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THE EXCHANGE RATE AND ITS IMPACT ON IRAQI ECONOMIC GROWTH USING THE (ARDL) MODEL

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Abstract

This article examines the relationship between exchange rates and Iraqi economic growth between 1990 and 2018, analyzing both short- and long-term effects. Using the Autoregressive Distributed Lag (ARDL) method developed by Pesaran et al. (2001) and the results of Toda Yamamoto's (1995) causality tests show that there is a long-term co-integrating relationship between the exchange rate and economic growth. This suggests that the two variables are linked in a sustainable way over the long term. However, the short-term effects are less pronounced, meaning that immediate variations in the exchange rate have a limited impact on economic growth. Furthermore, the causality test shows an indirect relationship between the exchange rate and economic growth, highlighting the existence of intermediate factors affecting this relationship.

Keywords: Exchange Rate, Gross Domestic Product, Inflation, Budget Balance, Unemployment, Trade Openness, ARDL, Iraq

FIRST: INTRODUCTION

Exchange rates are considered a connecting tool between an open economy and the rest of the world's economies, and at the same time it plays a prominent role in influencing the competitiveness of the economy and other macroeconomic variables such as inflation, economic growth, unemployment and the balance of payments.

The Iraqi economy is suffering from many big problems, The monetary policy was characterized by being a policy in line with the Financial Policy and following its requirements and directions without having any choice about it, which made it lose independence, as the balance sheet of the central bank was strongly linked to the general budget of the state, which led to disruption of the elements of economic balance and undermined the opportunities for economic growth and its competitiveness despite global openness, the dominance of the public sector and its backwardness, and thus there were multiple economic problems and structural imbalances emerged in all economic sectors despite the global openness, the dominance of the public sector and its backwardness. thus, there were multiple economic problems and structural imbalances emerged in all economic sectors despite the lack of coordination of economic policies, as the monetary policy was characterized by being in line with the Financial Policy and its internal and structural imbalance And that all these events and qualities have become a justification and motivation for transformations in the economy by moving towards a market economy strategy.

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SECOND: RESEARCH PROBLEM

The problem of this paper lies in the lack of clarity of the impact that the exchange rate exerts on the economy and on its ability to stabilize, grow and compete, so the problem of the study can be formulated by the following question:

What is the impact of the exchange rate on Iraqi economic growth for the period (1990-2018)?

THIRD: RESEARCH HYPOTHESIS

The research proceeds from the hypothesis that:

The existence of a relationship, impact and morale between the exchange rate and the Iraqi economic growth represented by gross domestic product in the short and long term

FOURTH: RESEARCH OBJECTIVES

The research aims to shed light on the impact of the exchange rate on the short-and long-term GDP in Iraq and on the causal relationship between the direct and indirect economic variables included in the model

FIFTH: RESEARCH STRUCTURE

The research was divided into three sections and ended with a set of conclusions and recommendations, where the first section discussed the relationship of the exchange rate to economic growth, the second section turned to some previous studies, and the third section was concerned with measuring the data of variables related to Iraq included in the statistical program interviews using the (ARDL) model and the causal relationship between them.

Theoretical Framework

Exchange rate and economic growth

The relationship between the exchange rate system and economic performance indicators (especially growth and inflation) is one of the controversial topics in the economic environment and this controversy has increased a lot in the last three decades, creating a collapse (Bretton Woods system), (Fixed exchange rate system) many researchers are increasingly concerned about the indicators of economic performance and their trends following the departure from this system, and they have raised a question that has remained controversial until the present time, is economic growth as one of the most important indicators of economic performance varies under different exchange rate systems Supporters of the fixed exchange rate stressed the close relationship between high and stable economic growth and the fixed exchange rate system, reinforcing their point of view with an analysis confirming this relationship, as they believe that the stability of This contributes to increasing the volume of capital flow into the country, which enhances economic growth, while supporters of flexible exchange rates believe that exchange rate movements are not always a bad thing as some try to portray them on the contrary, as these movements would rebalance the balance of payments when exposed to external shocks, as the movement of exchange rates ensures this, as well as this flexible

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exchange rate allows by eliminating price distortions, which increases economic growth rates, if extreme A number of researchers have concluded that the rate of economic growth is high under the intermediate exchange rate systems compared to the fixed and flexible exchange rate systems that this hypothesis was based on weak pillars, as countries mostly appear to follow a certain exchange rate system, but they are approaching in their internal policies a different exchange rate system, and this can be called shaded windows [Levy-yeyati & Zenegger (2002)], Many of those interested in this issue, foremost among them the IMF economists, have put forward an opinion that there is no point in making late corrections to exchange rates, which is accompanied by large and successive reductions. Instead, there should be gradual adjustments to exchange rates, whether under a fixed or flexible exchange rate system, and this has led to the cancellation of the significant differences between the two systems. the International Monetary Fund has observed this situation in many developing countries where the correction policies have not been effective enough, so it has been proposed to strengthen the fixed exchange rate system with monetary and fiscal policy, and thus macroeconomic policies have become within the framework of exchange rate systems the divergences are similar The differences between them have become so insignificant that this result does not mean anything as long as these systems are a temporary situation, as countries must choose either a fixed or flexible exchange rate system (the hypothesis of the missing middle), as these systems are vulnerable to currency crisis, which ultimately leads to their collapse [Felix (2003)].

The exchange rate has become one of the most important variables affecting economic growth, and exchange rate policy has become one of the crucial issues that countries rely on to stimulate economic growth, and this is confirmed by post-Keynesian ideas that call for increasing economic growth by reducing the local currency rate, which stimulates exports to become cheaper in the foreign market and this raises the external demand for exports of the country concerned, at the same time, reducing the local currency exchange rate undermines the volume of imports, whose prices are rising within the country, and the final result is an increase in the surplus of the trade balance, which is the main pillar to increase economic growth according to post-Keynesian ideas They believe that the main reason for the low growth rates in many developing countries is the overestimation of their exchange rates, which makes them forced to reduce them to balance their balance of payments and stimulate economic growth by increasing the volume of their exports [Nelson (2004)].

A number of authors have noted that the resources in a number of developing countries do not respond to the movements of their exchange rates, as well as the conflict between the exchange rate policy (as an auxiliary tool) and macroeconomic policies, and this leads to the distortion of relative prices and hinders efforts to increase the rate of economic growth, and here the exchange rate loses its role in stimulating growth and restoring balance in the balance of payments. In light of the weak flexibility of the productive apparatus and underdeveloped means of production, it makes sense not to stimulate the export exchange rate, as well as economic growth, and this requires increasing the volume of investments in infrastructure and export projects to increase the country's ability to produce as well as export [Muhammad (2017)].

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The theses of the updated Classical School adopted by the International Monetary Fund, which calls for building a market economy in developing countries, which is known in the economic development literature as economic stabilization programs, summarized these ideas by lifting subsidies, liberalizing trade and making the exchange rate a main pillar and liberalizing it and interest rates from state interventions, which contributes to reducing costs on the benefits that I have achieved in the near term, however The first of these negatives is the distortion of relative prices and reducing economic growth [Doha (2015)].

Discussions on the impact of exchange rate fluctuations on economic growth have mostly concluded that exchange rate fluctuations would create what is known as the cost of passage : This cost increases with the increasing volatility of exchange rates, and when compared with the stability of exchange rates, the cost of passage will be equal to zero if other restrictions imposed on the movement of capital, such as legislation and laws imposed on the movement of capital by countries, are excluded, and thus the stability of the exchange rate would increase economic growth by stimulating production [Habib (2015)], In fact, there are two opposite effects, the first: a fixed exchange rate stimulates economic growth by stimulating the flow of foreign investment into the country is offset by the second effect that a flexible exchange rate stimulates economic growth by reallocating resources to alternative uses and this increases the marginal product of the resource.

Previous studies

A study [Kader (2022)], the study aimed to identify the ability of the Central Bank of Iraq to maintain the stability of the exchange rate of the Iraqi dinar as well as highlighting one of the risks to the banking system, namely liquidity ratios, as the problem of research lies in clarifying the extent of the impact of exchange rates on the liquidity ratios of commercial banks in Iraq by relying on published data on the variables for the period from 2014 to 2018, and the research came to the conclusion that there is a moral impact of the exchange rate in the liquidity ratios for commercial banks operating in Iraq, the corresponding proposal was "the central bank should work to reduce exchange rate fluctuations in order to increase stability in bank liquidity ratios. "

A study [Idris (2022)], the study aimed to identify the exchange rate and its effects on economic variables, especially on the trade balance and its fluctuations, where it is of particular importance as a tool to link the national economy with international economies and a measure of the volume of dealing with the outside world, in addition, the exchange rate has a clear impact on the macroeconomics and its balances through its relationship with macroeconomic variables, especially its relationship in the trade balance and the current account and the impact of both on the balance of the balance of payments, the study has concluded that the exchange rate is one of the economic and financial indicators that express the efficiency of the economic performance of the variables of the national economy. A study [Ali (2022)], the gross domestic product and the general budget, especially the spending side, are one of the most important macroeconomic indicators for any country, the more these two indicators indicate the strength of the country's economy, so it is necessary to study the factors affecting these indicators, especially exchange rates, because it is not clear the impact that fluctuations in exchange rates

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have on macro variables, so the Iraqi economy, both GDP and public spending were chosen and the standard approach was used to highlight the impact that fluctuations in exchange rates have on GDP and public spending. The study found that there is a strong inverse relationship between the change in exchange rates, GDP and public spending, as the higher the exchange rates, the lower both GDP and public spending, and vice versa .A study [Mohammed & Assaf (2023)], the study aimed to identify the role of the exchange rate for the period (2004-2019) in the macroeconomics to achieve economic growth and reduce unemployment, price stability and increase exports, and microeconomics based on the interpretation of the behavior of an individual or an enterprise, producers or consumers, and the study found a direct long-term equilibrium relationship with some indicators of economic development in Iraq.

A study [Taha & Abdullah (2023)], the research aims to show the impact of exchange rate changes on some macroeconomic variables in Iraq and the quality of this impact (positive or negative) throughout the research period (2004-2020), and the research has reached a number of conclusions, perhaps the most important of which shows that the foreign reserves held by the central bank clearly affected the exchange rate and the general level of prices throughout the period (2004- 2020), as well as the recommendations recommended by him, the most prominent of which is the need to limit the powers related to the exchange rate in the hands of the Central Bank of Iraq and not to interfere by other parties in a currency, perhaps the most important of which is the need to diversify sources of income and revenues and not rely on oil revenues that are exposed to fluctuations in the global market rise and fall from time to time in order to strengthen and strengthen the exchange rate of the Iraqi dinar against other foreign currencies.

A study [Hadi & Abdul Jabbar Khairallah (2023)] the study aimed to find out the impact of exchange rate changes in the financial performance indicators of banks, the most important of which is the profitability index of a sample of Iraqi commercial banks during the extended period (2011-2020), as the results of the analysis of the compound growth of indicators compared to the growth of exchange rates showed an inverse relationship between exchange rates low profitability of most banks lack of interest of banks in real productive investment , The research was conducted by analyzing the composite growth rates of the exchange rate and financial performance indicators showed that the rise in the exchange rate negatively affected the rate of assets, capital and net profits achieved by banks sample research, and the results of the standard analysis clarified and confirmed the inverse relationship between the change in the foreign exchange rate and profitability index.

RESULT AND DISSECTION

1. Methodology:

In our empirical part, we use the ARDL (Auto Regressive Distributive Lags) staggered lag autoregressive model to test the existence of a long-term relationship between variables characterized by a different order of integration. This is a "bounds test" to characterize a long-term relationship between the exchange rate and economic growth. There are several stages in this study. Firstly, unit root tests are performed using the ADF test to assess the stationarity and

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degree of integration of the variables. Next, the model is analyzed using the ARDL procedure to understand short- and long-term results. ARDL modeling with appropriate lags is used to resolve correlation and series endogeneity issues. Finally, the number of lags for the dependent and explanatory variables is selected using Akaike's information criterion (AIC). We develop a model to study the relationship between the exchange rate and economic growth in Iraq over the period 1990 to 2018. The model adopted will take the following general form:

$$GDPt = f(PEt; SBt; TRADEt; INFt; CHOt) \quad [1]$$

With:

- GDP : Gross domestic product
- PE : Exchange rate
- SB: The budget balance represents the variation between government revenue and expenditure in relation to gross domestic product (GDP).
- TRADE: The degree of trade openness is determined by dividing average imports and exports by the country's gross domestic product (GDP).
- INF : the rate of inflation
- CHO : the unemployment rate

2. Determining the order of integration of variables

Before proceeding with the co-integration analysis, we check the stationarity properties of the data set using unit root tests. We apply classic unit root tests, such as the Augmented Dickey Fuller (ADF) stationarity test, or the more robust Phillips Perron (PP) stationarity test. We consider a series to be stationary if the test statistic (ADF, PP) is greater in absolute value than the critical value at 5%. The results of the various tests carried out are shown in Table 1.

Table 1: Stationarity test results: ADFand PP

Variables	Test ADF		Test PP		Conclusions
	Au niveau	*En1ère différence*	*Au niveau*	*En1ère différence*	
GDP	-2.537472 (0.1178)	-8.088576 (0.0000)	-2.402441 (0.1501)	-18.87575 (0.0001)	I(1)
PE	-2.290713 (0.1817)	-5.523157 (0.0001)	-2.287973 (0.1825)	-5.522067 (0.0001)	I(1)
SB	-2.807937 (0.0700)	-	-2.896850 (0.0584)	-	I(0)
TRADE	-2.541820 (0.1169)	-7.048676 (0.0000)	-2.383331 (0.1552)	-10.48277 (0.0000)	I(1)
INF	-2.750039 (0.0800)	-5.833343 (0.0001)	-2.604617 (0.1040)	-9.736219 (0.0000)	I(1)
CHO	-1.854328 (0.3479)	-4.651893 (0.0010)	-1.893904 (0.3302)	-4.651893 (0.0010)	I(1)

NOTE :(.) p value, Source : auteurs

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The results of the Augmented Dickey Fuller and Philipe Perron unit root tests indicate that all variables are stationary in first difference, except the SB variable which is stationary in level.

3. Test la relation de Co-intégration

The advantage of the ARDL model is that it can be applied to small sample sizes to examine the co-integration relationships between economic growth and the exchange rate, as well as long- and short-term parameters. Other advantages are also obtained from this ARDL modeling takes a sufficient number of lags to capture the data generation process. Therefore, to study this relationship, the ARDL representation of equation [1] is written as follows:

$$\Delta GDP = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=1}^{k} \alpha_{2i} \Delta PE_{t-i} + \sum_{i=1}^{k} \alpha_{3i} \Delta SB_{t-i} + \sum_{i=1}^{k} \alpha_{4i} \Delta TRADE_{t-i} + \sum_{i=1}^{k} \alpha_{5i} \Delta INF_{t-i} + \sum_{i=1}^{k} \alpha_{6i} \Delta CHO_{t-i} + \gamma ECM_{t-1} + \beta_1 GDP_{t-1} + \beta_2 PE_{t-1} + \beta_3 SB_{t-1} + \beta_4 TRADE_{t-1} + \beta_5 INF_{t-1} + \beta_6 CHO_{t-1} + \varepsilon_t \quad [1]$$

- Δ is the first difference operator;
- i = 1 then, k, the number of delays,
- α_0 represents the constant,
- α_1 à α_6 represent the short-term dynamics of the economic growth function,
- β_1 à β_6 represent the long-term dynamics of the model,
- et, ECT_{t-1} is the error correction term.

Estimation of the ARDL model requires two steps:

The first step is to determine the optimal Lag, using the Akaike information criterion (AIC), which enables us to select the optimal ARDL model that gives statistically significant results with the fewest parameters. Figure 1 characterizes the different specifications of the ARDL model in terms of minimization of Akaike's criteria. It can be seen that the ARDL model (1, 3, 2, 3, 2, 3) is optimal among the 19 other models, as it has the smallest AIC value.

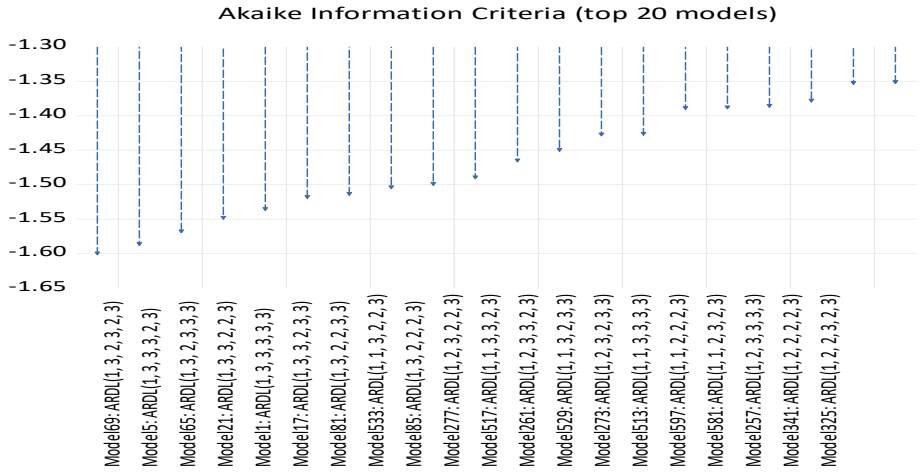

Figure1: Optimal ARDL model: AIC value

Source: Eviews12

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The second step is to check for the presence of a co-integration relationship using Fisher's test, which involves testing the following hypotheses:

- H0: β1=β2=β3=β4=β5 =0: Existence of a co-integration relationship,

- H1: β1 ≠β2≠β3≠β4≠β5≠0: Absence of a co-integration relationship.

The procedure for this test involves comparing the calculated F-statistics with the critical values simulated by Pesaran et al. (2001), for different thresholds and scenarios. If the calculated F-statistic exceeds the upper bound, this leads to acceptance of the null hypothesis, indicating the existence of a cointegrating relationship. On the other hand, if the calculated F-statistic is below the lower bound, this leads to rejection of the null hypothesis, suggesting the absence of cointegration between the variables. However, if the calculated F-statistic lies between the two bounds, the results of the cointegration test are inconclusive.

The results of the cointegration test are presented in Table 2, and two sets of critical values (lower and upper bounds) are determined for a given significance level, in line with Narayan's (2005) approach. The first set of critical values is calculated assuming that all variables included in the ARDL model are integrated of order I(0), while the second set is calculated assuming that they are integrated of order I(1). When the value of the test F-statistic exceeds the upper bound, the null hypothesis is accepted, while it is rejected if the F-statistic is below the lower bound.

Table 2: Cointegration tests by Pesaran et al (2001)

Variables	GDP, PE, SB, TRADE, INF, CHO	
Calculated F-stat	**15.84510**	
Critical threshold	I0 Bound	I1 Bound
1%	4.134	5.761
5%	2.91	4.193
10%	2.407	3.517

Source: Authors

A cointegrating relationship is observed between the series studied, at significance levels of 1%, 5% and 10%. This is confirmed by the value of the F statistic (15.84), which exceeds the corresponding upper bound. This finding enables us to estimate our long-term model.

4. ARDL model estimation

Having confirmed the order of integration, selected the optimal lag of our ARDL model, and confirmed the existence of a long-term relationship between the variables of interest, we then estimate the ARDL model to analyze the short- and long-term dynamics of the series.

The estimation results of the ARDL model are shown in Table 3. The overall quality of fit is satisfactory, and statistically significant at conventional levels. The R^2 fit coefficient is 99.4%: GDP differences are 99.4% elucidated by the dependent variables. In addition, the Durbin Watson statistic of 2.64 suggests the absence of serial correlation. Furthermore, most of the short- and long-term coefficients, including the coefficients of the error correction term (in

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absolute terms), lie within the theoretically acceptable range of 1 to 0. The value of the error correction term is -0.997734, which represents the speed of adjustment and is statistically significant at the 1% significance level. This value is correctly signed, indicating that adjustments are being made in the right direction. The result suggests that the speed of convergence to equilibrium is 99.7%. In other words, around 99.7% of short-term variations are quickly corrected and integrated into the long-term relationship. This means that the present value of GDP corrects for changes in the variables PE, SB, TRADE, INF and CHO, thereby restoring long-term equilibrium.

Table 3 : ARDL model estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short-term estimates				
D(PE)	0.000178	7.87E-05	2.262949	0.0643
D(PE(-1))	0.000293	0.000111	2.632313	0.0389
D(PE(-2))	0.000481	0.000119	4.046195	0.0068
D(SB)	-0.830714	0.314469	-2.641637	0.0385
D(SB(-1))	1.582361	0.266689	5.933349	0.0010
D(TRADE)	-0.954604	0.269241	-3.545541	0.0121
D(TRADE(-1))	1.364557	0.200111	6.819010	0.0005
D(TRADE(-2))	0.279981	0.115729	2.419293	0.0519
D(INF)	-0.003589	0.000368	-9.742985	0.0001
D(INF(-1))	0.007560	0.000640	11.81691	0.0002
D(CHO)	-0.011143	0.006171	-1.805574	0.0003
D(CHO(-1))	-0.038023	0.005228	-7.273301	0.0004
D(CHO(-2))	-0.042591	0.005727	-7.436162	0.0005
CointEq(-1)*	-0.997734	0.066989	-14.89401	0.0006
Long-term estimates				
PE	-0.000779	0.000253	-3.075881	0.0218
SB	-4.015789	1.408076	-2.851969	0.0291
TRADE	0.265068	0.398497	0.665169	0.5307
INF	-0.009391	0.001112	-8.443406	0.0002
CHO	0.020664	0.022514	0.917822	0.3941
C	19.66564	0.304940	64.49029	0.0000
ARDL selected (1, 3, 2, 3, 2, 3) residual model **R2 = 0.994861 F-statistic= 61.12976 RSS = 0.066018** **Adjusted R^2 = 0.978586 Prob(F-stat) = 0.000025 DW = 2.645387**				

Source: Authors

A. Interpretation and discussion of results

i. Short-term results:

The estimation results of our model give conclusive results concerning the effect of the exchange rate on economic growth in Iraq. Indeed, we note that the exchange rate has a significantly positive effect on economic growth. A 1% increase in the PE indicator leads to a 0.0001% increase in growth. However, this effect remains positive over the following two years, resulting in growth increases of 0.0002% and 0.0004% respectively. This result can be

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justified by the favorable exchange rate, such that a depreciation of the national currency in Iraq, can boost exports, support local industry, encourage tourism and increase remittances from Iraqi workers abroad. These short-term effects can boost economic growth by increasing foreign exchange earnings, creating jobs and stimulating production and investment. However, other factors such as political stability and economic policies also play an important role.

Our results show that the immediate effect of the budget balance is statistically significant, but negative. A 1% increase in the budget balance (SB) reduces growth by 0.830%. However, this effect becomes positive after the first year, contributing to an increase in growth of 1.582%. These results can be explained by the fact that the adoption of expansionary fiscal policies, characterized by budget deficits, can promote economic growth by injecting funds into the economy. This supports economic activity and job creation.

With regard to trade openness, our results show that this index has an immediate negative effect on economic growth. In the short term, a 1% rise in the TRADE indicator leads to a 0.954% fall in growth. However, this negative effect disappears and becomes positive at the end of the following period, generating an increase in growth of 1.364% at the end of the first year and 0.279% at the end of the third year. The opening up of trade in Iraq initially had a negative effect on economic growth due to increased competition and the contraction of domestic sectors. However, over the following two years, this effect was transformed into a positive trend, with Iraqi companies adapting to foreign competition, thereby promoting economic growth through increased trade, foreign investment and innovation opportunities.

For inflation, our results show that this index has an immediate negative effect on economic growth. In the short term, a 1% rise in the INF indicator causes growth to fall by 0.003%. However, this negative effect disappears and becomes positive at the end of the following period, generating an increase in growth of 0.007% at the end of the first year. Short-term inflation in Iraq has an initial negative effect on economic growth by reducing purchasing power and discouraging investment. However, moderate short-term inflation can also stimulate domestic demand and promote economic growth.

Finally, we note that the unemployment rate has a significantly negative effect on economic growth. A 1% increase in the CHO indicator leads to a 0.0011% drop in growth. However, this effect remains negative over the following two years, with growth declining by 0.038% and 0.042% respectively. These results translate into lower output, reduced domestic demand and significant social costs. Policies to stimulate employment and promote investment are needed to mitigate this negative effect and foster sustainable economic growth.

ii. Discussion of long-term results

We find that the long-term impact of exchange rates on economic growth in Iraq is significantly negative. Indeed, for every 1% increase in the exchange rate, Iraq's growth rate falls by 0.0007%. This result suggests that exchange rate volatility in Iraq has increased risks for companies and investors, discouraging investment and thus limiting the country's economic growth. Significant fluctuations in the exchange rate are associated with increased risks and lower investment rates. This negative relationship results in a lower level of production, which

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translates into a negative relationship between the exchange rate and economic growth. [saheb Alshukri .M.S & Hussein Ali .N.H (2022)].

Furthermore, our estimates show that the budget balance has a significant negative impact on economic growth: for every 1% increase in the SB, Iraq's growth rate falls by 4.015%. A state's budget deficit is not intrinsically considered a mistake, as there may be economic circumstances that necessitate an increase in public spending over a given period. However, the error lies in the fact that this deficit persists over several years, indicating an economic imbalance that requires attention and correction.[Murad.K.I & Mohammed H.J (2023)].

As far as inflation is concerned, it has a significantly negative effect on economic growth, meaning that every 1% increase in INF leads to a 0.009% drop in economic growth. According to [Hakim.S (2021)], inflation control requires reaching a proportional level of economic activity and prices, where the money/income ratio grows stably, compatible with financial growth and macroeconomic stability. Consequently, inflation control requires a combination of fiscal and monetary policies.

B. Diagnosis of the estimated ARDL model

***i.* Diagnostic tests**

According to the diagnostic test results presented in Table 4, using the Brusch-Gaufray ML test, no evidence of serial correlation is observed (0.6455 > 0.05). Furthermore, there is no indication of heteroscedasticity, as suggested by the results of the Brusch-Pagan-Gaufrey test and the ARCH test, where the probabilities of 0.9434 and 0.3075 are greater than 5%. The ARDL model is well specified. In addition, the Jarque-Bera test indicates that the errors follow a normal distribution (0.732797 > 0.05). According to the Ramsey specification test, our model is correctly specified, with a Fisher probability of 0.7109, greater than 0.05.

Table 4: ***Diagnostic tests of the estimated ARDL model***

Test hypothesis	Tests	Values	Probability
Auto-correlation	Brusch-Gaufrey	0.625108	0.6455
Heterocédasticity	Brusch-Pagan-Gaufrey	0.394680	0.9434
	ARCHTest	1.287146	0.3075
Normality	Jarque-Bera	0.621774	0.732797
Specification	Ramsey(Fisher)	0.392391	0.7109

***ii.* Stability diagnosis**

The stability of the model parameters was examined using two statistics:

- The cumulative sum of recursive residuals (CUSUM), this first test was used to investigate systematic changes in the estimated coefficients.
- The cumulative sum of squares of recursive residuals (CUSUMSQ), this second test was used to examine sudden and accidental changes in coefficient stability.

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Figure 2 shows the stability of the coefficients over the study period, as they are within the critical region (5% significance level).

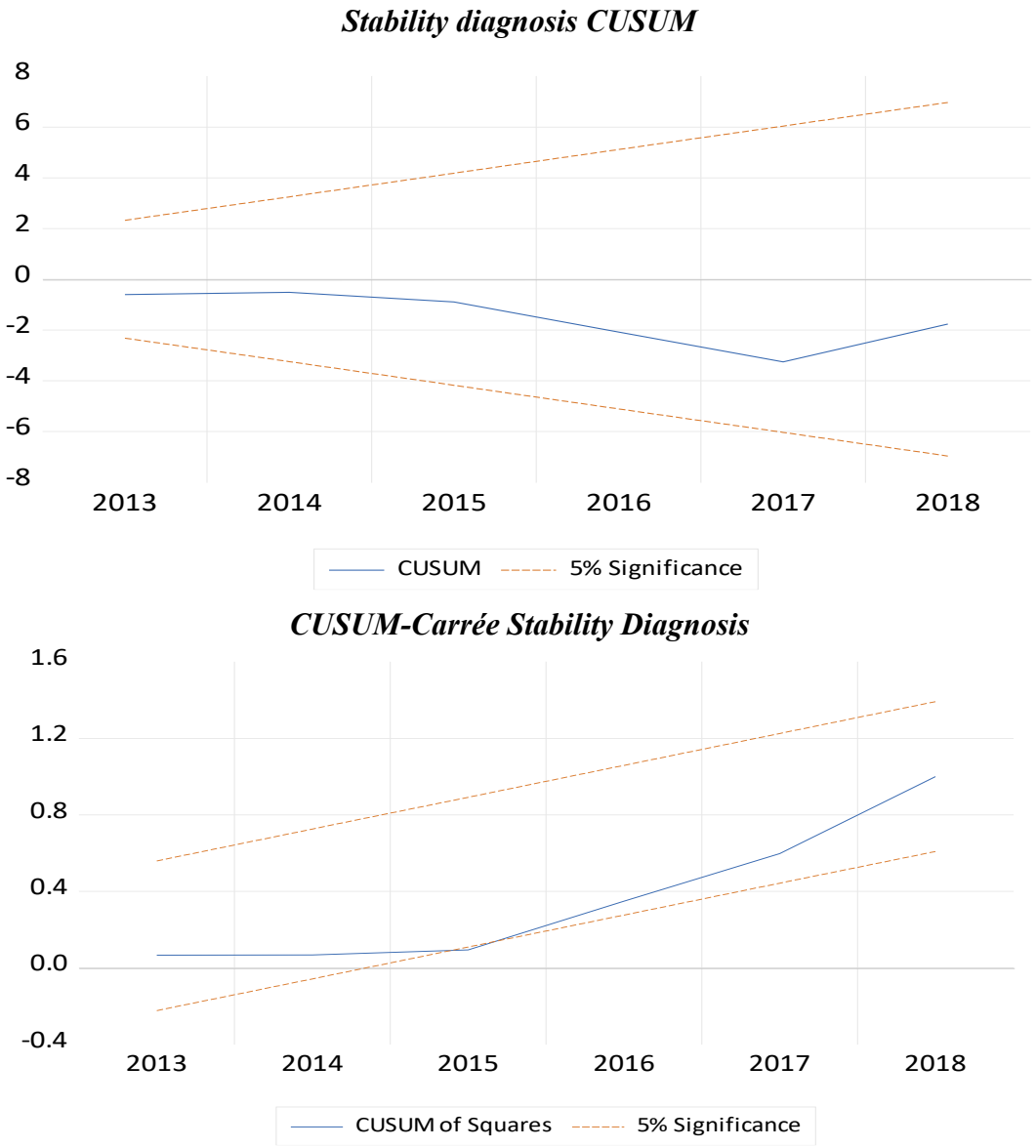

Figure 2

Source: Eviews 12

5.Study of Long-Term Causality

The advantage of the Toda Yamamoto Granger causality test by Toda & Yamamoto (1995) over the ARDL approach, which is based on Wald's chi-square "W" statistic, is that it can detect the direction of causality, whereas ARDL can only detect long- and short-term interactions between variables.

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Table 5: ***Toda-Yamamoto Causality Test results***

Dependent variables	Causal variables						Results
	GDP	PE	SB	TRADE	INF	CHO	
GDP	-	1.742542 (0.6275)	6.553340 (0.0876)	7.295763 (0.0630)	9.151319 (0.0273)	3.930627 (0.2691)	**SB➔GDP TRADE➔GDP INF➔GDP**
PE	5.092785 (0.1651)	-	4.338917 (0.2271)	2.088213 (0.5543)	15.61939 (0.0014)	5.724202 (0.1258)	**INF➔PE**
SB	5.536232 (0.1365)	3.233982 (0.3569)	-	3.746756 (0.2901)	1.093780 (0.7786)	6.526719 (0.0886)	**CHO➔SB**
TRADE	4.526078 (0.2100)	4.355698 (0.2255)	2.581898 (0.4607)	-	0.134857 (0.9873)	3.380793 (0.3366)	-
INF	1.847938 (0.6046)	17.67830 (0.0005)	0.636781 (0.8880)	7.161199 (0.0669)	-	1.161632 (0.7622)	**PE➔INF TRADE➔INF**
CHO	0.558334 (0.9059)	6.124334 (0.1057)	5.299952 (0.1511)	2.452828 (0.4839)	1.559236 (0.6687)	-	-

Source: authors

Table 5 presents the results of Toda and Yamamoto's (1995) causality tests. The results show unidirectional causal relationships from trade openness (TRADE) and inflation (INF) to economic growth (GDP) and from trade openness (TRADE) to inflation (INF), and direct causal relationships from unemployment (CHO) to budget balance (SB), and from budget balance (SB) to economic growth (GDP). Secondly, the relationship between the exchange rate (PE) and inflation (INF) is bi-directional. Ces liens de causalité de Toda et Yamamoto entre les variables sont bien résumés dans la figure3.

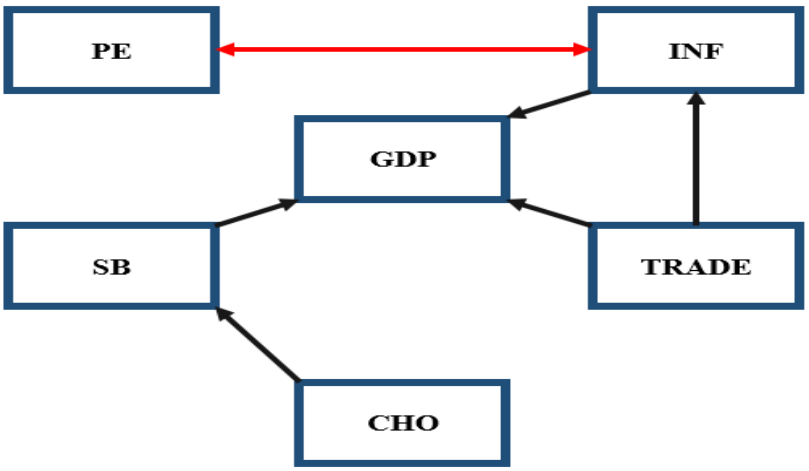

Figure 3: Summary of causal links between Variables

Source: authors

The study shows that there is a bidirectional causal relationship between the exchange rate and inflation, meaning that these two variables influence each other. When the exchange rate fluctuates, this can lead to variations in inflation, and the other way around. Moreover, inflation

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has a direct effect on economic growth, with high levels of inflation potentially holding back growth. These relationships underline the importance of exchange rate stability and inflation control in promoting sustained economic growth.

Trade openness can affect inflation in two main ways: by increasing the supply of imported goods, which can exert downward pressure on prices, and by being subject to exchange rate fluctuations, which can lead to higher prices for imported goods. However, the magnitude and direction of this relationship also depend on other economic factors such as monetary policy, trade policies and Iraq-specific macroeconomic conditions.

The causal relationship between fiscal balance, trade openness, inflation and economic growth is complex. A positive fiscal balance can contribute to economic growth by enabling governments to finance infrastructure projects and stimulate economic activity.

At the same time, trade openness can promote growth by creating new business opportunities and encouraging international trade. However, controlled inflation is essential to sustain growth, as it can stimulate consumption and investment. However, high inflation can have adverse effects on economic growth by reducing consumer purchasing power and increasing production costs.

To foster sustainable economic growth in Iraq, it is crucial to implement coherent economic policies, manage public finances efficiently, promote investment and competitiveness, and maintain macroeconomic stability.

The unemployment rate in Iraq has a direct causal relationship with the fiscal balance. This situation can be justified by high unemployment which negatively affects economic activity, reducing tax revenues and investments. Effective management of fiscal and employment policies is necessary to improve the fiscal balance and foster sustainable economic growth.

Results

Through the standard analysis the following is noted:

1. The relationship in the short and long term

- The existence of a positive correlation in the short term between the exchange rate and economic growth in Iraq, while the opposite is the case in the long term.
- There is a statistically significant correlation between the balance of payments and economic growth, but it is negative and becomes positive after the first year, which contributes to an increase in growth by 1.582% in the short term, while in the long term the impact remains negative.
- There is a negative relationship between trade openness and economic growth, but after a while it turns into a positive relationship.
- A negative correlation between inflation and unemployment and economic growth.

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2. Causal relationship

- The study shows that there is a bidirectional causal relationship between the exchange rate and inflation, while in the other variables it is observed that there is a unidirectional causal relationship.

Recommendations:

1- These short-term effects can enhance economic growth by increasing foreign exchange earnings, creating jobs , stimulating production and investment, however, other factors such as political stability and economic policies also play an important role.

2- That the adoption of expansionary fiscal policies can promote economic growth by injecting money into the economy, and this supports economic activity and job creation .

3- Promoting economic growth through increased trade, foreign investment and innovation opportunities.

4- Develop policies to stimulate employment and encourage investment to mitigate the negative impact of unemployment and promote sustainable economic growth.

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