

**‘Impact of Exchange Rate Volatility on Inflation in Algeria
-Using MIDAS Regressions-**

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Abstract:

The primary objective of this study is to examine the interplay between inflation and currency volatility in Algeria from 2010 to 2022. The study used MIDAS regressions using Almon Lag Polynomials to analyze quarterly Inflation Rate and monthly Exchange Rate data evaluated using Eviews 12. During the period under consideration, when high exchange rates occurred more frequently (monthly), the data indicate that low inflation rates occurred more frequently.

The study found that the exchange rate and inflation have a positive link immediately and an even larger correlation after four months. With the current exchange rate data only allowing for inflation rate forecasts up to the first quarter of 2023, this study also shows that inflation's short-term forecasting capabilities are limited.

Keywords: Exchange Rate Volatility, Inflation Rate, MIDAS regressions, Almon Lag Polynomials, Forecasting, Algeria.

JEL Classification: F31, E31, C11, O55.

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1. Introduction:

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Inflationary pressures and exchange rate volatility pose persistent challenges for developing economies. Policymakers and economists have long expressed concern over the destabilizing effects of exchange rate fluctuations on inflation and broader macroeconomic stability. When exchange rate volatility adversely impacts inflation, central banks must intervene through monetary policy instruments, such as interest rate adjustments, open market operations, and reserve management, to achieve key macroeconomic objectives, including price stability, sustainable growth, employment, and external sector equilibrium.

In Algeria, the Central Bank is pivotal in maintaining price stability and managing exchange rate fluctuations. Algeria's monetary policy mainly focuses on preserving the value of the Algerian Dinar and maintaining adequate levels of foreign currency reserves. Nevertheless, fluctuations in the exchange rate can have diverse and sometimes ambiguous effects on inflation and other macroeconomic indicators, depending on how such volatility is measured and analyzed. (Nuhu, 2021)

Despite the acknowledged importance of understanding this dynamic, empirical research examining the relationship between exchange rate volatility and inflation in Algeria remains limited. Furthermore, much of the existing literature has relied on traditional econometric approaches, such as maximum likelihood estimation (MLE) and ordinary least squares (OLS), often using aggregated data, which may not fully capture the complexities inherent in the high-frequency nature of financial variables.

Research Problem: This study addresses a critical gap by investigating the impact of exchange rate volatility on inflation in Algeria from 2010 to 2022. Unlike previous studies, it applies the Mixed Data Sampling (MIDAS) regression model, which is particularly suited for handling data of different frequencies, thus enhancing the accuracy and robustness of the findings.

Research Hypotheses: Based on the theoretical background and empirical observations, the following hypotheses are proposed:

- **H1:** Exchange rate volatility has a significant positive impact on inflation in Algeria.
- **H2:** The magnitude of the impact of exchange rate volatility on inflation varies over time.

Research Contribution: This research employs the MIDAS model to provide deeper insights into Algeria's inflation–exchange rate volatility nexus, offering practical implications for monetary policy design and macroeconomic management.

The remainder of the paper is organized as follows: Section 2 reviews the related literature. Section 3 outlines the data sources and methodology. Section 4 discusses the empirical findings. Finally, Section 5 concludes with policy recommendations.

2. Literature Review

2.1. Conceptual Issues

Currency valuation and domestic price levels are connected through multiple economic pathways, creating a complex link between exchange rates and price stability. This document delves deeper into these channels within the framework of EMEs, drawing attention to the difficulties and risks associated with controlling currency fluctuations and their effect on price stability. Everything from the function of tradable commodities prices to the ramifications for financial vulnerabilities and the role of foreign currency borrowing and global trade finance is included in the examination. (Nuhu, 2021, pp. 27-28)

Exchange Rate Fluctuations and Tradable Goods Prices: The value of marketable products is directly affected by fluctuations in exchange rates. Depreciation of the currency can cause import prices to rise rapidly in EMEs because imported items make up a large part of both consumption and production inputs. Exchange rate pass-through refers to this occurrence. Research shows that many EMEs have seen a reduction in the ERPT impact due to better monetary policy and structural changes. However, it is still an important component of price stability. The general price level can be pushed up when a currency depreciates because increased import prices can seep into non-tradable sectors. On the contrary, a decline in the price of tradable products may result from an exchange rate appreciation, which may promote price stability and pose deflationary dangers.

Spillover to Non-Tradable Sectors: Even the non-tradable sector, which includes services and items not sold internationally, can be impacted by fluctuations in the exchange rate. Inflationary pressures in non-tradable products and services occur, for example, when firms pass the cost increases of inputs for tradable goods onto consumers due to currency depreciation. Because of this domino effect, monetary policy is more complicated since central banks have to deal with inflationary pressures caused by outside shocks while still ensuring overall economic stability.

The Role of Exchange Rate Shocks: Large shocks to the exchange rate can compromise local price stability, especially in economies where trade is heavily denominated in dollars. Businesses may react to the uncertainty caused by fluctuating currency rates by making preemptive price adjustments or hedging against possible losses. These adjustments can intensify inflationary pressures when combined with tight credit conditions that limit funding availability for families and businesses.

Global Trade Financing and Dollar Invoicing: Reliance on dollar invoicing for global trade financing adds another complexity. Because of the US dollar's preponderance in international trade, emerging market economies are especially vulnerable to fluctuations in its value. Servicing dollar-denominated trade finance becomes more expensive as local currencies decline in value. The rising cost of imported intermediate products and the increased strain of repaying loans might make a weak currency seem like a competitive advantage in reality.

Impact on International Competitiveness: According to conventional wisdom, currency depreciation boosts global competitiveness by making exports more affordable. However,

structural problems, including supply chain bottlenecks, dependence on imported goods, and poor financial conditions, mean this influence is not often seen in EMEs. Conversely, depreciation can cause domestic economic contractions as companies fight to keep up with rising expenses and falling financing options.

Borrowing in Foreign Currency: The high rate of foreign currency borrowing by governments and enterprises is a significant issue in EMEs. Foreign debt becomes more burdensome to repay when the value of the local currency rises due to currency devaluation. Due to this dynamic, private and governmental sectors may experience financial hardship, which might affect domestic prices and economic stability.

The opposite is true when a currency appreciates because the cost of servicing foreign debt in local currency decreases, improving financial conditions. Although this expansionary effect might temporarily increase economic activity, it also worries people about their financial security. Before making any decisions, government officials need to consider the potential downsides of short-term economic stimulus measures, such as unexpected changes in capital flows or shocks.

Sovereign Debt and Foreign Investors: Investors outside the country hold much of the sovereign debt in EMEs. Currency appreciations, which attract foreign money, can loosen financial conditions and bolster economic expansion. However, the economy and price stability are jeopardized when reliance on foreign money is high because of the risks associated with unexpected capital withdrawals or changes in exchange rates.

Policy Implications and Financial Vulnerabilities: Keeping price stability and exchange rates under check is a massive task for policymakers. The main points to consider are:

- Controlling Exchange Rate Fluctuations: Central banks can intervene in the foreign exchange market to stabilize currency fluctuations. However, they must balance this with preserving foreign reserves and market trust.
- The inflation-targeting frameworks that many EMEs use necessitate precise interest rate calibration to mitigate price pressures caused by exchange rates without impeding economic growth.
- A reduction in dependence on borrowing foreign currency and a diversification of trade finance mechanisms might help address structural vulnerabilities and reduce the risks associated with exchange rate shocks.
- Strengthening the Economy: To make the economy more resistant to outside shocks, structural changes, such as increasing domestic manufacturing capacity and streamlining the supply chain

, are recommended.

The link between exchange rates and price stability affects the economy in various ways and operates through multiple routes. Maintaining stable pricing when unstable exchange rates might be challenging since they affect the cost of marketable products like imports. There is still a connection between currency rates and local pricing, even though the

pass-through effect of exchange rates has been reduced in numerous developing market economies. As a result of a significant shock to the exchange rate, local prices can become unstable. Secondly, changes in the currency rate can significantly impact the ability to repay loans, mainly because dollar invoicing is becoming increasingly used for global trade financing. Depreciation of the local currency, which is often accompanied by tighter credit restrictions, can cause internal economic contractions and may not improve international competitiveness. Finally, a significant portion of government debt is held by foreign investors, and many companies in developing economies still borrow in foreign currencies. When the value of a country's currency rises, it might loosen financial constraints, which can spur economic prosperity. But this leaves the economy open to disruption in the event of an abrupt devaluation or shock, which might undo the expansionary impacts and jeopardize price stability in the long run. It is crucial to carefully manage exchange rate changes to maintain long-term price stability, as they can have complex impacts on economic stability. (Keefe, 2020, p. 3)

2.2. Empirical Literature

(Žídek & Šuterová, 2017) Two time periods were analyzed to determine the impact of exchange rates on inflation in Switzerland: the pre-crisis era and the intervention period to prevent deflationary forces from worsening. The study's autoregressive models show that exchange rate shocks caused inflationary pressures. The empirical results show that intervention in the exchange rate is a useful unconventional instrument for monetary policy.

(Oguzhan, 2018) Using panel vector autoregression (PVAR) models in ten OECD nations, the impact of fluctuating exchange rates on industrial production growth rates, consumer price inflation, short-term interest rates, and stock returns was examined. However, the impulse response analysis failed to find a statistically significant effect of exchange rate measurements on inflation, even though exchange rates considerably affect inflation trends via changes in import prices.

(Nuhu, 2021) analyzed yearly time series 1986–2019 to determine the effect of currency volatility on inflation in Nigeria. The research looked at how changes in the exchange rate affected inflation over the long run using two models: GARCH and VECM. The economic variables that were considered independent were the money supply (MS), imports (IMP), exports (EPT), and the consumer price index (CPI), which was used as the dependent variable. Research shows that the money supply and the nominal exchange rate heavily impact inflation. One factor that adds to Nigeria's inflationary pressures is the exchange rate's volatility.

(Abu Bakr Ahmed, 2020) Examined Sudan's currency and inflation rates, presuming a clear relationship between the two. Using information from secondary sources and the Eviews program, they conducted a descriptive and analytical analysis covering 2010–2020. The results demonstrated a strong relationship between the two variables, with the modified R^2 at 76%. This suggests that the exchange rate explains 76% of the variation in inflation, while other factors contributed to the remaining 24%.

(Mohammed Jabbouri, 2014) evaluated the impact of different exchange rate regimes on inflation by analyzing panel data and the Generalized Method of Moments (GMM) for 50 nations between 1980 and 2008. Their research showed that inflation was significantly lower under pegged exchange rate regimes and significantly higher under floating rate regimes.

(Hamrit, 2012) analyzed the data from 1984 to 2014 using the Granger representation theorem to determine the correlation between inflation and currency rates in Algeria. According to the results, there was a short-term causal relationship between exchange rates and inflation, but inflation also affected exchange rates in the other direction.

(Salma, 2020-2021) examined the effect of foreign inflation and changes in the currency rate on Algerian inflation using the ARDL and NARDL models from 1986 to 2019. Although the study discovered a negative link in the long run, it found that local price levels (inflation) were positively affected by imported inflation and changes in the dinar exchange rate.

(Fouad Majnah, 2022) used an econometric model to examine how Arab nations' official currency rates and economic openness affected inflation and trade balances from 1990 to 2020. The study found that foreign exchange rate movements negatively affected inflation in Algeria over the long run.

(Oumeir Shloufi, 2021) Examined the effects of currency rates on inflation and the Algerian economy's resilience to shocks using yearly data from 1980 to 2018. Inflation and the real exchange rate have a mutually supportive long-term connection, according to the ARDL model. The study found that changes in the exchange rate are crucial to inflation dynamics and greatly help keep the economy stable by dampening the effects of outside shocks.

According to the literature assessment, Few studies have examined how exchange rate volatility affects inflation in Algeria. Most studies have ignored this particular link in the Algerian setting in favor of more general economic themes or different geographical locations. Among the few studies that deal specifically with the topic, this one examines how changes in the Algerian currency rate affect inflation. The study sheds light on the impact of exchange rate volatility on inflationary trends in the country by concentrating on this topic. If policymakers in Algeria want to comprehend and control the inflation dynamics, this approach is essential. This study aims to fill this knowledge vacuum by investigating the correlation between inflation in Algeria and fluctuations in the country's currency rate.

3. Methodology and Data

Inflation is hypothesized to rise in response to more exchange rate volatility, which is why this study seeks to understand the nature of that link. The Mixed Data Sampling (MIDAS) regression model handles the discrepancies in the inflation and exchange rate data periods or frequency. When estimating parameters for the MIDAS regression model, the Almon Polynomial Distributed Lag (PDL) weighting function is employed. After comparing the results with a lag-distributed model, the model with the most minor error estimates inflation in Algeria.

3.1. The MIDAS Regression Model

The MIDAS regression model presupposes a constant sampling frequency, or reference interval, for the dependent variable Y_t . More samples are taken from the independent variable X_t compared to Y_t . Here, we see the MIDAS regression model that Ghysels, Santa-Clara, and Valkanov (2004) suggested:

Where:

- With a lower sampling frequency, Y_t represents the dependent variable at time t .
- α stands for the intercept term.
- Regressor U_t and Y_t have the same frequency.
- Expression $X_{(t/s)^H}$ is the set of regressors for high frequencies with S values, where S is the ideal lag for low-frequency data.
- The function f describes the effect of high-frequency data on the low-frequency regressand.
- θ , b and λ are the estimated coefficients.

$$Y_t = \alpha + \beta U_t + f\left(\left\{X_{t/S}^H\right\}, \theta, \lambda\right) + \varepsilon_t \quad (1)$$

The MIDAS model offers simplicity and versatility while conserving information from higher-frequency data by utilizing different weighting systems, such as Step weights, Beta weights, Almon-PDL weights, and Exponential Almon weights. Research frequently employs Almon-PDL weights to limit lag coefficients among them.

The Almon Polynomial Distributed Lag (Almon-PDL) function leverages high-frequency lags to manage mixed-frequency data. In the MIDAS model, the coefficients are written as polynomial lags of order p . Here is the formula for the mixed-data-sampling model with Almon-PDL weights: By utilizing different weighting systems, such as Step weights, Beta weights, Almon-PDL weights, and Exponential Almon weights, the MIDAS model offers simplicity and versatility while conserving information from higher frequency data. Research frequently employs Almon-PDL weights to limit lag coefficients among them.

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$$Y_t = \alpha + \beta U_t + \sum_{\eta=0}^{k-1} X_{(t-\eta)/S}^H \left(\sum_{j=0}^p \eta^j \theta_j \right) + \varepsilon_t$$

The MIDAS model with Almon-PDL weights calculates the number of parameters using the polynomial lag order, in contrast to the Distributed Lag (DL) model, which uses the number of high-frequency lags. Using fewer parameters to capture the important high-

frequency data results in less complexity and the possibility of overfitting, making the model more parsimonious. (Mallikarjunappa, 2019)

3.2. Data

The dataset encompasses monthly exchange rate data from January 2010 to December 2022 and Algerian inflation rate data from 2010Q1 to 2022Q4 (using constant 2010 prices). Inflation rate data from 2010Q1–2022 and monthly exchange rate data are used to estimate the MIDAS regression model's parameters. The model incorporates known exchange rate data from 2020–2022 and Q1 inflation forecasts for 2023 into its predictions.

4. Empirical Results

4.1. Using MIDAS Models to measure the effect of the Exchange Rate on Inflation

We used EViews 12 to apply the Almon (PDL) Weighting MIDAS model to analyze the impact of Algeria's monthly exchange rate (EXCHm) on quarterly inflation (INFq). Table 1 displays the outcomes of the estimation.

Table 1. Midas model estimation results

Dependent Variable: INFQ				
Method: MIDAS				
Date: 02/17/23 Time: 12:00				
Sample (adjusted): 2010Q4 2022Q4				
Included observations: 49 after adjustments				
Method: PDL/Almon (polynomial degree: 3)				
Automatic lag selection, max lags: 12				
Chosen selection: 3				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.365840	0.974384	0.375458	0.7091
INFQ(-1)	0.860381	0.075048	11.46445	0.0000
Page: EXCH Series: EXCHM Lags: 3				
PDL01	-0.982988	0.681244	-1.442932	0.1561
PDL02	1.105536	0.790664	1.398237	0.1691
PDL03	-0.262985	0.193411	-1.359717	0.1808
R-squared	0.748406	Mean dependent var	4.762163	
Adjusted R-squared	0.725534	S.D. dependent var	1.956651	
S.E. of regression	1.025080	Akaike info criterion	2.983870	
Sum squared resid	46.23475	Schwarz criterion	3.176913	
Log likelihood	-68.10482	Hannan-Quinn criter.	3.057110	
Durbin-Watson stat	1.061868			
EXCH\EXCHM	Lag	Coefficient	Distribution	
	0	-0.140437		
	1	0.176146		
	2	-0.033242		

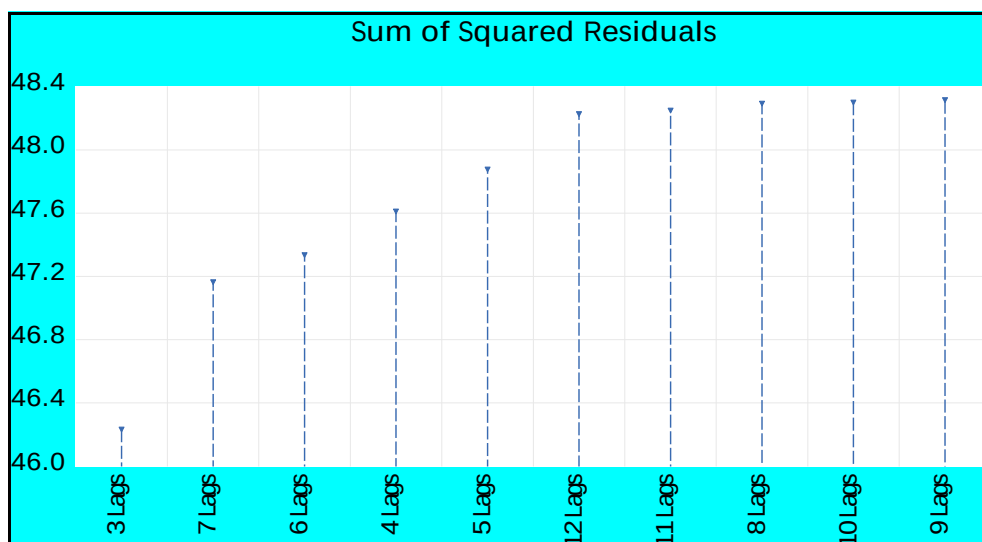
Source: Eviews 12

Based on the results in Table 1, the third-degree Almon coefficient for the weighting function was chosen. Three lag times were selected after calculating the minimum value using the Akaike Information Criterion (AIC).

To determine how the exchange rate, a high-frequency variable, affected inflation, a low-frequency variable, model selection criteria such as the Akaike Information Criterion (AIC), the Schwarz Criterion (BIC), and the Hannan-Quinn Criterion (HQIC) were employed.

These criteria helped reduce the amount of random error to guarantee the best possible model fit. The findings of this estimate are shown in Figure 1.

Fig.1. Optimum Lag Selection



Source: Eviews 12

We compensate for delays of up to three months if the exchange rate data is inaccurate. Thus, information on the exchange rate from three months prior is required to interpret the quarterly inflation rate. Each quarter's inflation rate is estimated and interpreted using the most recent three months' worth of exchange rate data, as the information criteria require. This method enables the model to consider the impact of three-month exchange rate swings on inflation within the same quarter.

Analyze the effect of the previous values of the series on the inflation rate

Part one of Table 1 shows the t-statistics and coefficients for the low-frequency variable—inflation—provided by the estimation results. The following equation mathematically represents this connection:

$$INFQ = 0.36 + 0.86INFQ(-1) + \varepsilon_t$$

The results show that the inflation rate from the previous period has a positive and statistically significant effect on the inflation rate from the present era. This result is in line with what is predicted by well-established economic theory: that inflation is likely to be persistent. With a coefficient of 0.86, the data show that previous inflation rates affect inflation. This indicates that the inflation rate in the present period changes by 0.86 units for every one-unit change in the inflation rate in the prior period.

The movement of commodity prices explains this correlation. Demand rises as people reevaluate their expectations and purchasing habits in response to price increases. This causes inflation to rise, both now and in the future. Inflation remains a problem even after accounting for different periods, showing how previous price rises influence inflationary tendencies.

Parameter Estimation of MIDAS Regression Model

The statistical analysis and results of the coefficient estimation for the Almon (PDL) Weighting model are shown in the second section of Table 1. This model's weighting coefficients were determined to be statistically significant at the 5% level, suggesting that the exchange rate positively influences the inflation rate during each three months. According to the distribution of lag coefficients at the end of Table 1, this effect becomes more noticeable after 4 months and gradually fades with time. The following is the estimated MIDAS model using these results:

$$NFQ = 0.17EXCHM_t - 0.98EXCHM_{(t-3)/s} + 0.10EXCH^2_{(t-3)/s} - 0.26EXCH^3_{(t-3)/s} + \varepsilon t$$

Consistent with economic theory, the data show that changes in the value of the Algerian dinar relative to the euro have an immediate effect on inflation. As a result of increasing import costs expressed in local currency, prices rise when the value of the local currency falls, and the exchange rate rises, the theory states. Domestic prices are driven up due to a weaker dinar, which increases the cost of imported goods.

According to the data, inflation rises by 0.17 percentage points for every one-unit drop in the dinar's exchange rate versus the euro. As this proves, inflation rates in Algeria are directly related to the euro's value. Inflation grows as the dinar loses value compared to the euro, lending credence to the idea that a weaker currency leads to higher prices at home.

4.2. Robustness Checks

It is crucial to run Residual and Stability Diagnostics to ensure the model is resilient before using it to make predictions. These checks show that the model is accurate and can make good predictions.

Our model's findings show that the Almon Weighting parameters are statistically significant; they explain 74% of the inflation variance. Because of this, the model describes the connection between inflation and the exchange rate well. However, stability diagnostics (such as testing for parameter constancy across time) and residual diagnostics (such as checking for autocorrelation, heteroscedasticity, and normalcy) are necessary to establish the dependability and robustness of the model. For reliable forecasting, these tests ensure that the model's parameters are consistent over time and that the residuals do not show systematic patterns that could mean misspecification.

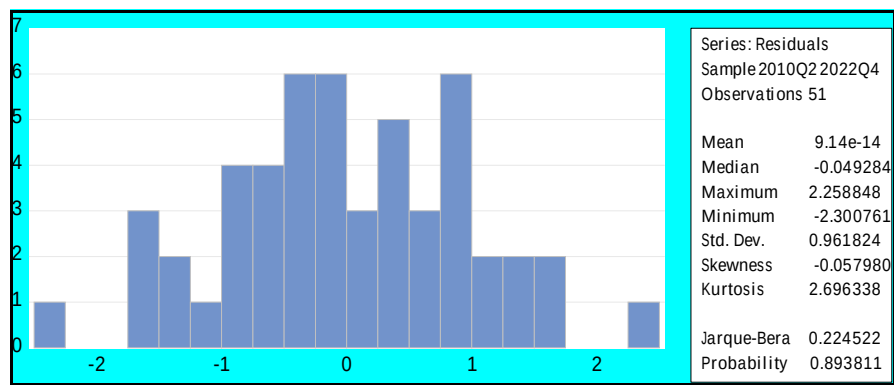
A-Residual Diagnostics:

A-1- Histogram and Normality Test

We also calculate the Jarque-Bera statistic, which checks for normalcy by evaluating skewness and kurtosis, to see their residuals and descriptive statistics. The residuals may not follow a normal distribution, which could affect the model's reliability, according to a significant result (p-value < 0.05).

Figure 2 displays the numerical values for key statistical measures (mean, standard deviation, skewness, kurtosis, and the Jarque-Bera test result), descriptive statistics, and the Jarque-Bera statistic. This provides insights into the model's fit, whether any adjustments are needed for the residuals' behavior, and a visual representation of the residuals' distribution in a histogram.

Fig. 2. Normality Test Result



Source: Eviews 12

The test result's lack of statistical significance was determined by a Jarque-Bera value of 0.22, which is less than the critical value of $\chi^2 = 5.99$ ($\alpha > 0.05$). Since we cannot rule out the possibility that the residuals follow a normal distribution, we can conclude that the null hypothesis is correct.

a-2- Error Autocorrelation test

Autocorrelation tests are performed to determine if the residuals show any signs of autocorrelation. These tests check if the residuals exhibit consistent patterns over time to ensure the model has not missed any important details in the data's underlying dynamics. A model with autocorrelation may emerge with biased or inefficient parameter estimations

Table 2 shows the p-values and test statistics for the Autocorrelation tests and contains the findings for several lag orders. There is no autocorrelation if the p-values for all lags are non-significant (typically greater than 0.05), which means that the model correctly represents the time-dependent structure of the data. However, if there are significant p-values at inevitable delays, it could be a symptom of autocorrelation, and the model may need to be revised or improved.

Table 2. Error autocorrelation test

Date: 02/17/23 Time: 15:15								
Sample (adjusted): 2010Q2 2022Q4								
Included observations: 51 after adjustments								
Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob*	
				1	0.242	0.242	3.1555	0.076
				2	0.163	0.111	4.6269	0.099
				3	0.096	0.037	5.1471	0.161
				4	0.091	0.048	5.6223	0.229
				5	0.085	0.044	6.0498	0.301
				6	0.243	0.214	9.6028	0.142
				7	0.246	0.154	13.324	0.065
				8	-0.077	-0.240	13.692	0.090
				9	-0.041	-0.067	13.799	0.130
				10	-0.097	-0.091	14.426	0.154
				11	-0.094	-0.076	15.029	0.181
				12	-0.019	-0.002	15.054	0.238
				13	-0.050	-0.112	15.232	0.293
				14	-0.198	-0.164	18.083	0.203
				15	-0.153	0.033	19.846	0.178
				16	-0.078	0.055	20.321	0.206
				17	-0.080	0.037	20.827	0.234
				18	-0.081	-0.042	21.371	0.261
				19	-0.096	-0.083	22.150	0.277
				20	-0.171	-0.049	24.690	0.214
				21	-0.101	0.061	25.608	0.222
				22	-0.054	-0.035	25.876	0.257
				23	0.030	0.031	25.961	0.303
				24	-0.142	-0.214	27.982	0.261

*Probabilities may not be valid for this equation specification.

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Source: Eviews 12

Table 2 shows no statistical significance in any of the columns that pertain to the confidence interval or the Q-Star test. Thus, we cannot rule out the possibility of residual autocorrelation, as stated in the null hypothesis. The absence of consistent time-dependent patterns in the residuals and the model's accurate representation of the underlying data dynamics are both shown by this. As a result, the estimated model is more reliable and robust because the residuals do not exhibit autocorrelation.

a-3-The actual, fitted, and residuals Graph

We offer a graph that shows the residuals, the actual and fitted values of the variables, and the regression results for visualization purposes. The result may be seen in Figure 3.

Fig. 3. The actual, fitted, and residuals Graph



Source: Eviews 12

Figure 3's findings show a close relationship between the fitted and actual values of the variables. The estimated model is of good quality since the predicted values are so close to the observed data. Because of the tight fit, we can be confident in the model's ability to explain the correlation between inflation and the exchange rate. Since the model faithfully captures the interplay of the variables, it is safe to use it for future research and predictions.

B-Stability test: We validate the model's predictions and check if the parameters are stable using the ADF test. The results are shown in Table 3.

Table 3. ADF test

UNIT ROOT TEST RESULTS TABLE (ADF)			
Null Hypothesis: the variable has a unit root			
<u>At Level</u>			
With Constant	t-Statistic	RESID01	-3.8862
	Prob.		0.0041
With Constant & Trend	t-Statistic		-3.8444
	Prob.		0.0221
Without Constant & Trend	t-Statistic		-3.9388
	Prob.		0.0002
<u>At First Difference</u>			
With Constant	t-Statistic	d(RESID01)	-8.9725
	Prob.		0.0000
With Constant & Trend	t-Statistic		-8.9593
	Prob.		0.0000
Without Constant & Trend	t-Statistic		-9.0464
	Prob.		0.0000
Notes:			
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant			
b: Lag Length based on SIC			
c: Probability based on MacKinnon (1996) one-sided p-values.			
This Result is The Out-Put of Program Has Developed By:			
Dr. Imadaddin AlMosabbbeh			
College of Business and Economics			
Qassim University-KSA			

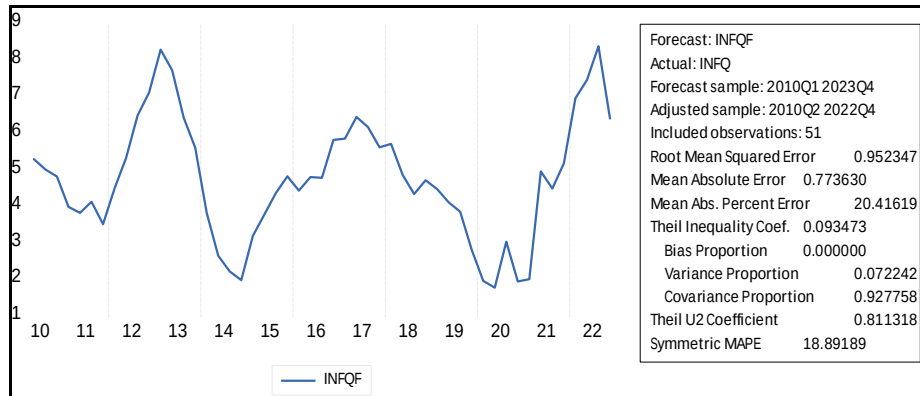
Source: Eviews 12

Table 3 shows that the model residuals are stable at the level, as confirmed by the Augmented Dickey-Fuller (ADF) test. In this case, the absence of a unit root and stationary residuals proves the model is well-specified. The model's estimations are supported by stability at the 0.5% significance level, which confirms that the residuals do not show any trends or systematic patterns over time. So, the residuals are stable, so the model is valid for interpreting and making predictions.

4.3. Forecasting Inflation rate by using the MIDAS model

One significant benefit of MIDAS models is that they make better use of all the data available from high-frequency variables, such as the exchange rate, to improve the accuracy of their predictions. With this function, the model may use up-to-date inflation and exchange rate data to predict inflation rates until the second quarter of 2023.

In order to forecast quarterly inflation rates, MIDAS models use mixed-frequency data, which allows them to include information on exchange rates every month. By drawing on the abundance of high-frequency data to foretell how the lower-frequency variable (inflation) would behave, this skill allows for more accurate predictions. The model extends its predictions to the middle of 2023 by using the current inflation and exchange rate data to produce trustworthy projections for the subsequent periods.

Fig. 4. Forecasting Inflation rate

Source: Eviews 12

Figure 4 shows that the RMSE is 0.95, meaning there is almost no difference between the actual and projected values; the error is almost negligible. The model's predictions are very accurate, as this shows. Additional evidence supporting the model's excellent predicted accuracy is the Theil index, which is 0.09 and very close to zero. The low Theil index improves the model's accuracy in predicting future values, which indicates few forecast mistakes.

Table 5. PREDICTED VALUES

YEAR	PERIOD	ACTUAL VALUES	PREDICTED VALUES
2021	Q1	4.30	3.03
	Q2	4.52	4.98
	Q3	5.16	4.51
	Q4	6.87	5.20
2022	Q1	7.93	6.97
	Q2	8.81	7.47
	Q3	7.74	8.40
	Q4	5.13	6.43
2023	Q1	/	6.5

Source Prepared by the researchers, based on Figure 4

Table 5 shows the actual and expected inflation rates for the following periods are very close. This nearness verifies that the estimated model is resilient. This alignment demonstrates the model's ability to predict and capture inflation trends accurately.

In addition, the MIDAS model requires three months' worth of exchange rate data to predict inflation for one quarter (trimester). Using data on exchange rates from the beginning of 2023, we accurately forecasted Algeria's inflation rate for the first three months of that year. Because of this capability, inflation estimates can be periodically updated using the most

recent exchange rate data. To keep the model up-to-date and accurate, its inflation rate projections can be updated whenever new monthly exchange rate data is available.

5. Conclusion:

In light of this study investigating the relationship between exchange rate volatility and inflation in Algeria over the period 2010–2022, using MIDAS regression models with Almon Lag Polynomials in EViews 12, the following conclusions and recommendations can be drawn:

a. Consequences :

- The study found a positive correlation between the monthly exchange rate and the quarterly inflation rate, indicating that exchange rate fluctuations have an immediate positive impact on inflation, with this effect becoming more pronounced after approximately four months.
- Temporary variations in the exchange rate are transmitted to inflation with a lag, highlighting the delayed effects of exchange rate volatility on domestic price levels.
- The MIDAS model effectively utilizes current exchange rate data to predict future inflation rates, extending its predictive capability into the first quarter of 2023.
- These findings suggest that exchange rate volatility significantly influences inflation, and policymakers should carefully monitor exchange rate fluctuations to anticipate and mitigate potential inflationary pressures.

b. Recommendations:

- Algerian monetary authorities should improve their systems for monitoring exchange rate fluctuations, enabling quicker responses to exchange rate shocks.
- Given the lagged effect of exchange rate volatility on inflation, policymakers should consider implementing proactive measures that target inflationary pressures in the months following exchange rate movements.
- Future studies should investigate the impact of external shocks, such as oil price volatility, and examine how these interact with exchange rate dynamics to offer a more comprehensive understanding of the inflationary process in Algeria.
- Policymakers could benefit from expanding advanced forecasting models, such as the MIDAS model, to predict inflation more accurately and promptly, allowing for more effective monetary policy adjustments.

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7. Appendices:

a. Liste of tables:

- **Table 1:** MIDAS model estimation results
- **Table 2:** Error autocorrelation test
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b. Liste of figures:

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- **Figure 2:** Normality Test Result
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