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Periodicals of Engineering and Natural Sciences ISSN 2303-4521
Vol. 8, No. 3, September 2020, pp.1888-1897

The effect of changing the exchange rate on some economic variables by using the autoregressive distributed Lag (ARDL) in Iraq

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ABSTRACT

The issue of the exchange rate has emerged as one of the most important problems facing countries in drawing the parameters of their foreign exchange, as dealing in the foreign currency market has become one of the most dangerous transactions, and studies have shown the existence of several mutual effects between exchange rate fluctuations and macroeconomic variables. The study focuses on analyzing the impact of fluctuations The exchange rate on macroeconomic variables. This comes in the wake of the fundamental changes in the macroeconomic indicators in Iraq, which included inflation and oil prices, which had a major impact on the value of the Iraqi dinar against the US dollar. The Autoregressive Distributed Lag (ARDL) was used to analyze time-series data from 1990-2017. This model can distinguish between dependent and explanatory variables and eliminate the problems that may arise due to the presence of autocorrelation and internal growth. The ARDEL model can also estimate the short-term and long-term relationship, simultaneously. The results showed that there is a long-term relationship between the exchange rate with inflation, GDP, expanded the money supply, and foreign reserves. This is consistent with the reality of economic theory, but in the short term, there is a relationship between the exchange rate and inflation. The reason is that there is no relationship between the price Exchange and other variables in the short term due to the inability to demonstrate the impact of these variables in a relatively short period, from which we conclude that reducing volatility in macroeconomic variables due to the stability the exchange rate in the Iraqi economy to help decision-makers draw correct economic policies.

Keywords: The exchange rate, gross domestic product, expanded money supply, foreign reserves, border approach testing, ARDEL model, Iraqi economy

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1. Introduction

The mistake followed before 2003 in economic policies led to an increase in the money supply in the economy, as well as to a decline in the rate of growth of the gross domestic product, and for the state to interfere in all joints of economic life had a negative impact on the Iraqi economy and in particular on the instability of the exchange rate. After Iraq entered a war in 2003, which led to the destruction of civilian infrastructure, industrial parks, oil refineries, etc., from the effects of known wars, all of this led to distortions and imbalances in the Iraqi economy. After this year, and as a result of the monetary issuance, and the effects of the economic embargo and the stoppage of oil exports, it reflected negatively on the Iraqi dinar exchange rate, which led to its sharp decline.

In a recent study [1], they indicated that most economists agreed that the large increase in the money supply by the government to finance the huge budget deficit was the reason for the emergence of large inflation in Iraq, as others pointed out that the low exchange rate was another reason for inflation.

Many academics and economists have been interested in managing the exchange rate system, studying the effect of the difference in exchange rate systems on economic growth, and discovering whether the difference in the exchange rate has an impact on economic growth in Arab countries, where [2], the Arab countries witnessed large differences in the exchange rate, as it reached its peak in 2011/2012, and this difference

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negatively affected economic growth, as the researchers tried to model the relationship between the exchange rate difference and economic growthnel.
In other research on developing countries, it was found that less flexible exchange rate regimes are associated with slow economic growth and increased production.
As for industrialized countries, there is no significant impact of the exchange rate on economic growth, as this conclusion came from a study conducted [3] on 183 Arab countries, for the period after Brighton Woods, and using a new classification of systems based on the actual behavior of economic variables with Relationship.

2. Material and methods

This study used data for the period 1990-2017, which contained annual observations for each studied variable, (exchange rate, gross domestic product, inflation, wide money supply, and foreign reserves), from the annual bulletin - the Central Bank of Iraq - Department of Statistics and Research.
Before going into the ARDEL self-regression model, it is necessary to first test the stationary of the studied variables in the aforementioned model.

2.1. Stationary study of variables (unit root test)

Historical or temporal-economic events rarely achieve stationary random paths, in order to test the stability of each of the (exchange rate, gross domestic product, inflation, broad money supply, and foreign reserves) where the time series is stationary if the average and the variance are constant over time, and also if the joint variance depends only on the distance between two periods and does not depend over time, if one or both of them is not achieved, then we can say that the series is un stationary, unit root tests are the most important way to determine the stationary of time series [4], as well as to identify statistical properties, in addition to that, to know the properties of time series in terms of their degree of integration. The Dickey -Fuller test and Philip Byron test were used to test the time series stability of the studied variables.
This test is based on examining the null hypothesis which states that the variable in question contains (Unit Root) versus the alternative hypothesis that the variable does not contain (Unit Root), where the ADF test is based on:

$$\Delta y_t = \delta y_{t-1} - \sum_{j=1}^{p} \varphi_j \Delta y_{t-1} + \epsilon_t$$
$$\Delta y_t = \delta y_{t-1} - \sum_{j=1}^{p} \varphi_j \Delta y_{t-1} + c + \epsilon_t \qquad (1)$$
$$\Delta y_t = \delta y_{t-1} - \sum_{j=1}^{p} \varphi_j \Delta y_{t-1} + c + bt + \epsilon_t$$

where,
ϵ_t : White noise errors, That is, the error is disconnected and its variance is constant over time, (p) in the degree of slowdown ($P = \varphi - 1$), Its value is determined by a standard, Akaike and Schwarz.
Or, we start with a certain value of (p) and estimate the model in, (p-1) Slow down, then, (p-2) Slow down, until the (pieme) coefficient becomes a significant delay. The ADF test is based on the null hypothesis y_t it is $I(1)$ which means that $\varphi = 1$, that is, the time series is No stationary, against the alternative hypothesis y_t is $I(0)$, i.e. the meaning of y_t ,to accept or reject the null hypothesis, its calculated ADF statistic is compared with the critical values of Fullers, if the calculated values are less than the tabular values is stationary, then we accept the null hypothesis, and therefore the series is No stationary, as can depend on P-Value, which is compared with the value of the level of significance, and if it is less than it, then the null hypothesis is rejected, and therefore the series is stationary, that is, the integrity of the series is zero.
As for Philip Byron PP unit root test, which has become widely used in time series stationary testing, its suitability in the case of small samples is more than the ADF test, just as Philip Peron Unit Root test differs fundamentally from the ADF test in dealing with the self-correlation and variance of the error limit, where PP ignores self-correlation when testing a variable[5], and PP relies on it using the following equation:

$$\Delta y_t = \beta D_t + \pi y_{t-1} + \mu_t \qquad (2)$$

The auto-correlation and any variation of the error limit μ_t when directly testing the variable by changing its test statistic $T_{\pi=0}$ and $T_{\hat{\pi}}$ as these two variations are denoted by $Z_{\pi}$and Z_t as shown in the following equations:

$$Z_t = \left(\frac{\hat{\sigma}^2}{\hat{\alpha}^2}\right)^{1/2} . t_{\alpha=0} - \frac{1}{2}\left(\frac{\hat{\alpha}^2 - \hat{\sigma}^2}{\hat{\alpha}^2}\right)\left(\frac{T.SE(\widehat{\pi})}{\hat{\sigma}^2}\right) \qquad (3)$$

$$Z_{\pi} = T_{\hat{\pi}} - \frac{1}{2}\left(\frac{T^2 - SE(\hat{\pi})}{\hat{\sigma}^2}\right)(\hat{\alpha}^2 - \hat{\sigma}^2) \qquad (4)$$

Where $\hat{\sigma}^2$ and $\hat{\alpha}^2$ are estimated for two contrast parameters.

$$\sigma^2 = \lim_{T\to\infty} T^{-1} \sum_{t=1}^{T} E\left(\mu_i^2\right)$$

$$\alpha^2 = \lim_{T\to\infty} \sum_{t=}^{T} E\left(T^{-1} S_T^2\right)$$

Where: $S_T = \sum_{t=1}^{T} \mu_t$ under the null hypothesis which indicates that, $\pi = 0$, then the statistics Z_{π} and Z_t, to (P.P) it has distributions that are close to its statistics, t-statistics to the ADF, being unbiased, and one of the most important advantages of PP testing is that it does not depend on determining the value of the slowdown factor. The PP test compares corrected statistics (t) with critical values at a given level of significance, where if the calculated value of corrected t is less than the tabular value, then we cannot reject the null hypothesis, i.e. the sense of time series No stationary, and can also depend on P-Value In the same way as ADF.

2.2. Autoregressive distributed lag (ARDL)

The traditional models of co-integration tests suffer from the problem of internal growth, while the ARDEL methodology presented by Pesaran and shin [6] can then be expanded by Pesaran [7], to distinguish between the dependent variable and explanatory variables and eliminate problems that may arise due to the existence of self-correlation and internal growth, the ARDEL model can estimate the short and long-term relationship in that one, and also provides an unbiased and highly efficient estimate, and the use of the ARDEL model is based more fit to one formula, below will be the general model description for ARDEL.
Model ARDEL ($p,q_1,q_2,\ldots,q_k$) it is according to the following equation:

$$\gamma(L,P)y_t = \sum_{i=1}^{k} B_i(L,P)x_{it} + \delta w_t + \mu_t \qquad (5)$$

where,

$$\gamma(L,P) = 1 - \gamma_1 L - \gamma_2 L^2 - \cdots - \gamma_P L^P$$
$$for \quad i = 1,2,3,\ldots,k \quad , \quad \mu_t \sim iid(o, s^2)$$
$$p = 0,1,2,\ldots,m \quad , \quad q = 0,1,2,\ldots,m$$

L: is the slow factor of the $L^0 y_t = x_t,\ L^1 y_t = y_{t-1}$

w_t : A vector of size (sx1) that represents real variables such as (constant limit, general trend, seasonal variables or explained variables with a fixed delay).

Also, $(m+11)^{k+1}$ ARDL Models latency

m : is the maximum delay, which is chosen by the researcher.

Therefore, the ARDEL (p, q) model has one variable, and it is described as the following equation:

$$\gamma L(y_t) = \varphi + \vartheta L(x_t) + \mu_t \qquad (6)$$

where,

$\gamma(L) = 1 - \emptyset_1 - \cdots - \gamma_P L^P$,

$\vartheta(L) = \beta_0 - \beta_1 - \cdots - \beta_q L^p$

Therefore, the general model ARDEL (p, q1, q2, ..., qk) for the dependent variable and a number of independent variables is in the following equation:

$$\gamma L(y_t) = \varphi + \vartheta_1(L)x_{1t} + \vartheta_2(L)x_{2t} + \vartheta_k(L)x_{kt} + \mu_t \qquad (7)$$

Using the slowdown coefficient L, which applies to both vectors: $L^k y = y_{t-k}$, which represents the vector of the polynomial as well as the estimated vector B (L, q). The term error **(**u_t**)**, called the white noise error, is fixed and independent of: $y_t, y_{t-1}\dots,\quad x_t, x_{t-1},\dots$, and the standard least squares method is used to estimate ARDEL models.

2.3. ARDEL integration model application

This method is used by [8,9] and [10], to determine the long-term relationship between the variables and to illustrate this method, the ARDEL model (p, q) was used with the *I*(d) variables:

$$y_t = \varphi_1 y_{t-1} + \cdots + \varphi_p y_{t-p} + \vartheta_0 x_t + \vartheta_1 x_{t-1} + \cdots + \vartheta_p x_{t-p} + \mu_{1t} \quad (8)$$

Where, $t = 1,2,\dots,T\ ,\quad \mu_t = iid(0, s^2)$

On the other hand, it can be written in the following equation:

$$y_t = \sum_{i=1}^{p} \varphi_i y_{t-i-1} + \sum_{i=0}^{p} \vartheta_i y_{t-i+1} \quad (9)$$

We can say that the model is constant in the case φ <1, this assumption indicates that there is a long-term relationship between the two variables $x_t(y_t)\ ,\ y_t(x_t)$ If $\varphi = 1$, then we conclude that there is no long-term relationship between the two variables, and it can be represented by the following equation:
Model ARDEL (p,q1,q2,…,qk), the common integration test shall be:

$$\Delta x_t = \delta_{0i} + \sum_{i=1}^{k} \alpha_i \Delta x_{t-1} + \sum_{i=1}^{k} \alpha_2 \Delta y_{t-1} + \delta_1 x_{t-1} + \delta_2 y_{t-1} + v_{1t} \quad (10)$$

$$\Delta y_t = \delta_{0i} + \sum_{i=1}^{k} \alpha_i \Delta y_{t-i} + \sum_{i=1}^{k} \alpha_2 \Delta x_{t-i} + \delta_1 y_{t-1} + \delta_2 x_{t-1} + v_{1t} \quad (11)$$

Where *(k):* the highest slowdown factor.
$(\delta_1 - \delta_2)$: Long term relationship.
$(\alpha_1 - \alpha_2)$: The short-term dynamic relationship in a given model is represented by a number of variables.
We use the *F* statistic to test the hypothesis below which states that coefficients for slowing factors are equal to zero.

$$H_0: \delta_1 = \delta_2 = 0 \quad (12)$$
$$H_1: \delta_1 \neq \delta_2 \neq 0 \quad (13)$$

The F statistic in equations (12) and (13) is called Wald test, this statistic is compared with the highest value and lowest critical value of $I(0), I(1)$ defined by Pesaran [7], and according to the sample size, if its calculated F is higher than the critical value at I(1) then we reject the null hypothesis, and conclude that there is a common integral relationship between the variables, but if it is less than the lower critical value at I(0) then we cannot accept the null hypothesis either if it is between them the issue remains unresolved.

The second step is to determine the delay period for this ARDEL model after confirming that there is a long-term relationship between the variables, and to determine the appropriate length of delay period we use the Akaka Information (AIC) and Schwarz Bayesian (SBC)[11,12] criteria according to equation (6):

$$AIC_P = \frac{-n}{2(1 + \log(2\pi))} - \frac{n}{2logS^2 - P} \quad (14)$$

$$SBC_P = \log(S^2) + \left(\frac{logn}{n}\right) P \quad (15)$$

Where S^2 represents the greatest possible predictor of the regression model.
n is the estimated number of parameters.
p=0,1,2,…,P where P is the optimal arrangement for the specified model.

The best model is the model that has the lowest AIC, SBC, the lowest random error estimate and the largest value of R^2. This model represents the long-term relationship of study variables.

3. Results and discussion

3.1. Stationary of the variables

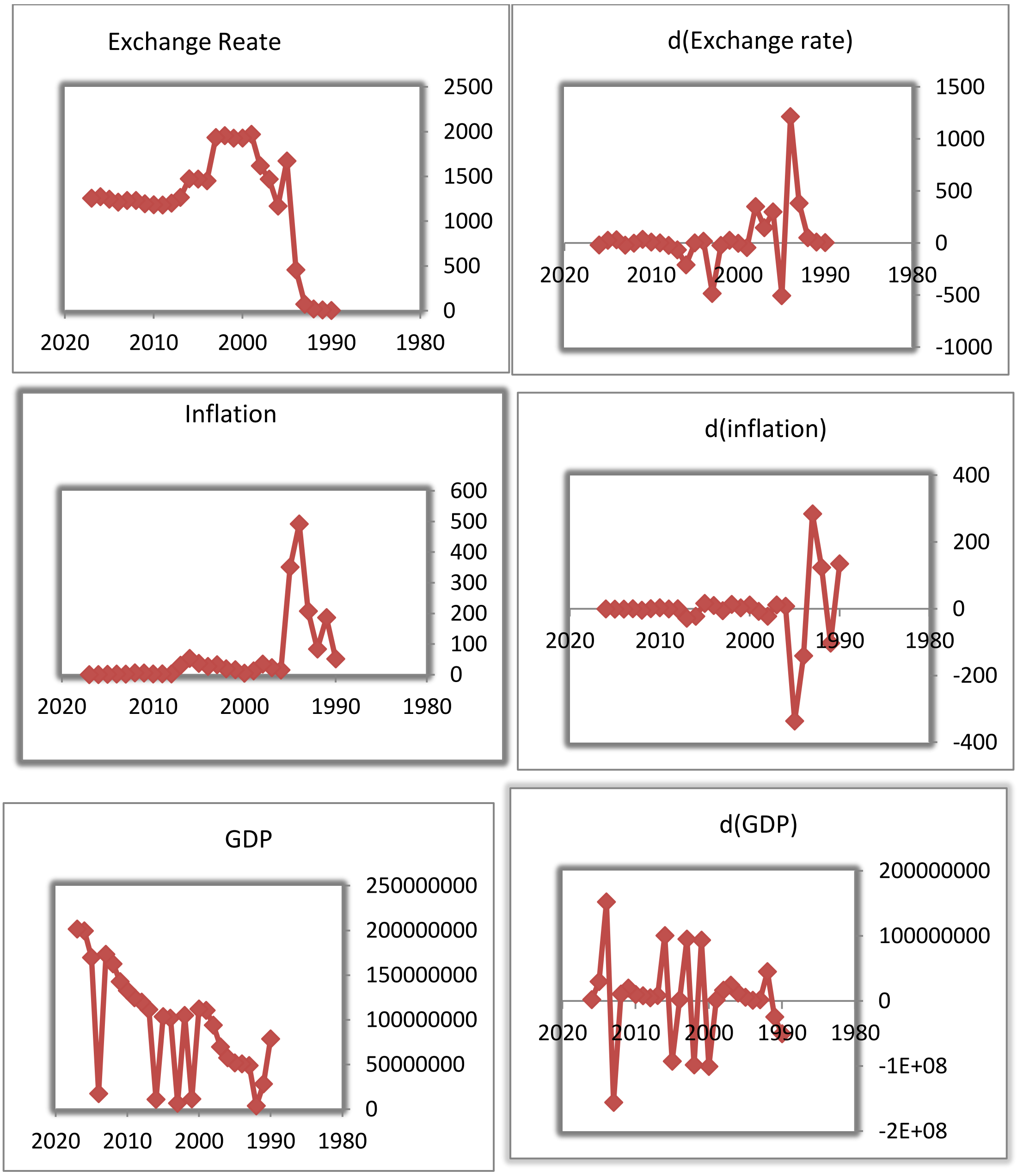
The study data are annual data for (the exchange rate, productive domestic product, inflation, expanded money supply, and foreign reserves). The analysis begins with the study of the stationary of each of these variables, followed by the use of the self-regression model for slower time gaps ARDEL, and the error correction methodology, to determine the short and long-term relationship between variables.As a first step, we test the stationary of time series using the ADF and PP tests, and know the characteristics of each time series in terms of their degree of integration, and it must be noted that the PP test is more accurate than the ADF test in the case of a relatively small sample size, and this leads us to rely mainly on PP test, in the event that the analysis differs between the two tests, this test examines the null hypothesis that the variable in question is not-stationary, that is, it contains the unit root, against the alternative hypothesis, which says (the variable in question is stationary, that is, it does not contain the root of the unit), to accept or reject the null hypothesis we rely on the test's P-Value, if it is less than the 0.05 level of significance, for example we reject the null hypothesis and then acknowledge that there is stationary in the time series of the variable concerned.

Table 1. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test for the Exchange rate, Inflation, GDP, Foreign reserves, Broad Money

		ADF		PP	
Variable	Model type	Test statistics	P-Value	Test statistics	P-Value
Exchange rate	Constant	-5.159564	0.0006	-2.246395	0.1957
	Constant+ trend	-9.464361	0.0000	-1.711818	0.7151
	None	-1.831579	0.0652	-0.159975	0.6191
Inflation	Constant	-3.819879	0.0114	-2.338960	0.1678
	Constant+ trend	-3.768496	0.0367	-3.054521	0.1369
	None	-6.106552	0.0000	-1.992960	0.0460
Gross Domestic Product (GDP)	Constant	-3.052575	0.0426	-2.946450	0.0532
	Constant+ trend	-5.614651	0.0005	-5.647356	0.0005
	None	0.057612	0.6923	-0.600874	0.4476
Foreign reserves	Constant	-2.560123	0.1134	-2.560123	0.1134
	Constant+ trend	-2.727772	0.2341	-2.727772	0.2341
	None	-0.846672	0.3398	-0.776473	0.3704
Broad Money	Constant	0.990627	0.9943	0.624853	0.9878
	Constant+ trend	-2.351479	0.3899	-1.630297	0.7537
	None	1.578207	0.9663	1.800886	0.9799

From Table 1, the exchange rate according to the results of a test, ADF is not fixed in the case of a general trend and a fixed limit, and if any model of ADF is not significant, then the variable is not stationary , and accordingly, the exchange rate is not stationary, and this is also confirmed by the PP test. And it becomes clear to us that the exchange rate is not stationary in any of the three models, and here we must take the differences to know the degree of stationary of the exchange rate, and what was mentioned about the exchange rate corresponds to inflation, where the ADF test confirmed that the variable is not stationary in the case of a fixed limit and direction General, as well as a test, PP confirmed stationary of inflation in the case of a fixed limit and the general trend.

Therefore, differences should be taken to know the degree of stationary and the gross domestic product, as it is similar to the state of inflation and the exchange rate, as it has not been established in all its models, so it is considered not stationary. As for the expanded money supply and foreign reserves, both ADF and PP have confirmed that they are not stationary, and differences must be taken to know the degree of their stationary.
Figure 1 shows the annual time series for (exchange rate, inflation, gross domestic product, expanded money supply, foreign reserve), for the period 1990-2017, and through it we can see the not stationary of both (mean and variance) over time, and therefore the difference must be taken It is worth noting that this figure has shown us that the exchange rate (the first difference to the exchange rate), inflation (the first difference to inflation), the gross domestic product (the first difference to the gross domestic product), and the expanded money offer (the first difference to the expanded money supply) and foreign reserves (The first difference is the foreign reserve), has stabilized and established the mean and variance across a time. This was confirmed by the ADF and PP tests for differences.



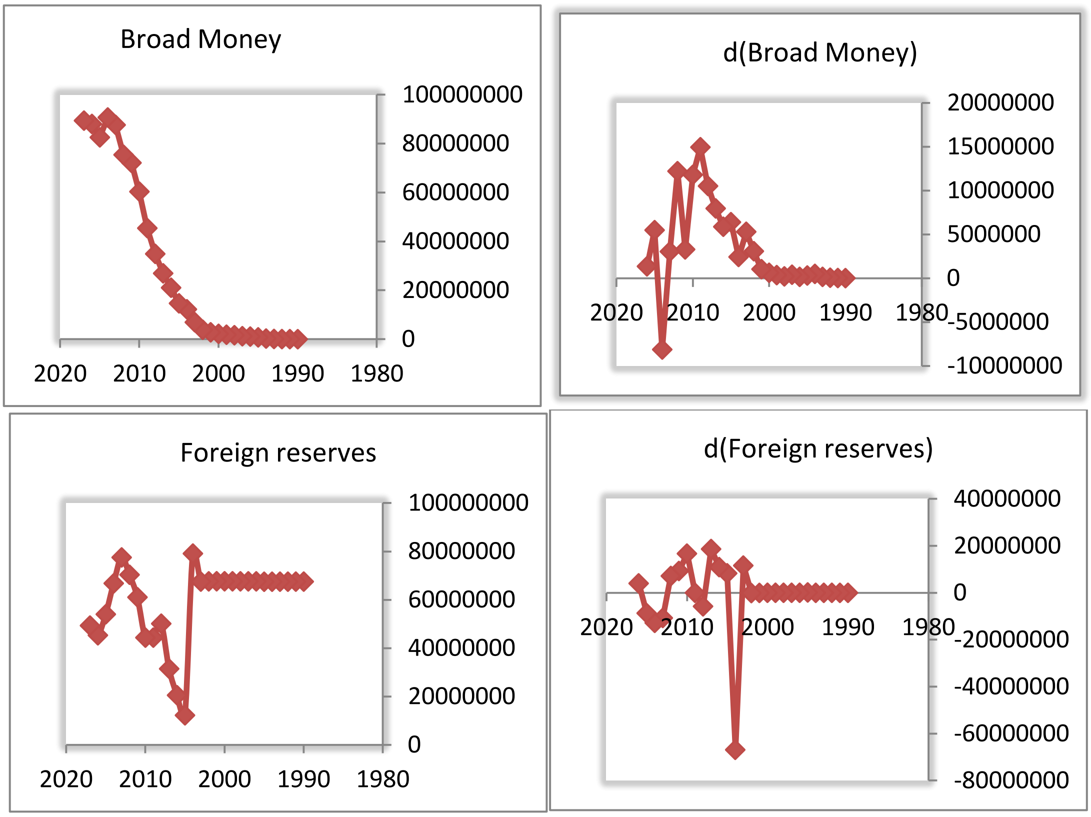


Figure 1. Time series plot of exchange rate, inflation, GDP, board money and foreign reserves their differences (d)

From Table 2, we note that the P-Value is less than 0.05, and accordingly (the exchange rate, inflation, gross domestic product, expanded money supply, and foreign reserves), was stationary after taking the first differences, and accordingly the degree of integration of all variables (1).

Table 2. Augmented Dickey-Fuller(ADF) and Phillips- Perron (PP) unit root test for the exchange rate, Inflation, GDP, foreign reserves and broad money for first different

		ADF		PP	
Variable	Model type	Test statistics	P-Value	Test statistics	P-Value
Exchange rate	Constant	-4.963874	0.0011	-5.425711	0.0002
	Constant+ trend	-3.744922	0.0454	-5.923642	0.0003
	None	-4.908029	0.0001	-5.386212	0.0000
Inflation	Constant	-8.808879	0.0114	-8.989615	0.0000
	Constant+ trend	-5.165406	0.0000	-9.508223	0.0000
	None	-4.920910	0.0008	-6.799528	0.0000
GDP	Constant	-6.361532	0.0000	-20.21254	0.0006
	Constant+ trend	-6.267979	0.0001	-27.29920	0.0000
	None	-8.790560	0.0000	-11.32142	0.0000
Foreign reserves	Constant	-5.602202	0.0001	-5.795546	0.0001
	Constant+ trend	-5.483162	0.0008	-5.651870	0.0005
	None	-5.703135	0.0000	-5.910079	0.0000
Board Money	Constant	-3.835020	0.0099	-12.89058	0.0000
	Constant+ trend	-3.987895	0.0294	-18.09207	0.0000
	None	-2.755049	0.0088	-6.230059	0.0000

3.2. Autoregressive distributed lag (ARDL)

This method was developed by Shinaed and Sun 1998 and Pesarn 1997, where this method was used in the Bound test, and according to Pesarn, this test is applied not to rely on the characteristics of time series, whether they are stable at levels I(0), or integrated from The first degree I(1), or from both, and in this study all the variables (exchange rate, gross domestic product, inflation, expanded money supply, foreign reserve) are integrated from degree I(1), and we are studying the ARDEL model using (GDP, inflation, expanded money supply, foreign reserve) as explanatory variables to determine the extent of each effect on the exchange rate[5], which can be found with the following equation:

$$E_t = \delta_0 + \sum_{i=1}^{m} \alpha_i E_{t-i} + \sum_{i=1}^{n} \beta_i I_{t-i} \sum_{i=1}^{z} \varphi_i G_{t-i} \sum_{i=1}^{k} \vartheta_i F_{t-i} + \sum_{i=1}^{x} \gamma_i M_{t-i} + \omega_t, \qquad (16)$$

Where E represents the exchange rate.
I represent inflation.
G represents GDP.
F is foreign reserve.
M is the expanded money supply.
x, k, z, n, and m represent the length of the slowdown period for each exchange rate, inflation, gross domestic product, foreign reserve, and expanded money supply, respectively.
ω : White noise error term.
$\gamma_0, \alpha_0, \beta_0, \varphi_0, \gamma_0$: drift components.

The first step in testing the ARDEL model for the exchange rate against (GDP, inflation, expanded money supply, foreign reserve), is a test of a long-term balance relationship, after which we move to estimating long-term transactions, and from them to estimating parameters of independent variables and short-term transactions. This test is based on the calculation of its statistic F through the Wald test, as (F = 5.772527), and this value is greater than the critical value of the upper limit at the level of significance 0.05 which is (4.223), and therefore we reject the null hypothesis, that there is no co-integration between the variables, This means that there is a long-term balance relationship between the variables, and therefore the exchange rate is related to a long-term integration relationship with both (GDP, inflation, expanded money supply, and foreign reserves), as shown in Table 3.

Table 3. Testing for the existence of level relationship among variables in the ARDEL model (bound test)

	Value of Statistics
Number of repressors	K=4
Computed F-Statistic	5.772527
5%Critical value	
Lower bound value	3.058
Upper bound value	4.223

The second stage includes obtaining long-term parameters, as shown in Table 4. It was based on slow periods according to the Schwarz Bayesion Criterion scale, and thus we obtained the ARDEL model (3,1,3,0,2), and as shown, the dependent variable (exchange rate) has a slowing rate of (3), while the explanatory variables, the GDP is slowing down (1), Inflation at slowdown (3), expanded money supply at slowdown (0), foreign reserve at slowdown (2).

Table 4. Estimated long-run coefficients: ARDEL (3,1,3,0,2) selected by Schwarz Bayesian criterion

Regressor	Coefficient	Std.Error	t-statistic	P-Value
Inflation	-2.933994	1.156594	-2.536754	0.0276
GDP	2.06E-06	2.02E-06	1.020130	0.3296
Broad Money	-8.26E-06	2.34E-06	-3.524863	0.0048
Foreign Reserves	6.37E-06	4.86E-06	1.310252	0.2168
Constant	1248.745	384,5716	3.247107	0.0078

Table 4 shows the results of estimating the most important economic variables that can affect the exchange rate in the event that some of the parameters estimated by their signals coincide with what is imposed by the reality of economic theory, i.e. statistically called significant, while the signals of some other parameters came contrary to what the reality indicates the theory Economic, i.e. not significant. As for inflation and money supply, they had a relationship with the negative and significant trend, as the value of P was less than (0.05), and this indicates a long-term balance relationship between both inflation and expanded money supply with the exchange rate.

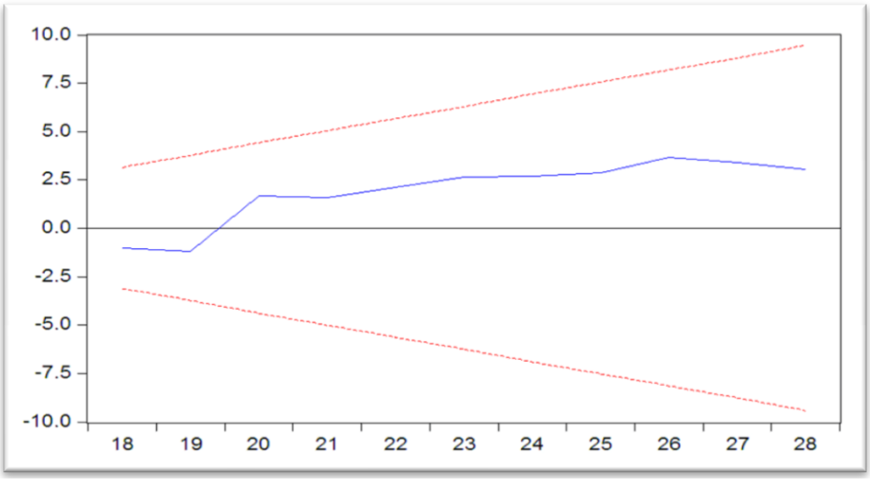
Table 5. Error correction representation of the selected ARDEL model: ARDEL (3,1,3,0,2) by Schwarz Bayesian Criterion

Regressor	Coefficient	Std-Error	t-statistic	P-Value
D(Inflation)	-3.112271	0.583926	-5.329906	0.0002
D(GDP)	1.54E-07	3.92E-07	0.393519	0.7015
D(Foreign Reserves)	9.69E-07	1.79E-06	0.542751	0.5981
ECM(-1)	-0.688999	0.097073	-7.097776	0.0000

Through Table 5 of the results of estimating the error correction equation for the chosen ARDEL model, it is clear that there is a statistical significance of the ECM parameter with a negative signal for this parameter, and this confirms the existence of a co-integration relationship between the variables under study, the estimated value of the ECM parameter was -0.68999, This means that 68.8% of the imbalance in the exchange rate of the previous year is corrected in the current year, and we note that there is a negative and significant effect of the change in the exchange rate on inflation in the short term, while the gross domestic product and foreign reserves were not significant in the short term.
We note that the adjusted R^2 has reached approximately 0.83, which means that the model is good and that the dependent variable (parallel exchange rate) will explain 83.8% of the changes that occur in the variables under study.

3.3. Testing the suitability of the estimated model

The results of the diagnostic tests for ARDEL (3,1,3,0,2) LaGrange Multiplier Test for Sequential Correlation (3.8019) (P-Value = 0.512) show a test value of Heteroscedasticity which is supposed to be distributed as a Chi-square with a value of 2.8334 (P-Value = 0.092), as well as the Shapirs-Wilk test for normal distribution which has a Jaque-Bera value (2.154358) (P-Value = 0.340555), which means that the normal error distribution hypothesis is fulfilled.
Depending on the results of the diagnostic tests of the model, we confirm the validity of using this model due to the lack of a problem of multicollinearity, as the random error is distributed naturally with the stability of the random error limit.
In order to make sure that the data used are free from any structural changes, it is necessary to use a test, the cumulative total of the remaining CUSUM, and this test is considered one of the most important tests that show any change in the data, and the extent and stability of long-term parameters, with short-term parameters, and stability is achieved for transactions The estimated error correction equation for the self-regression model for slowed time gaps, if the graph of the CUSUM test falls within critical limits with a significant level of 5%, which means that the parameters are stable throughout the study period.
Through the model diagram, we notice that the CUSUM test for this model expresses a mean line within the boundaries of the critical region, indicating the stability of the model at the 5% level of significance.



CUSUM ----- 5% Significance

Figure 3. The result of CUSUM test for stability

4. Conclusion

Through modeling the relationship between the exchange rate and economic variables (inflation, foreign domestic product, expanded the money supply, and foreign reserve), a long-term relationship has been reached between the exchange rate and inflation, and this result corresponds to the reality of the economic theory in Iraq, as there is a long-term relationship between the exchange rate and the expanded money supply, this variable measures an important relationship between the local currency and foreign currencies, and that the increase in the money supply leads to a decrease in the local currency towards foreign currencies (increase in the exchange rate), Wei Connect the opposite when reduced money supply, ie, it leads to a decline in the foreign exchange rate.

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