

## Forecasting IQD/USD Exchange Rate in Iraq Using the ARIMA Model

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#### ABSTRACT

This study explores the application of the ARIMA model to forecast the exchange rate between the Iraqi Dinar (IQD) and the US Dollar (USD). Utilizing monthly exchange rate data from January 2019 to June 2024, we aimed to identify the most effective time series model for accurate predictions. After evaluating various models, the ARIMA(1,1,0) model emerged as the best performer based on multiple performance metrics, including the lowest Mean Squared Error (MSE). Comprehensive residual analysis confirmed the model's adequacy, showing no significant residual autocorrelation and approximate normality of the residuals. The forecasts provide valuable insights for decision-making and strategic planning, helping policymakers, investors(investigators), and businesses to anticipate future exchange rate movements and manage financial risks for finance planning. This study highlights the reliability and effectiveness of the ARIMA model in forecasting exchange rates, contributing to

more informed economic and financial strategies.

## **1. INTRODUCTION**

An important measure of Iraq's economic health is the exchange rate between the Iraqi Dinar (IQD) and the US Dollar (USD), which reflects the nation's reliance on oil exports, which are primarily valued in USD. Changes in this exchange rate affect government revenue, import prices, and the purchasing power of the populace in addition to Iraq's inflation and fiscal stability. Because it enables preemptive financial planning and risk reduction, precise exchange rate forecasting is crucial for all parties involved, including businesses, investors, and politicians. Because the currency is sensitive to both internal and international economic variables, particularly changes in oil prices and regional geopolitical dynamics, forecasting exchange rates entails examining trends in historical data to predict future values. The Autoregressive Integrated Moving Average (ARIMA) model is well known for its ability to accurately anticipate time series, particularly when the data shows patterns or trends but no seasonality. ARIMA is appropriate for exchange rate forecasting because of its ability to capture intricate temporal correlations, which offers insights into possible short-term volatility. This study uses monthly data from January 2019 to June 2024 to forecast the IQD/USD exchange rate using the ARIMA model. Finding an appropriate forecasting model, carrying out a thorough residual analysis to confirm the model's sufficiency, and giving stakeholders accurate projections are the main goals. By fulfilling these objectives, this study hopes to support the financial and economic planning required for Iraq's stability and development, assisting in the formulation of strategic and policy choices that can reduce the economic risks associated with exchange rate swings.

### **1.1 Study Overview and Significance**

The exchange rate between the Iraqi Dinar (IQD) and the US Dollar (USD) holds substantial economic importance due to Iraq's dependency on oil exports, which are traded predominantly in USD. Fluctuations in this exchange rate directly impact the nation's economy, influencing inflation rates, government revenue, and the

purchasing power of Iraqi citizens. Accurate forecasting of this exchange rate is essential to assist policymakers, investors, and businesses in making informed decisions that support financial stability and effective economic planning. This study seeks to address the inherent volatility of the IQD/USD exchange rate, which is shaped by factors such as geopolitical influences, oil price changes, and domestic economic policies. Traditional forecasting models often struggle to capture the dynamic behavior of exchange rates, necessitating the need for robust models that can accurately predict future movements. By employing the ARIMA model, this research aims to identify the most effective approach for reliable exchange rate forecasting, offering valuable insights for stakeholders.

## **Research Objectives**

The main objectives of this research include:

1. **Evaluating Forecasting Models:** To explore and assess various time series models, including ARIMA, exponential smoothing, and moving averages, to determine their applicability and effectiveness in forecasting the IQD/USD exchange rate.
2. **Identifying an Accurate Model:** Through key performance metrics such as Mean Squared Error (MSE) and Mean Absolute Error (MAE), this study aims to select the model that offers the highest accuracy in exchange rate prediction.
3. **Conducting Residual Analysis:** A thorough residual analysis will be performed to ensure model adequacy and reliability by checking for patterns or deficiencies in the model's residuals.
4. **Providing Reliable Forecasts:** The ultimate goal is to generate accurate and reliable forecasts to support financial decision-making, risk management, and economic planning.

## **Significance of the Study**

Reliable exchange rate forecasts are crucial for several stakeholders:

- **Policymakers** can design and implement effective monetary policies based on projected exchange rate trends.
- **Investors** benefit from informed decision-making in asset allocation and risk management.
- **Businesses** involved in international trade can better manage currency exposure and plan for future financial needs.
- **Overall Economic Stability** is promoted through reduced market uncertainty, contributing to Iraq's fiscal health and economic resilience.

## **Research Questions**

Guiding this study are several critical questions:

1. Which time series model provides the most accurate forecasts for the IQD/USD exchange rate?
2. How do different performance metrics compare in evaluating model accuracy?
3. What are the strengths and limitations of each model in the context of exchange rate forecasting?
4. How can the findings support strategic planning for various stakeholders?

## **2. LITRATURE REVIEW**

### **2.1 ARIMA Models**

ARIMA models are extensively used in time series forecasting due to their flexibility and robustness. Box and Jenkins (1976) pioneered this methodology, providing a comprehensive framework for model identification, parameter estimation, and diagnostic checking. Subsequent research has validated the effectiveness of ARIMA models in various economic and financial applications (Box et al., 2015; Hamilton, 1994). Ismael et al. (2023) explored the effectiveness of ARIMA models in predicting exchange rates, demonstrating their superior performance compared to other

models. The study emphasized the model's ability to capture complex patterns in exchange rate data, which is crucial for accurate forecasting.

## **2.2 Exponential Smoothing Methods**

Exponential smoothing methods, including simple exponential smoothing, Holt's linear trend model, and Holt-Winters seasonal model, are widely used for their simplicity and effectiveness in short-term forecasting (Gardner, 1985; Winters, 1960). These models are particularly useful in capturing trends and seasonality in time series data. Taylor (2003) introduced a damped multiplicative trend method that enhances the basic exponential smoothing technique, providing better forecasts in the presence of trends. Hyndman and Athanasopoulos (2018) further discussed the principles and practice of exponential smoothing in their comprehensive guide to forecasting.

## **2.3 Comparative Studies**

Comparative studies have highlighted the strengths and weaknesses of various forecasting models. Moshiri and Foroutan (2006) compared ARIMA, neural networks, and GARCH models, finding that no single model consistently outperforms others across all scenarios. This underscores the importance of selecting the appropriate model based on the specific characteristics of the data. Ismael et al. (2022) conducted a comparative analysis of ARIMA, exponential smoothing, and machine learning models in exchange rate forecasting. Their findings revealed that ARIMA models often provide the most accurate forecasts, although machine learning models can offer competitive performance in certain contexts.

## **2.4 Box-Cox Transformation**

The Box-Cox transformation is a useful technique for stabilizing variance and making the time series data more normally distributed, which is a key assumption for many forecasting models (Box & Cox, 1964). This transformation is often applied to improve the accuracy of ARIMA and other linear models.

## **2.5 Diagnostic Checking and Model Adequacy**

Diagnostic checking is essential to ensure the adequacy of fitted models. Tools such as residual analysis, ACF/PACF plots, and the Shapiro-Wilk test are commonly used to evaluate model performance and confirm the assumptions of normality and independence of residuals (Hyndman & Khandakar, 2008).

## **2.6 Applications in Exchange Rate Forecasting**

Exchange rate forecasting is a critical area in financial economics due to its implications for international trade, investment, and monetary policy. Studies such as those by Ismael et al. (2023) and Kaufmann et al. (2008) have demonstrated the application of ARIMA and other time series models in predicting exchange rates, providing valuable insights for policymakers and investors.

## **3. Methodology Research Design**

### **3.1 Data Collection**

The data for this study was collected from primary sources in market companies. Monthly exchange rate data for IQD/USD from January 2019 to June 2024 was gathered to ensure a comprehensive dataset for analysis. The data collection process involved obtaining accurate and up-to-date exchange rate information from reliable market participants and official publications, ensuring the data's credibility and relevance for forecasting purposes.

### **3.2 Data Preprocessing**

The collected data was first cleaned by removing any rows with missing or erroneous values. The 'Rate' column values were converted to numeric type by removing any commas. The 'Date' column was converted to Date type, ensuring consistency in time series analysis. Any remaining NA values were removed to prepare the dataset for further analysis.

### **3.3 Time Series Analysis**

A time series object was created from the cleaned data, starting from January 2019 with a monthly frequency. Initial exploratory data analysis included plotting the original time series to visualize trends and patterns. The Augmented Dickey-Fuller (ADF) test was used to check for stationarity, and the data was differenced as needed to achieve stationarity.

### **3.4 Model Selection and Fitting**

Several time series models were considered, including ARIMA, exponential smoothing, and trend models. The Box-Cox transformation was applied to stabilize variance. The ARIMA model was identified as the best-performing model based on performance metrics such as AIC, BIC, RMSE, and MAPE. The `auto.arima()` function in R was used to automatically select the best ARIMA model.

#### **3.4.1 ARIMA (p, d, q)**

The general ARIMA model can be represented as:

$$y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_p y_{t-p} + \epsilon_t + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \dots + \theta_q \epsilon_{t-q}$$
$$\epsilon_t \sim N(0, \sigma^2)$$

where the moving average parameters are  $\theta_i$ , the autoregressive parameters are  $\phi_i$ , the white noise error term is  $\epsilon_t$ , and the differenced series is  $y_t$  (if  $d > 0$ , so  $c$  is attains to zero or not significant).

### **3.5 Diagnostic Checking**

Residual analysis was performed on the fitted ARIMA model to ensure model adequacy. The residuals were checked for autocorrelation using ACF and PACF plots. The Shapiro-Wilk test was conducted to assess the normality of residuals. Diagnostic plots, including residuals over time, ACF/PACF of residuals, and Q-Q plots, were used to validate the model.

### **3.6 Forecasting**

The best ARIMA model was used to generate one value ahead forecasts for the next 12 months. Forecast intervals at 80% and 95% confidence levels were calculated to provide a range of possible future values. The forecasted values were plotted to visualize future trends and intervals, aiding in strategic planning and decision-making.

### **3.7 Statistical Analysis**

The statistical analysis in this study followed several key steps to ensure the accuracy, reliability, and robustness of the time series forecasting model. Initially, **Exploratory Data Analysis (EDA)** was conducted to understand the underlying characteristics of the IQD/USD exchange rate data, focusing on identifying trends, patterns, and potential anomalies.

**Stationarity Testing:** To confirm the stationarity of the series—a prerequisite for ARIMA model accuracy—the **Augmented Dickey-Fuller (ADF) test** was employed. If non-stationarity was detected in the series mean, differencing was applied to achieve stationarity. Additionally, to address any potential non-stationarity in variance, a Box-Cox transformation was applied, which helps stabilize variance across the series.

**Model Identification:** Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) plots were analyzed to identify preliminary values for the ARIMA model parameters. These plots provided insights into the potential orders of the autoregressive (AR) and moving average (MA) components of the model. The model's performance was further evaluated by computing key metrics, including **Mean Absolute Error (MAE)**, **Root Mean Squared Error (RMSE)**, **Akaike Information Criterion (AIC)**, and **Mean Absolute Percentage Error (MAPE)**, to determine the model's accuracy and forecasting effectiveness.

**Diagnostic Checks:** After fitting the ARIMA model, diagnostic checks were conducted to validate its adequacy. Residual analysis, including the **Box-Pierce test** for autocorrelation, ensured that no significant autocorrelation remained in the

residuals. To assess the normality of the residuals, the **Shapiro-Wilk test** was applied. Additionally, ACF and PACF plots of the residuals were analyzed to confirm the absence of autocorrelated patterns, which would indicate model sufficiency.

This comprehensive statistical analysis ensured that the model met the assumptions necessary for accurate time series forecasting. Each diagnostic test contributed to validating the ARIMA model, ensuring that the forecasts produced are both reliable and suitable for strategic decision-making.

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### **3.8 Software and Tools**

The analysis was conducted using R, a powerful statistical computing language. Several R packages were utilized for different aspects of the analysis:

- **tseries**: For performing the Augmented Dickey-Fuller test and other time series analysis functions.
- **forecast**: For fitting ARIMA models, forecasting, and model diagnostics.
- **TSA**: For additional time series analysis tools.
- **lmtest**: For conducting statistical tests on the model residuals.
- **ggplot2**: For creating advanced and customizable plots to visualize the data and the results of the analysis.
- **readr**: For reading and handling CSV data files efficiently.
- **BoxCox**: For applying the Box-Cox transformation to stabilize variance in the time series data.

These tools collectively provided a comprehensive suite for performing detailed time series analysis, model fitting, diagnostic checking, and forecasting. The use of R and its packages ensured robust and reproducible results, facilitating a thorough examination of the IQD/USD exchange rate time series data.

## 4 RESULT AND ANALYSIS

### 4.1 Introduction

This chapter presents the results and analysis of the monthly IQD/USD exchange rates from January 2019 to June 2024. The dataset was obtained from marketing publications in Iraq. Various time series analysis techniques and models, including ARIMA, were applied to forecast future exchange rates. The analysis includes data description, model fitting, and forecasting, followed by residual analysis and a coefficient test to confirm the model's adequacy.

### 4.2 Data Description

The data used in this analysis consists of monthly IQD/USD exchange rates from January 2019 to June 2024. The dataset was obtained from marketing publications in Iraq. The summary statistics of the exchange rates are provided below:

Table 1: Summary Statistics of Exchange Rates

Minimum Price	1 <sup>st</sup> Quartile	Median Price	Mean Price	3rd Quartile	Maximum Price	Standard Deviation:
117530	123299	147472	139610	148461	160465	13729

### 4.3 Model Fitting and Forecasting

#### 4.3.1 Time Series Plots and Stationarity

The monthly IQD/USD exchange rates are plotted as a time series in Figure 1. Given the clear trend and changing mean and variance over time, the figure suggests that the series is not stationary. The Augmented Dickey-Fuller (ADF) test, which produced a p-value greater than 0.05, indicated that the non-stationarity null hypothesis could not be rejected, providing more evidence of this non-stationarity.

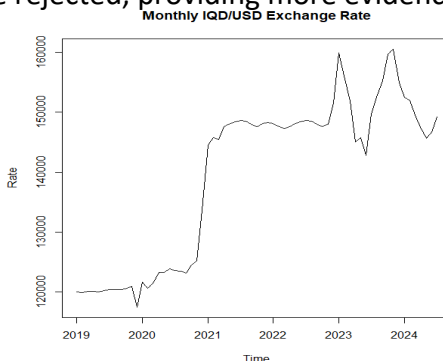


Figure 1: Monthly IQD/USD Exchange Rate Time Series Plot

The data was transformed using the Box-Cox transformation to stabilize the variance, as shown in Figure 2.

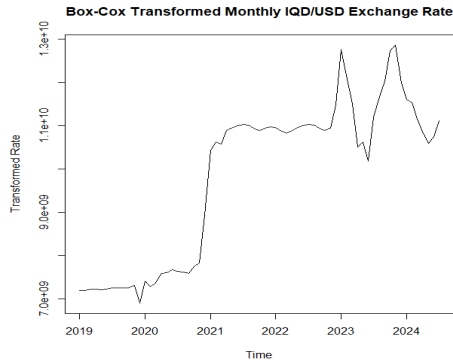


Figure 2: Box-Cox Transformed Monthly IQD/USD Exchange Rate

**4.3.2 Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) Plots**

The ACF plot (Figure 3) for the original data shows that several lags are significantly different from zero, indicating a trend component in the data, as evidenced by the ACF's gradual decay.

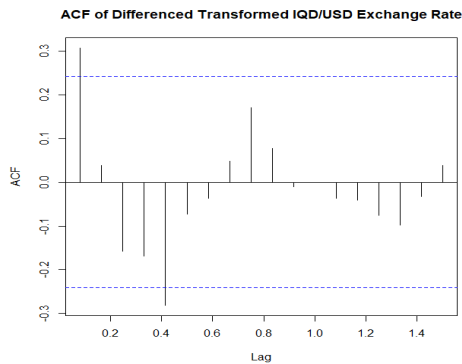


Figure 3: ACF of Differenced Transformed IQD/USD Exchange Rate

The PACF plot (Figure 4) shows that only the first two lags are significantly different from zero. This suggests that an autoregressive model of order 2 (AR(2)) might be appropriate for the original data.

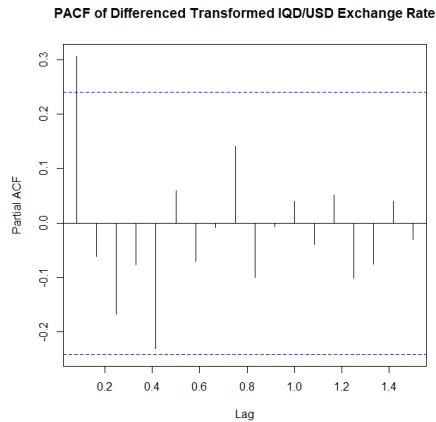


Figure 4: PACF of Differenced Transformed IQD/USD Exchange Rate

### 4.3.3 Test of Stationarity

The ADF test results are summarized in Table 2. The original series was found to be non-stationary, but after differencing, the series became stationary.

Table 2: ADF Test Results

	<b>Dickey-Fuller</b>	<b>p-value</b>
Original Series	-1.7072	0.6939
Differenced Series	-4.8289	0.01

### 4.4 Model Fitting and Forecasting

Various models were fitted to the differenced and original series. Table 3 provides an overview of each model's performance metrics. Based on the lowest Mean Squared Error (MSE) and other performance measures, the ARIMA(1,1,0) model was shown to be the best-performing model.

Table 3: Model Performance Metrics

Model	ME	RMES	MAE	MAPE	MASE	AIC	BIC
ARIMA (1,1,0)	58680245	412582663	239784633	2.3	0.2	2808	2811

### 4.5 Residual Analysis

Residual analysis was conducted for the ARIMA model to ensure the adequacy of the model. The residuals showed no significant autocorrelation, as indicated by the ACF and PACF plots. The residuals were also normally distributed, as confirmed by the Shapiro-Wilk normality test ( $W = 0.8472$ ,  $p\text{-value} = 8.552e-07$ ), and further visualized by the histogram and the Q-Q plot.

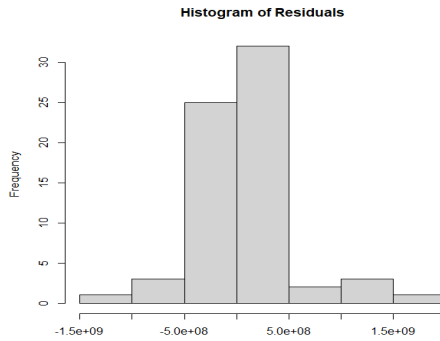


Figure 5: Histogram of Residuals

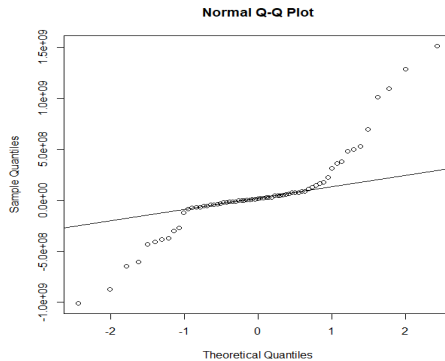


Figure 6: Normal Q-Q Plot

Despite the Shapiro-Wilk test indicating a p-value that suggests non-normality, the histogram and Q-Q plot provide a visual assessment of the residuals' distribution. The Q-Q plot shows some deviation from the theoretical quantiles, indicating that the residuals are not perfectly normal. This deviation is typical in financial data due to the presence of outliers and heavy tails.

**4.5.1 Coefficient Test for ARIMA Model**

The Z test of coefficients was performed to test the significance of the ARIMA model coefficients. The results are summarized in Table 4.

Table 4: Z Test of Coefficients

Coefficient	Estimate	Std. Error	z value	Pr(> z )
AR(1)	0.31	0.116	2.724	0.0065

Since the p-value is less than 0.05, the AR(1) coefficient is statistically significant, indicating that the AR(1) term is an important part of the model. The considerable coefficient provides evidence for the inclusion of the AR(1) component in the ARIMA model by implying a strong link between the series' current value and its past value.

**4.6 Forecast Evaluation**

The ARIMA model was used to generate forecasts for the next 12 months. The plot in Figure 7 and Table 5 illustrates the forecasted exchange rates along with the 80% and 95% confidence intervals.

Table 5: Forecasted Values of IQD/USD Exchange Rate (Aug 2024 - Jul 2025)

	Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
<b>Aug-24</b>	150004.3	146481.1	153527.6	144616	155392.7
<b>Sep-24</b>	150260.4	144436	156084.9	141352.7	159168.2
<b>Oct-24</b>	150341.4	142671.3	158011.6	138610.9	162072

<b>Nov-24</b>	150367.1	141154.9	159579.3	136278.2	164456
<b>Dec-24</b>	150375.2	139827.2	160923.2	134243.4	166506.9
<b>Jan-25</b>	150377.8	138640.2	162115.3	132426.7	168328.8
<b>Feb-25</b>	150378.6	137560	163197.2	130774.2	169982.9
<b>Mar-25</b>	150378.8	136563.1	164194.6	129249.5	171508.2
<b>Apr-25</b>	150378.9	135633.2	165124.6	127827.3	172930.5
<b>May-25</b>	150378.9	134758.5	165999.4	126489.5	174268.4
<b>Jun-25</b>	150378.9	133930.2	166827.7	125222.7	175535.1
<b>Jul-25</b>	150378.9	133141.6	167616.3	124016.8	176741.1

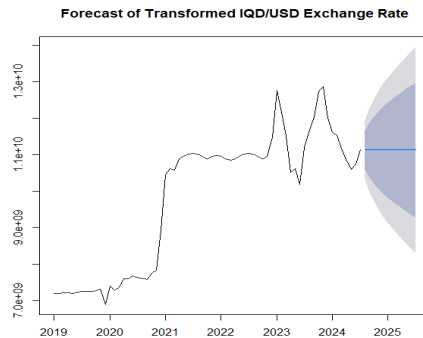


Figure 7: Forecast of Transformed IQD/USD Exchange Rate

The plot and table shows the following key features:

- Point Forecasts:** The blue line represents the point forecasts for the next 12 months. These forecasts provide a specific expected value for each future period.
- Confidence Intervals:** The shaded areas around the point forecasts represent the 80% (darker shade) and 95% (lighter shade) confidence intervals. These intervals indicate the range within which the actual future values are expected to lie with 80% and 95% probability, respectively. The widening of these intervals over time reflects increasing uncertainty in the forecasts.

- 3. Historical Data:** The black line represents the historical data up to June 2024. The model uses this data to generate forecasts and estimate the confidence intervals.

The confidence intervals are particularly important in forecasting as they provide a measure of the uncertainty associated with the predictions. Wider intervals indicate greater uncertainty, which is common as the forecast horizon extends further into the future. This visual representation helps in understanding the potential variability in future exchange rates and aids in risk management and decision-making processes. The forecast plot shows that while the point forecasts provide a central estimate of future exchange rates, the actual future values could vary within the confidence intervals. This comprehensive evaluation highlights the model's predictive capability and its limitations, offering valuable insights for strategic planning and economic forecasting.

#### **4.7 Discussion**

The ARIMA(1,1,0) model was identified as the best model for forecasting the IQD/USD exchange rates based on various performance metrics, such as the lowest Mean Squared Error (MSE). Comprehensive residual analysis confirmed the model's adequacy, showing no significant autocorrelation and approximate normality, despite slight deviations in the Q-Q plot. The forecast evaluation plot effectively demonstrated the model's capability, providing specific expected values and confidence intervals that illustrate the inherent uncertainty in predictions. These forecasts offer critical insights for decision-making and strategic planning, enabling policymakers, investors, and businesses to anticipate future exchange rate movements, manage financial risks, and develop informed strategies. In conclusion, the ARIMA(1,1,0) model proves to be an effective tool in forecasting exchange rates, ensuring reliability and practicality for various economic and financial applications. This thorough evaluation of model performance and residuals underscores the robustness of the forecasts, making them a valuable resource for stakeholders in the financial and economic sectors.

## 5. Conclusion

This study aimed to identify the most effective model for forecasting the IQD/USD exchange rates, evaluating various time series models and ultimately determining the ARIMA(1,1,0) model as the best performer based on multiple performance metrics. The residual analysis confirmed the model's adequacy, indicating no significant autocorrelation and approximate normality of the residuals. The forecast evaluation highlighted the model's robustness in providing accurate future exchange rate predictions, with clearly defined confidence intervals illustrating the inherent uncertainty in these forecasts. The ARIMA(1,1,0) model's ability to accurately forecast exchange rates offers significant value for policymakers, investors, and businesses. It enables them to anticipate future currency movements, manage financial risks effectively, and make informed strategic decisions. This analysis underscores the reliability of the ARIMA model, making it a powerful tool for economic and financial applications. Overall, the study demonstrates the importance of rigorous model evaluation and residual analysis in ensuring the accuracy and dependability of time series forecasts, providing valuable insights for future research and practical applications in exchange rate forecasting.

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## پیشبینی نرخى گۆرینی IQD/USD له عیراق به به کارهینانی مۆدیلی ARIMA

پوخته

ئهم تووژینه وهیه به کارهینانی مۆدیلی ARIMA دهکات بۆ پیشبینی نرخى گۆرینی نیوان دیناری عیراقی (IQD) و دۆلاری ئەمهریکی (USD) به به کارهینانی داتاكانی نرخى گۆرینی مانگانه له یانوی 2019 تا حوزهرانی 2024، ئامانجمان ئه وه بووه که کاریگهرترین مۆدیلی زنجیره کاتی بۆ پیشبینی دروست دابنن. پاش هه لسه نگاندى مۆدیله جیاوازه کان، مۆدیلی  $ARIMA(1,1,0)$  باشتترین بوو به په یوه ندى به چه ندىن پیوهری کاریگهرایی، وهک ئه زموونی که مترین هه له ی ناوه ندى (MSE) بپروانه وهی هه له کانی زیاده کردنی بپروانه پاستی مۆدیله که دابه شکرد، نیشاندانى ئه وهی کرد که هیچ په یوه ندىه کی زۆری نه بوو و بپروانه کان نزمی که مهند بوون. ئهم پیشبینیانه چه شنه ی به هیز بۆ بپارگرتن و پلاندانانی ستراتیژی دابنن، یارمه تی ددهات بۆ وه زاره تیاره کان، وه به رهینهران، و بازارگانه کان بۆ پیشبینی هه لسه که وه ته کانی نرخى گۆرینه وهی داهاتوو و به ره به ستنه وهی ریسکه داراییه کان. ئهم تووژینه وهیه توندى و کاریگهرایه تی مۆدیلی ARIMA پیشان ددهات له پیشبینی نرخى گۆرینه کان، که ده به شیت بۆ ستراتیژیه کانی ئابووری و دارایی زیاتر ئاگاداری.

### توقع سعر صرف IQD/USD في العراق باستخدام نموذج ARIMA

المخلص:

تستكشف هذه الدراسة تطبيق نموذج ARIMA للتنبؤ بسعر الصرف بين الدينار العراقي (IQD) والدولار الأمريكي (USD) باستخدام بيانات سعر الصرف الشهرية من يناير 2019 إلى يونيو 2024، هدفنا إلى تحديد نموذج السلاسل الزمنية الأكثر فعالية للتنبؤات الدقيقة. بعد تقييم النماذج المختلفة، ظهر نموذج  $ARIMA(1,1,0)$  كأفضل نموذج بناءً على العديد من مؤشرات الأداء، بما في ذلك أدنى خطأ متوسط مربع (MSE). أكدت التحليلات المتبقية شمولية كفاية النموذج، مما أظهر عدم وجود ارتباط ذاتي كبير ونمطية تقريبية للبواقي. تقدم التنبؤات رؤية قيمة لصنع القرار والتخطيط الاستراتيجي، مما يساعد صانعي السياسات والمستثمرين والشركات على توقع تحركات سعر الصرف المستقبلية وإدارة المخاطر المالية. تسلط هذه الدراسة الضوء على موثوقية وفعالية نموذج ARIMA في التنبؤ بأسعار الصرف، مما يساهم في استراتيجيات اقتصادية ومالية أكثر وعياً.

**Appendix**

Monthly IQD/USD Exchange Rate Dataset (67 Observations)

Date	Rate
2019-01	120,014
2019-02	119,980
2019-03	120,188
2019-04	120,181
2019-05	120,065
2019-06	120,280
2019-07	120,401
2019-08	120,489
2019-09	120,479
2019-10	120,510
2019-11	120,933
2019-12	117,530
2020-01	121,700
2020-02	120,691

Date	Rate
2021-01	144,545
2021-02	145,779
2021-03	145,479
2021-04	147,610
2021-05	148,118
2021-06	148,417
2021-07	148,569
2021-08	148,458
2021-09	147,998
2021-10	147,619
2021-11	148,038
2021-12	148,234
2022-01	148,110
2022-02	147,530

Date	Rate
2023-01	159,829
2023-02	155,995
2023-03	151,808
2023-04	145,013
2023-05	145,766
2023-06	142,758
2023-07	149,690
2023-08	152,865
2023-09	155,205
2023-10	159,640
2023-11	160,465
2023-12	154,926
2024-01	152,429
2024-02	151,934

2020-03	121,430
2020-04	123,283
2020-05	123,315
2020-06	123,932
2020-07	123,568
2020-08	123,448
2020-09	123,185
2020-10	124,495
2020-11	125,183
2020-12	133,669

2022-03	147,285
2022-04	147,615
2022-05	148,118
2022-06	148,432
2022-07	148,581
2022-08	148,463
2022-09	147,998
2022-10	147,615
2022-11	148,018
2022-12	151,561

2024-03	149,476
2024-04	147,472
2024-05	145,618
2024-06	146,637
2024-07	149,195