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Forecasting the Exchange Rate of the Iraqi Dinar Against the Us Dollar Applied Research in the Secondary Market

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ABSTRACT
The special circumstances experienced by Iraq have a great impact on the fluctuation in determining the exchange rate, so it was necessary to develop a scientific method that determines the policy of the Central Bank toward the exchange rate, and this is what we noticed after 2020 Iraq turned to an open economy and the Central Bank followed a policy to stabilize the exchange rate because of its great impact on the stability of the economy in general. Where this research was prepared to evaluate this policy towards the exchange rate by estimating the probabilities of change experienced by the exchange rate (decline, stability, and rise) by following the method of prediction and estimation of the probabilities of the causes of the occurrence of the phenomenon and through which the cases of transition from one case to another can be estimated, or to predict the state of stability of the phenomenon in the future. This research consists of two main parts, namely the theoretical side, which contains definitions, and the basis for the existing applied side, where the theoretical side contains the definition of the exchange rate, its objectives, and the factors affecting it. The practical aspect, includes the collection of data, which is represented in the exchange rate of the Iraqi dinar against the US dollar issued from the secondary market, the data was obtained through the secondary market (the struggling market).

Keyword: Exchange Rate, Forecasting, Foreign Goods, Tariffs, General Trend.

1- Introduction:

After 2020, the Central Bank developed a policy to raise the exchange rate, has this policy reached the stability of exchange rates in the long term? The extent to which this policy can be evaluated purely statistically, by calculating the probabilities of exchange rate change, The stability of exchange rates in Iraq is very important, so the research shows the theoretical framework in price stability as well as predicting and reaching real results and providing recommendations that serve the stability of exchange rates, the research seeks To achieve the following Estimate the probabilities of exchange rate change depending on the current period, predicting the probabilities of exchange rate change in

The period of stability of the phenomenon, and the time of reaching the state of stability, the research hypothesis begins:

1- There is statistical significance to predict the stability of exchange rates of the US dollar against the Iraqi dinar for the coming years.

2- There is no statistical significance to predict the stability of exchange rates of the US dollar against the Iraqi dinar for the coming years.

2- The concept of exchange rate

The exchange rate is the central element of international financial economies and as such the polar element. In modern financial thought, (11) it is of great importance in adjusting and adjusting the balance of payments of the country, especially developing countries. It is a term that has many definitions, including the exchange rate is the ratio by which foreign exchange for national currency is obtained.

(1) The exchange rate is the number of monetary units in which one unit of a domestic currency is exchanged for a foreign one.

(2) A device that links the prices of commodities in the domestic economy and their prices in the world market and the domestic price of goods, linked through the exchange rate (12)(3)

3- Exchange rate objectives

Resistance to inflation: An improvement in the exchange rate leads to a decrease in the level of imported inflation and an improvement in the level of competitiveness of enterprises. In the short term, the reduction in import costs has a positive impact on the decline in the level of imported inflation. (4)

Resource allocation: The exchange rate shifts resources to the international export-oriented goods sector.13

Income distribution: The exchange rate plays an important role in the distribution of income between local groups or sectors when the competitiveness of the traditional export sector (raw materials or agriculture) is high.

As a result of the decrease in the real exchange rate, this makes it profitable, and the profit accrues to the owners of capital while the purchasing power of workers decreases. Conversely, when the exchange rate falls, it leads to an increase in purchasing power (5)

Development of domestic industries: The central bank can depreciate the exchange rate in order to encourage national industry (14), but the devaluation by the central bank protects the domestic market from external competition and encourages exports (6)

4- Factors affecting the exchange rate:

Relative price levels: According to the theory of purchasing power parity, when the prices of local goods rise, the demand for local goods decreases, and the price of the national currency tends to decline as it is possible to continue to sell local goods in a good way, and vice versa (8)

5- Tariffs and quotas:

Tariffs (e.g., taxes on imported goods) and quotas (restrictions on the illiteracy of goods that can be imported) affect the exchange rate, as this increases demand for domestic goods. (9)

6- Preference for foreign goods over local goods:

Increasing demand for a country's exports causes its currency to appreciate in the long run, and increased demand for imports causes the value of the national currency to depreciate (10)

7 - Types of exchange rates:

There are several types of the exchange rate, including (17)

1- Nominal exchange rate:

It is the measure of the currency of one country that can be exchanged for the value of the currency of another country, currencies are exchanged or bought and selling currencies according to currency rates between each other, and the nominal exchange rate of a currency is determined according to the demand and supply in the exchange market at a certain moment in time, and for this, the exchange rate can change according to the change in demand and supply, and according to the exchange system adopted in the country, the rise in the price of a currency affects Privileges for other currencies. The nominal exchange rate is divided into the official exchange rate, i.e., applicable to official current exchanges, and the parallel exchange rate, which is the rate applicable in parallel markets. This means that there can be more than one nominal exchange rate at the same time for the same currency in the same country.

2- Real exchange rate:

The real exchange rate can express the number of units of foreign goods that seek to buy one unit of local goods, and thus measures competitiveness and it benefits economic operators in making their decisions, for example, the rise in export incomes in conjunction with the high costs of producing exported materials at the same rate that pushes to think about increasing exports, but this rise In returns, it did not lead to any change in the profits of exporters, although their nominal incomes increased by a high percentage.

3- Effective exchange rate:

The effective exchange rate expresses the indicator that measures the average change in the exchange rate of one currency relative to several other currencies in a period of time, so the effective exchange rate index is equal to the average of several binary exchange rates, and it indicates the extent to which a country's currency has improved or evolved relative to a group of other currencies. The actual exchange rate can vary in terms of its value given the possibility of different factors such as the base year, the list of currencies of the client countries, and the weights adopted in the composition of the basket, if the goal of the index is to measure

the impact of the exchange rate change on export returns, bilateral exports will be used to determine the weights of the index, but if the goal is to measure the impact On the balance of payments, bilateral imports will be used to determine weights, and if the goal is to measure the export returns of a commodity or a number of goods of a country to the world, the shares of competing countries of world exports will be used to form weights in the index. As for the base year, a year is chosen in which the economy of the country concerned is close to equilibrium.

4- Equilibrium exchange rate:

It is the price that leads to a sustainable balance of payments balance when the economy is growing at a normal and sufficient rate.

5 – **Time Series:** (15)

The time series is a set of observations or data that are collected on a particular phenomenon in certain periods of time and often these periods of time are equal was a year, month, day, and other details and the nature of the study and its purpose and consists of two variables, one of which is independent, which is the time variable and the other is a dependent variable, which is the value of the studied phenomenon.

5-1 Time Series Elements:

The work of researchers is focused on analyzing the phenomenon into its elements and studying each element separately to identify how the element changes in terms of its nature, amount, and direction, and its elements or compounds can be classified into the following:

A – Secular Trend (T):

These data appear when there is instability on average over time and this change may be for the population of a country or GDP or currency exchange rates or profits of certain companies, the general trend has two types, the first is when the general trend is increasing, i.e., positive trend and the second is the general trend is decreasing, i.e., negative direction.

B – Seasonal Variations (S):

They are changes that appear identically in specific periods of time the number of passengers on the lines of transport and the sale of clothes at certain times of the year and this situation appears in many applications that apply to seasonal changes, including economic, environmental, commercial, military, medical and others.

C . Cyclical Variations (C):

In some cases, changes in the time series are different and are the result of fluctuations in series data such as sales of phones, cars, and others, and can be distinguished from seasonal changes that seasonality changes are in equal periods, while periodic changes occur in different periods.

D – Irregular Variations (I):

They are changes that occur as a result of sudden or unexpected events, which result in changes in the time series in a different manner, which requires studying and analyzing their changes, such as the changes that occurred in global prices as a result of the Russian-Ukrainian war, which has become clear consequences on the global market.

6- Steps to build a prediction model: (16)

There are several steps to building a predictive statistical model, including:

A.form Determination:

This is done through the graph of the time series at a particular phenomenon and the study of the behavior of the series accurately through the drawing and then choose the appropriate statistical model for the series data and this is through experience according to previous studies on the one hand and the use of a number of statistical measures in comparison and comparison on the other hand.

b. Model Estimation:

Here the parameters of the model specified in the first stage are estimated using a number of statistical methods of estimation.

C- The validity and accuracy of the model:

In this step, the estimated model is taken and a special test is conducted for it by taking the errors of the model and examining them to see the extent to which its data matches the estimated values of the chosen model when the test is conducted and passed, the decision will be made to adopt and choose it definitively and in the event of failure to pass the test, it is completed to determine another statistical model and the same process is done for the second step.

D. Calculation of the forecast:

The final chosen model is used to calculate future predictions with the calculation of forecasting errors and their own confidence units, provided that these predictions are located within the predictive confidence limit with a certain error rate and through these predictions are used to make appropriate decisions.

7- Types of statistical forecasts:

Statistical models can be divided when used to predict according to a certain horizon (term or extent) in calculating these predictions and are often of two types:

A- Short-term forecasting:

This type of prediction in which the period of future predictions is very short in its ranges and this uses time series analysis represented by one of the following models: self-regression models, moving average models, and mixed models from the two models previously, and these three types of models are called the Box-Jenkins linear models represented by ARMA models. This type is characterized by accuracy and has an important and effective role in the process of making the necessary decisions and policies when applying a particular phenomenon due to keeping up with such predictions of the conditions of the studied phenomenon and simulating it, and there are also other models that use this type of predictions, including models of the self-regression vector VAR and models of non-linear time series such as the model ARMAX, ARCH, and others.

B. Long-term forecasting:

This type of forecasting has many future predictions in their ranges so that they take long-term periods of time, and this is when calculating predictions for linear regression models (simple or multiple), as well as some standard models that calculate growth rates for population size, for example.

As for the advantages of this type of prediction, it does not keep pace with the continuity of the changes that occur to me the phenomenon studied in the sense that it is inaccurate and ineffective in calculating the future expectations of the phenomenon as it moves away from the circumstance experienced by that phenomenon because of the length of its predictive periods

so that it affects the variation of the prediction line and causes its value to increase against the lack of effectiveness of the work of the model.

At the same time, this type of forecasting has an important and significant role in drawing up long-term strategic plans and making decisions for them.

8 – Time series analysis:

There are several ways through which the time series can be analyzed depending on the type of data specified for the study and in this research the time series will be analyzed by estimating the equation of the general direction, where the general trend is measured by the changes that occur on the phenomenon and for the long level and this vehicle is one of the most important components of the time series and that depends on it in calculating estimates and the value of this vehicle may increase directly with time or inversely with it and this compound can be linear or Non-linear, and for the purpose of estimating this compound there are several methods, including (15)

A- Method of booting by drawing:

The method of drawing is one of the primitive methods to determine the shape of the general trend, which gives a simplified and quick picture of that trend, where this method depends on drawing the diffusion form of the data under study and then trying to draw a straight line that approaches most of the points of the diffuse shape and because of the fact that the drawing of the line varies from person to person the attempt to reconcile the graph is difficult and depends on the experience of the researcher himself.

b- Semi-average method:

If we assume that we have a series of data represented by y1, y2, ... yn size n and the general trend vehicle cannot be represented as follows:

$\hat{y} = \alpha + bt$

Whereas:

α B Parameters of the model of the public linear machines

C - Least squares method (L S M):

The general trend model can be likened to a simple linear regression model where it contains yt represents the dependent variable and t represents time and is considered the illustrative variable and therefore

$\hat{y} = \alpha + bt$

To obtain the estimators of the parameters of the general direction vehicle, they are by the following equation:

$$b = \frac{\sum y_t t - n\,\bar{t}\bar{x}}{\sum t^2 - \frac{(\sum t)^2}{n}}$$

One:

$\alpha = \bar{y} - bt$

Whereas:

α: The constant limit parameter of the equation of the general trend compound represents

B: represents the slope of the component of the general direction

By applying one of the previous estimation methods, it is possible to predict the prices of the currencies that will be under study.

D- Moving Average Method :

The moving media method is one of the introductory methods used to estimate the general trend, which is based mainly on the estimated neighborhood points of assessment by taking the average values adjacent to the data to be predicted.

1- Simple Moving Average (KMA):

The simple moving media method relies on an odd number of adjacent data (K) to calculate moving averages and the resulting value will represent the value of the general trend of the value that mediates those values, which m of values and follows from the values where:

Tt = $\frac{1}{K}\sum_{j=-m}^{m} y_{t+j}$

Whereas:

M = $\frac{(k+1)}{2}$

Since m represents the values preceding the Ti viewing, we will lose m of values at the beginning of the series, and similarly, we will lose the same number of m of yam at the end of the time series, denoted by the symbol (KMA).

2- Centered Moving Average Method:

The central moving media method is used when K is an even number, and since the moving media method needs to be the power values in the middle of the values that are used to calculate the moving medium, so a moving average is calculated multiple of the number of even observations to become the process (2KMA) where a moving average is made the previous moving media extracted from the second degree to get the central moving averages.

Exclude the effect of the general trend from the value of the time series:

The process of excluding the effect of the general trend, and depending on the type of model is collective, the effect of the general trend is excluded by subtracting the estimated values of the trend from the time series, i.e.:

y_t - T_t = S_t + C_t + e_t

If the model is multiplicational, the effect of the general trend is excluded by dividing the data of the phenomenon by the value of the general trend, i.e.:

$\frac{y_t}{T_t}$ = S_t * C_t * e_t

3- **Applied aspect:**

A- Data:

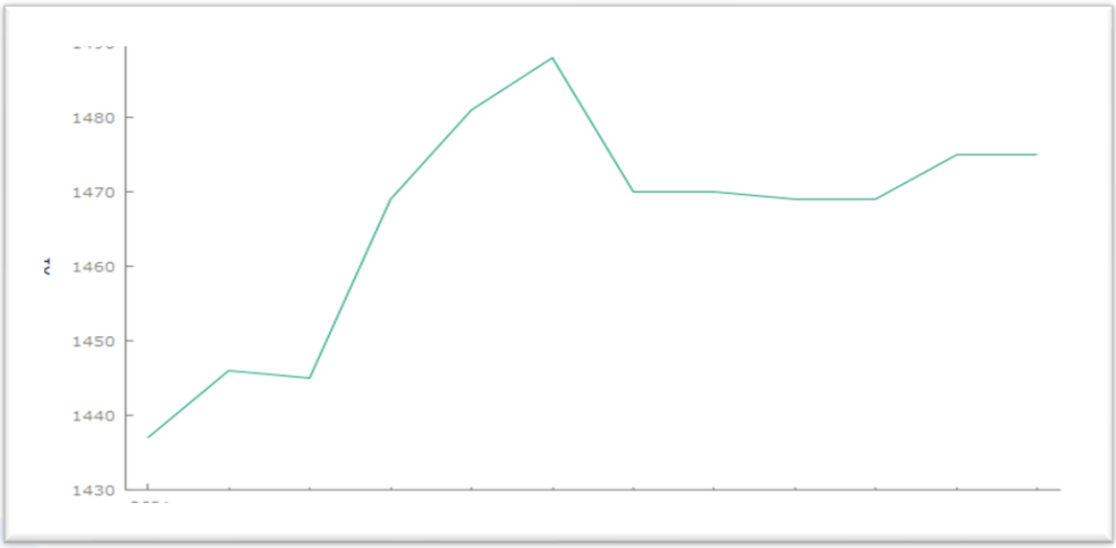
The data was obtained through the Central Bureau of Statistics, where the data consisted of exchange rates according to the Iraqi markets (Al-Kifah markets), over a period of twelve months and for the year 2021.

Table 1: Selling price rates for 2021 in Alkifah markets		
No.	Month	Selling rate in the struggle markets
1	January	1437
2	February	1446
3	March	1445
4	April	1469
5	May	1481
6	June	1488
7	July	1470
8	August	1470
9	September	1469
10	October	1469
11	November	1475
12	December	1475

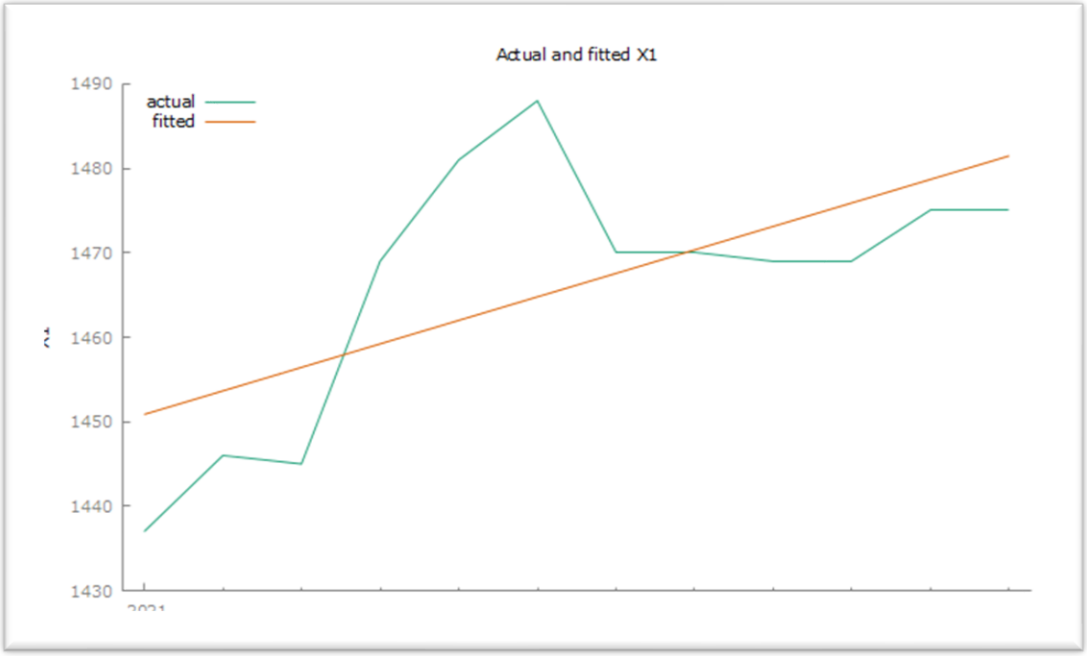
b- Analysis:

The data was analyzed using the Gertl program and using the general trend model, where several steps are used for analysis as follows:

The first step: We are working on drawing the data to know the stability of the time series, as shown as follows:



The second step: We work to take the first difference for the purpose of stabilizing the data, then we redraw the data as shown in the following form:



The third step: We are working on analyzing the data in the least squares method, as shown in the following table:

Table 2: Analysis of data by general trend method

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	1448.08	7.54769	191.9	<0.0001	***
Time	2.78322	1.02553	2.714	0.0218	**

Mean dependent var	1466.167	S.D. dependent var	15.40858
Sum squared resid	1503.946	S.E. of regression	12.26355
R-squared	0.424143	Adjusted R-squared	0.366557
F(1, 10)	7.365424	P-value(F)	0.021786
Log-likelihood	−46.01291	Akaike criterion	96.02582
Schwarz criterion	96.99563	Hannan-Quinn	95.66676
Rho	0.577355	Durbin-Watson	0.721891

Through the above results, it is clear that the model is suitable for prediction, as the calculated F test value appeared (7.365424) with a significance of (0.021786), which is less than the level of significance 0.05, and the analysis also showed that the value of the coefficient of determination R 2 = 0.42, meaning that it explained 42% of the changes in dollar exchange rates. As for the parameters of the linear regression model, the analysis showed that the value

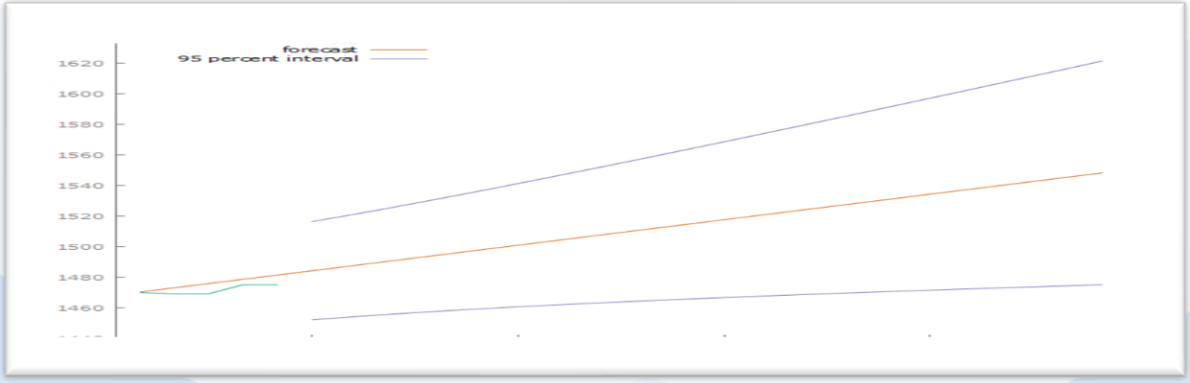
of the marginal slope had reached 2.78322 b 1 = with a significant level of 0.0218, while the fixed limit was b. ^{0} = 1448.08 with a significant level of 0.0001.

Fourth Step: We are working on forecasting for the next 24 months as shown in the following table and figure:

Table 3: Forecast of USD/USD exchange rates for the year 2022-2023

For 95% confidence intervals, t(10, 0.025) = 2.228

Obs	X1	prediction	std. error	95% interval
2022:01	undefined	1484.26	14.4001	(1452.17, 1516.34)
2022:02	undefined	1487.04	14.9026	(1453.84, 1520.25)
2022:03	undefined	1489.82	15.4568	(1455.38, 1524.26)
2022:04	undefined	1492.61	16.0575	(1456.83, 1528.39)
2022:05	undefined	1495.39	16.6997	(1458.18, 1532.60)
2022:06	undefined	1498.17	17.3786	(1459.45, 1536.90)
2022:07	undefined	1500.96	18.0903	(1460.65, 1541.26)
2022:08	undefined	1503.74	18.8309	(1461.78, 1545.70)
2022:09	undefined	1506.52	19.5972	(1462.86, 1550.19)
2022:10	undefined	1509.31	20.3863	(1463.88, 1554.73)
2022:11	undefined	1512.09	21.1957	(1464.86, 1559.32)
2022:12	undefined	1514.87	22.0230	(1465.80, 1563.94)
2023:01	undefined	1517.66	22.8665	(1466.71, 1568.61)
2023:02	undefined	1520.44	23.7243	(1467.58, 1573.30)
2023:03	undefined	1523.22	24.5949	(1468.42, 1578.02)
2023:04	undefined	1526.01	25.4771	(1469.24, 1582.77)
2023:05	undefined	1528.79	26.3696	(1470.03, 1587.54)
2023:06	undefined	1531.57	27.2715	(1470.81, 1592.34)
2023:07	undefined	1534.36	28.1819	(1471.56, 1597.15)
2023:08	undefined	1537.14	29.0999	(1472.30, 1601.98)
2023:09	undefined	1539.92	30.0248	(1473.02, 1606.82)
2023:10	undefined	1542.71	30.9562	(1473.73, 1611.68)
2023:11	undefined	1545.49	31.8933	(1474.43, 1616.55)
2023:12	undefined	1548.27	32.8356	(1475.11, 1621.43)



From the table and figure above, the exchange rates of the dollar against the dinar have been predicted until 2023, the twelfth month of it, where it is expected that the exchange rate (1548.27) against one dollar will reach its current price of 1475 against the dollar, that is, there will be an increase in the exchange rate from the current price to the price in 2023, and that this increase will work to increase the prices of materials and local markets, which requires the Central Bank The Ministry of Finance will work to maintain the exchange rate using certain fiscal policies.

Conclusions and Discussion:

After the data was collected, a stability test was conducted on it, where the data was found unstable, then work was done to make the data stable by taking the first difference and then the logarithm for it, where the test results for the second time were stable, then work was done to analyze that data using the general trend in forecasting, which showed that exchange rates can reach in 2023 for the twelfth month of it to an exchange rate of 1548.27 dinars per US dollar That is, there will be an increase of 75 dinars per dollar, and this indicates a significant increase in the price of the currency, which will cause significant losses on the local market and direct impact on the Iraqi citizen, who must work by the competent authorities to reduce this price or work to sell currencies in higher amounts to maintain the current exchange rate.

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