

MEASURING AND ANALYZING THE RELATIONSHIP BETWEEN EXCHANGE RATES AND THE PUBLIC BUDGET IN IRAQ FOR THE PERIOD 1990–2023

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Abstract. There are numerous interrelationships among macroeconomic variables, including the relationship between the budget deficit and exchange rate movements, particularly in resource-dependent (rentier) economies such as Iraq. The budget deficit results from the continuous increase in public expenditure coupled with a decline in public revenues, especially since the Iraqi economy depends almost exclusively on the oil sector, and because of the fluctuations in oil prices denominated in U.S. dollars, which, in turn, affect the exchange rate of the Iraqi dinar, which has had a negative impact on the state's general budget. The study includes three main sections. The first section represents the theoretical framework of the exchange rate and the general budget deficit. The second section analyzes the reality of both the exchange rate and the general budget in Iraq for the period (1990–2023), while the third section deals with the standard analysis of the relationship between the two variables mentioned above.

Keywords: exchange rate, general budget, budget deficit.

ИЗМЕРЕНИЕ И АНАЛИЗ ВЗАИМОСВЯЗИ МЕЖДУ ВАЛЮТНЫМ КУРСОМ И ГОСУДАРСТВЕННЫМ БЮДЖЕТОМ ИРАКА ЗА ПЕРИОД 1990–2023 ГГ.

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Аннотация. Между макроэкономическими показателями существует множество взаимосвязей, одной из которых является взаимосвязь между дефицитом государственного бюджета и изменениями валютного курса, особенно в странах с рентной (ресурсозависимой) экономикой, таких как Ирак. Дефицит государственного бюджета возникает вследствие постоянного роста государственных расходов при одновременном сокращении государственных доходов. Это особенно характерно для экономики Ирака, которая практически полностью зависит от нефтяного сектора. Колебания мировых цен на нефть, выраженных в долларах США, оказывают влияние на обменный курс иракского динара, что, в свою очередь, негативно сказывается на состоянии государственного бюджета. Исследование состоит из трех основных разделов. Первый раздел посвящен теоретическим аспектам валютного курса и дефицита государственного бюджета. Во втором разделе проводится анализ динамики валютного курса и состояния государственного бюджета Ирака за период 1990–2023 гг. Третий раздел содержит эконометрический (статистический) анализ взаимосвязи между указанными макроэкономическими переменными.

Ключевые слова: валютный курс; государственный бюджет; дефицит государственного бюджета.

Introduction

The general budget is one of the tools of fiscal policy in Iraq, as it plays an important role in achieving the objectives of this policy. Its importance is not limited to achieving a fiscal balance between expenditures and public revenues only, but also works to achieve an integrated

balance at the macroeconomic level, which contributes to reaching the strategic objectives defined in accordance with the country's economic policy. Through the analysis of the study, it is found that the Iraqi economy has been significantly affected by many challenges as a result of an expansionary spending policy. This policy led to a financial deficit during some years of the study period, which led to the search for real solutions to address this deficit at the internal and external levels. The fiscal deficit is mainly due to the state's inability to pay its public expenditures from its own resources, i.e., oil revenues. This has led to an increase in the problem of deficits, which often reflects a lack of efficiency in the preparation of the general budget, which has negatively affected the effectiveness of the budget. The exchange rate is also one of the most important economic indicators, as it plays an important role in influencing the level of economic activity. It is also a more effective tool used by the state when adopting a monetary or fiscal policy for the purpose of stimulating and revitalizing the national economy. In addition, the exchange rate is very sensitive to changes in the global economy, especially changes in oil prices. This is due to the commodity composition of Iraqi exports, which are mainly based on crude oil, the prices of which are usually valued in U.S. dollars. Any change in the value of oil casts a direct shadow on the Iraqi economy, given its heavy dependence on the dollar to assess its oil revenues. This, in turn, is reflected in the exchange rate of the Iraqi dinar against the dollar, making it a key means of linking the Iraqi economy to the global economy. Moreover, the exchange rate has a significant impact on the state's general budget, with oil revenues accounting for more than 90% of the total budget revenues (2).

Importance of the study:

The importance of the study is based on the importance of the research variables, namely the exchange rate of the Iraqi dinar, the deficit and surplus in the general budget in Iraq, as the general budget is an important tool that developing countries, including Iraq, rely on to achieve economic and social goals, and the budget represents the image that reflects the nature of government revenues and public expenditures and the role of the state in formulating fiscal policy to achieve various economic goals. The exchange rate is also the main element that reflects the nature of the economic and banking system of the state and the extent to which the state is able to control it to face internal and external challenges.

Research Problem:

The research problem is formulated through the following questions:

- How to address the persistence of the phenomenon of deficits in the general budget, which exceeded the volume of public expenditure on the volume of government revenues for most of the years of the study period?
- Does the reduction of the dollar exchange rate against the Iraqi dinar have a positive impact on the Iraqi economy?
- Is there an impact relationship between the exchange rate and the budget deficit in two directions?

Hypothesis of Research:

The hypothesis of the study was as follows:

- There is an inverse effect relationship between economic variables that affect each other, including the reciprocal relationship between the budget deficit and exchange rates.
- The depreciation of the dollar against the Iraqi dinar has a positive role in improving economic conditions and addressing the deficit in the general budget.
- There is a reciprocal relationship between the exchange rate and the budget deficit.

Research Objectives:

1. Identify the reality of the Iraqi economy.
2. Explaining and analyzing the reality of the general budget and explaining the Iraqi dinar exchange rate system.
3. Measuring the exchange rate and the general budget.
4. Developing recommendations that would address the existing imbalances in the general budget.

Section One: The Conceptual Framework of the Exchange Rate and the General Budget

The first requirement: the exchange rate (its concept, types, and functions)

First: The Concept of the Exchange Rate

The exchange rate is associated with each of the local prices that are most prevalent in the world market, while the real exchange market is influenced by the quantity of foreign products needed for purchasing a local product, and the exchange rate aims at achieving objectives in terms of internal and external balance, as the exchange rate's primary objective is to achieve stability in the currency exchange of the nation against foreign currencies; however, it is hard to achieve due to several factors influencing it, just like any other commodity in a perfectly competitive market environment (3). It refers to the cost of one unit of the foreign currency, taking into consideration the number of units of the local currency involved, considering that the exchange rate refers to the exchange between two currencies within the foreign exchange market (4). It is also referred to as the rate upon which the exchange takes place within a limited period of time between the local monetary units and foreign currencies (5). From the above definitions, it can be noted that we can establish the exchange rate in which one unit of the foreign currency is traded against a number of units of the local or national currency. An increase in the price of the foreign currency implies that the local currency needs more to acquire one unit of foreign currency; hence its external value reduces.

Second: Types of Exchange Rate

The companies that conduct business inside the country use their own domestic currency for the purpose of meeting the cost of production and distributing profits amongst themselves as well as paying interest to their domestic borrowers. Companies having multiple branches need to change their domestic currency into multiple foreign currencies (6).

1. Nominal Exchange Rate: It is known as the foreign exchange rate, which is the number of units of the local or national currency that are paid for obtaining one unit of foreign currency, or vice versa, it is the number of units of foreign currency for obtaining one unit of local currency (7).
2. Real exchange rate: This type of exchange rate began to be used as an alternative to nominal exchange rates following the increase in inflation rates in the countries of the world and fluctuations in nominal exchange rates as a result of price fluctuations, as real exchange rates were used in economic analysis to follow up on the effects of monetary policy in the local economy, and the real exchange rate is defined as the ratio of the level of the global price of traded commodities to the ratio of local prices determined by a common currency, so that the real exchange rate reflects the real rate, i.e., the increase or fall of the exchange rate of a country's currency, i.e., its purchasing power (8).
3. Actual exchange rate: This implies that the average of calculating the variation in the exchange rate of one country's currency to a set of foreign currencies. If this average is considered the degree of improvement of the country's currency relative to the foreign currency set in terms of development of the country. That is, the average exchange rate of the country's currency relative to other countries' currencies for a particular year (9), and there are two forms of exchange rates (10).

A. Nominal Effective Exchange Rate: It is defined as the nominal real value of a particular year of currencies as a result of the fluctuations in nominal exchange rates compared to the base rate, or it is the average binary nominal exchange rate calculated by measuring a particular base period.

B. Real effective exchange rate: It is used to measure the extent to which the purchasing power of a particular currency has changed over time compared to other currencies, and the real effective exchange rate is the average of prices, i.e., it indicates the extent to which a country's currency has developed relative to a group of foreign currencies of other countries.

4. Equilibrium exchange rate: It is the price that is determined at the quantity offered for a currency at the required quantity of the currency itself, and that any country that desires a strong and successful foreign policy must adhere to the equilibrium exchange rate system because it represents the macroeconomic balance.

Third: Exchange Rate Functions (12)

1- Standard Function: The exchange rate is the link between local prices and international prices, as it uses the comparison between local prices of products and services and the prices of the global market, as it is a key factor to compete with the outside world for local producers.

2- Development function: The exchange rate develops certain exports by encouraging the export of those products and services to obtain foreign currency, and on the other hand, the exchange rate can cause the complete dispensation of some local products and their replacement with imports due to their low prices compared to local prices.

3- Distributive function: The global national income and national wealth are redistributed among the countries of the world due to the exchange rate being fundamentally linked to foreign trade.

Section Two: the concept of the public budget and its deficit.

First: The concept of the general budget.

Many disagreed in clarifying the meaning of the concept of the public budget, as there are those who believe that the public budget is legally valid, since it is only valid through the legal permission that the executive authority obtains from the legislative authority, and therefore the general budget is considered a tool for imposing the legislative authority for its control over the executive authority (13). There is also a concept of the public budget from two basic aspects, namely accounting, i.e., it shows future expenditures and revenues, and the second is that it is considered a tool for the state to achieve its goals, i.e., it is a process of forecasting the general expenditures and revenues of the state over a period of time, usually a year, and expressing the economic and social objectives of the state. It is also defined as a plan that includes estimating the expenditures and revenues of the state over a period of time, usually a year. This estimate is one of the goals sought by the political authority in the country (15), and it is clear from the previous definitions that the general budget is a forecast of the amounts of money that can be collected as well as that can be spent by the state in order to achieve its economic, social and political goals, within a period of time, such as a year, provided that it is approved by the people through the House of Representatives.

Second: The Concept of the General Budget Deficit

The government fiscal deficit occurs when the government spends more than it receives from revenues, as the budget deficit can be defined as the amount of what the government spends exceeds the government's revenues through taxes and fees during a period of time, usually one year (16), and the deficit is defined as the increase in total government expenditures over the total government revenues for a known period of time, usually one year, meaning that government spending is what determines the nature of the deficit in the budget, as it tends to increase more than revenues because of the development and rapid increase of the needs of the society (17).

Section Two: Economic Analysis of the Exchange Rate and the General Budget (Deficit and Surplus) in Iraq for the Period (1990–2023)

First: The development of the nominal and parallel exchange rate of the Iraqi dinar for the period (1990–2023)

One of the important factors in achieving the internal and external balance of the country is that the exchange rate should be stabilized, controlled, and the exchange rate of the Iraqi dinar should be supported to be able to implement the directions of the fiscal and economic policy in the country, especially since the general budget in Iraq has been suffering from a continuous deficit throughout the study period, except for specific years when the general budget was in a state of positive improvement.

Table (1) Evolution of the official and parallel exchange rate of the Iraqi dinar for (1990–2023)

Sunnah	Official Rate	Exchange	Annual growth rate	Parallel Exchange Rate	Annual growth rate
1990	0,3108		—	4	—

1991	0,3108	0	10	150
1992	0,3108	0	21	110
1993	0,3108	0	74	252,38
1994	0,3108	0	458	518,92
1995	0,3108	0	1674	256,50
1996	0,3108	0	1170	30,11—
1997	0,3108	0	1471	25,73
1998	0,3108	0	1620	10,13
1999	0,3108	0	1972	21,73
2000	0,3108	0	1930	2,13—
2001	0,3108	0	1929	0,05—
2002	0,3108	0	1957	1,45
2003	0,3108	0	1936	1,07—
2004	1453	23.37—	1453	24,95—
2005	1469	1,10	1472	1,31
2006	1467	0,14—	1475	0,20
2007	1255	14,45—	1267	14,10—
2008	1193	4,94—	1203	5,05—
2009	1170	1,93—	1182	1,75—
2010	1170	0	1186	0,34
2011	1170	0	1196	0,84
2012	1166	0,34—	1233	3,09
2013	1166	0	1232	0,08—
2014	1188	1.89	1214	1,46—
2015	1190	0,17	1247	2,72
2016	1190	0	1275	2,25
2017	1190	0	1258	1,33—
2018	1190	0	1209	3,89—
2019	1182	0,67—	1196	1,08—
2020	1304	10,5	1234	3,17
2021	1450	11,1	1474	19,4
2022	1450	0	1474	0
2023	1300	10,3—	1512	2,57

Source: Prepared by the researcher based on:

The Central Bank of Iraq, General Directorate of Statistics and Research, Annual Bulletin for Different Years.

From the above data illustrated in Table (1), it can be noted that the monetary authorities, as illustrated by the Central Bank of Iraq, implemented a fixed and inefficient official exchange rate policy between 1990 and 2002 in light of the decrease in the exchange rate of the Iraqi dinar both in the domestic and foreign market, as the parallel exchange rate of the Iraqi dinar decreased to (10) dinars per dollar, which amounted to (4) dinars in the year 1990. Such a fall in the value is caused by the unjustified economic sanctions levied against Iraq, cessation of exporting products, and continuation of military expenditures; while this decline in the value of the Iraqi dinar against the dollar has gone up to (1674) dinars per dollar in 1995, with an annual growth rate of (256.50%) owing to an increase in money supply caused by printing money without any backing. As such, in order to meet the deficit in the budget of the government, while in 1996, there occurred some changes in the value of the exchange rate, which reached an estimated value of (1170) dinars per dollar, with an annual growth rate of (-30.11%). This is due to the signing of the memorandum of understanding between Iraq and the United Nations Security Council. The positive expectations regarding the signing of the memorandum of understanding have had a huge impact on decreasing the nominal exchange rate of the foreign

currency during that year. The dinar per dollar increased by annual growth rates of approximately (25.73%), (10.13%), and (21.73%), respectively. And this is because people in the community do not like to hold the Iraqi dinar and prefer to hold foreign dollars for various reasons such as speculative reasons. And this trend continued until the years 2001 and 2002 when the dinar per dollar decreased to (1929) and (1957), respectively, with annual growth rates of (0.05%) and (1.45%). While in 2003, following the invasion of Iraq by international forces and the collapse of the old regime, the value of the Iraqi dinar declined relative to foreign currencies.

The parallel exchange rate of the Iraqi dinar reached about 1936 dinars per dollar, with a negative annual growth rate of about 1.07%. In 2004, the Iraqi economy was removed from sanctions and the Iraqi Central Bank enjoyed independence in formulating and implementing its monetary policy and making economic decisions. This happened through Law Number 56 for the year 2004, which marked the emergence of a new transitional phase in the history of the Iraqi Central Bank. It released the Iraqi dinar from the dual exchange rate restraints that existed in the previous phase into a single exchange rate that would be approved based on the currency auction process practiced by the Iraqi Central Bank.

The Iraqi Central Bank was able to unify the exchange rate of the Iraqi dinar against foreign currency, in addition to the creation of equality within the exchange market mechanism through fulfilling the market's demand for foreign currency on one side, and at the same time fulfilling the demands of the private sector in financing their whole importation at balanced exchange rates on the other side, which eventually led to decreasing the official and parallel exchange rate in 2004 up to reaching the official exchange rate to be (1453) dinars per dollar with an annual negative growth rate of (23.37%). As well as that, the parallel exchange rate was (1453), and there was a negative annual growth rate of (-24.95%), as the official and parallel exchange rates became the same in that particular year. The fall in the official and parallel exchange rate of the Iraqi dinar occurred in 2007 and 2008, when the official exchange rate was (1255) and (1193), respectively, with negative annual growth rates of (14.45%) and (4.94%), respectively, while the parallel exchange rate was (1267) and (1203), respectively, with negative annual growth rates of (14.10%) and (5.05%). As a result of which there was an observed great deal of convergence between the official and unofficial exchange rates as a consequence of the Central Bank's backing up of the exchange rate of the Iraqi dinar along with the decline in the inflation rate in Iraq and security stability throughout that period. As far as the years 2009, 2010, and 2011 are concerned, the official exchange rate declined to become stable at (1170) Iraqi dinars against one dollar for all three years, while the unofficial exchange rate was reduced to (1182), (1186), and (1196) in accordance with the growth rates of (1.75%), (0.34%), and (0.84%). With the difference between the two rates becoming minimal, this led individuals to develop faith in the Iraqi dinar. In the years 2012 and 2013, the official exchange rate dropped to around (1166) dinars per dollar, whereas the parallel exchange rate rose to (1233) dinars and (1232) dinars per dollar, respectively, at annual growth rates of (3.09%) and (0.08%), through the process of purchasing and selling foreign currencies. The official exchange rate rose again in 2014, where it reached (1188) dinars per dollar at an annual growth rate of (1.89%). On the other hand, the parallel exchange rate fell this year to (1214) dinars per dollar at an annual negative growth rate of (1.46%). In that case, the official exchange rate increased marginally and stabilized at (1190) dinars per dollar for the period between 2015 and 2018, where the parallel exchange rate also increased marginally, reaching (1247) dinars, (1275) dinars, (1258) dinars, and (1209) dinars per dollar, with growth rates of (2.72%), (2.25%), (1.33%), and (-3.89%). In 2019, the official exchange rate declined to reach about (1182) dinars per dollar with a negative annual growth rate of about (0.67%), while the parallel exchange rate declined to reach about (1196) dinars per dollar with a negative annual growth rate of (1.08%).

Hence, the Central Bank opted to control the exchange rate by conducting auctions on a daily basis where it sold dollars in an effort to meet the local demand under the managed float system that was applied to maintain the dinar exchange rate stability. Regarding the period between the years 2020–2022, there was an increase in the exchange rate to 1450 dinars in 2022,

which was due to the Iraqi government's approach to devalue its domestic currency against the foreign currency (dollar) according to economic and financial guidelines that were passed in the form of a white paper by the Ministry of Finance of Iraq, while in 2023, the exchange rate started decreasing, reaching 1300 dinars with a negative growth rate of (10.3)%. This was attributed to the delay in budget decision-making, leading to lower government expenditures.

Second: Analysis of the reality of public revenues, public expenditures, surplus and deficit in the general budget in Iraq for the period (1990–2023)

The Iraqi economy is represented as a rentier economy, where oil revenues contribute significantly to public revenues; at the same time, it is also offset by a significant weakness in the contribution of other sectors to the volume of those revenues, and the reason is due to poor planning and management of industrial, productive and service projects, especially the decline of the agricultural sector in that contribution, and the continued dependence of the Iraqi budget on oil revenues may expose it to great risks and challenges due to the emergency changes in global oil prices, as well as the small role of tax revenues and other revenues, which leads to the weakening of the effectiveness of those revenues, which negatively affects the financing of the public budget and destabilizes the economy.

The general budget in Iraq is the main pillar capable of guiding the economy towards achieving economic growth and raising the living standards of the members of society, and the general budget may be organized with a deficit or surplus according to the goals planned by the state and according to the economic reality in it, and in order to get to know the state budget status, the development of public revenues, public expenditures, and the deficit or surplus of the general budget in the Iraqi economy will be analyzed for the period (1990–2023).

Table (2) Evolution of the size of the general budget (deficit and surplus) for (1990–2023) in Iraq in million dinars.

Sunnah	General Revenues	Overhead	Surplus and deficit
1990	8491	14179	–5,688
1991	4228	17497	–13,269
1992	5047	32883	–27,836
1993	8997	68954	–59,957
1994	25659	199442	–173,783
1995	106986	690784	–583,798
1996	178013	542542	–364,529
1997	410537	605802	–195,265
1998	520430	920501	– 400,071
1999	719065	1033552	–314,487
2000	1133034	1498700	365666
2001	1289246	2079727	790481
2002	1854585	9232254	7377669
2003	4596054	1982548	2613506
2004	32988946	32117491	871455
2005	40502890	26375175	14127715
2006	49055545	37494459	11561086
2007	54599451	39308348	15291103
2008	80252182	67277196	12974986
2009	55243526	55589720	380368
2010	70178284	70134201	44083
2011	99998776	78757666	21241110
2012	119817014	105140082	14676932
2013	113840075	119127555	5287480
2014	105386623	113473517	– 8086894

2015	66470252	70397515	– 3927263
2016	54409270	67067437	12658167
2017	77335955	75490115	1845840
2018	106569884	80873189	25696695
2019	107566995	111723523	4156528
2020	63199689	76082443	12882754
2021	109081464	102849659	6231805
2022	161697437	116959582	44737855
2023	174352421	123465731	50886690

Source: Prepared by the researcher based on

The Ministry of Finance, the Budget Department and the Final Accounts Department for Different Years.

The Central Bank, General Directorate of Statistics and Research, Economic Report for Different Years.

Through Table (2), we note that the size of the general budget was in a continuous deficit from 1990 to 2002, where the deficit in the general budget in 1990 amounted to about (5.677) million dinars to reach (7377669) million dinars in 2002. The reason for this deficit in the general budget is due to the increase in public expenditures, especially military expenditures, due to the Second Gulf War as well as the economic blockade imposed on Iraq during that period, and the deficit in the general budget continued at an increasing pace starting from the years after 1990, when it reached (13.269) million dinars in 1991, an increase in the deficit from 1990 amounting to about (7.592) million dinars. The deficit in 1992 amounted to about (27.836) million dinars, and thus the deficit in the general budget continued, where in 1995 it reached about (583.798) million dinars, an increase of about (410.015) million dinars. In 1996 and 1997, the deficit reached about (364,529) and (195,265) million dinars, respectively, but the deficit began to fluctuate after that period, when the Security Council issued a resolution allowing Iraq to export crude oil abroad under what was known as the "oil-for-food" program.

The deficit in the general budget continued but in varying proportions between rise and fall from 1998 to 2002, where the deficit in 1998 amounted to about (400.064) million dinars, an increase from the previous year amounting to about (204). The deficit in the general budget in 2002 amounted to about (7377669) million dinars, and the reasons for the deficit in the general budget are the Second Gulf War, as a result of which the Iraqi economy became burdened with debt and strict international sanctions were imposed, in addition to the destruction of infrastructure during the war. All these factors led to the decline in public revenues and their failure to keep pace with the increasing public expenditure during that period (19).

In 2003, the budget began to achieve a remarkable surplus, amounting to (2613506) million dinars in 2003 and (871455) million dinars in 2004 due to the increase in oil revenues, and it is noted that the general budget achieved a surplus in 2011, reaching (21241110) million dinars. This surplus in the general budget continued to increase until 2012, when it reached (14676932) million dinars. The reason for this surplus is due to the increase in the approved price for the sale of crude oil, but the achievement of a surplus in the general budget does not naturally reflect the improvement of the state's economic performance, as the amount of the surplus achieved in the general budget is the result of the improvement and expansion of the sources of financing and the rotation of the amounts of investment and operational allocations and the development program of the regions and governorates from the previous year to the following year due to the decrease in the implementation rates in those budgets.

In addition, oil revenues constitute the largest part of public revenues, and oil is naturally subject to fluctuations in the price of a barrel in global markets between rising and falling, and the increase in crude oil prices in the global market above the expected price, which is often lower than the world price on which the initial estimates were based when setting the general budget, consequently increases actual revenues above the budget estimate and thus leads to the appearance of a surplus in the general budget.

In the years (2013–2016), the general budget suffered a deficit of (5287480) million dinars in 2013, and the amount of the deficit in 2016 reached (12658167) million dinars. The reason for this deficit in the general budget is due to the decrease in oil prices, as well as the increase in public expenditures offset by a decrease in public revenues as a result of the unstable security conditions due to the collapse of some areas under the control of terrorist gangs.

In the years (2017–2018), the general budget achieved a surplus of (1845840) million dinars in 2017 and (25696695) million dinars in 2018, as a result of the improvement of the security situation and the increase in oil revenues after the recovery of some oil wells and border crossings that were controlled by terrorist gangs, which coincided with the rise in oil prices.

In the years (2019–2020), the general budget witnessed a deficit of (4156528) million dinars in 2019 and (12882754) million dinars in 2020, due to the increase in the volume of public expenditure, especially military spending, at a rate greater than the increase in the volume of public revenues, and also due to the COVID-19 pandemic, the contraction of the global economy, the decrease in demand for oil in the global markets, and the decline in oil prices.

While in the years (2021–2022), a surplus of (6231805) million dinars was achieved in 2021 and (44737855) million dinars in 2022, while in 2023, the budget achieved a higher surplus than the previous year, amounting to (50886690) million dinars, due to the significant increase in the volume of oil revenues and the improvement in oil prices in that year, as well as the improvement in the health and economic conditions of the countries of the world, the reopening of ports between countries, and the return of trade to all countries of the world.

Section Three: Measuring and Analyzing the Impact of Exchange Rates on the Public Budget in Iraq for the Period (1990–2023)

The first requirement: Characterization of the variables of the Standard Model

In order to show the impact of exchange rates on the general budget in Iraq, the standard model of the variables used has been formulated and described as follows:

$$PR = F(EX)$$

$$PR = b_0 + b_1 EX + U_i \dots (1)$$

$$PE = F(EX)$$

$$PE = b_0 + b_1 EX + U_i \dots (2)$$

First: Independent Variables

EX: Exchange Rate

Second: Dependent variables

PR: General Revenue

PE: Overhead

The second requirement: The Dickey-F and Lr Extended Time Series Stability Test (ADF) of the Unit Root for the Estimated Standard Model in Iraq.

Table (3) Dickie PandLr Extended Test for Unity Root in Iraq

UNIT ROOT TEST RESULTS TABLE (ADF)				
Null Hypothesis: the variable has a unit root				
	At Level			
		PR	PE	EX
With Constant	t-	-0.0180	-0.5287	-1.1124
	Statistic			
	Prob.	0.9502	0.8730	0.6991
With Constant & Trend		n0	n0	n0
	t-	-3.2469	-2.7746	-1.5309
	Statistic			
Without Constant & Trend	Prob.	0.0936	0.2160	0.7980
		*	n0	n0
	t-	1.0401	0.5928	-1.4535
	Statistic			
	Prob.	0.9182	0.8394	0.1339

		n0	n0	n0
	<u>At First Difference</u>			
		d(PR)	d(PE)	d(EX)
With Constant	t-Statistic	-5.2605	-6.8489	-5.6503
	Prob.	0.0002	0.0000	0.0000
		***	***	***
With Constant & Trend	t-Statistic	-5.3678	-6.8163	-5.5936
	Prob.	0.0007	0.0000	0.0004
		***	***	***
Without Constant & Trend	t-Statistic	-4.8245	-6.4901	-5.5352
	Prob.	0.0000	0.0000	0.0000
		***	***	***
<u>Notes:</u>				
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant				

Source: The researcher's work is based on the results of the (10 EViews) program.

Table (3) shows the unit root test for all variables, as the time series of the dependent variable (PR) was stable at a significance level of (10%) with only a constant and a trend, and the time series of the dependent variable (PE) was unstable at the level in all specifications, and the time series of the independent variable (EX) was unstable at the level in all specifications, so the test was performed after taking the first difference. The time series of the two dependent variables (PR-PE) became stable at a significance level of (1%) with the presence of a constant and a trend, with a constant only, and without a constant and trend, and the time series of the independent variable (EX) became stable at a significance level of (1%) with the presence of a constant, a trend, a constant only, and without a constant and trend, which is integrated of the first order.

First: Estimating the ARDL Model for the General Revenue Function

Table (4) Estimating the Long-Run Relationship with the ARDL Model in Iraq: General Revenue Function

Dependent Variable: PR				
Method: ARDL				
Dynamic regressors (2 lags, automatic): EX				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
PR(-1)	1.008555	0.186978	5.393976	0.0000
PR(-2)	-0.278679	0.197375	-1.411923	0.1690
EX	-14055.24	7075.423	-1.986487	0.0568
C	44869077	20099905	2.232303	0.0338
R-squared	0.867625	Mean dependent var		54793573
Adjusted R-squared	0.853442	S.D. dependent var		51941097
S.E. of regression	19884538	Akaike info criterion		36.56525
Sum squared resid	1.11E+16	Schwarz criterion		36.74847
Log likelihood	-581.0440	Hannan-Quinn criter.		36.62598
F-statistic	61.17358	Durbin-Watson stat		1.775463
Prob(F-statistic)	0.000000			

Source: Prepared by the researcher based on the results of the (EViews 10) program.

After the test on the stability of the variables, the ARDL model was estimated for the general revenue function, and after estimating the model, the results illustrated in the following table were achieved ($R^2 = 0.867625$), meaning that the independent variable of the model (EX)

explained the dependent variable (PR) by (86%), and the adjusted R-squared value was found to be (0.853442). The value of F was found to be (61.17358), which is larger than the tabulated value based on the value of Prob(F-statistic), which shows that the model is significant at (5%). Thus, the null hypothesis ($H_0: \beta = 0$) is rejected in favor of the alternative hypothesis ($H_1: \beta \neq 0$).

Second: Testing the Optimal Slowdown Periods for the General Revenue Function

The deceleration intervals are tested based on the AIC criterion, which gives the optimal lag periods, and the optimal lag period for the estimated model is (1,2), as shown in Figure (1).

Figure (1) – Optimal Slowdown Periods of Public Revenues

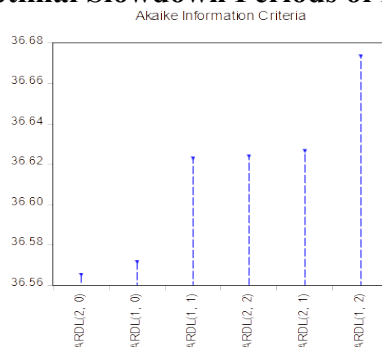


Figure: Prepared by the researcher using the (EViews 10) program.

Third: Bounds Test for the General Revenue Function

Table (5) shows the bounds test to find out whether or not there is a long-term equilibrium relationship between the variables included in the model. We compare the calculated value with the upper and lower critical values at significance levels of (1%, 2.5%, 5%, 10%). It is clear that the calculated value of (F), which is (5.942503), is greater than the critical value of (F) at the (1%) significance level. Therefore, we reject the null hypothesis (H_0), which states that there is no long-term equilibrium relationship, and accept the alternative hypothesis (H_1), i.e., the existence of a long-term equilibrium relationship between the variables.

Table (5) Test the Limits of the Estimated Model in Iraq for the Public Revenue Function

F-Bounds Test				
Test Statistic	Null Hypothesis: No levels relationship			
	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	5.942503	10%	3.02	3.51
K	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Source: The researcher's work is based on the results of the (10Eviews) program.

Fourth: Testing the Standard Problems of the Estimated Model of the General Revenue Function

A. Serial Correlation Test between Residuals

To verify that the estimated model is free from the problem of serial correlation between residuals, we perform the Breusch-Godfrey Serial Correlation LM Test, which shows the serial correlation test. As the probability values of both the calculated (F) and (Chi-square) are greater than (5%), we reject the alternative hypothesis (H_1), which states that there is serial correlation between residuals, and accept the null hypothesis (H_0), which states that there is no serial correlation between residuals.

Table (6) Serial Correlation Test in Iraq for the Public Revenue Function

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.994841	Prob. F(2,26)	0.1563
Obs*R-squared	4.257125	Prob. Chi-Square(2)	0.1190

Source: The researcher's work is based on the results of the EViews 10 program.

B. Testing the Problem of Variance Heterogeneity

To verify that the estimated model is free of the problem of variance heterogeneity, we perform the Heteroskedasticity Test: Harvey. As the probability values of the calculated (F) and (Chi-square) are greater than (5%), i.e., the variance of errors is homogeneous, we reject the alternative hypothesis (H_1), which states the existence of the problem of variance heterogeneity, and accept the null hypothesis (H_0), which states that there is no variance heterogeneity problem, indicating that the error variances in the model are homogeneous, as shown in Table (7).

Table (7) Testing the Variance Heterogeneity of an Estimated Model in Iraq for the General Revenue Function

Heteroskedasticity Test: Harvey			
F-statistic	35.50736	Prob. F(3,28)	0.1627
Obs*R-squared	25.33938	Prob. Chi-Square(3)	0.1548
Scaled explained SS	43.14122	Prob. Chi-Square(3)	0.1402

Source: The researcher's work is based on the results of the EViews 10 program.

Fifth: Testing the Quality of the Model for the General Revenue Function

A. Jarque-Bera Normal Distribution Test

Figure (2) shows the normal distribution of residuals, as the probability value of (0.110976) for the Jarque-Bera test is greater than the (5%) significance level, and this shows that the estimated model follows the normal distribution of random errors, i.e., the residuals are normally distributed.

Figure (2) Jarque-Bera Test of the Normal Distribution of Residuals in Iraq for the General Revenue Function

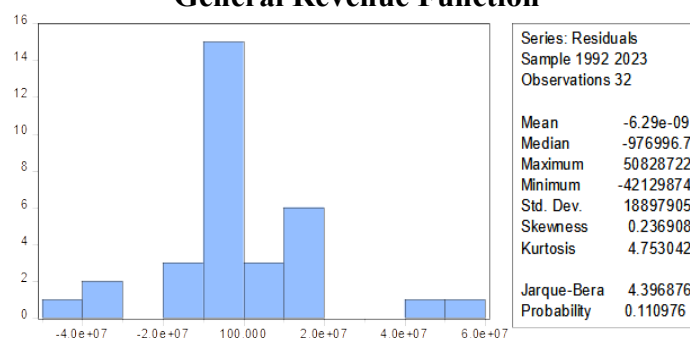
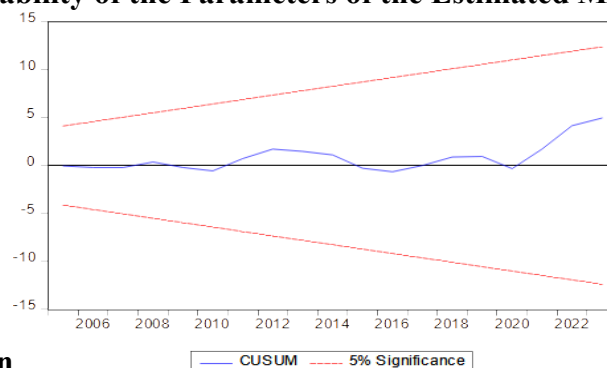


Figure: The researcher's work is based on the results of the EViews 10 program.

B. Testing the Structural Stability of the Parameters of the Estimated Model for the General Revenue Function

This test aims to examine the stability of the estimated parameters of the economic model over time through the CUSUM (Cumulative Sum of Residuals) test, as it is used to ensure that the data used in the model do not contain any structural changes. As shown in Figure (3), the graph line of the cumulative sum of residuals statistics is within the critical boundary area, and there is no case of exceeding the upper and lower limits (Upper and Lower Limits). This indicates that the parameters are stable at the (5%) significance level and that there are no substantial structural changes.

Figure (3) Testing the Structural Stability of the Parameters of the Estimated Model



in Iraq for the Public Revenue Function

Figure: The researcher's work is based on the results of the EViews 10 program.

Sixth: Testing the Error Correction Model and the Short- and Long-Term Relationships of the Public Revenue Function

1- Short Term:

Table (8) shows the analysis of the results of the regression and error correction parameter (ECM) to study the dynamic relationship between the independent variable of the exchange rate (EX) and the dependent variable of public revenues (PR), as it is clear that the dependent variable of public revenues (PR) has a positive coefficient but is not statistically significant.

This indicates that the change in public revenues in the past year (PR(-1)) does not significantly affect the change in the exchange rate in the current year in the short term, and this is in line with reality and economic theory, as public revenues (related to oil or taxes) affect macroeconomic fundamentals such as the trade balance and foreign reserves, and thus the exchange rate in the long term, while the error correction parameter (CointEq(-1)) is (-0.270123), which has a negative and significant coefficient at the (1%) significance level, indicating that the exchange rate corrects about (27%) of any imbalance in one year from the long-term equilibrium (resulting from a shock in public revenues or any other variable), and this is considered a good correction speed, reflecting the flexibility of the exchange market or the extent of the intervention of the Central Bank to correct the imbalances.

Table (8) Results of the Short-Term Error Correction Model

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PR(-1))	0.278679	0.166965	1.669083	0.1062
CointEq(-1)*	-0.270123	0.108103	-2.498752	0.0186

Source: The researcher's work is based on the results of the EVIEWS 10 program.

B- Long Term:

Table (9) shows the analysis of the results of the long-term error correction model. We note that the independent variable (EX) has a negative and significant effect at the (1%) significance level on the dependent variable (PR), where the value of the coefficient reached (-52032.67), which indicates that an increase in the exchange rate (EX) by (1%) leads to a decrease in the dependent variable of public revenues (PR) by (52%). The probability value (Prob. = 0.0029) means that the effect is significant at the (1%) significance level, and the constant (C) has a coefficient value of (1.66%), which indicates that the expected value of the dependent variable when the exchange rate is zero is (1.66%). This reflects the level of structural or autonomous public revenues that are not affected by the exchange rate, which includes components such as oil revenues collected in foreign currency. The probability value reached (Prob. = 0.0002), which means that the constant is significant at the (5%) significance level, while the EC equation indicates that any deviation from the long-term equilibrium between public revenues (PR) and the independent variable of the exchange rate (EX) will be gradually corrected over time.

Table (9) Results of the Long-Term Error Correction Model

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	-52032.67	15945.40	-3.263177	0.0029
C	1.66E+08	38808366	4.280157	0.0002
EC = PR - (-52032.6717*EX + 166105906.6443)				

Source: The researcher's work is based on the results of the EVIEWS 10 program.

Requirement Three: Estimation of the ARDL Model for the Overhead Function

After testing the stability of the variables, the Autoregressive Distributed Lag (ARDL) model of the overhead function was estimated, and after performing the model estimation, the results shown in Table () were obtained. The value of ($R^2 = 0.901858$) means that the

independent variable in the model (EX) explained the change in the dependent variable (PE) by (90%), and the adjusted R-squared value was recorded as (0.895316). The calculated F value was (137.8405), which is greater than the tabulated value according to the value of Prob(F-statistic), which confirms the significance of the model at the (5%) significance level. Therefore, we reject the null hypothesis ($H_0: \beta = 0$) and accept the alternative hypothesis ($H_1: \beta \neq 0$).

Table (10) Estimation of the Significant Relationship with the ARDL Model in Iraq for the Function of Public Expenditures

for the Function of Public Expenditures

Dependent Variable: PE				
Method: ARDL				
Dynamic regressors (2 lags, automatic): EX				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
PE(-1)	0.729670	0.104753	6.965624	0.0000
EX	-13549.92	4969.476	-2.726630	0.0106
C	42726928	14214776	3.005811	0.0053
R-squared	0.901858	Mean dependent var		48139691
Adjusted R-squared	0.895316	S.D. dependent var		44939900
S.E. of regression	14540283	Akaike info criterion		35.90925
Sum squared resid	6.34E+15	Schwarz criterion		36.04530
Log likelihood	-589.5027	Hannan-Quinn criter.		35.95503
F-statistic	137.8405	Durbin-Watson stat		2.170105
Prob(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Prepared by the researcher based on the results of the EVIEWS 10 program.

First: Testing the Optimal Slowdown Intervals for the Overhead Function

Slowdown intervals are tested based on the AIC criterion, which gives the lowest slowdown intervals, and the optimal slowdown period for the estimated model is (2,2), as shown in Figure (4).

Figure (4) – Optimal Slowdown Periods for the Overhead Function
Akaike Information Criteria

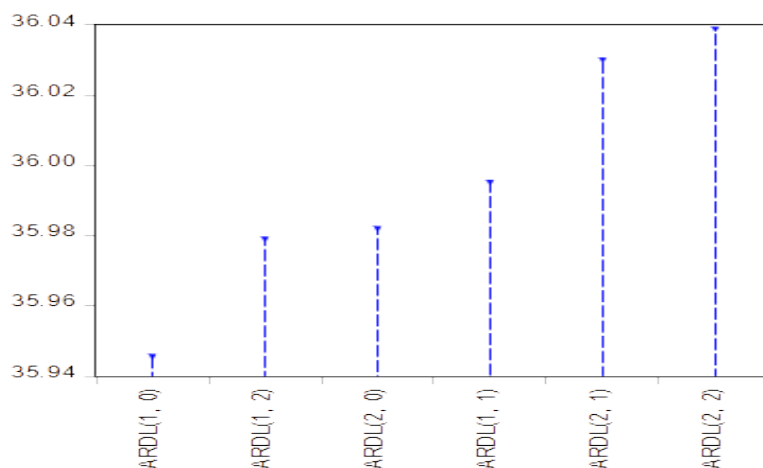


Figure: Prepared by the researcher based on the results of the EVIEWS 10 program.

Second: Bounds Test for the Overhead Function

Table (11) shows the bounds test. We compare the calculated value with the upper and lower limits at significance levels of (1%, 2.5%, 5%, 10%). It is clear that the calculated value of (F), which is (6.318806), is greater than the critical value of (F) at the (1%) significance level. Therefore, we reject the null hypothesis (H_0), which states that there is no long-term equilibrium relationship, and accept the alternative hypothesis (H_1), i.e., the existence of a long-term equilibrium relationship between the variables.

Table (11) Test the Limits of the Estimated Model in Iraq for the Overhead Function

F-Bounds Test				
Null Hypothesis: No levels relationship				
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	6.318806	10%	3.02	3.51
K	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Source: The researcher's work is based on the results of the EViews 10 program.

Third: Testing the Standard Problems of the Estimated Model of the Overhead Function

A. Serial Correlation Test between Residuals

Table (12) shows the serial correlation test, as the probability values of both the calculated (F) and (Chi-square) are greater than (5%). Therefore, we reject the alternative hypothesis (H_1), which states that there is serial correlation between the residuals, and accept the null hypothesis (H_0), which states that there is no serial correlation between the residuals.

Table (12) Serial Correlation Test in Iraq for the Function of Public Expenditures

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.237351	Prob. F(2,28)	0.7903
Obs*R-squared	0.550144	Prob. Chi-Square(2)	0.7595

Source: The researcher's work is based on the results of the EViews 10 program.

B. Testing the Problem of Variance Heterogeneity

We note that the probability values of the calculated (F) and (Chi-square) are greater than (5%), i.e., the error variance is homogeneous. Therefore, we reject the alternative hypothesis (H_1), which states that there is a problem of variance heterogeneity, and accept the null hypothesis (H_0), which states that there is no problem of variance heterogeneity, indicating that the error variances in the model are homogeneous, as shown in Table (13).

Table (13) Variance Heterogeneity Test for an Estimated Model in Iraq for the Function of Public Expenditure

Heteroskedasticity Test: Harvey			
F-statistic	7.535575	Prob. F(2,30)	0.3122
Obs*R-squared	11.03473	Prob. Chi-Square(2)	0.1340
Scaled explained SS	38.51404	Prob. Chi-Square(2)	0.1135

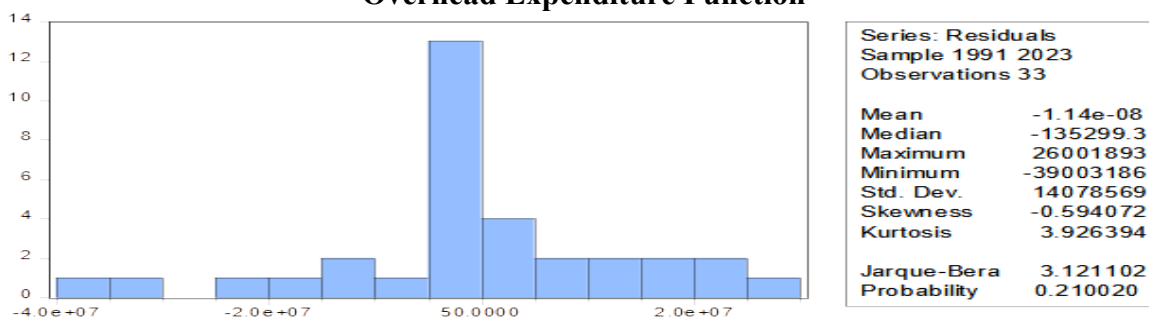
Source: The researcher's work is based on the results of the EViews 10 program.

Fourth: Testing the Quality of the Model for the Overhead Function

A. Jarque-Bera Normal Distribution Test

Figure (4) shows the normal distribution of residuals, as the probability value of (0.210020) for the Jarque-Bera test is greater than the (5%) significance level, and this shows that the estimated model follows the normal distribution of random errors, i.e., the residuals are normally distributed.

Figure (4) Jarque-Bera Test of the Normal Distribution of Residuals in Iraq for the Overhead Expenditure Function



Source: The researcher's work is based on the results of the EViews 10 program.

B. Testing the Structural Stability of the Parameters of the Estimated Model for the Overhead Expenditure Function

Figure (5) shows that the graph of the cumulative total statistics of the residuals is located within the critical boundary area, and there is no case of exceeding the upper and lower limits. This indicates that the parameters are stable at the (5%) significance level, and there are no substantial structural changes.

Figure (5) Structural Stability Test of the Parameters of the Estimated Model in Iraq for the Public Expenditure Function

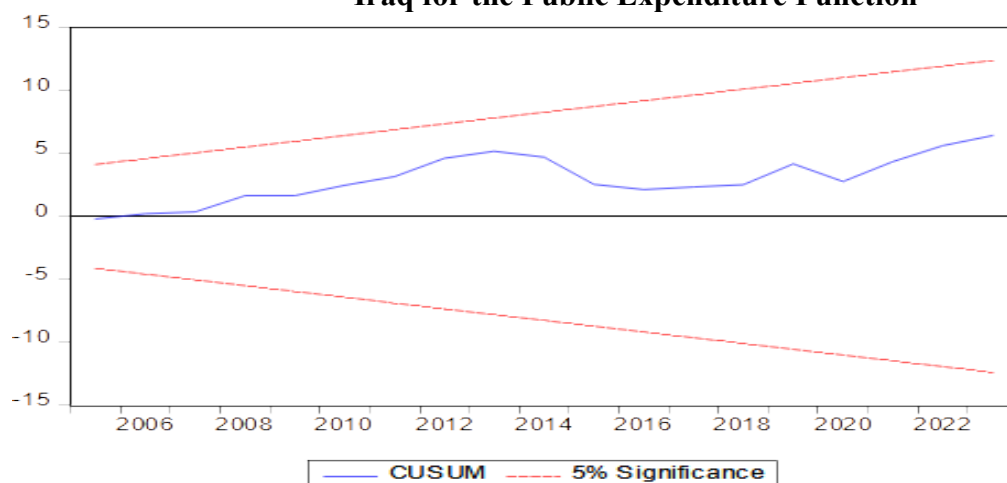


Figure: The researcher's work is based on the results of the EViews 10 program.

Fifth: Testing the Error Correction Model and the Short- and Long-Term Relationships of the Overhead Function

1- Short Term:

Table (14) shows the analysis of the results of the regression and error correction parameter (ECM) to study the dynamic relationship between the independent variable of the exchange rate (EX) and the dependent variable of overhead expenditure (PE). It is clear that the presence of a negative and significant coefficient connects the short-term dynamics with the long-term equilibrium, while the error correction parameter (CointEq(-1)) was (-0.270330) and has a negative and significant coefficient at the (1%) significance level, which indicates that the exchange rate corrects about (27%) of the imbalance in the long-term relationship that is corrected in each period of time.

Table (14) Results of the Short-Term Error Correction Model

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)*	-0.270330	0.082952	-3.258862	0.0028

Source: The researcher's work is based on the results of the EViews 10 program.

B- Long Term:

Table (15) shows the analysis of the results of the error correction model in the long run. We note that the independent variable (EX) reached a value of (-50123.58), as the negative sign means that there is an inverse and significant relationship between the exchange rate and public expenditures in the long term, i.e., in the case of a depreciation of the local currency (increase in the exchange rate) by one unit, the overhead decreases by (-50%). The probability value (Prob. = 0.0001) means that the effect is significant at the (1%) significance level, and the constant (C) has a coefficient value of (158054), which is a large value that reflects the volume of overhead when the exchange rate is equal to zero, while the EC equation indicates the equilibrium state to which the overhead has been inclined in the long run, and any deviation from it is corrected in the following periods.

Table (15) Results of the Error Correction Model in the Long Term

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

EX	-50123.58	11178.48	-4.483933	0.0001
C	1.58E+08	26500914	5.964115	0.0000
EC = PE - (-50123.5768*EX + 158054502.2436)				

Source: The researcher's work is based on the results of the EViews 10 program.

Conclusions:

1. The study proved that there is a statistically significant inverse equilibrium relationship between the exchange rate and public expenditures in Iraq in the long run, as a rise in the exchange rate leads to a decrease in public expenditures. The same inverse relationship also applies to public revenues, confirming the structural impact of the exchange rate on both sides of the budget.
2. In the short term, the effect of the exchange rate on public revenues was statistically insignificant, while its effect on public expenditures was significant. This indicates an immediate public expenditure response to exchange rate changes, while the revenue response is lagging, reflecting the nature of Iraq's oil-dependent rentier economy.
3. The Error Correction Model (ECM) confirms the significance and negativity of the correction coefficient for both functions (revenue and expenditure), with an adjustment rate of about 27% per year. This means that any exchange rate shock causes the variables to deviate from equilibrium, but about a quarter of this imbalance is corrected during the following year, returning to the long-term equilibrium path.
4. Diagnostic tests (e.g., serial correlation, heteroskedasticity, normal residual distribution, and structural stability) have proven that the estimated models are statistically sound and free of standard problems, which gives high confidence in the results and makes them valid for economic inference and analysis.
5. The estimated models showed very high explanatory power, as the independent variable (exchange rate) explained about 86% of the changes in public revenues and 90% of the changes in public expenditures, proving that the exchange rate is one of the main determinants of the public budget in Iraq during the study period.

Recommendations:

1. The study recommends that the Iraqi government should take the exchange rate into account when formulating the public budget, not only as a monetary indicator, but also as a strategic variable that directly affects both revenues (especially oil revenues) and public expenditures.
2. Given the speed of adjustment (27%), the Central Bank of Iraq (CBI) is advised to activate monetary policy instruments more efficiently to absorb external shocks (such as oil price fluctuations) that are transmitted through the exchange rate to the budget, thereby reducing imbalances and maintaining budget stability in the short term.
3. To reduce dependence on oil revenues linked to the exchange rate, the study recommends accelerating the implementation of structural reforms aimed at diversifying the sources of public revenues (such as activating non-oil tax revenues and fees), including:
4. Given the close relationship between the exchange rate (as a monetary instrument) and the public budget (as a fiscal instrument) demonstrated by the study, it recommends strengthening institutional coordination mechanisms between the Ministry of Finance and the Central Bank of Iraq to ensure the coherence of macroeconomic policies and avoid the unintended negative effects of one policy on the other.

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