



Analyzing the impact of exchange rate fluctuations and inflation on the GDP in Iraq using the modern methodology of Cointegration for the period (1988-2020).

Dalia Omar Nazmi Al-Bayati
daliyomar93@gmail.com

Saif Adel Sabbar Al-Dulaimi
Saif92Adel@gmail.com

Nadhem Abdullah Abid Al-Mihimdy
nadhim.abd@uoalhuda.edu.iq

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Abstract

The research aims to analyze the impact of exchange rate fluctuations (EXM and EXN) and inflation (INF) on the gross domestic product (GDP) in Iraq for the period 1988-2020. The research is important by analyzing the magnitude of the macroeconomic and especially GDP effects of these variables, as well as the economic effects of exchange rates on economic activity. The results of the standard analysis using the ARDL model showed a long-term equilibrium relationship, according to the Bound Test methodology, from explanatory (independent) variables to the internal (dependent) variable, while the value of the error correction vector factor was negative and moral at a level less than (1%). The relationship between EXM and GDP was inverse, with partial flexibility for EXM (-7.666), meaning that an increase in EXM (1%) will lead to a decrease in GDP (7.666%). This applies to the reality of the Iraqi economy, as the method used in recent times is to devalue the local currency. The effect of EXN was steady in the long run, with the partial flexibility of EXN (5.785), that is, an increase of EXN (1%) will lead to an increase in GDP (5.785%), and the model as a whole is statistically significant. The explanatory power of the model is high, as it was ($R^2=0.816$), indicating that 81% of the changes in GDP in constant prices are due to the change in (EXM, EXN, and INF). The study concluded that in light of the outbreak of the coronavirus, the disruption of most economic projects, and the decline in the prices of the Iraqi government, as a result of the decrease in the balance of oil and oil revenues, as a result of the balance of the government part of the solution is to devalue the local currency by controlling the nominal exchange rate. At present, the Iraqi Monetary Authority recommends that the Managed Flexible Exchange System be continued as an effective means of avoiding external shocks for the Iraqi economy, as it allows for appropriate adjustments to be made continuously.

Keywords: official exchange rate , parallel exchange rate , gross domestic product , inflation , ARDL model .

Introduction:

The subject of change in exchange rates and inflation rates occupies a large space in economic studies and economic thought, because of its importance through the economic effects it has on macroeconomic indicators, the most important of which is the gross domestic product, especially in light of the outbreak of the Coronavirus (Covid-19) and the disruption of most international projects, and with the drop in world oil prices made it necessary for the Iraqi state to address the imbalances in the balance of payments and the general budget. The developing countries, including Iraq, have most of their economies open and suffer from a deficit in their balance of payments due to the large volume of their imports relative to their exports, as fluctuations in foreign exchange rates and high inflation rates significantly affect the trade balance of these countries, including Iraq.

The Iraqi economy is dependent on and affected by changes in currency exchange rates and inflation rates. The problem of research can therefore be expressed by asking how much of the exchange rate fluctuations (official and parallel) and inflation affect Iraq's gross domestic product?

The research aims to analyze the impact of exchange rate fluctuations and inflation on the gross domestic product in Iraq during (1988-2020) through the variables (the official and parallel exchange rate and inflation) and other variables.

1. Methodology**2.1 Research Limits:**

Spatial boundaries: Republic of Iraq.

Temporal limits: The research adopted the period (1988-2020) to display changes in the gross domestic product, exchange rate changes, and inflation rates as a result of the circumstances that surrounded the entire Iraqi economy.

2.2 Research Hypothesis:

There is a positive impact of the exchange rate and inflation rates on the gross domestic product in the event of the availability of other factors that work to stimulate it in line with the current fluctuations in Iraq.

The contents of the research, it was divided into four axes that included the first: the conceptual framework of the exchange rate, gross domestic product, and inflation. The second aspect, it included an analysis of some economic and monetary indicators in the Iraqi economy for the period (1988-2020). And that the third aspect was the share of the theoretical framework of the standard methods used. The fourth aspect culminated in measuring and analyzing the impact of the exchange rate and the inflation rate on the gross domestic product using the ARDL methodology for the period (1988-2020), as well as for the conclusions and recommendations.

3.1 The Conceptual Framework for Exchange Rate, GDP, and Inflation.**3.1.1 The Concept and Types of the Exchange Rate:****i. The concept of exchange rate:**

The exchange rate is defined as the unit price of the foreign currency expressed in units of the national currency, or it is the unit price of the local currency expressed in units of foreign currency. In units, the second method is based on determining the price of one unit of the foreign currency, expressed in units of the local currency. This is how researchers will measure its impact on the Iraqi economy (Al-Ghaliby, 2011: 21).

ii. Types of the exchange rate.

There are several types of the exchange rate, including (Sami, 2011: 38): -

A. The nominal exchange rate

It is defined as the price of a unit of a foreign currency in terms of units of the local currency, and this definition can be reversed so that the nominal exchange rate expresses a unit of the local currency that pays a price for several units of foreign currency, as the nominal exchange rate represents the measure of a country's currency that can be exchanged for the value of the currency of another country so that the process of exchanging those currencies according to the rates of these currencies announced between each other, and the nominal exchange rate is determined according to the demand and supply of that price in the exchange market at a specific moment in time. The country where this rate is the current currency rate that does not take into account the purchasing power of the currency.

The nominal exchange rate includes two types of exchange rates: the official exchange rate, which is applicable for official trade exchanges, and the parallel exchange rate, which is applicable in parallel markets. The exchange rate of the local currency against the foreign currency, so the official exchange rate is seen as a measure of the relative prices between two currencies.

B. Real exchange rate:

It is the price that is equivalent to the nominal exchange rate according to the differences between the relative levels of local prices with the relative rates of foreign prices. It is defined as the number of units of foreign goods needed to purchase one unit of local goods, and this means that it is a real concept that measures the relative prices of two commodities.

C. Actual exchange rate:

It is the index that measures the average change in the exchange rate of a currency about several currencies of other countries in a certain period. Therefore, the actual exchange rate index is equal to the average of several bilateral exchange rates, and it indicates the extent to which a country's currency has improved in the direction of other currencies.

D. The equilibrium exchange rate:

It is a price that is consistent with the overall economic balance and represents the sustainable balance of the balance of payments when the economy is growing at a natural rate, meaning that it prevails in a non-disrupted economic environment.

3.1.2 Gross Domestic Product (GDP):

It is defined as the value of all final goods and services that were produced during a specific year only within the political borders of the country without others since sales of goods and services that were produced in previous years are not included in the calculation of the gross domestic product for this year, for example, the value of the property is calculated in the year in which it was made building the property, not selling it (Al-Qadi, 2004: 136).

By defining GDP, its types can be stated as follows:

A. Monetary (nominal) gross domestic product (at current prices): the value of final goods and services measured at normal market prices.

Disadvantages: It does not reflect the real change in output. When prices rise from year to year, the domestic product rises due to the increase in prices and not the quantity produced.

B. Real GDP (at constant prices) is the value of final goods and services produced during different years measured at one price (base year price) to reflect the real quantity only without the change in prices.

Regarding the structural distribution of the Iraqi economy, the following is noted (Ministry of Planning, 2020: 2):

- i. Commodity activities constituted (46.4%) of the total GDP at current basic prices. Crude oil activity occupied the forefront of the total commodity activities, as it contributes (65.1%) of the total of these activities. As for the activity of agriculture, forestry, and fishing, it ranked second, as it contributes (12.5%) of the total commodity activities, and the electricity and water activity contributed 8.3% of that group, noting that the commodity activities are represented by the activities of (agricultural, forestry, fishing, mining and quarrying, manufacturing industry, electricity and water, and building and construction).
- ii. Distributive activities represented by trade, transport, communications, banking, and insurance activities contributed (21.2%) of the total GDP.
- iii. The service activities represented by the activities of social and personal development services and the activity of ownership of the role of the population contributed (32.4%) of the total GDP.

3.1.3 The Concept of Inflation, Its Causes and Types:

Economic inflation is defined as an increase that appears continuously in the prices of services and products, and government authorities have not been able to impose control over them. From other definitions of economic inflation, it is a gradual rise in prices that appears as a result of an expansion in supply or demand or an increase in costs.

3.2 Analysis of Some Economic and Monetary Indicators in the Iraqi Economy for the Period 1988-2020.

The GDP is one of the indicators that express the level of the economic performance of the state. Analyzing the growth of the output and the structuring of sectors is one of the main points to knowing the places of imbalance and its treatment. It is defined as the market value of all final goods and services in their local form that is produced in a country during a specific time and thus includes everything that is produced in the economy of goods and services. As well as its direct connection with inflation, which is one of the important indicators that call for direct follow-up of its trends by those interested in monetary and financial affairs, as it expresses the soundness of the structure of the national economy, as on its basis the future conditions are predicted and policies and plans are drawn up by comparing the relative rate of change of the gross domestic product, with the relative rate of change of the monetary mass to indicate whether the economy is experiencing inflationary or deflationary pressures. Here the exchange rate intervenes to deal with these pressures and protect the currency, as the currency of a country is a direct reflection of its GDP, as the full amount of money in a

particular country is equal to the total amount of economic output, meaning the higher the GDP, the stronger the currency and purchasing power. If there is a pattern of growth in the GDP of a particular economy, the best decision would be to buy this currency because its value will increase over the years, as it has been confirmed that this country will witness growth in the coming years (Al-Sayed, 2011: 115).

This aspect will analyze indicators, gross domestic product, exchange rates, and inflation rates in the Iraqi economy for the period (1988-2020):

3.2.1 Gross Domestic Product (GDP):

The development and growth of output, in general, reflects the economic efficiency and the development of the standard of living and then as a measure of well-being, and the gross domestic product is one of the most important basic indicators that are used as well as other indicators for drawing economic policies and making international and domestic comparisons (Al-Hashimi and Al-Jubouri, 2002: 123). The GDP can be calculated at constant (real) prices according to the following formula (Daoud, 2014: 168): -

$$\text{real GDP} = \frac{\text{GDP at current prices}}{\text{Implicit reducer of GDP}} * 100$$

Because of the difference and disparity in the conditions experienced by the Iraqi economy during the research period, the period was divided into two phases: the first phase is represented by the period (1988-2002) and the second phase includes the period (2003-2020):

i. The evolution of the gross domestic product for the period (1988-2002):

In the early eighties, the Iraq-Iran war broke out and was accompanied by the Iranian army's destruction of oil facilities and the suspension of oil exports, which led to a decline in oil revenues, and this decline led to deterioration in the rate of GDP. The country faced another war after it invaded Kuwait in the early 1990s. In addition to imposing economic sanctions on Iraq and preventing the export of Iraqi oil, the war also destroyed the rest of the infrastructure and other facilities. As the largest resource for the national treasury, where the government needs expenditures to finance the growing demand, it has to finance this spending through new currency issuance, which has helped raise the rates of inflation.

Inferred from Table (1) that the gross domestic product witnessed a clear fluctuation due to the conditions that the country went through from wars and the imposition of the economic blockade on it . We note that GDP from 1988 fell at constant prices, reaching (45778374) million dinars to (44350995) in 1989, with a negative annual change rate of (-3.22%). GDP in 1990 reached fixed prices of (69992934) million dinars, with an annual change rate of (36.64%), and 1991 output dropped to (28265405.2) million dinars, with a negative annual change rate (-147.63%) because of the imposition of comprehensive economic sanctions and the prohibition of oil exports. Then the gross domestic product rose again in 1992 to reach (37477725.8) million dinars and continued to decline until 1996, when it reached (5749427.4) million dinars, with a negative annual change rate (-800.73%). The output witnessed a rise during the years (1997-2000) due to the drop in price levels as a result of the signing of the memorandum of understanding and the resumption of oil exports. The annual rate of change amounted to (1.50%). Then the gross domestic product decreased during the two years (2001, 2002) to (114128642, 104917973) million dinars, with a negative annual change rate of

(1.68%, -8.78%), respectively, and this decline was the result of the events of September (11) and the decline in oil prices.

ii. **The evolution of the gross domestic product for the period (2003 - 2020):**

The GDP declined in 2003 to (66335848) million dinars, recording a negative annual change rate of (-58.16%) due to the occupation of Iraq and the sabotage and destruction operations that swept the country. The year 2004 witnessed an increase in output at constant prices, and this increase continued at varying rates until 2009, when the output amounted to (124659542) million dinars, as the output recorded an annual change of (3.90%). At the beginning of this period, Iraq entered a new turning point on the political, economic, and social levels, as the political system in Iraq changed, and what followed was a change in all the policies that were followed. Thus, there was a noticeable improvement in GDP growth, especially after the lifting of economic sanctions. Then the GDP rose again during the years (2010-2013) with varying rates of growth, as the output reached its highest level in 2013 to reach (173273046) million dinars, with a growth rate of (7.96%). The Gross domestic product (GDP) declined in 2014 at a negative annual rate of change (-0.64%), respectively, and this decline is due to the significant drop in oil prices, in addition to the events in Iraq due to the control of ISIS terrorist gangs on some Governorates of Iraq and its control over some oil fields.

For the years 2017, 2018, and 2019, it witnessed an increase in GDP, reaching a maximum of (225058367.9) million dinars in 2019, with an annual growth rate of (6.45%), and this increase in output is due to the rise in oil prices. However, it is noted that the gross domestic product (GDP) decreased, as it amounted to (188112265.8) million dinars in 2020, as shown in Table (1), and thus it has decreased (-19.64%) as a result of the economic crisis resulting from the virus (Covid-19), which struck the world and brought about great changes. At all levels, especially with the drop in world oil prices, it is worth noting that the amount of crude oil produced decreased in 2020 to (1463.4) million barrels, after it was (1674.8) million barrels in 2019, with a decrease of (12.6%), as well as the average price of the decrease in oil barrel during this period from (61.1) dollars per barrel in 2019 to 38.4% per barrel in 2020, i.e. a decrease rate of (37.2%), and this, in turn, led to a decrease in the gross domestic product of the crude oil sector for the year 2020 compared to 2019, as the output of the crude oil sector decreased Oil reached (60795.7) million dinars in 2020 after it was (114386.4) million dinars in 2019, with a decrease of (46.9%) (Ministry of Planning, 2020: 2).

3.2.2 Inflation Rate (INF):

Inflation is defined as the continuous rise in the general level of prices, or it is the increase in the amount of money that leads to an increase in prices (Zardak, 2001: 213). As for inflation in Iraq, its monetary roots were in the seventies, as a result of the rise in oil revenues, the increase in the money supply and the expansion of demand total, and the inflation rate rose in the eighties as a result of the first Gulf War and the accompanying structuring reasons in the Iraqi economy such as the decline in the growth of the gross domestic product and the continued growth of the currency at high rates, in addition to what Iraq witnessed from the rise in prices at the beginning of the nineties of the last century was due to the economic blockade and the ban on the export of oil, which forced the government to increase the money supply by issuing cash and printing the currency excessively in order to cover, as well as the lack of imports and a flexible production apparatus

that could absorb the pressures of domestic demand for goods and services, and these reasons coincided in the nineties to create a situation between inflation and stagnation. This is the worst case and is known as stagflation (Shendi, 2011: 11).

i. The development of the inflation rate for the period (1988-2002):

From the data in Table (1), it is noted that the value of the consumer price index in 1988 amounted to (0.012%) and in 1989 it reached (0.013%) and the inflation rate reached (7.69%). The index continued to rise until there was a major jump in inflation in 1991, with annual inflation (71.43%) and the index (0.07%). The inflation rate continued to rise at high rates during the period 1992-1995 until it reached its highest level during the research period (82.61%) in 1994, and the inflation rates during the period became. This period is of an unbridled type, and the Iraqi economy has not witnessed rates like it before, as the annual inflation rate in 1995 reached (79.09%), and this rise in price levels was due to the economic sanctions imposed on Iraq and the ban on oil exports, which forced the government to resort to the new monetary issuance and printing the currency became excessively inflated until the money supply, with the rigidity of the commodity supply and the inflexibility of the production system, led to severe inflationary pressures. After the signing of the memorandum of understanding on oil for food with the United Nations and the resumption of oil exports, it allowed the import of basic food commodities, so many items of the ration card were covered, which greatly reduced the pressures of demand for goods and services, and then the annual inflation rates fell to (-18.28%). In 1996, the government took austerity measures to reduce high inflation rates by identifying and compressing spending and reducing spending on health and education fields to work on increasing state resources by increasing tax revenues and canceling subsidies and exemptions (Al-Khazraji, 2007: 146). However, inflation rates quickly returned to rise, reaching (18.42%) in 1997, and this rise in inflation rates continued until 2002, at varying rates, as the inflation rate reached (16.28%). This rise in inflation rates came as a result of the Central Bank's continuation of the new monetary issuance process to cover the size of the budget deficit.

ii. Evolution of the inflation rate for the period (2003-2020):

It is inferred from Table (1) that the years (2003, 2004, 2005) witnessed a rise in inflation rates at similar rates of (25.09%, 21.15%, 27.05%), respectively, as a result of the increase in government spending and support for employee salaries to initiate some services, and the rate of inflation continued to increase as it reached high rates that Iraq has not witnessed since the first half of the nineties, as it reached (34.69%) in 2006. The reason is due to the acceleration in the implementation of economic reform policies and the lifting of subsidies on fuel and some commodities included in the ration card, while the year (2007) witnessed a decrease. The inflation rate reached (23.60%), and this is due to the monetary policy adopted by the Central Bank to target inflation and raise the value of the Iraqi dinar through interest rates. The year (2008) witnessed a low level of the inflation rate reached (11.27%), while the inflation rate recorded in (2009) amounted to (7.70%) and the reason for this is due to the financial crisis that affected the global economy. Then inflation fell again during the years (2010-2012), the inflation rate in 2012 reached (5.71%) and the reason is due to the high prices of most paragraphs of the index output prices and low supply at home and dependence on the these imported goods are characterized by their high prices, as

inflation moves from outside to inside because of these goods, and this is what is known as imported inflation. The inflation rate reached (2.54%) in 2014 compared to (1.48%) in 2013. This means that the rate of (1.06%) of the volume of inflation for this year is temporary and that the decline in inflation rates indicates the ability of monetary policy to maintain low rates of the level of inflation within acceptable limits in light of the turbulent security conditions. For the years from 2015 to 2019, they witnessed a decrease in inflation rates, as the inflation rate in 2019 reached (-0.20%). A group of international variables and internal factors contributed to affecting inflation rates, including the global economic recession crisis and the resulting decline in growth rates for all economic activities, in addition to the monetary policy achieved by maintaining stability in the general level of prices through its measures to support domestic liquidity and the continuation of achieving stability in the exchange rate through the foreign currency sale window (the Central Bank Al-Iraqi, 2019: 76). During this period, it is noted that the gross domestic product decreased from (225058367.9) in 2019 to (188112265.8) in 2020 and an increase in inflation rates to become (1.00%) in 2020 due to the government's measures to reduce the exchange rate of the Iraqi dinar against the dollar to be (1450) after it was (1200), as the GDP decreased due to the decrease in the contribution of the economic sectors, especially oil, whose prices fell, and consequently the decision of the Organization of the Petroleum Exporting Countries to reduce the ceiling of its production of oil, which led to the confusion of financial revenues from hard currency and the inability of the state to cover investment and operating expenses in the budget and thus resorting to borrowing internal and external.

Table (1): The evolution of the GDP and the rate of inflation in Iraq for the period (1988-2020).

Inflation rate INF %	Consumer Price Index 100 =2007	Annual rate of change GDP	GDP constant prices, the year 2007, million dinars	Year
21.36	0.012	---	45778374	1988
7.69	0.013	-3.22	44350995	1989
35.00	0.02	36.64	69992934	1990
71.43	0.07	-147.63	28265405.2	1991
46.15	0.13	24.58	37477725.8	1992
67.50	0.4	23.25	48829665	1993
82.61	2.3	3.71	50711820.3	1994
79.09	11	2.08	51786921.8	1995
-18.28	9.3	-800.73	5749427.4	1996
18.42	11.4	91.75	69704838.9	1997
12.98	13.1	25.85	94001921	1998
10.88	14.7	14.95	110529589	1999
5.16	15.5	1.50	112208511.5	2000
13.89	18	1.68	114128642	2001
16.28	21.5	-8.78	104917973	2002
25.09	28.7	-58.16	66335848	2003
21.15	36.4	34.83	101788449	2004
27.05	49.9	1.72	103568449	2005
34.69	76.4	5.30	109368369	2006

23.60	100	1.87	111455813	2007
11.27	112.7	6.97	119802041	2008
7.70	122.1	3.90	124659542	2009
2.40	125.1	6.08	132731012	2010
5.30	132.1	6.98	142696722	2011
5.71	140.1	11.40	161066280	2012
1.48	142.2	7.96	174990175	2013
2.54	145.9	-0.64	173872800	2014
1.42	148	5.31	183616252.1	2015
0.07	148.1	5.23	193744446	2016
0.20	148.4	3.64	201059363.1	2017
0.40	149	4.50	210532887.2	2018
-0.20	148.7	6.45	225058367.9	2019
1.00	150.2	-19.64	188112265.8	2020

Source: Prepared by researchers based on data from the Ministry of Planning and the Central Bank of Iraq for the period (1988-2020).

3.2.3 Exchange Rate

Changes in the exchange rate affect the local economy through their impact on the volume of trade and the trade balance, or through their impact on foreign investment and capital flows from and abroad. When an increase in domestic interest rates occurs, it attracts capital inward. If the exchange rate is not stable, the value of the local currency will rise and return the balance of payments to balance, and if the exchange rate is stable, the unexpected increase in interest rates will lead to capital flows and thus increase the money supply (Musa, 2018: 62).

The exchange rates in Iraq before 2003 are distortionary, as they do not reflect the true value of the Iraqi dinar, in addition to the plurality of exchange rates without an acceptable economic justification, as there was an official and parallel exchange rate, administrative exchange rates, the exchange rate of citizens' remittances and the accounting rate ... etc., and it is estimated that the prevailing exchange rates are approximately ten rates, and there may be more rates than that. This plurality of exchange rates has significant negative effects on the economy, including unequal opportunities between the public and private sectors and the failure to direct sufficient foreign exchange resources to foreign trade (Shendi, 2006: 4). The Iraqi dinar was linked to an almost fixed exchange rate for a long time, as the exchange rate of the US dollar was taken as a mediator to evaluate the Iraqi dinar daily against foreign currencies, so the exchange rate of the Iraqi dinar was affected against other currencies in the same proportion to the rise and fall of the dollar towards it (Bakhit, 2000: 34). Iraq followed the fixed exchange rate system from the eighties and the nineties to 2002, and after the events of 2003, Iraq followed the managed floating exchange system.

Evolution of the exchange rate for the period (1988-2002):

Table (2) shows the development of the official and parallel exchange rate of the Iraqi dinar towards the dollar, as it shows that the official exchange rate in 1988 was equal to (0.31) dinars per dollar, and the official exchange rate was stable until 2002 because the system followed in that period is the fixed exchange system. The parallel exchange rate, it was equal to (2.08) dinars per dollar in 1988, and the parallel exchange rate rose to (3.06) dinars per dollar in 1989, at an annual rate of change of (32.03%), and the parallel exchange rate continued to rise at high rates of change during the years from 1990 to 1995, as the parallel exchange rate amounted to (1674) dinars per dollar in 1995, with an annual rate of change of (72.64%), exchange rate and prices. The year 1996 witnessed a decrease in the parallel exchange rate to (1170) dinars per dollar, with a negative annual change rate of (-43.08%), and this decline came after the signing of the Memorandum of Understanding between Iraq and the United Nations and the drop in price levels. Parallel exchange rates rose again during the period 1997-1999 with varying positive rates of change, respectively (20.46%, 9.20%, 17.97%), so in the years 2000 and 2001, it achieved negative rates of change of (-2.33% and -0.05%). In 2002, the parallel exchange rate witnessed a slight increase, amounting to (1957) dinars per dollar, at an annual rate of change (1.43%), after it decreased in 2001 to (1929) dinars per dollar, fixed exchange.

i. Evolution of the exchange rate for the period (2003-2020):

Among the measures taken by the Central Bank to achieve stability in the value of the local currency is the replacement of the old currency with new specifications, and when the new currency entered circulation, it was generally accepted by the public because of its security and the difficulty of counterfeiting, and the process of replacing the currency has raised the value of the Iraqi dinar. It reduced the phenomenon of dollarization, which was widely spread due to the loss of confidence in the local currency, as well as the salaries that were paid in US dollars after 2003 (Abbas, 2008: 68), and the Central Bank took upon itself the supply of foreign currency in a way that covers the need of the local demand for foreign currency and the payment of imports of goods and services, as well as the withdrawal of the surplus part of the local currency to maintain its value. This is done through the currency sale window, i.e. buying and selling foreign currencies.

The year 2003 witnessed an increase in the official exchange rate, reaching (1836) dinars per dollar, and it achieved the highest annual rate of change during the research period, which amounted to (99.98%), and this rise came as a result of re-evaluating the Iraqi dinar exchange rate after the third Gulf War. As for the parallel exchange rate, it was decreased to (1936) dinars per dollar, with a negative annual change rate of (-1.08%). The year 2004 also witnessed a decrease in both the official and parallel exchange rates, as both amounted to (1453) dinars per dollar, with a negative annual change rate of (-26.36%, -33.24%), respectively. In 2005, the official and parallel rates achieved a positive change of (1.09% and 1.29%), respectively, the official exchange rate declined in 2006 to (1467) dinars per dollar, with a negative annual change rate of (-0.14%) and continued to decline until 2009, reaching (1170) dinars per dollar and achieved a negative change of the amount (-1.97%), while the parallel exchange rate achieved a slight increase in 2006, reaching (1475) dinars per dollar, at a positive annual change rate of (0.20%), after

which the parallel exchange rate witnessed a decline until 2009 when it reached (1182) dinars per dollar with an annual negative change rate of (-1.78%).

The official exchange rate remained constant in the two years (2010, 2011) and amounted to (1,170) dinars per dollar, while the parallel exchange rate rose, respectively, to (1185, 1196) dinars per dollar, with a positive annual change rate of (0.25%, 0.92%) respectively. In 2012, the official exchange rate decreased to (1166) dinars per dollar, with a negative annual change rate of (-0.34%), while the parallel exchange rate achieved a positive change in 2012 that amounted to (3%). In the years 2013 and 2014, the official exchange rate witnessed stability due to the Central Bank's efforts to improve the value of the Iraqi dinar. As for the parallel exchange rate, it fell to (1232, 1214) dinars per dollar and achieved a negative annual change of (-0.08%, -1.48%), respectively. This is due to the Iraqi Central Bank imposing new restrictions on banks in response to concerns about money laundering and illegal outflows of foreign exchange linked to the increased demand for foreign currency (CBI, 2014: 40). The official exchange rate rose to (1167) dinars per dollar in 2015 with an annual rate of change of (0.09%) and continued to rise until 2020, when it reached (1192) dinars per dollar, at a rate of change of (0.008%), while the parallel exchange rate achieved A growth rate of (2.7%, 2.2%) in the years 2015 and 2016, while in the years (2017, 2018 and 2019) the parallel exchange rate decreased in succession until 2019 reached (1196) dinars per dollar, with a negative annual change rate of (-1.09%), then achieved an increase in the year 2020 reaching (1234) dinars per dollar.

Table (2): The evolution of exchange rates in Iraq for the period (1988-2020).

difference between nominal and parallel	Annual rate of change % (EXN)	parallel exchange (EXN) rate	Annual rate of % (EXM) change	Official exchange EXM) rate (Year
1.77	---	2.08	---	0.31	1988
2.75	32.03	3.06	0.00	0.31	1989
3.69	23.50	4	0.00	0.31	1990
9.69	60.00	10	0.00	0.31	1991
20.69	52.38	21	0.00	0.31	1992
73.69	71.62	74	0.00	0.31	1993
457.69	83.84	458	0.00	0.31	1994
1673.69	72.64	1674	0.00	0.31	1995
1169.69	-43.08	1170	0.00	0.31	1996
1470.69	20.46	1471	0.00	0.31	1997
1619.69	9.20	1620	0.00	0.31	1998
1974.69	17.97	1975	0.00	0.31	1999
1929.69	-2.33	1930	0.00	0.31	2000
1928.69	-0.05	1929	0.00	0.31	2001
1956.69	1.43	1957	0.00	0.31	2002
100	-1.08	1936	99.98	1836	2003
0	-33.24	1453	-26.36	1453	2004
3	1.29	1472	1.09	1469	2005
8	0.20	1475	-0.14	1467	2006
12	-16.42	1267	-16.89	1255	2007
10	-5.32	1203	-5.20	1193	2008
12	-1.78	1182	-1.97	1170	2009

15	0.25	1185	0.00	1170	2010
26	0.92	1196	0.00	1170	2011
67	3.00	1233	-0.34	1166	2012
66	-0.08	1232	0.00	1166	2013
48	-1.48	1214	0.00	1166	2014
80	2.65	1247	0.09	1167	2015
93	2.20	1275	1.27	1182	2016
75	-1.27	1259	0.17	1184	2017
26	-4.14	1209	-0.08	1183	2018
14	-1.09	1196	-0.08	1182	2019
42	3.08	1234	0.00	1192	2020

Source: From the researchers' work based on the data of the Ministry of Planning and the Central Bank of Iraq for the period (1988-2020).

4. Methods and Materials

4.1 Description and Formulation of the Standard Model

i. Description of the standard form.

The characterization stage is one of the most important and difficult stages of building the standard model because it requires defining the variables that the model must contain.

The standard model is defined as an economic model that symbolically shows the nature of the economic relations of the phenomenon studied more accurately, using the determining factors or affecting the behavior of the phenomenon, in part or whole (Sefo, 2006: 47).

The nominal exchange rate (which is divided into the official exchange rate, meaning the rate approved in official commercial exchanges, and the parallel exchange rate, which is the rate applicable in parallel (black markets) is one of the important and effective factors in moving economic activity and increasing GDP as well as the rate of inflation. These factors are among the factors affecting the gross domestic product either increasing its value and increasing with it the welfare of individuals or vice versa in the Iraqi economy, and it is one of the important issues, which cannot be analyzed only on the descriptive aspect, but it is necessary to determine and measure their impact and the percentage of their contribution to the changes that occur in the gross domestic product during the research period (1988-2020), and this is done through the use of economic measurement, which is one of the distinctive quantitative methods in this field, as it is characterized by ease and high possibility of determining the nature of the variables that are entered or excluded from the models, and it can be the standard model variables are described as follows:

A. External independent variables: They are divided into three variables

- official exchange rate EXM
- Parallel exchange rate EXN
- Inflation rate INF

B. The dependent variable (internal): It is represented by

- Gross Domestic Product (GDP) at constant prices

C. Random Variable (U_t)

The random variable includes variables that are difficult to measure, such as customs, traditions, and the nature of human behavior. It may include some real or financial and monetary variables, as well as financial and international flows that could not be calculated. It is possible that sufficient data are not available about them or that it is difficult to measure them quantitatively.

ii. Choosing the model and building the functional relationship.

Precisely, a set of functions can be described for this standard model according to the following functional relationship:

$$GDP = F(EXM, EXN, INF)$$

Noted that the double logarithmic formula was used to estimate the relationship between the research variables to rid the time series of the problem of heterogeneity of variance and to try to obtain fixed linear relationships in which the capabilities are known as economic elasticity, and accordingly, the variables used in estimating the research model are:

LnGDP: The natural logarithm of GDP at constant prices.

LnEXM: The natural logarithm of the official exchange rate.

LnEXN: The natural logarithm of the parallel exchange rate.

LnINF: The natural logarithm of the general price level.

4.2 Characterization of the Autoregressive Model of ARDL.

The ARDL methodology is a modern methodology developed by Pesaran (in 1997, Shin and Sun in 1998, and developed by Pesaran and others in 2001). The terms in the ARDL framework can be applied regardless of the characteristics of the time series, whether they are static or integral at their levels $I(0)$, or integral of the first degree $I(1)$, or a mixture of the two, and the only condition for applying this model is that they are not the time-series data of the search variables are integrated of the second degree $I(2)$, and the ARDL model takes a sufficient number of lags to obtain the best set of data from the general framework model, and its estimated parameters in the short and long term are more consistent than those in other methods Like Granger 1987, Autocorrelation Vector Model (VAR) and Error Correction Vector Model (VECM) (Dariush and Abdelkader, 2014: 17), so the ARDL model is the most suitable model with the sample size used in this research, which is (32) observations for the period (1988-2020).

The following steps can be followed to apply the ARDL model methodology: -

1) The time-series data sedation test determines the degree of its integration using the extended Dickie-Fuller unit root tests (ADF) and Phelps-Perron (PP) or its lack of silence, and it is as follows (Shuman and Hassan, 2013: 180): -

A) The first formula: - The formula does not contain a fixed term and time direction:

$$\Delta Y_t = \lambda Y_{t-1} + U_t \dots\dots\dots(1)$$

The second formula: - The formula contains the constant term only: (B)

$$\Delta Y_t = C + \lambda Y_{t-1} + U_t \dots\dots\dots(2)$$

The third formula: - The formula contains the fixed term and the time trend: (C)

$$\Delta Y_t = C + Bt + \lambda Y_{t-1} + U_t \dots\dots\dots(3)$$

Since: -

ΔY_t : The first difference of the series Y_t .

λ : parameter of the decelerator variable one period Y_{t-1}

U_t : random error

C : fixed limit

t : time in the form of a general trend

2) Determining the optimum number of lags using the unconstrained autoregressive model (VAR) and by the delay period that carries the lowest value for the criteria of Akaike (AIC), Schwarz (SC), and Hannen Quinn (HQ) criterion, then the error correction model of the estimated relationship is estimated for decision-making and determining The speed of long-term adaptation among the basic ARDL model variables (Al-Yousef, 2013: 22).

3) Testing the existence of a long-term co-integration relationship using the Bound Test and ARDL model estimation.

4) Testing the integrity and stillness of the model through a set of diagnostic tests (Al-Waeli, 2017: 106).

A) Testing that the model is free of serial correlation using the Breusch-Godfrey Serial Correlation LM Test.

B) To test the significance of the estimated parameters using the Wald Test.

C) The normal distribution test for the residuals of the ARDL model. Jarque Bera (JB).

D) Test the linear pairing between the independent variables using the Variation Amplification Factor (VIF) test.

5) Estimation of short-term (error correction model) and long-term parameters, which can be estimated according to the following formula:

$$\Delta(\text{Ln}Y_t) = c + \lambda \text{Ln}Y_{t-1} + \beta \text{Ln}X_{t-1} + \sum_{i=1}^n a_1 \Delta \text{Ln}(Y_{t-i}) + \sum_{i=0}^m a_2 \Delta \text{Ln}(X_{t-i}) + \mu_t \quad (4)$$

Since: -

Δ : first difference. C : constant term. n, m : the upper limits of the time lags for the independent and dependent variables. λ : the error correction factor or is the percentage of short-term errors that can be corrected per unit time in order to return to a long-term equilibrium position. β : parameters of the long-term model. a_2 and a_1 : short term parameters, and μ_t : is the random error term.

6) Structural stability test of ARDL model parameters according to the two tests (CUSUM - CUSUM SQ).

5. The Results of Measuring the Fluctuations of the Exchange Rate and Inflation on the GDP and Analyzing Them Using the ARDL Model for the Period (1988-2020).

5.1 The Unit Root Test for the Invariance of Variables.

According to the (ARDL) methodology, we will test the static time series data for search variables using the Eviews.12 program. And conducting an expanded Dickey-Fuller test (ADF) and Phelps-Peron (PP) in order to find out whether the variables are static or not, that is, they contain a unit root to determining the order of integration. After conducting the test for the variables, we obtained the outputs shown in Table (3): -

Table (3): Probabilistic values of the results of the extended Dickey-Fuller (ADF) and Phelps-Perron (PP) unit root test.¹

	integration rank	At Level			At First Difference		
		A	B	Non	A	B	Non
GDP Prob.	I(1)	-2.64 0.0944	-2.97 0.1532	-0.62 0.4379	-6.53 0.0000	-6.40 0.0000	-6.64 0.0000
EXM Prob.	I(1)	-1.55 0.4925	-2.39 0.3756	-0.60 0.4487	-6.66 0.0000	-6.56 0.0000	-6.67 0.0000
EXN Prob.	I(1)	-1.99 0.2895	-1.57 0.7816	-0.208 0.6032	-5.92 0.0000	-6.21 0.0001	-5.88 0.0000
INF Prob.	I(0)	-2.6370 0.0963	-3.1628 0.1098	-2.67 0.0092			

Source: Prepared by researchers based on the outputs of the Eviews.12 program. The variables in the table were tested according to the extended Dickey-Fuller test and the Phillips-Perron test, so the test results were found to be identical for all variables.

We note from Table (3) that some time series were static at the level, whether there is a secant or a categorical and a general trend, that is, they are devoid of unit root and do not contain false regression, and these variables are (INF) at the level of significance (Significant at the) 5% and 1% and it is integrated of degree I(0), while the rest of the variables represented by (GDP, EXM, EXN) were not static at a level, so the test was conducted after taking the first differences for the original chains and it was found that they stabilized at the level of significance of 1% and 5% and it is integrated of degree I(1), whether with or without a transversal or transversal and a general trend.

5.2 Testing The Optimal Slowdown Periods.

Before estimating the relationship according to the ARDL model, it is necessary to determine the optimal time-slow periods for the static time series by using several criteria according to the Eviews program and as in the table:

Table (4): Criteria for selecting the optimal slowdown period for the GDP model.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-953.8213	NA	6.34e+22	63.85475	64.04158	63.91452
1	-887.4642	110.5951	2.24e+21	60.49761	61.43174*	60.79645
2	-868.2672	26.87585	1.92e+21	60.28448	61.96591	60.82238
3	-844.9358	26.44227*	1.40e+21*	59.79572*	62.22446	60.57269*

Source: Prepared by researchers based on the outputs of the Eviews.12 program.

It is clear from the tables that all criteria (LR, FPE, AIC, HQ) except for the criterion (SC) indicate the need to take three-time gaps and at a significant level (5%), that is, the appropriate delay period Lag in the model is three slow periods.

¹ A: means the regression contains only secant.

B: means regression has secant and general direction.

Non: means a regression that has no categorical or general direction.

5.3 Estimation of The Standard Model Using Autoregressive Distributed Deceleration (ARDL) Methodology.

First step:- After testing the unit root of the invariance of the variables, it is to estimate the autoregressive model of the ARDL of the GDP model and with delays (3) and after conducting the model estimation process, we got the results shown in Table (5).

Table (5): Results of the preliminary estimate of the GDP model according to the (ARDL) methodology.

	Coefficient	Std. Error	t-Statistic	Prob.
LnGDP(-1)	0.111301	0.162178	0.686292	0.5013
LnEXM	-7.666791	3.408317	-2.249436	0.0372
LnEXM(-1)	8.077920	3.198342	2.525659	0.0211
LnEXN	14.11461	5.683053	2.483631	0.0231
LnEXN(-1)	7.399822	7.164103	1.032903	0.3153
LnEXN(-2)	-2.120968	7.331227	-0.289306	0.7757
LnEXN(-3)	-14.25207	6.748812	-2.111790	0.0489
LnINF	-7.990011	17.33109	-0.461022	0.6503
LnINF(-1)	-53.43472	26.43679	-2.021226	0.0584
LnINF(-2)	-26.59858	26.34739	-1.009534	0.3261
LnINF(-3)	-21.72019	15.53917	-1.397770	0.1792
C	19956.76	6116.693	3.262672	0.0043
R-squared	0.816287	Adjusted R-squared		0.704019
F-statistic	7.270833 (0.0000129)	Durbin-Watson stat		2.053056

Source: Prepared by researchers based on the outputs of the program Eviews.12

It is clear from the above table that shows the results of estimating the ARDL model, as the explanatory power of the estimated model was high as it reached ($R^2=0.816$), meaning that the independent variables included in the estimated model explain (81%) of the changes that occurred in the dependent variable, and the value of R-squared Adjusted = (0.704), as well as the model, was significant, as the calculated F value was large (7.270) and it is significant at a level less than (1%), meaning that the estimated model is significant, and thus we reject the null hypothesis ($H_0: b_i=0$) and accept the alternative hypothesis ($H_1: b_i \neq 0$).

Second step:- To test the existence of a co-integration relationship, that is, the existence of a long-term equilibrium relationship, through the Bounds Test, which is shown in Table (6).

Table (6): The results of the bounds test for the estimated model (ARDL) of the gross domestic product.

Test Stat.	Value	K
F- Stat	6.879556	3
Signi.	I0- Bound	I1 Bound
10%	2.37-	3.2
5%	2.79 -	-3.67
2.5%	3.15-	4.08
1%	3.65	-4.66

Source: Prepared by researchers based on the outputs of the Eviews.12 program.

The above table shows the results of the boundary test, and, from it, it is inferred that the calculated value of (F-statistics) was (6.879556) greater than (Tabular F-statistic) at a level of significance (1%), that is, greater than (4.66), and therefore we will reject the null hypothesis and accept the alternative hypothesis that is, the existence of a relationship A long-term equilibrium is moving from the explanatory variables to the dependent variable.

Third step:- Diagnostic tests for the estimated ARDL model.

A. Test the estimated model to ensure that the model is free from the problem of serial correlation using the Breusch-Godfrey Serial Correlation LM Test) and the heterogeneity of variance as shown in the following table:

Table (7): Results of the serial correlation and heterogeneity test of the GDP model.

Breusch-Godfrey Serial Correlation LM Test			
F- statistic	0.757857	Prob. F	0.4848
Obs*R-squared	2.596036	Prob. Chi-Square	0.2731
Heteroskedasticity Test: ARCH			
F-statistic	0.896925	Prob. F	0.5606
Obs*R-squared	10.62167	Prob. Chi-Square	0.4755
Scaled explained SS	4.686496	Prob. Chi-Square	0.9454

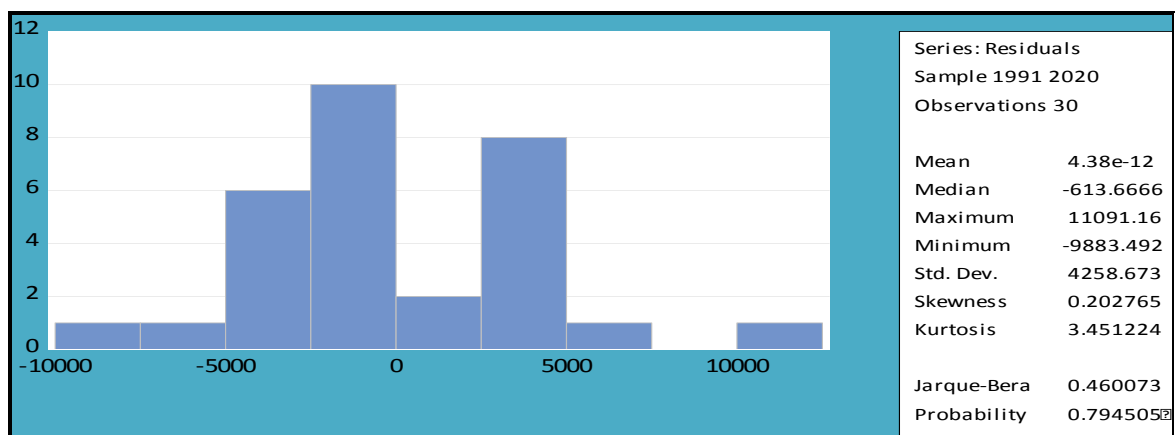
Source: Prepared by researchers based on the outputs of the Eviews.12 program.

Table (7) clarifies that the estimated model is free from the problem of serial correlation, i.e. we accept the null hypothesis which states that there is no serial correlation between the residuals because the value of the F and Chi-Square test is not significant at the level of significance (5%), as we reject the alternative hypothesis of the existence of serial correlation as well as the model was free from the problem of heterogeneity of variance because the statistical indicators were also insignificant, meaning that the variance of errors was homogeneous.

B. Normal distribution test for residuals of the ARDL model: Jarque Bera (JB)

Figure (1) shows the results of the normal distribution test for the residuals of the ARDL model of GDP.

Figure (1): Normal distribution test for residuals of the ARDL model of the GDP function.



Source: Prepared by researchers based on Eviews.12 output.

It is clear from the results of Figure (1) that the condition for the normal distribution of the residuals was fulfilled, as the test result was not significant and its value was (JB= 0.460) with a probability value of (Prob= 0.794), which means acceptance of the null hypothesis that states that random errors are distributed normally.

C. Test the linear pairing between the independent variables using the Variation Amplification Factor (VIF).

For any standard model whose capabilities are analyzed and includes two or more variables, it is necessary to ensure that the model is free from the problem of double linearity. There are several tests, the most important of which is the Variance Inflation Factor (VIF) test. If the centered VIF value is confined between (0-10), the model is free from the problem of linear coupling between the independent variables of the estimated model. Otherwise, the (null hypothesis) is rejected and the (hypothesis) accepted (alternative), that is, the existence of a multi-linear problem, and it is inferred from the results of Table (8) that there is no multi-linear problem among the independent variables of the model.

Table (8): Results of the Variation Inflation Factor (VIF) test of the GDP model.

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LnEXM	0.009487	2.459862	1.177860
LnEXN	0.011089	5.716103	1.128572
LnINF	0.368138	1.579111	1.285892
C	27028.64	8.028599	NA

Source: Prepared by researchers based on the outputs of Eviews.12.

Fourth step: - estimating the parameters of the short-term (error correction model) and the long-term according to the ARDL methodology, and after conducting the estimation, we obtained the results shown in Table (9).

It turns out that the official exchange rate in the short term and by (t) test was significant at a level less than (1%). As the relationship between the official exchange rate and GDP was an inverse relationship, as the partial elasticity of the official exchange rate amounted to (-7.666), meaning that an increase in (EXM) (1%) would lead to a decrease in GDP (-7.666%), and this applies with the reality of Iraq, given that the method adopted in recent times is to reduce the value of the local currency, but this reduction will not find a way to make Iraqi products more competitive because the Iraqi economy depends on one supplier and therefore this reduction in the value of the currency will not lead to an increase in the gross domestic product as well. The increase in the value of imports leads to an increase in the cost of purchasing capital goods, contributing to an increase in production. As for the parallel exchange rate for the current year and two previous years, it was significant at a significant level less than (5%), and it is related to a direct relationship, as the partial elasticity of the parallel exchange rate amounted to (14.114), meaning that an increase in (EXN) (1%) will lead to an increase in the GDP for the current year (14.114%) and for the previous year (16.373%) percent and the previous two years (14.252%). It matches the economic theory because the increase in the exchange rate of the local currency leads to an increase in exports and an increase in the demand for the local currency and a decrease in the demand for foreign currency and encourages producers to increase production, and this shows the positive relationship. As for the inflation rate for the current year, it is

related to an insignificant inverse relationship at the level of significant (5%), while the inflation rate for the previous two years was directly related to the output and at a significant level (5%) and an increase in output (48.318%) percent for a previous year and (21.720%) percent for two previous years, and the result matches the logic of the economic theory.

The Keynesian model relied on explaining the relationship between inflation and economic growth on both the aggregate demand curve and the aggregate supply curve. According to this model, in the short run, the aggregate supply curve is a horizontal line, and the change in the demand side of the economy affects only prices, but if this latter curve is sloping, then the change in aggregate demand affects both prices and production, and this applies with the fact that many factors drive the rate of inflation and the level of output in the short run. These factors include expectations, labor force, prices of other factors of production, and fiscal and monetary policy. Since prices and wages are static, it takes a while for the economy to reach an equilibrium state. As a result of this reason, there is no visible relationship between inflation and economic growth in the short-run (which represents the steady-state). The adjustment speed parameter was (-0.888), which is negative and significant at a significant level less than (1%), meaning that the short-term imbalances are corrected (88%) of them towards the long-term equilibrium value in the same year, meaning that the correction process was almost strong during the second year, the imbalances are corrected (12%).

As for the long-term, the official exchange rate EXM, through the t-test, was insignificant at the level of significance (5%), meaning that the official exchange rate in the long term does not affect the GDP as it is characterized by relative stability, meaning that it is managed by the monetary authority and this agrees with the economic theory and that this fixation is very important to reduce inflationary pressures on consumer prices, especially in Iraq, as it does not have a solid production base that enables it to let the exchange rate be determined according to supply and demand in the market. The balance of payments and a deficit in the state's general budget. Therefore, we see that the Central Bank of Iraq always seeks to maintain the fixed exchange rate by its administration in order to maintain the stability of domestic prices within the framework of the capabilities that were available from the international reserves derived from oil exports, while the relationship was significant at the level (10%) of the parallel exchange rate EXN, as the relationship between the parallel exchange rate and the gross domestic product was a direct relationship, and this shows the increase in the movement and activity of the private sector in the fields of investment and production, which is positively reflected on the output. As for the inflation rate factor (INF), it was significant at a level less than (1%), and it is related to an inverse relationship with the GDP, as an increase in inflation rates (1%) will lead to a decrease in the GDP (-123.487%). Moving from the short term to the long term, the aforementioned factors have what is known as a shock on the stable state of the economy, and therefore, the relationship between inflation and economic growth is positive at the beginning of the short term, but at the end of the course, that relationship transforms and becomes negative.

Keynes says that in the short term, it is possible for inflation to stimulate aggregate demand because the economy has not reached a state of full employment. In addition to the existence of flexibility in the productive apparatus, any increase in prices will lead to an increase in production and employment in the short term. As for the long-term, after the economy has reached a stage close to full use and the inflexibility of the production system, any increase in aggregate demand will generate an increase in prices and thus continue to rise in prices without being offset by an increase in production, which means an increase in the production costs of the commodity, a decrease in demand for it, and a decrease in profits to reduce production and expel manpower and this negatively affects the gross domestic product.

The researchers stress the need to continue managing the exchange rate by the monetary authority and not to move towards floating the exchange rate despite the occurrence of a positive relationship between the parallel exchange rate and the gross domestic product, given that Iraq is one of the rentier economies largely dependent on oil, which is not concerned with economic diversification policies and suffers from imbalances structure in its productive commodity sectors.

Table (9): Results of estimating the short and long-term parameters and the error correction parameter (ECM) of the ARDL model of GDP.

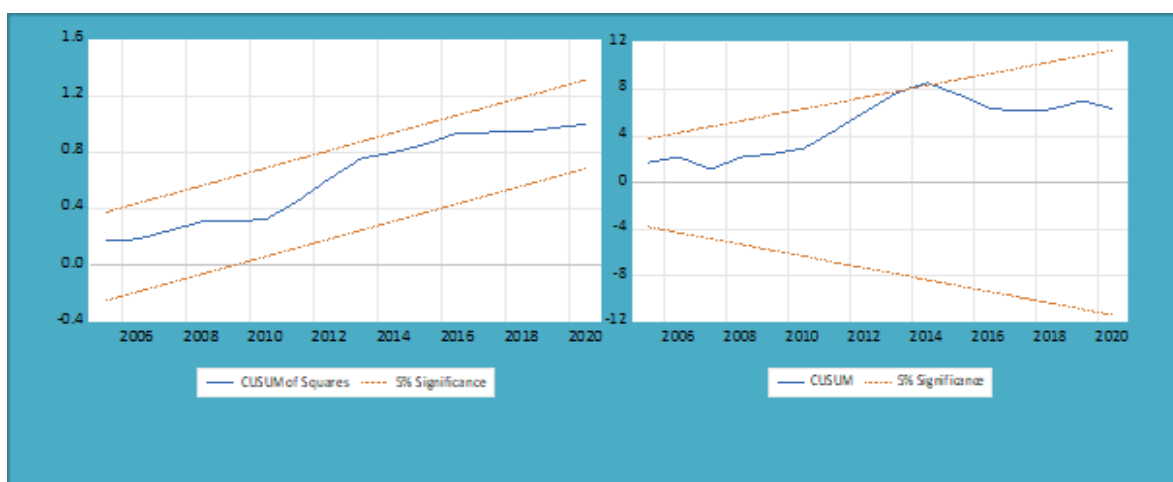
Short term milestones				
(Variable)	(Coefficient)	(Std. error)	(t-stat)	(Prob)
D(LnEXM)	-7.666791	2.608838	-2.938777	0.0088
D(LnEXN)	14.11461	4.574722	3.085348	0.0064
D(LnEXN(-1))	16.37304	4.973374	3.292139	0.0041
D(LnEXN(-2))	14.25207	5.320127	2.678897	0.0153
D(LnINF)	-7.990011	13.01378	-0.613965	0.5469
D(LnINF(-1))	48.31877	18.67948	2.586731	0.0186
D(LnINF(-2))	21.72019	12.44635	1.745106	0.0980
CointEq(-1)*	-0.888699	0.137061	-6.483960	0.0000
EC = LnGDP - (0.4626*LnEXM + 5.7853*LnEXN -123.4879*LnINF + 22456.1606) Error Correction Equation				
Long-term milestones				
	Coefficient	Std. error	t-stat	Prob
LnEXM	0.462620	2.969466	0.155792	0.8779
LnEXN	5.785301	3.071877	1.883312	0.0759
LnINF	-123.4879	23.67475	-5.216016	0.0001
C	22456.16	4769.678	4.708108	0.0002

Source: Prepared by researchers based on the outputs of Eviews.12.

Fifth step: - testing the structural stability of the parameters of the ARDL model.

After estimating the error correction formula for the ARDL model, it is necessary to conduct a structural stability test for the (short and long-term) coefficients of the GDP model to ensure that the included data are free of any structural changes in them and testing the cumulative sum of the squares of the recurring residuals (CUSUM SQ) as shown in Figure (2) below:

Figure 2: The structural stability of the GDP model coefficients according to the two tests (CUSUM - CUSUM SQ).



Source: Prepared by researchers based on the outputs of the Eviews.12 program.

From the above figure, it is noted that the CUSUM test statistic fell within the critical limits (the upper and lower bounds) at the level of significance (5%), and this means that the estimated coefficients of the unconstrained error correction model used are structurally stable across the time period in question, as well as the case for the (CUSUM SQ) test, as it fell within the critical limits at the level of (5%), and it is inferred from these two tests that there is stability and consistency in the model between the parameters of the short and long term.

6. Conclusions and Recommendations

6.1 Conclusions

- i. The uncontrolled fluctuations in the Iraqi dinar exchange rate increase the degree of risk to all international operations and the same import and export operations in the local and global markets, and this matter prompted most developed and developing countries to reconsider the exchange rate of their currency as it is an effective mechanism in achieving external balance. Including resorting to a devaluation of the currency to achieve competitiveness of local goods, provided that the country has a diversified production base, this requirement is considered to be an important factor proving the validity of the research hypothesis.
- ii. The exchange rate is the indicator by which the prices of local goods and services are determined by foreign goods and an indication of the extent of the purchasing power of the local currency on economic activity and gross domestic product, which is one of the important indicators in the process of growth and development, so the exchange rate affects the process of economic growth indirectly through local prices.

- iii. The high rate of inflation within the country leads to instability in the macroeconomic environment, and the central bank may be forced to raise interest rates to contain inflation, which has a negative impact on the investment sector, which in turn negatively affects the gross domestic product. The government is also forced to increase the wages of workers in the public sector as a result of the high rates of inflation and this puts pressure on the state's general budget and thus increases the budget deficit, and from here the government tends to borrow to cover this deficit and all this leads to negative results on the economy as a whole.
- iv. The results of static analysis of time series data for research variables according to the expanded Dickey-Fuller test and Phillips-Peron indicate that only the inflation variable (INF) is static at the level, meaning that it is free from false regression, while the rest of the variables are stable after taking the first differences, which are (GDP, EXM, EXN).
- v. The error correction model indicates that the official exchange rate in the short term is insignificant at a level less than (1%). As the relationship between the official exchange rate and GDP was an inverse relationship, as the partial elasticity of the official exchange rate amounted to (-7.666), meaning that an increase in EXM (1%) would lead to a decrease in GDP (7.666%), and this applies to the reality of Iraq economy, because the method used in recent times is to devalue the local currency. As for the effect of the parallel exchange rate, it was direct in the long term, as the partial elasticity of the parallel exchange rate amounted to (5.785), meaning that a rise in EXN (1%) leads to an increase in GDP (5.785%) and that the model as a whole is statistically significant, while the explanatory power for the model, it is high, as it was $0.816 = R^2$, indicating that 81% of the changes that occur in the GDP in constant prices are due to the change in the official and parallel exchange rate and the rate of inflation.
- vi. It was found from the error correction model that the adjustment speed was large, reaching (-0.888), which is negative and significant at a level of significance less than (1%), meaning that the short-term imbalances are corrected (88%) of them towards the long-term equilibrium value in the same year This means that the correction process was almost strong, and during the second year, the imbalances are corrected 12%.
- vii. In the short term, the relationship of the nominal exchange rate with the gross domestic product is better than its relationship with the parallel exchange rate, and this is very logical with the case of Iraq, as the control of the exchange rate by the Central Bank and its change, down or up, directly affects economic activity, as happened this year.
- viii. In light of the outbreak of the Coronavirus, the disruption of most economic projects, and the drop in oil prices, the Iraqi government was obligated to address the imbalances in the balance of payments and the general budget resulting from the decline in oil exports and then the decline in government revenues due to the rentier Iraqi economy, and part of these treatments is the devaluation of the local currency through controlling at the nominal exchange rate.

6.2 Recommendations

- i. At present, the monetary authority in Iraq must continue to follow the managed flexible exchange system as an effective way to spare the Iraqi economy from external shocks, because it allows for appropriate adjustments to be made on an ongoing basis by paying attention to some economic indicators, including the balance of payments and the reserves of the Central Bank.**
- ii. The necessity of reforming monetary policy in Iraq and diversifying direct and indirect monetary tools to achieve macroeconomic stability and combat monetary inflation in Iraq, is one of the prominent problems afflicting the Iraqi economy.**
- iii. Establishing sovereign funds that help stabilize both the exchange rate and inflation during crises or declines in crude oil prices as economic determinants of GDP.**
- iv. Work to enhance the confidence of foreign investors in the Iraqi dinar by developing the Iraqi market for securities and creating new securities to diversify it, such as issuing securities and savings bonds in the local currency with the presence of guarantees, so that these markets contribute to achieving the optimal use of available resources and stimulate economic activities.**
- v. Maintain acceptable levels of inflation rates to achieve economic stability through the continuation of the Central Bank to exercise its activity in open market operations in order to be able to control the exchange rates of the national currency at the official and parallel rates to ensure that the monetary mass of hard currency that is dealt with in the last market is within Iraq's reserves from hard currency to raise domestic savings and then raise the ability to invest and satisfy the market's need of foreign currency and then achieve a unified exchange rate throughout Iraq.**
- vi. Work to diversify Iraq's savings of hard currencies and to not limit them to the US currency, so that the value of the Iraqi dinar is not subject to the hegemony of the US dollar.**

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تحليل أثر تقلبات سعر الصرف والتضخم على الناتج المحلي الاجمالي في العراق باستعمال منهجية نموذج ARDL للمدة (1988-2020).

أ.د. ناظم عبد الله عبد المحمدي
كلية الهدى الجامعة

nadhim.abd@uoalhuda.edu.iq

م.م. سيف عادل صبار الدليمي

Saif92Adel@gmail.com

م. دالية عمر نظمي البياتي
وزارة التعليم العالي والبحث العلمي

daliyomar93@gmail.com

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مستخلص البحث:

يهدف البحث إلى تحليل أثر تقلبات سعر الصرف (الرسمي EXM والموازي EXN) والتضخم (INF) على الناتج المحلي الاجمالي (GDP) في العراق للمدة (1988-2020). إذ يستمد البحث أهمية من خلال تحليل حجم تأثير هذه المتغيرات على الاقتصاد الكلي وخاصة GDP، وكذلك الآثار الاقتصادية لسعر الصرف على النشاط الاقتصادي. وأظهرت نتائج التحليل القياسي باستعمال نموذج الانحدار الذاتي للإبطاء الموزع (ARDL) وجود علاقة توازنية طويلة الأجل، وفقاً لمنهجية اختبار الحدود (Bound Test) تتجه من المتغيرات التفسيرية (المستقلة) إلى المتغير الداخلي (التابع)، فيما كانت قيمة معامل متجه تصحيح الخطأ سالبة ومعنوية عنده مستوى أقل من (1%). إذ ان العلاقة بين (EXM و GDP) كانت علاقة عكسية، إذ بلغت المرونة الجزئية لـ EXM (-7.666) أي ان الزيادة في EXM بنسبة (1%) سيؤدي إلى انخفاض GDP بنسبة (7.666%)، وهذا ينطبق مع واقع الاقتصاد العراقي كون الاسلوب المتبع في الفترات الاخيرة هو تخفيض قيمة العملة المحلية. أما تأثير EXN فكان طردياً في الأجل الطويل، إذ بلغت المرونة الجزئية لـ EXN (5.785) أي ان ارتفاع EXN بنسبة (1%) سيؤدي إلى زيادة GDP بنسبة (5.785%) وان النموذج ككل معنوي من الناحية الاحصائية، أما القوة التفسيرية للنموذج فهي عالية، إذ كانت $R^2=0.816$ ، تدل على أن 81% من التغيرات الحاصلة في GDP بالأسعار الثابتة تعود إلى التغير في (EXM, EXN, INF). وقد توصلت الدراسة إلى استنتاج مفاده ان في ظل تفشي فايروس كورونا وتعطيل اغلب المشاريع الاقتصادية وانخفاض أسعار النفط كان الزاماً على الحكومة العراقية معالجة الاختلالات في ميزان المدفوعات والموازنة العامة الناجمة عن انخفاض الصادرات النفطية ومن ثم انخفاض الإيرادات الحكومية بسبب ريعية الاقتصاد العراقي، وجزء من هذه المعالجات هو تخفيض قيمة العملة المحلية عبر التحكم بسعر الصرف الاسمي. وتوصي السلطة النقدية العراقية في الوقت الحاضر على الاستمرار باتباع نظام الصرف المرن المدار باعتباره وسيلة فعالة لتجنيب الاقتصاد العراقي الصدمات الخارجية، لأنه يسمح بإجراء التعديلات المناسبة بصورة مستمرة من خلال الانتباه إلى بعض المؤشرات الاقتصادية ومنها ميزان المدفوعات واحتياطيات البنك المركزي.

المصطلحات الرئيسية للبحث: سعر الصرف الرسمي، سعر الصرف الموازي، الناتج المحلي الاجمالي، التضخم، منهجية ARDL.