rate pass-through or oil price effects on domestic prices, especially in developing countries with high import openness like Algeria, as demonstrated in the study by (Laurent , Moustapha, Hamza , & Saad , 2024)and (Ha, Stocker, & Yilmazkuday, 2019).

The explanation for the positive effect of the exchange rate on inflation in the case of the Algerian economy can be attributed to two main factors. The first is related to imported inflation. An increase in the exchange rate, i.e., a decrease in the value of the local currency against foreign currencies, tends to create inflationary pressures through the imported inflation channel. This arises due to the increase in import prices, given Algeria's open economy and its heavy reliance on imports. Therefore, any decline in the value of the local currency directly contributes to an increase in production and consumption costs in the domestic market, thus raising the inflation rate. The second factor is related to monetary inflation, which can occur due to a positive shock in the exchange rate. An increase in the exchange rate means higher demand for foreign currencies relative to the local currency, which creates inflationary pressures due to the depreciation of the local currency.

As for the positive effect of oil prices on inflation in the Algerian economy, it reflects the structure of the economy, which is of a rentier nature. Oil revenues remain a key factor in the formation of public revenues and an important source of foreign currency. An increase in oil prices is usually accompanied by an improvement in public finance indicators. As a result of higher revenues, it becomes possible to follow an expansionary fiscal policy through the

government spending channel, which is the primary driver of aggregate demand in the Algerian economy, whether through increases in wages, subsidies, or public investments. This expansion in spending, in turn, stimulates aggregate demand. Given the limited domestic supply due to the stagnation of the production apparatus in Algeria and its lack of flexibility, this increase ultimately translates into inflationary pressures and a rise in the general price level.

Another important point revealed by the estimation results is that the effect of the dummy variable, which represents the structural break, had a strong and statistically significant negative impact on inflation. This means that the behavior of inflation was different before and after the structural break. This result reflects the effectiveness of the reforms initiated by Algeria during this period, following the sharp price increases in the early 1990s. It became essential to restore the economic situation to a correct path, which led to the adoption of a series of reform programs that primarily aimed at stabilizing prices. Among the most notable of these were the stabilization and economic reform programs that Algeria adopted under the supervision of the International Monetary Fund, followed by policies of price liberalization and efforts to improve public finance, along with the partial liberalization of the exchange rate market. All of these factors positively contributed to curbing inflationary pressures and directing prices toward long-term stability.

6. Conclusion

This study aimed to investigate the longrun relationship between the exchange rate, oil prices, and inflation in the Algerian economy during the period 1970–2023. This was done through a new perspective that takes into account the impact of structural breaks on the characteristics of the time series. To this end, several econometric contributions were employed, such as the traditional unit root tests of Dickey & Fuller and Phillips & Perron, in addition to the Zivot & Andrews test, which is distinguished from the former tests by its ability to detect the effect of structural breaks. Based on this, we tested the long-run equilibrium relationship between the aforementioned variables using the Gregory & Hansen methodology, with the aim of obtaining statistically significant results

The main findings of the study indicate that the exchange rate and oil prices are key determinants that help explain the dynamics of inflation. The relationship between inflation and the exchange rate on one hand, and inflation and oil prices on the other hand, is found to be positive, as revealed by the estimation results using both the Fully Modified Ordinary Least Squares (FMOLS) method and the Dynamic Ordinary Least Squares (DOLS) method. These findings are consistent with theoretical expectations and the structure of the Algerian economy. Furthermore, the results of the Gregory & Hansen cointegration test confirm the existence of a stable long-run relationship between inflation, the exchange rate, and oil prices, which supports the validity of the proposed hypotheses.

Based on these findings, the study recommends the adoption of effective economic policies to mitigate the impact of exchange rate fluctuations and oil prices, directing them towards achieving controlled levels of inflation. This can be done by activating mechanisms to regulate the exchange rate market to ensure relative stability and reduce sharp fluctuations. In addition, supporting domestic production to reduce dependence on imports and promoting economic diversification is essential to mitigate the effects of imported inflation. The most critical factor remains the effective implementation of economic policies and the creation of

synergies among them, with a focus on enhancing the efficiency of monetary and fiscal policies by controlling money supply and developing effective tools to alleviate inflationary pressures resulting from exchange rate fluctuations. Furthermore, balanced fiscal policies should be implemented, taking into account external shocks and ensuring a stable and investment-friendly economic environment.

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7. Appendices

Appendix 1. Results of FMOLS

Dependent Variable: LINF				
Method: Fully Modified Least Squares (FMOLS)				
Sample (adjusted): 1971 2023				
Included observations: 53 after adjustments				
Cointegrating equation deterministics: C @TREND				
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTC	0.513015	0.200525	2.558361	0.0137
LOP	0.445516	0.163726	2.721113	0.0090
D1997	-2.874575	0.316993	-9.068268	0.0000
C	-0.507028	0.771285	-0.657382	0.5141
@TREND	0.014335	0.016155	0.887349	0.3793
R-squared	0.598895	Mean dependent var		1.832197
Adjusted R-squared	0.565469	S.D. dependent var		0.855175
S.E. of regression	0.563723	Sum squared resid		15.25359
Long-run variance	0.236159			

Appendix 1. Results of DOLS

Dependent Variable: LINF				
Method: Dynamic Least Squares (DOLS)				
Sample (adjusted): 1972 2022				
Included observations: 51 after adjustments				
Cointegrating equation deterministics: C @TREND				
Fixed leads and lags specification (lead=1, lag=1)				
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTC	0.770765	0.259483	2.970393	0.0052
LOP	0.754327	0.187096	4.031776	0.0003
D1997	-3.491915	0.530173	-6.586373	0.0000
C	-2.080226	0.906434	-2.294957	0.0275
@TREND	0.005098	0.017518	0.291011	0.7727
R-squared	0.748461	Mean dependent var		1.841340
Adjusted R-squared	0.660082	S.D. dependent var		0.861553
S.E. of regression	0.502306	Sum squared resid		9.335535
Long-run variance	0.162731			

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