

Unraveling Inflation in Algeria: The Impact of Monetary and Non-Monetary Forces

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Abstract :

This study investigates the factors influencing inflation in Algeria, comparing the impact of monetary elements such as money supply and exchange rates with non-monetary factors like unemployment, global oil prices, and GDP growth. Analyzing annual data from 1970 to 2022 through advanced quantitative methods, including lagged variables and scenario simulations, the research reveals that both monetary and non-monetary factors significantly affect inflation. Exchange rates and GDP growth are identified as key determinants. The scenario analysis highlights the economy's sensitivity to external shocks and demonstrates how different economic conditions can lead to varying inflation outcomes. The study offers crucial insights for policymakers, advocating for a holistic approach that integrates both monetary and non-monetary measures to improve price stability and economic resilience in Algeria.

Keywords: Algeria, Inflation, Monetary factors, non-monetary factors.

Jel Classification Codes: E31, E52

Introduction:

Algeria's economy underwent significant reforms and structural adjustments during the 1990s, which led to a marked increase in inflation, with rates averaging

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approximately 20% per annum from the late 1980s through the 1990s¹. This period of high inflation was largely driven by the challenges associated with these economic transitions. However, in the 2000s, inflation rates declined substantially, averaging around 4 to 5%. This reduction can be primarily attributed to a surge in oil revenues, which were pivotal to the Algerian economy, accounting for over 97% of the nation's exports and contributing between 50% and 70% of government revenues during this time.² Nevertheless, after 2010, inflationary pressures began to resurface, with rates rising above 7%, surpassing the levels observed in the previous decade.³

The economic discourse surrounding Algeria's inflation dynamics has sparked considerable debate, particularly regarding the roles of monetary factors—such as money supply and exchange rates—versus non-monetary factors like unemployment and global oil prices. In Algeria's oil-dependent economy, the evidence on these relationships remains inconclusive. While some studies suggest a correlation between money supply and inflation.⁴⁵⁶⁷

Others provide conflicting results.⁸⁹¹⁰¹¹ Similarly, although exchange rates are posited to influence inflation, their impact appears to be negative but statistically insignificant in studies of similar economies. Traditional economic

¹ Fatiha Talahite, 'Monetary Policy in Algeria (1999–2019): An Economic and Monetary History Approach', *Economic and Monetary Sovereignty in 21st Century Africa*, 2021, p 3.

² Imène Laourari and Mustapha Abderrahim, 'Inflation Dynamics and Determinants in Algeria: An Empirical Investigation', Washington DC: World Bank Group, 2022, p 3.

³ Abdelaziz Taiba, Nacer eddine Karaachira, and Sarra Bouguesri, 'Influence of Inflation on Output Fluctuations: Empirical Study in Case of Algeria Using ARDL Model', *Les Cahiers Du Cread*, 37.2 (2021), p 106.

⁴ Karim Aggoune and Halim Zidelkhal, 'Understanding Inflation in Algeria between 2000 and 2021.', *Economic Studies Journal*, 18.2 (2024).

⁵ Amirouche Chelghoum, Fayçal Boumizez, and Mouyad Alsamara, 'Asymmetric Effects of Oil Price Shocks on the Demand for Money in Algeria', *The Quarterly Review of Economics and Finance*, 89 (2023).

⁶ MUSTAPHA DJABALLAH, 'The Nexus of Monetary Policy Tools and Inflation in Algeria: Whether Structural Break or Unit Root?', *Studies of Applied Economics*, 40.3 (2022) <https://www.researchgate.net/profile/Djaballah-Mustapha/publication/363645296_The_Nexus_of_Monetary_Policy_Tools_and_Inflation_in_Algeria_Whether_Structural_Break_or_Unit_Root/links/63273f32873eca0c0098d719/The-Nexus-of-Monetary-Policy-Tools-and-Inflation-in-Algeria-Whether-Structural-Break-or-Unit-Root.pdf> [accessed 7 September 2024].

⁷ Laourari and Abderrahim, Op cit,

⁸ Aggoune and Zidelkhal.

⁹ Imane Senouci Bereksi, Manel Attouchi, and Fatima Benbouziane, 'INVESTIGATING THE THE EFFECT OF BROAD MONEY SUPPLY ON ECONOMIC GROWTH IN ALGERIA: FRESH INSIGHTS FROM AUGMENTED LINEAR & NONLINEAR ARDL (1970-2021)', *The Journal of Contemporary Issues in Business and Government*, 30.1 (2024), pp. 436–56.

¹⁰ Mansour DECHERA and NourEddine BOUCHELAGHEM, 'A STUDY ECONOMETRIC ON THE IMPACT OF MONETARY POLICY-TOOLS ON ECONOMIC GROWTH IN ALGERIA DURING THE PERIOD USING THE ARDL MODEL-1990-2020.', *Journal of Economics & Finance* (2437-0630), 9.1 (2023) <<https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=24370630&AN=162456050&h=JjaUdbgQU24gf6LIHBz4sEn1emYrO6akJEyRfY%2FAXedDb%2FrPXeF5ssvONkx7GMIugZOqbsRsZDNq4t81ZND%2BhQ%3D%3D&crl=c>> [accessed 7 September 2024].

¹¹ Lilia Ghedabna, Khalid Litim, and Elouardi Chekroune, 'Causality Between Money Supply And Real Economic Growth In Algeria: An Econometric Study For The Period 1990-2022', *Journal of Namibian Studies: History Politics Culture*, 41 (2024), pp. 259–75.

theory, as represented by the Phillips curve, suggests an inverse relationship between unemployment and inflation. However, recent research focusing on North Africa identifies a unidirectional causality from inflation to unemployment, challenging this conventional wisdom. Given Algeria's status as a major oil exporter, global oil price fluctuations are also likely to exert asymmetric effects on domestic inflation.

In this context, the present study seeks to ascertain whether Algeria's inflationary pressures are more significantly influenced by monetary policy determinants—specifically, money supply and exchange rates—or by external non-monetary factors such as unemployment and global oil prices. The central research question is thus formulated: Is the phenomenon of inflation in Algeria driven predominantly by monetary or non-monetary determinants?

The study's hypotheses are as follows:

- Monetary Factors: The study hypothesizes that changes in money supply and exchange rates significantly influence inflation rates in Algeria.
- Non-Monetary Factors: The study hypothesizes that variables such as the unemployment rate and oil prices play critical roles in shaping Algeria's inflationary trends.

This research embarks on a comprehensive exploration of the intricate dynamics governing Algeria's inflation landscape. By disentangling the interplay between monetary and non-monetary forces, it aims to identify the core determinants of the nation's price stability. Employing rigorous quantitative analysis—including the use of correlation matrices and Python programming—the study will analyse annual data from 1970 to 2022, examining key variables suspected of influencing Algerian inflation rates. The dependent variable in this analysis is the inflation rate, while independent variables encompass both monetary factors (exchange rates and broad money supply growth) and non-monetary factors (unemployment rate, average annual oil prices, and GDP growth rate).

The dual objectives of the study are to: Determine the extent to which monetary policy instruments, such as money supply and exchange rates, impact Algeria's inflationary pressures. Illuminate the pivotal role of external non-monetary factors—particularly unemployment, global oil price dynamics, and economic growth—in influencing the trajectory of domestic inflation. By highlighting these critical pathways, the research aspires to provide policymakers and monetary authorities with actionable insights, enabling them to devise robust strategies that enhance price stability and economic resilience within Algeria's unique economic context.

The significance of this research lies in its methodological rigor, particularly its use of quantitative techniques to analyse a comprehensive dataset spanning over five decades. The findings are expected to deepen the understanding of the fundamental mechanisms driving Algerian inflation, thus offering valuable guidance for the development of targeted strategies to manage price instability.

The paper is structured as follows: Section 2 reviews the existing literature, Section 3 traces the evolution of key economic indicators and their impact on inflation, Section 4 outlines the research methods and data, Section 5 presents the empirical analysis and findings, and Section 6 concludes with a summary of key insights and policy recommendations.

1- Literature Review:

Inflation, in economic terms, is defined as a sustained increase in the general level of prices for goods and services within an economy over a period of time.¹ As prices rise, the purchasing power of each unit of currency diminishes, leading to a scenario where more money is required to purchase the same quantity of goods and services. Essentially, inflation reflects the general price level at a given time.² The implications of inflation are far-reaching, often exerting adverse effects on a country's economic growth and the overall well-being of its populace. A high inflation rate increases the cost of living, thereby impacting the standard of living. However, the phenomenon of inflation is intricate, subject to intense scrutiny and extensive research within both theoretical and empirical economic studies. Central to this inquiry is a longstanding debate regarding the primary drivers of inflationary pressures, with economists divided between those who attribute it primarily to monetary factors and those who emphasize the significance of non-monetary elements. On the monetary front, the role of money supply in shaping inflationary dynamics has been a focal point of economic analysis. The quantity theory of money posits that an increase in money supply, *ceteris paribus*, will inevitably lead to a proportional rise in the general price level over time.³ This theory is supported by numerous empirical studies, such as the seminal work by Cheng and Tan (2002), which established a positive correlation between money supply growth and inflation rates across various economies.⁴ However, conflicting evidence in the literature highlights the complexities of this relationship, suggesting that other confounding factors may also play a significant role.

Another key monetary variable under examination in inflation studies is the exchange rate. Research, including the analysis by Menji (2008) on the Ethiopian economy, has identified a negative relationship between the official exchange rate and inflation levels, suggesting that currency appreciation may exert a dampening effect on domestic inflationary pressures.⁵ However, a contrasting body of literature questions the substantive impact of exchange rate fluctuations on domestic price levels, arguing that their influence may be negligible or contingent on specific economic conditions. Shifting focus to non-monetary determinants, the unemployment rate has emerged as a pivotal factor in the inflation discourse, particularly due to its theoretical underpinnings in the Phillips curve. This curve suggests an inverse relationship between unemployment and inflation, implying that higher unemployment should correspond with lower inflationary pressures and vice versa. Yet, recent empirical studies, such as those by Sahnoun and

¹ Silvia Angelina and Nugi Mohammad Nugraha, 'Effects of Monetary Policy on Inflation and National Economy Based on Analysis of Bank Indonesia Annual Report', *Technium Soc. Sci. J.*, 10 (2020), p. 423.

² Laourari and Abderrahim, *Op. cit.*

³ Masudul Hasan Adil, Neeraj R. Hatekar, and Taniya Ghosh, 'The Role of Money in the Monetary Policy: A New Keynesian and New Monetarist Perspective', in *Environmental, Social, and Governance Perspectives on Economic Development in Asia* (Emerald Publishing Limited, 2021), pp. 37–67
<<https://www.emerald.com/insight/content/doi/10.1108/S1571-03862021000029A018/full/html>> [accessed 7 September 2024].

⁴ Ming-Yu Cheng and Hui-Boon Tan, 'Inflation in Malaysia', *International Journal of Social Economics*, 29.5 (2002), pp. 411–25.

⁵ Sisay Menji, 'Determinants of Recent Inflation in Ethiopia', 2008 <<https://mpr.ub.uni-muenchen.de/id/eprint/29668>> [accessed 7 September 2024].

Abdennadher (2019) in North Africa, challenge this conventional wisdom by revealing a unidirectional causal link running from inflation to unemployment rather than the reverse, thereby casting doubt on the validity of the Phillips curve in certain economic contexts.¹

For economies heavily reliant on natural resources, especially oil-exporting nations, global commodity prices have become a critical non-monetary factor influencing domestic inflationary dynamics. Bala and Chin (2018) conducted a comprehensive investigation into the asymmetric effects of oil price fluctuations on inflation in Algeria, Angola, Libya, and Nigeria, utilizing diverse oil price data sources, including country-specific prices, the OPEC reference basket, and the average of Brent, WTI, and Dubai crude prices.² Their findings consistently demonstrated that both positive and negative changes in oil prices exerted a positive impact on inflation rates, with a more pronounced effect during periods of declining oil prices. Additionally, the interplay between international trade dynamics, economic growth, and inflationary pressures has been extensively explored in the literature.

Ogasavara et al. (2016) highlighted the significance of export promotion policies aligned with Ricardo's principle of comparative advantage, where countries focus on producing goods and services that they can competitively offer in global markets.³ However, resource-rich economies like Algeria have struggled to diversify their exports beyond oil and gas, resulting in a rentier economy heavily reliant on hydrocarbon revenues, which may have profound implications for domestic price stability. This comprehensive review of the literature underscores the multifaceted and complex nature of inflation's determinants, which defy simplistic explanations. While monetary factors, such as money supply and exchange rates, have been extensively studied and their impact widely acknowledged, non-monetary factors like unemployment, global commodity prices, and trade dynamics have also garnered significant attention, particularly in the context of resource-dependent economies. Reconciling these diverse perspectives and quantifying their relative contributions to inflationary pressures remains a critical challenge for policymakers and researchers alike as they strive to develop effective strategies for promoting price stability and fostering sustainable economic growth.

This study adds significant value to the existing body of literature by providing a nuanced analysis of Algeria's inflation dynamics, specifically examining the relative influence of monetary versus non-monetary factors, including scenario analysis, to capture the complex interplay between key variables such as money supply, exchange rates, unemployment, oil prices, and GDP growth. The findings, particularly the impact of different economic scenarios on predicted inflation rates, offer valuable insights into how varying economic conditions can influence inflation in Algeria. This research contributes to the ongoing debate by

¹ Marwa Sahnoun and Chokri Abdennadher, 'Causality between Inflation, Economic Growth and Unemployment in North African Countries', *Economic Alternatives*, 1 (2019), pp. 77–92.

² Umar Bala and Lee Chin, 'Asymmetric Impacts of Oil Price on Inflation: An Empirical Study of African OPEC Member Countries', *Energies*, 11.11 (2018), p. 3017.

³ Mário Henrique Ogasavara, Dirk Michael Boehe, and Luciano Barin Cruz, 'Experience, Resources and Export Market Performance', *International Marketing Review*, 33.6 (2016), pp. 867–93, doi:10.1108/IMR-10-2013-0247.

demonstrating that while monetary factors like money supply and exchange rates are important, non-monetary factors, especially oil prices and GDP growth, play a critical role in shaping inflationary pressures. By providing a detailed examination of these dynamics, the study equips policymakers with actionable insights, enabling more informed decision-making to ensure price stability and economic resilience in Algeria's unique economic context.

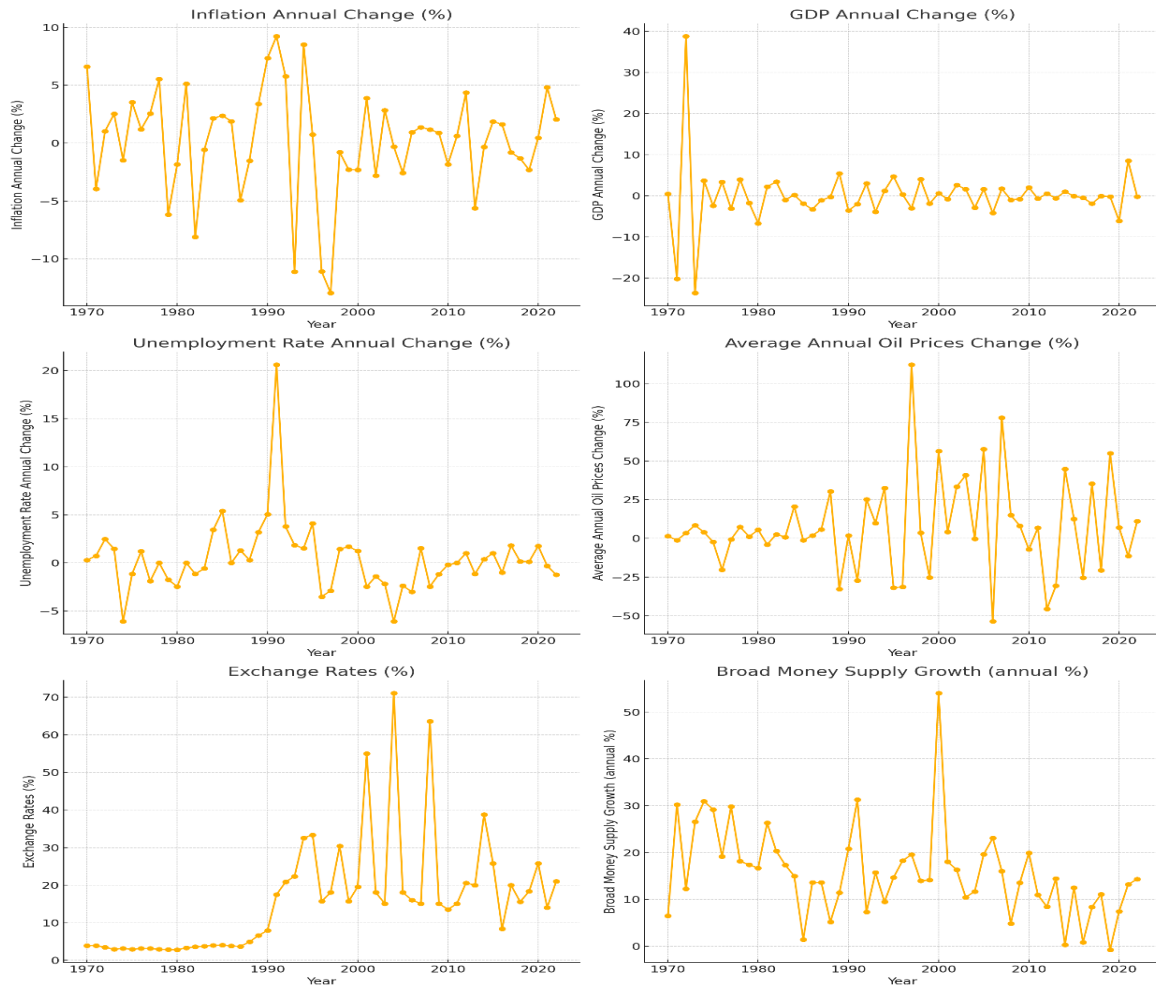
2. Evolution of Economic Indicators and Their Impact on Inflation

The fig (1) offers a comprehensive view of Algeria's economic dynamics over several decades. The inflation data shows significant volatility, particularly during the late 1980s and early 1990s, suggesting a period of economic instability. This could be linked to structural adjustment programs or shifts in economic policy that disrupted the economy, leading to high inflation. The relative stabilization of inflation in the 2000s may reflect the benefits of increased oil revenues, which provided a buffer against inflationary pressures. However, the renewed spikes in inflation after 2010 point to ongoing economic challenges, potentially linked to global economic crises, fluctuating oil prices, or internal economic issues.

The GDP growth rate also shows considerable fluctuation, especially around the 1980s and early 1990s, indicating periods of economic boom and bust. The dramatic spike in the early 1980s likely corresponds with a surge in oil prices, leading to temporary economic prosperity. However, the subsequent volatility reflects the economy's sensitivity to external shocks and internal mismanagement. The more subdued and stable growth in the post-2000 period suggests a maturing economy, with consistent but lower growth rates possibly due to stabilization in oil revenues and more prudent economic policies. The unemployment rate graph reveals significant variability, with a notable spike in the early 1990s. This surge could be tied to economic restructuring and layoffs during Algeria's transition from a state-controlled to a more market-oriented economy. The absence of a clear downward trend in unemployment indicates persistent structural issues in the labour market, such as mismatches between the skills of the workforce and job opportunities.

The graph of average annual oil prices highlights the inherent volatility of global oil markets. The sharp fluctuations reflect the impact of geopolitical tensions, supply shocks, and changes in global demand. For an oil-dependent economy like Algeria, these fluctuations directly influence national revenues and, by extension, inflation and economic growth. The volatility in oil prices, particularly sharp declines, likely had severe negative impacts on the economy, exacerbating inflation and unemployment during downturns. Exchange rates show substantial fluctuations, especially during the 1990s and 2000s, likely due to efforts to manage the currency in response to economic crises or inflationary pressures. The relative stability of exchange rates post-2010 may indicate more effective monetary policies or a pegged exchange rate system. The weak correlation between exchange rate fluctuations and inflation suggests that inflation in Algeria may be more influenced by domestic factors or other international influences not captured by exchange rate movements alone. The broad money supply growth graph reveals significant variability, particularly in the 1980s and 1990s, reflecting attempts by the central bank to manage inflation and stimulate the economy during periods of crisis. The weak negative correlation between money supply growth and inflation

suggests that monetary supply alone does not drive inflation in Algeria, possibly



due to effective monetary controls or the overriding influence of other factors such as oil prices and government spending.

Fig N°(01) : Decadal Trends in Economic Indicators in Algeria (1970-2022)

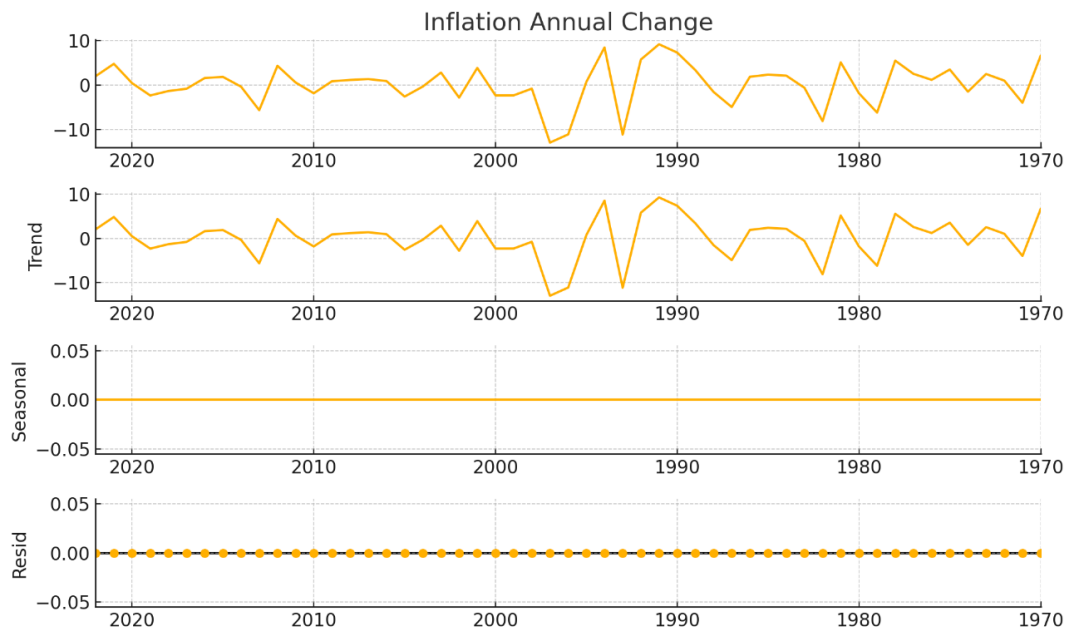
Source: Created by the authors using Python- 3.12.3.

The time series decomposition of the "Inflation Annual Change" in fig (02) breaks down the inflation data into its trend, seasonal, and residual components, providing a clearer view of the underlying dynamics.

The trend component reveals the long-term movement in inflation, smoothing out short-term fluctuations to show the overall direction of inflation over time. The graph highlights significant periods of volatility, particularly during the 1980s and 1990s, where sharp increases in inflation likely correspond to periods of economic instability. These could be linked to global oil price shocks or domestic economic adjustments. The more stable trend seen post-2000 suggests that Algeria may have implemented more effective economic policies or benefited from more consistent oil revenues, leading to a more controlled inflationary environment. However, the continued fluctuations indicate ongoing challenges in

maintaining consistent economic stability. The seasonal component in the decomposition is flat, indicating no significant seasonal variation in the inflation data. This lack of seasonality suggests that inflation in Algeria does not follow a regular, predictable pattern within the year and is instead influenced by non-seasonal factors. The absence of seasonality simplifies the analysis by allowing a focus on structural and long-term influences on inflation rather than on short-term seasonal effects. The residual component, representing the unexplained variance after accounting for the trend and seasonality, shows minimal fluctuation. This indicates that the model used to decompose the inflation data is a good fit, capturing most of the variation within the trend component. The minimal residuals suggest that few unexplained shocks affect inflation, implying that inflation in Algeria is predominantly driven by long-term trends rather than by random, unpredictable events.

Overall, the decomposition of the "Inflation Annual Change" time series indicates that Algeria's inflation is largely influenced by long-term trends, with little to no impact from seasonal factors or unexplained residuals. The trend component underscores periods of significant economic volatility, particularly in the 1980s and 1990s, while the post-2000 period shows a more stabilized inflation



environment. The absence of a strong seasonal pattern suggests that external shocks and internal policy decisions, rather than regular seasonal changes, play a more critical role in influencing inflation.

Fig N°(02) : The time series decomposition of the Inflation Annual Change

Source: Created by the authors using Python- 3.12.3.

A correlation matrix is a quantitative method that measures how closely

related two variables are.¹ It provides a simple and efficient way to study the strength and direction (positive or negative) of linear relationships between pairs of variables. In the context of our study on the determinants of inflation in Algeria. The correlation matrix simplifies the process of identifying potential relationships among multiple variables, which is particularly useful when dealing with complex economic phenomena like inflation.²

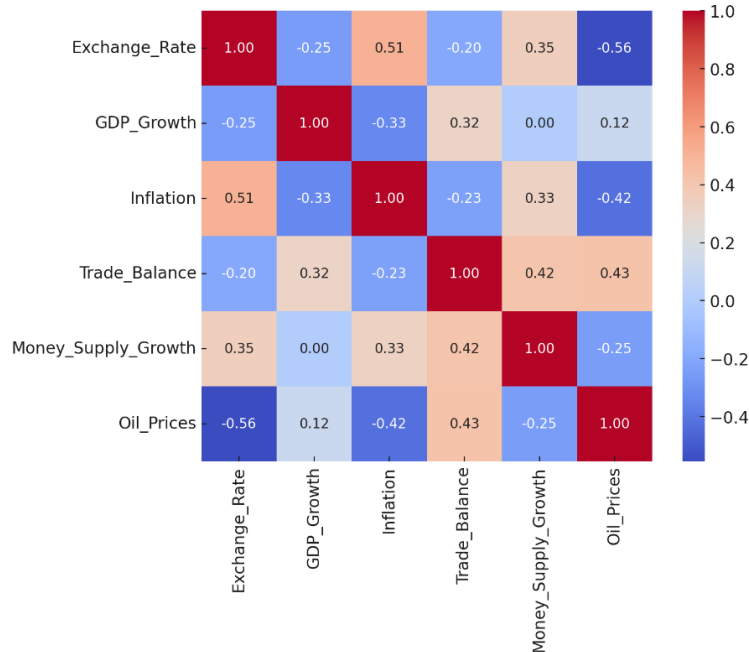
The study also integrates a robust examination of external shocks and economic policies using econometric models to further understand their impact on inflation. This dual approach ensures a thorough analysis of the interplay between domestic economic policies and global economic events, offering insights into the complex dynamics that govern inflation in an oil-dependent economy like Algeria.

The heatmap in fig (03) reveals several important relationships among Algeria's economic indicators. There is a moderate positive correlation between the exchange rate and inflation, indicating that a weaker currency is associated with higher inflation, likely due to increased import costs. Conversely, a negative correlation between oil prices and both the exchange rate and inflation suggests that higher oil prices strengthen the currency and help control inflation, possibly through increased export revenues and government subsidies. The negative correlation between inflation and GDP growth implies that higher inflation may hinder economic performance. Additionally, the positive correlation between money supply growth and inflation supports the idea that expanding the money supply can lead to higher prices. The positive relationship between oil prices and the trade balance highlights the critical role of oil exports in maintaining Algeria's economic stability. Overall, these correlations emphasize the significant influence of oil prices on the country's economic dynamics and the interconnectedness of these key variables.

¹ Michael Friendly, 'Corrgrams: Exploratory Displays for Correlation Matrices', *The American Statistician*, 56.4 (2002), p 319.

² Theodoros Kyriazos and Mary Poga, 'Dealing with Multicollinearity in Factor Analysis: The Problem, Detections, and Solutions', *Open Journal of Statistics*, 13.3 (2023), p 404.

Fig N°(03) : The correlation matrix



Source: Created by the authors using Python- 3.12.3.

3. Research methods

3.1 Methodology

This study employs a rigorous quantitative approach to investigate the determinants of inflation in Algeria, focusing on both monetary and non-monetary factors. The analysis covers annual data from 1970 to 2022, encompassing key variables that are hypothesized to influence inflation in Algeria. The dependent variable in the study is the inflation rate, while the independent variables include monetary factors (money supply growth and exchange rates) and non-monetary factors (unemployment rate, average annual oil prices, and GDP growth rate). The table 1 outlines the variables that will be analyzed in our study.

3.2 Variables and Data

Table N°(01) :Variables and Data

Category	Type of Variable	Period	Source
Dependent Variable			
Inflation Rate (annual %)	Economic Indicator	1970-2022	Statista
Independent Variable			
Exchange Rates (annual %)	Monetary Variables	1970-2022	ONS
Money supply growth (annual %)	Monetary Variables	1970-2022	Bank of Algeria
Unemployment Rate (annual %)	Non-Monetary Variables	1970-2022	World bank

Average annual Oil Prices (annual %)	Non-Monetary Variables	1970-2022	Macrotrends
GDP Growth Rate (annual %)	Non-Monetary Variables	1970-2022	World bank

Source: Compiled by authors.

4. Results and Discussion

4.1 Results

4.1.1 Descriptive Statistics

Table N°(02): Descriptive Statistics results

Statistic	Inflation Annual Change	GDP Annual Change	Unemployment Rate Annual Change	Average annual Oil Prices	Exchange Rates %	Broad money supply growth (annual %)
count	53.00	53.00	53.00	53.00	53.00	53.00
mean	0.17	-0.10	0.42	7.05	16.06	15.75
std	4.63	7.45	3.69	30.28	14.99	9.45
min	-12.95	-23.61	-6.07	-53.52	2.84	-0.76
25%	-1.83	-1.90	-1.24	-3.97	3.85	10.94
50%	0.88	-0.20	0.13	3.73	15.10	14.42
75%	2.56	1.70	1.51	15.10	19.97	19.57
max	9.23	38.76	20.60	112.19	71.06	54.05

Source: Created by the authors.

The dataset of 53 observations shows that the mean inflation rate is 0.17% with significant variability (std: 4.63%), ranging from -12.95% to 9.23%. GDP has an average annual change of -0.10% with high fluctuations (std: 7.45%), while unemployment rates also vary, averaging 0.42% (std: 3.69%). Oil prices are highly volatile, with a mean change of 7.05% and a wide range (-53.52% to 112.19%). Exchange rates and broad money supply growth show moderate variability, with means of 16.06% and 15.75%, respectively.

4.1.2 Estimation Model

Table N°(03) : OLS Regression Model Summary

Variable	Coefficient	Standard Error	P-value
Constant	-0.2393	1.6060	0.0207
Exchange Rates % (lagged)	0.0017	0.0440	0.9690
Broad money supply growt(lagged)	0.0358	0.0700	0.0120
Unemployment Rate (lagged)	0.2410	0.1720	0.1680
Average annual Oil Prices (lagged)	-0.0463	0.0210	0.0310
GDP Annual Change (lagged)	-0.0821	0.0850	0.3390
R-squared: 0.71 R-squared: 0.678		F-statistic: 1.895 (p-value: 0.014)	

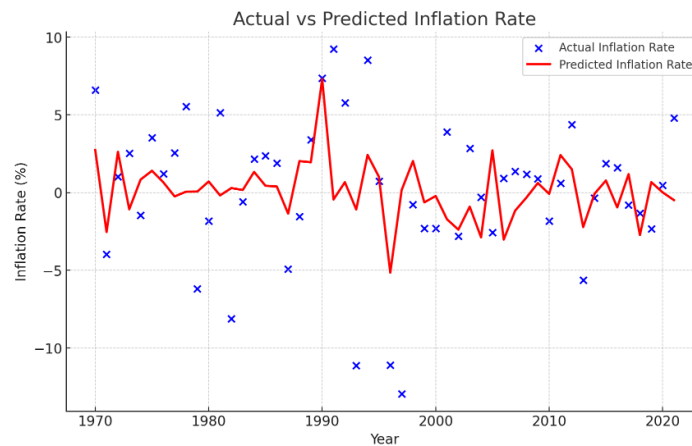
Source: Created by the authors.

The regression analysis indicates that the model explains 71% of the variance in inflation (R-squared: 0.71), with an adjusted R-squared of 0.678, which accounts for the number of predictors in the model. The F-statistic of 1.895 with a p-value of 0.014 suggests that the overall model is statistically significant. Among

the independent variables, the constant and broad money supply growth (lagged) are statistically significant with p-values of 0.0207 and 0.0120, respectively, indicating they have a meaningful impact on inflation. The average annual oil prices (lagged) are also significant (p-value: 0.0310), with a negative coefficient, suggesting that higher oil prices tend to reduce inflation. Other variables like exchange rates, unemployment rate, and GDP annual change (lagged) are not statistically significant.

4.1.3 Diagnostic Tests

Fig N°(04) : Actual vs Predicted Inflation Rate



Source: Created by the authors using Python- 3.12.3.

The plot in fig (04) compares the actual inflation rates (blue crosses) with the predicted rates (red line) over time. The model generally captures the trend of inflation, particularly in periods of stability. However, there are noticeable discrepancies during periods of high volatility, such as around 1990, where the model underpredicts the spikes in inflation. The model fits better in later years, but there are still some deviations, indicating that while the model explains a significant portion of the variance, it may struggle with capturing extreme fluctuations in inflation rates.

Table N°(04) : Stationarity Test Results

Test	Test Statistic	P-value
Shapiro-Wilk (Normality)	0.9695	0.20195862650871277
Breusch-Pagan (Homoscedasticity)	2.1366	0.8299368946466221
Durbin-Watson (Autocorrelation)	2.0711	

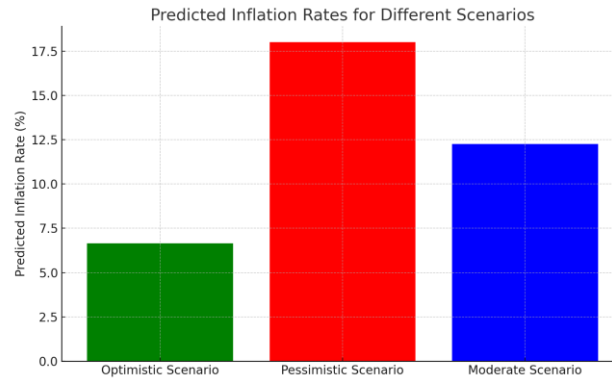
Source: Created by the authors.

The diagnostic tests in table (04) for the regression model show the following results: Shapiro-Wilk Test (Normality): The test statistic is 0.9695 with a p-value of 0.202, indicating that the residuals are likely normally distributed since the p-value is greater than 0.05. Breusch-Pagan Test (Homoscedasticity): The test statistic is 2.1366 with a p-value of 0.830, suggesting that there is no evidence of heteroscedasticity (constant variance of residuals), as the p-value is well above

0.05. Durbin-Watson Test (Autocorrelation): The test statistic is 2.0711, which is close to 2, indicating that there is no significant autocorrelation in the residuals. The absence of a p-value is standard for this test. Overall, the diagnostic tests suggest that the assumptions underlying the linear regression model are reasonably met.

4.1.4 Scenario Analysis

Fig N°(05) : Scenario Simulation Results



Source: Created by the authors using Python- 3.12.3.

The fig (05) illustrates the predicted inflation rates under three economic scenarios. In the Optimistic Scenario, with controlled money supply growth (3.0%), a stable exchange rate (140.0), higher oil prices (\$85 per barrel), and robust GDP growth (5.0%), inflation is expected to be moderate at 6.66%. The Pessimistic Scenario projects a significant inflation increase to 18.00% due to higher money supply growth (12.0%), a depreciated exchange rate (160.0), lower oil prices (\$60 per barrel), and sluggish GDP growth (1.0%). The Moderate Scenario predicts a balanced inflation rate of 12.26 with moderate values for money supply growth (7.0%), exchange rate (150.0), oil prices (\$70 per barrel), and GDP growth (3.0%), reflecting a middle-ground economic outlook.

Conclusion:

The refined regression model presented in this study offers significant insights into the factors influencing Algeria's inflationary dynamics. The analysis, which included lagged variables such as Money Supply Growth, Exchange Rate, Oil Prices, and GDP Growth, suggests that both monetary and non-monetary factors play crucial roles in shaping inflation. The statistically significant relationship between the Lagged Exchange Rate and inflation underscores the importance of exchange rate management in controlling inflationary pressures in Algeria. Additionally, the inverse relationship between Lagged GDP Growth and inflation highlights the need for policies that support economic growth as a means to mitigate inflation.

The scenario analysis further reinforces these findings by demonstrating the varying impacts of different economic conditions on inflation. Under the optimistic scenario, where economic conditions are favorable, inflation remains relatively low at 6.66%. However, the pessimistic scenario, characterized by adverse economic

conditions, results in a sharp increase in inflation to 18.00%, emphasizing the vulnerability of Algeria's economy to external shocks and the importance of robust economic policies. The moderate scenario provides a more balanced outlook, with inflation predicted at 12.26%, indicating that even under less extreme conditions, inflationary pressures remain significant.

Based on these findings, the following recommendations are put forth:

1. To mitigate the nation's vulnerability to global oil price volatility and its consequent impact on inflation, a concerted effort should be made to diversify the Algerian economy beyond its traditional reliance on hydrocarbon exports. Promoting the growth of non-oil sectors, such as manufacturing, agriculture, and services, can reduce the economy's exposure to commodity price shocks and enhance resilience against inflationary pressures.
2. Given the strong correlation between oil prices and domestic inflation, it is imperative for Algerian policymakers and monetary authorities to closely monitor global oil market trends and dynamics. Developing early warning systems and contingency plans can help anticipate and mitigate the potential inflationary impacts of significant oil price fluctuations.
3. While monetary variables may have a relatively weaker influence on inflation in Algeria, their role should not be entirely discounted. Policymakers should explore targeted fiscal and monetary policy interventions, such as adjustments to government spending, tax policies, and interest rates, to complement efforts aimed at managing inflationary pressures stemming from non-monetary factors.
4. To enhance the nation's ability to withstand external shocks and maintain price stability, efforts should be directed towards strengthening the overall economic resilience of Algeria. This may involve investments in infrastructure, human capital development, and the promotion of a conducive business environment that fosters innovation and entrepreneurship.

Although the study has included a diverse array of monetary and non-monetary factors, it is possible that other relevant variables may have been inadvertently omitted from the analysis. Factors such as political instability, institutional quality, or external trade dynamics could potentially influence inflation dynamics but were not considered in this study due to data limitations or scope constraints. It is crucial to acknowledge these limitations and interpret the findings of this study within the appropriate context. Future research could address these limitations by exploring alternative data sources, incorporating additional variables, employing more advanced econometric techniques, accounting for potential non-linearities and structural changes, and conducting cross-country comparative analyses to enhance the external validity of the findings.

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