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The effect of the Mass of Money Supply for the Iraqi Dinar on the Inflation Rate during the Period (2020-2022): The Iraqi Economy as a Model

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Abstract

Economists believe that the inflation rate is determined mainly by several factors, one of which is the money supply. The money supply is clearly linked to the monetary base. Thus, this study aims to determine the effect of money supply for the Iraqi dinar on the inflation rate in the Iraqi economy for the period (1M2020- 12M2022). The study found that the growth in the money supply was the result of the increase in the net assets of the banking system, as well as net government debt and private sector debt. In addition, the inflation rate was rising as a result of the change in the exchange rate and the increase in demand for goods and services caused by the increase in the money supply. The study also found that there is a relationship of mutual integration between the money supply and the inflation rate. Then, the return of the model to the state of equilibrium and the elimination of imbalances in inflation needs to (8) months and (8) days approximately through the mechanisms that are followed by the Central Bank of Iraq with its various tools. Moreover, there is a positive relationship between the money supply and inflation, and that increasing the money supply by one unit leads to an increase in the inflation rate by (1.9%) in long-term. The study recommended the need to pay attention to the money supply that reflects the economic situation, and that its components reflect the real extent of the development of the banking system and awareness of the public and the development of monetary markets. It also recommended developing a general framework for the integration of monetary tools of the Central Bank with the financial tools of fiscal policy in order to find stability for the exchange rate of the Iraqi dinar.

1. Introduction

Economic studies have been interested in analyzing monetary policy and its effectiveness in affecting economic activity in general and the inflation rate in particular. Inflation is one of the most prominent economic topics that have aroused the interest of researchers, as their views and interpretations on this renewed problem have differed [1]. Inflation affects all classes of society, as the economic literature indicates the multiplicity of theories that tried to explain the phenomenon of inflation. Some theories support the principle that inflation is a purely monetary phenomenon [2]. In other words, inflation results from the increase in the money supply, as in the traditional monetary theory and modern monetary theory [3]. Friedman believes that the money supply is an external variable that is determined outside the system and is not affected by internal factors, such as prices, interest rates and output, but rather it affects them. While other theories believe that inflation results from reasons other than the increase in the money supply, but rather related to high costs or high income, as in supply theories and structural theories[4].

Monetary policy refers to the intervention of monetary authorities to influence the money supply and direct the credit using certain monetary means to reach economic goals [5]. Monetary policy under the Central Bank Law is characterized by a monetary path that differs from the previous one in terms of the tools used in the implementation of monetary policy and goals, starting from the goal of reducing inflation, price stability, maintaining a stable monetary system, reaching the economic welfare, providing job opportunities, strengthening the Iraqi dinar and reducing the phenomenon of dollarization [6].

1.1 Research Problem

Research problem lies in the vital role played by monetary policy as one of the important economic policies in addressing the economic problems faced by the Iraqi economy, raising the level of economic performance and stabilizing commodity prices (inflation). Based on this problem, the following research question is formed:

a. What is the effect of money supply on inflation rates in Iraq?

1.2 Research Hypothesis

The research assumes a positive and significant relationship between the money supply as an indicator of monetary policy and the inflation rate.

1.3 Research Significance

Research significance comes from the importance of its problem, which revolves around the most important problem experienced by Iraq during this period that is price fluctuations and continuous rise. One of the most important goals of monetary policy is economic stability, i.e., the stability of the general level of prices and combating inflation.

1.4 Research Methodology

The research relies on the analytical and quantitative standard approach in studying and analyzing the relationship between the money supply, monetary policy index and the inflation rate through the use of standard models.

1.5 Research Scope

This research is limited to examining the effect of money supply on inflation rate during the period (2020-2022) as a result of the changes that have occurred in the Iraqi economy in general and monetary policy in particular through the devaluation of the Iraqi dinar.

1.6 Research Outline

This research is divided into two sections. The first section deals with the theoretical framework, while the second section shows the economic measurement of the effect of money supply on the inflation rate in Iraq.

2. Theoretical Background

2.1 Literature Review

The economic literature indicates a difference in the interpretation of the phenomenon of inflation. Some economists believe that inflation is a purely monetary phenomenon and that its primary causes are due to monetary factors. While others believe that there are other real or structural reasons. This explains the multiplicity of economic theories that explain the sources of inflationary forces leading to the continuous rise in prices [7]. This results in finding three theories of demand, supply, and structure, noting that these theories are not independent or contradictory with each other, but they must be relied upon in an integrated manner .

Demand theories in their interpretation of inflation are based on the demand aspect. They assume that the existence of demand surplus is the main cause of inflation. The supporters of this trend are monetary theory (classical and modern) and the Keynesian theory. The classical monetary theory indicates a close relationship between the amount of money and inflation, and that the excessive increase in the amount of money is the main reason behind the occurrence of inflation phenomenon. This interpretation is called monetary inflation [8]. The relationship between the quantity of money and the general level of prices is presented as Fisher's equation of exchange, later developed by Alfred Marshall in a new form called Cambridge equation [9].

Fisher's equation is one of the oldest theories that dealt with money and the explanation of its fluctuations [10]. This theory shows that inflation is mainly associated with the money supply, and that there is a direct relationship between the amount of money and the general level of prices [11]. Fisher has formulated the exchange equation known by his name as follows:

$$M*V=P*T$$

Where M is the supply of money at a certain time, V is velocity of exchange, P is price rate, and T is volume of exchanges realized in the economy during the calculation period.

This relationship tends to analyze the quantity of money (money supply) and changes in prices [8]. This direct relationship is based on the assumption that there is no hoarding, and that the increase in the amount of money is directed directly towards spending [1]. In addition to the assumption that the speed of circulation of money and the volume of exchanges are constant, meaning that changes in the value of money are inversely proportional with the same proportion to the change in its quantity. In the sense that price stability is based on the idea of spending and velocity of exchange. Fisher's theory assumes that monetary authorities can only affect in the short term on both the price level and the level of national income by controlling the amount of money increase or decrease [12]. But, in the long term, only prices will change away from their balance levels. Later, Alfred Marshall and members of the Cambridge School developed the formulation of

Fisher's equation, by replacing the idea of demand for money with velocity of its exchange and the use of the national product instead of the volume of exchanges and called it the Cambridge equation [13]. Therefore, the equation of exchange has become as follows:

M=K*P*Y

Where K is the proportion of cash balances that individuals wish to retain from their cash income for exchange purposes and Y is the real national product. Concerning the short term, the Cambridge equation does not differ from Fisher's equation in relation to the impact of changing the amount of money on the general level of prices. In this period, the Cambridge School assumes the stability of the gross national product, and the stability of the demand for money, as it is determined by factors that change in the long term. In addition, price stability is based on psychological reasons represented in the percentage of cash balances that individuals want to keep.

As for Keynesian theory, it is concerned with the direct demand for money, i.e., monetary preference. It has studied its relationship to national spending and has focused its efforts on studying the relationship between the level of national expenditure and national income, rather than the relationship between the amount of money and the general level of prices. Keynesians believe that the money supply is determined within the system, that is, it is an "internal variable" where it is affected by output, interest rates and prices [14].

In short, demand theories have focused on the demand aspect, ignoring inflationary forces resulted from supply, such as general production costs, wage costs…etc [2]. Therefore, other theories have emerged that explain inflation based on the supply aspect, including the theory of cost inflation. This theory believes that the main cause of inflation is the high costs of production [15]. This is because producers raise prices to compensate for the increase in costs resulting from the increase in wages or in the prices of the inputs of the production process, whether local or imported [16].

Finally, according to structural theories, inflation is not attributable to purely monetary factors or demand and supply factors, but there are structural factors that contribute to the increase in inflation [14]. These factors differ in developed countries from developing countries, where they believe that structural inflation in developed countries results from many reasons, including: the increase in economic growth rates at large rates, the growth of productive units and their transformation into large monopolistic companies, productivity inflation and change in the relative prices of goods as a result of the change in growth relationships between the different sectors of the national economy[17]. The rise in relative prices in some markets for some commodities leads to a significant rise in the general level of prices. As for the causes of inflation in developing countries, they can be attributed to many reasons, including: the relative high prices of agricultural and food products; the weak import capacity as a result of the decline in the foreign exchange earnings of countries; the long growth period for development projects; the high rates of wages exceeding productivity growth rates for political and social reasons; the banking weakness that many developing economies have as a result of excessive expansion of loans and failure to recover them [18], [19].

2.2 Results of Previous Studies

The study of Al-Naif et al. (2017) aimed to test and analyze the relationship between the money supply and inflation in the Jordanian economy during the period 1968-2015. To achieve the objective of the study, the method of econometric analysis of time series was used, where the stability of the study variables was tested using the augmented Dickey-Fuller (ADF) test before applying Johansson's cointegration methodology to test the long-term equilibrium relationship. Granger's causality test was also used to determine the direction of causation, if any, in the short term. An econometric model was developed to estimate the economic relationship between the study variables. The study found that the money supply was unstable at the level, and then stabilized after taking the first difference and that inflation had stabilized at the level. The results of the cointegration indicated that there is no relationship between the money supply and the price index in the long term, while the results of Granger's causality showed a unidirectional short-term causality running from money supply to prices. This means that the money supply causes inflation in Jordan and not vice versa. The results of the econometric model estimate indicated that the change in the money supply significantly affects the change in prices. The study recommended the need to manage changes in the money supply in a way that limits the rise in prices to achieve economic stability. It also recommended the application of econometric models, including the model of this study, in controlling domestic liquidity and price behavior, and further specialized research is needed to analyze the impact of money supply and its mutual effects on other macroeconomic indicators, in particular the interest rate and discount rate.

The study of Al-Hamdani et al. (2018) aimed to measure the impact of changes on the money supply on GDP. The descriptive approach and the standard economics approach were used to design the model based on the Eviews program in the analysis in light of the data of the Central Bank of Iraq (2005-2015). The tests of Dickey-Fuller and Phillips-Perron were also utilized to find out the extent of variables stability. By using the ordinary least squares (OLS) method, the equation was estimated, and the results showed that the value has reached (93%). This indicates that the independent variable (money supply) explains the changes in domestic product (dependent variable) by (93%) and when the money supply changes by one unit, the domestic product changes by (989.0). The study recommended achieving a balance between the money supply in Iraq and growth in the real sector by diversifying the productive base in the country.

The study of Khudair and Taan (2018) aimed to measure and analyze the money supply in Iraq and identify the variables affecting it, such as gross domestic product (GDP), exchange rate, inflation rate, unemployment rate and government

spending for the period (2004-2016). The econometric model was built according to quarterly data using the program (Eviews9). The study found that there is a common cointegration relationship between the variables of the study as well as a causality relationship between the variables of the study. It was clear that there is a unidirectional causality relationship between the money supply and GDP, as well as a bidirectional causality relationship between the money supply and both government spending and the exchange rate. Moreover, there is no causality relationship between the money supply and the rates of inflation and unemployment. According to the estimates of the short-term relationship, there is a direct relationship between the money supply and both GDP and unemployment rate, whereas there is an inverse relationship between the money supply and each of the exchange rate, unemployment rate and government spending. As for the long-term relationship, there is a direct relationship between the money supply and both GDP, inflation rate and exchange rate, and an inverse relationship between the money supply and both the unemployment rate and public spending [13], [20].

3 Analysis of the correlation between the broad money supply and the inflation rate in Iraq

The monetary authorities in Iraq seek to control inflation rates and money supply levels through the use of their various tools. Figure (1) shows the developments in the broad money supply and the inflation rate in Iraq during the period (1M2020- 12M2022) as follows [21]:

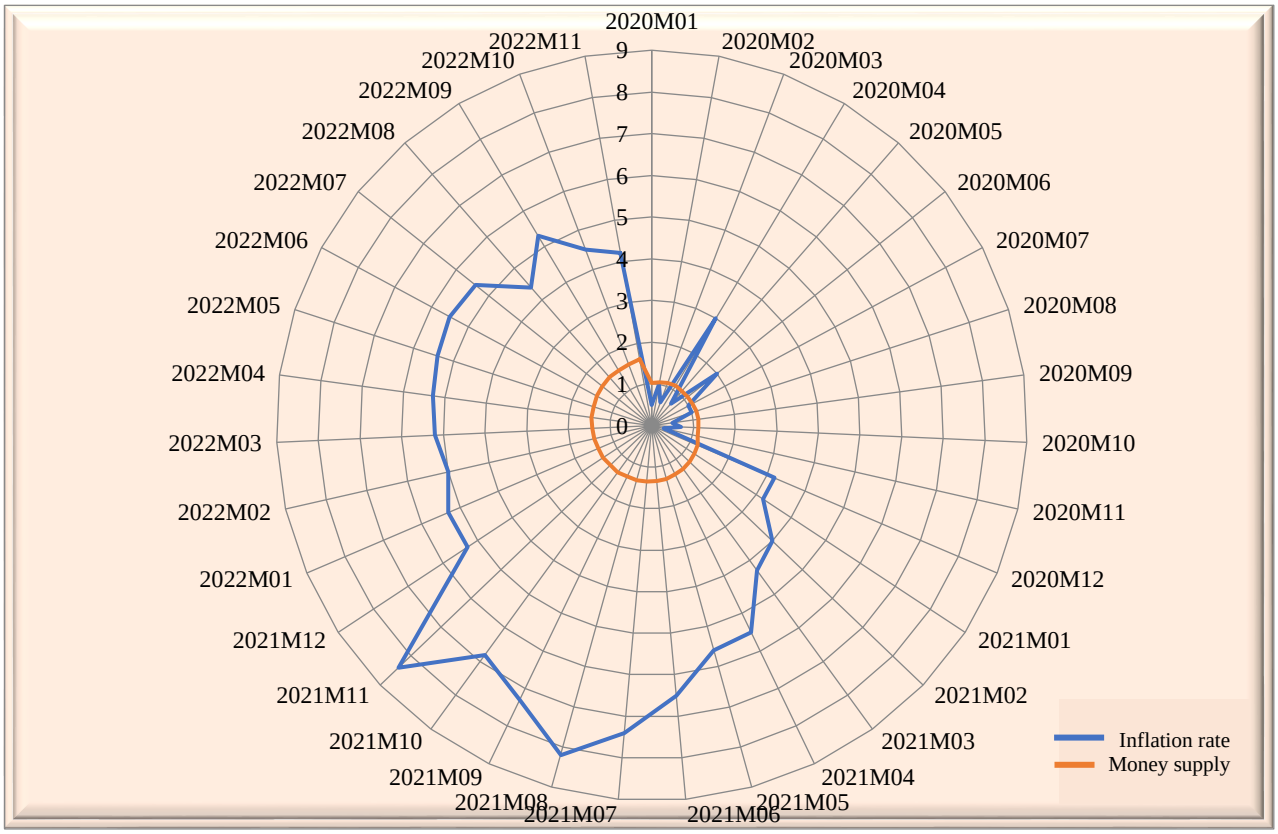

Figure 1: Broad money supply and inflation rate in Iraq during the period (1M2020- 12M2022)

Source: Prepared by the researcher based on the data of Appendix (1).

Figure (1) clarifies the broad money supply and inflation rate in Iraq during the period (1M2020- 12M2022). The money supply showed a slow rise compared to inflation rates, which were fluctuating and heading to rise around the broad money supply. The rise in the broad money supply in 2020 was attributed to the growth in the narrow money supply, which grew by 19.1% than 2019 due to the growth of currencies traded outside banks by 25.9% and current deposits by 10.8% (Central Bank of Iraq, Annual Report, 2020, 22). This increased the growth rates of the money supply, which in turn devalued the real Iraqi dinar, raising the level of prices for goods and services to raise the inflation rate.

The expansion factors also have a major role in raising the level of money supply represented by the increase in net assets of the banking system, as well as net government debt and private sector debt. This is reflected in having another expansion in the money supply. Thus, the broad money supply increased by 16.7% to become (139.9) billion dinars in 2021 after it was (119.9) billion dinars in 2020 (Central Bank of Iraq, Annual Report, 2021, 2-3). The money supply continued to increase that resulted from the increase in government spending as well as the decrease in purchases window of the Iraqi dinar by banks and the public due to the intensity of sales imposed on them by the US Federal Reserve. It is noteworthy that the decline in the value of the dinar exchange rate by the Central Bank of Iraq reflected in the change in the exchange rate in the local markets. Accordingly, the exchange rate became (1481) Iraqi dinars per (1) US dollar in November of 2021, after it was (1249) Iraqi dinars per (1) US dollar in November of 2020. This change occurred for

enhancing the financial revenues (dinars) of the Iraqi government as a result of the double shock that hit the Iraqi economy, represented by the low oil prices and the health crisis. Moreover, the change in the exchange rate of the Iraqi dinar was one of the factors causing the increase in the money supply, on the one hand, and the inflation rate, on the other hand. Therefore, inflation rises at the rate of change in the exchange rate and the sales window is reduced to fund foreign imports. This in turn has raised the general level of prices, reflecting on a rising inflation rate.

Despite the stable rise in the money supply in 2022, as it increased at the end of the period by (16.8) billion dinars, inflation rates were a result of the decline. This is due to the stability of the currency in 2022 compared to 2021. Based on the above, it is clear that:

1. The increase in money supply was the result of an increase in the banking system's net assets as well as net debts of government and private sector.
2. The inflation rate was rising as a result of the change in exchange rate and the increased demand for goods and services caused by the increase in the money supply.

4 Measuring and analyzing the effect of money supply on the inflation rate in Iraq for the period (2020-2022)

4.1 Research variables

a) Dependent variable: inflation rate (Y).

b) Independent variable: Money supply (X).

4.2 The mathematical formula of the model

$LOG(Y) = B_O+B_1LOG(X)+ ei$

4.3 Analysis Methodology

4.3.1 Statistical and Econometric Tests of Data

1. Drawing the Time Series

Through the graphs below, it is noted that the inflation variable, expressed by the symbol (Y), is unstable during the study period, as it begins to decrease at the beginning of the period and then rises gradually until the end of the study period. In addition, the money supply variable, expressing the independent variable (X), is also increasing, which indicates the direct relationship between them (see Fig. 1).

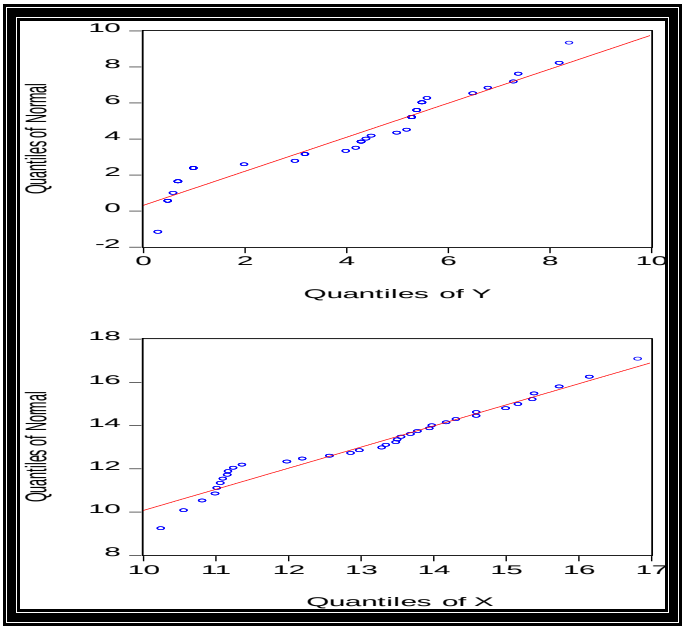

Figure 2: Drawing the Study Variables

Source: Prepared by the researcher based on the statistical program (EViews.12).

a. Root of Unit Test

To ensure that the time series is free of root of unit and to indicate its stability, the researcher used the Phillips-Perron (PP) test. The test results were as follows: the results of the unit root test for the dependent variable, inflation (Y), and the independent variable, money supply (X), are unstable at the level. Then, they become stable at the first difference with constant, or with constant and trend equally. Based on the values of (prob), which were less than (5%), they showed the stability of the study variables in Iraq, as shown in table (1).

Table 1: time series stability test

variable	With Constant	With Constant & Trend	Without Constant & Trend	With Constant	With Constant & Trend	Without Constant & Trend
	Prob*	Prob*	Prob*	Prob*	Prob*	Prob*
Y	0.4038	0.8062	0.5944	0.0000	0.0000	0.0000
X	0.9969	0.9101	1.0000	0.0007	0.0020	0.0182

Source: Prepared by the researcher based on the statistical program (EViews.12).

Based on the results of the unit root tests of the study variables, the ARDL model can be applied to the study data.

b. Model Estimation

It is clear that the ARDL model determines the degrees of time slowdowns of the variable contained in the following model:

1. The validity of econometric model

Based on the test results of the explanatory power of the model expressed by the coefficient of determination (R^2), the independent variable (money supply) has explained (27%) of the change that occurred in the dependent variable (inflation rate). Additionally, there is (73%) due to factors outside the model that can affect the dependent variable. As for F-test, which is concerned with the total significance of the model, statistically it has reached a probability ratio (prob=0.019156), indicating the quality of the model at a significant level (5%).

Table 2: estimation results

R-squared	0.278085	Durbin-Watson stat	1.848508
F-statistic	3.852039	Prob (F-statistic)	0.019156

Source: Prepared by the researcher based on the statistical program (EViews.12).

2. Long-term equilibrium relationship test (cointegration of variable (Y))

In order to test the existence of a long-term equilibrium relationship (co-integration) between the money supply as an independent variable and inflation as a dependent variable, it is necessary to perform Bound Test, as shown in Table (3) below.

Table 3: Cointegration Test

ARDL Long Run Form and Bounds Test Dependent Variable: D(Y) Selected Model: ARDL (1, 1) Case 2: Restricted Constant and No Trend Date: 05/22/23 Time: 09:36 Sample: 2020M01 2022M12 Included observations: 34		
Test Statistic	Value	K
F-statistic	29.07735	1
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

Source: Prepared by the researcher based on the statistical program (EViews.12).

Through the results of the cointegration test shown in Table (4) above, the calculated statistical value of (F) was (12.8), which is greater than the minimum and maximum tabulated values of (6.56) and (7.3) at the level of significance (5%). This indicates the existence of a cointegration relationship between the variables of the study, i.e., a long-term equilibrium relationship between the research variables.

3. Long-term relationship results

Through this test, the long- and short-term parameters were estimated to detect the degree of influence of the independent variable on the dependent variable and determine the type of relationship as shown in table (4).

A. Error Correction Coefficient (UECM)

It predicts the return of the model to the equilibrium state and measures the speed of return in the long term between the independent variables and the dependent variable included in the model. It indicated that error during the year is corrected

within (1/1.45), i.e., the return to equilibrium within (8 months and 8 days) approximately, through the mechanisms followed by the Iraqi Central Bank with its various tools.

B. Long-Term Relationship

When the sign is positive, the relationship between the money supply and inflation is positive, and that increasing the money supply by one unit leads to an increase in the inflation rate by (1.9%) in the long term, as well as the significant relationship at a significance level (5%) (see Table 4).

Table 4: Short- and Long-Term Estimation Results

ARDL Long Run Form and Bounds Test Dependent Variable: D(Y) Selected Model: ARDL(1, 1) Case 2: Restricted Constant and No Trend Date: 05/22/23 Time: 09:36 Sample: 2020M01 2022M12 Included observations: 34				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)*	-1.458156	0.151165	-9.646114	0.0000
X	1.901209	0.940703	2.021052	0.0523

Source: Prepared by the researcher based on the statistical program (EViews.12)

4.3.2 Diagnostic Tests

To ensure the accuracy and validity of the results obtained from previous tests, some diagnostic tests were performed in order to prove the results.

A. Autocorrelation Problem

The estimated models are tested to ensure that they are free of autocorrelation problem or the so-called serial correlation between the values of the model. The LM Test is used. Through the data of the of autocorrelation problem test (LM Test), the value of (F-statistic) at (Prob = 0.6936) is not significant at the significance level (5%). This means that the null hypothesis that indicates the absence of problem is accepted, while the alternative hypothesis that expresses the existence of the problem is refuted. In other words, there is no autocorrelation problem in the model between random residues.

B. Heteroskedasticity Problem

The estimated models are tested by the ARCH test to ensure that they are free of heteroskedasticity problem for the residues. It indicates that the value of F-statistic at (Prob = 0.4556) is greater than 5%. This means that there is no problem of heteroskedasticity. Therefore, the null hypothesis is accepted, while the alternative hypothesis that states the existence of heteroskedasticity problem between random residues is refuted. This test increases the accuracy of the results of the ARDL model (see table 5).

Table 5: diagnostic test results

Heteroskedasticity Test: ARCH			
F-statistic	0.531852	Prob. F(1,31)	0.4713
Obs*R-squared	0.556616	Prob. Chi-Square(1)	0.4556
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.307868	Prob. F(2,28)	0.7375
Obs*R-squared	0.731591	Prob. Chi-Square(2)	0.6936

Source: Prepared by the researcher based on the statistical program (EViews.12).

C. The Problem of The Normal Distribution of The Model Residues

Based on figure (3), the model is free of the problem of residues, depending on the probability of (0.950165), which is greater than 5%.

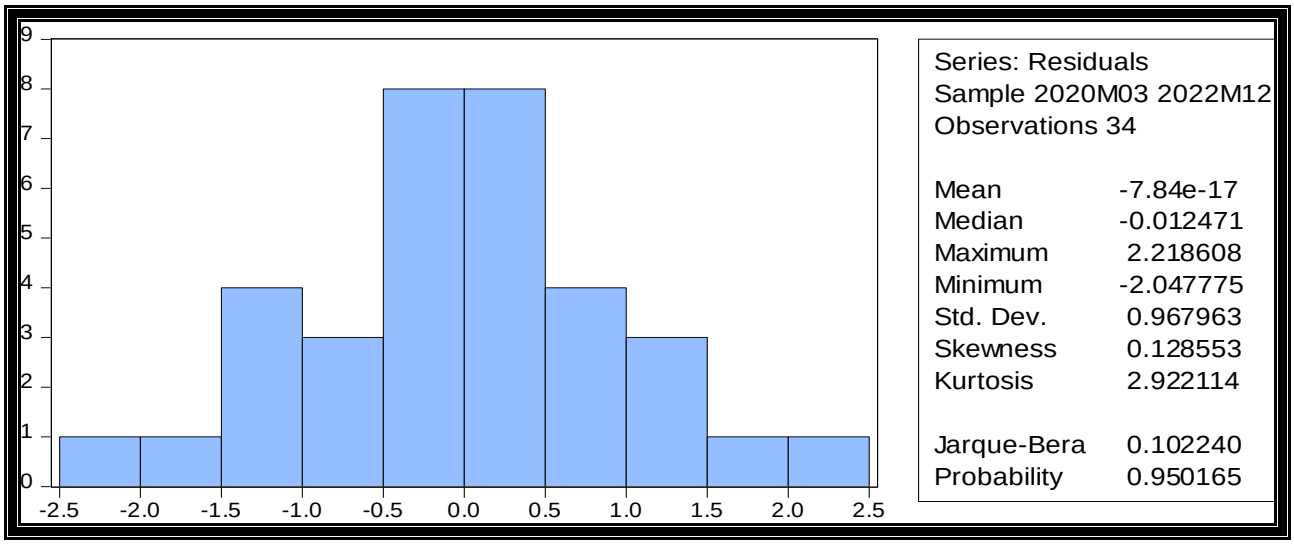

Figure 3: Testing the normal distribution of model residues

Source: Prepared by the researcher based on the statistical program (EViews.12).

D. Model Stability Test

The stability test is based on the cumulative total test of the model residues. As shown in Figure (4), the model was stable during the study period (2020-2022) because the blue line expressing the model residues is located within the critical lines (confidence limits) expressed by the red lines. Therefore, the model does not suffer from any structural imbalance.

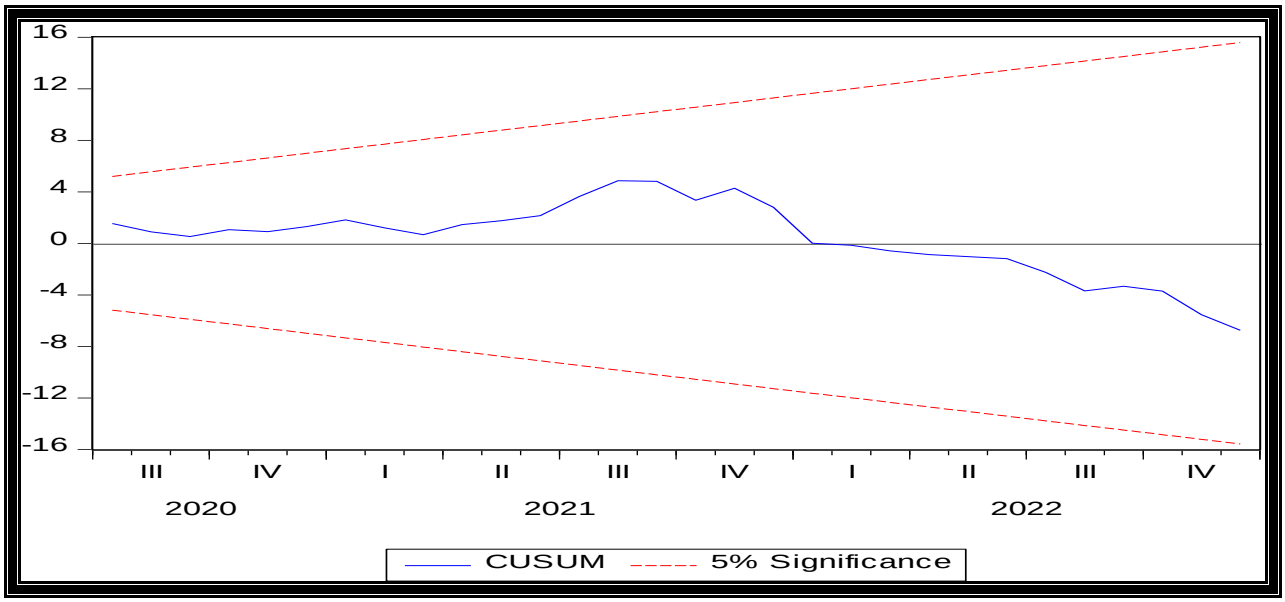

Figure 3: structural stability test of the model

Source: Prepared by the researcher based on the statistical program (EViews. 12).

5 Conclusions and Recommendations

5.1 Conclusions

The increase in the money supply was the result of an increase in the banking system's net assets as well as net debts of government and private sector. The inflation rate was increasing as a result of the change in exchange rate and the increased demand for goods and services caused by the increase in the money supply. According to the coefficient of determination, the independent variable (money supply) explained (27%) of the change that occurred in the dependent variable (inflation rate) and there were (73%) due to factors outside the model that can affect the dependent variable. The F-test, which is concerned with the total significance of the model, statistically reached a probability ratio (prob = 0.019156), indicating the quality of the model at the level of significance (5%). The calculated statistical F-value was (12.8), which was greater than the minimum and maximum tabulated values of (6.56) and (7.3) at the level of significance (5%), indicating a cointegration relationship between the study variables. In other words, there was a long-term

equilibrium relationship between the research variables. The error correction coefficient UECM, which predicts the return of the model to the equilibrium state and measures the speed of return in the long term between the independent variables and the dependent variable included in the model, indicated that the error was corrected during the year by (1/1.45). this means that the return to equilibrium was within (8 months and 8 days) approximately, through the mechanisms followed by the Iraqi Central Bank with its various tools. The was a positive relationship between the money supply and inflation, and that increasing the money supply by one unit led to an increase in the inflation rate by (1.9%) in the long term, as well as the significance of relationship at a significance level (5%).

5.2 Recommendations

Adopting a flexible exchange policy by the Central Bank of Iraq in line with the nature of the Iraqi economy and the fluctuations of oil prices at international prices. The necessity of calculating an index on the exchange rate of the Iraqi dinar against foreign currencies and is calculated on the basis of the daily trading of the foreign exchange market. The need to pay attention to the money supply that reflects the economic situation, and that its components reflect the true picture of the extent of the development of the banking system and the awareness of the public and the development of the money markets. The need to find platforms for currency trading based on a series of currencies with the Iraqi dinar and that these platforms be either in the Iraq Stock Exchange or the Central Bank of Iraq. The necessity to keep the independence of the Central Bank of Iraq, and this is according to the law, provided that the objectives of the Central Bank are integrated with the general objectives of the Iraqi state.

Develop a general framework for the integration of monetary instruments of the Central Bank with the financial instruments of fiscal policy in order to stabilize the exchange rate of the Iraqi dinar. Finding alternatives to managing the money supply, stabilizing monetary inflation rates, not relying on oil revenues to finance budgets, and seeking other options that reflect positively on the macroeconomy. Achieving balance in the real sector by diversifying production, and not meeting aggregate demand through external imports of goods and services, in order to achieve a balance between money supply and aggregate demand. Work to fight administrative and financial corruption prevalent among the sectors of the state, as it contributes to increasing public expenditures, and then raising price rates significantly. Withdrawing cash from the public by lowering interest rates on loans or raising the statutory reserve ratio, selling bonds and shares at attractive interest rates, as such measures reduce the rate of inflation.

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Appendices

Appendix 1: Monthly data on the inflation rate and money supply in Iraq during the period (2020-2022)

Month	Inflation rate	Money supply
2020M01	0.5	10.2530572
2020M02	1	10.5677133
2020M03	0.6	10.8219690
2020M04	3	11.0696059
2020M05	0.7	11.0015681
2020M06	2	11.0254072
2020M07	1	11.1106913
2020M08	1	11.1674519
2020M09	0.5	11.2494374
2020M10	0.7	11.1817097
2020M11	0.3	11.3735480
2020M12	3.2	11.9906260
2021M01	3.2	12.2036970
2021M02	4	12.5762378
2021M03	4.3	12.8693135
2021M04	5.5	12.9860360
2021M05	5.6	13.2949578
2021M06	6.5	13.3546538

2021M07	7.4	13.4910510
2021M08	8.2	13.5603854
2021M09	7.3	13.5101124
2021M10	6.8	13.7855413
2021M11	8.4	13.6914524
2021M12	5.3	13.9885978
2022M01	5.3	13.9566578
2022M02	5	14.1848009
2022M03	5.2	14.3176487
2022M04	5.3	14.6019268
2022M05	5.4	14.6008796
2022M06	5.5	15.0009856
2022M07	5.4	15.1762007
2022M08	4.4	15.3983098
2022M09	5.3	15.3728440
2022M10	4.5	15.7418697
2022M11	4.2	16.1556029
2022M12	4.3	16.8212533

Source: Central Bank of Iraq, published at: https://www.cbi.iq/

Appendix (2): Stability Test

UNIT ROOT TEST TABLE (PP)

At Level			
		Y	X
With Constant	t-Statistic	-1.7384	1.1139
	Prob.	***0.4038***	***0.9969***
		n0	n0
With Constant & Trend	t-Statistic	-1.5120	-1.1251
	Prob.	***0.8062***	***0.9101***
		n0	n0
Without Constant & Trend	t-Statistic	-0.2348	6.2022
	Prob.	***0.5944***	***1.0000***
		n0	n0
At First Difference			
		d(Y)	d(X)
With Constant	t-Statistic	-8.3247	-4.6467
	Prob.	***0.0000***	***0.0007***
		***	***
With Constant & Trend	t-Statistic	-8.5486	-4.8850
	Prob.	***0.0000***	***0.0020***
		***	***
Without Constant & Trend	t-Statistic	-8.3246	-2.3922
	Prob.	***0.0000***	***0.0182***
		***	**

Source: Prepared by the researcher based on the statistical program (EViews.12).

Appendix (3) Model Interface (ARDL)

Dependent Variable: D(Y)
Method: ARDL
Date: 05/22/23 Time: 10:09
Sample (adjusted): 2020M03 2022M12
Included observations: 34 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): D(X)
Fixed regressors: C
Number of models evalulated: 12
Selected Model: ARDL(1, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(Y(-1))	-0.458156	0.156510	-2.927316	0.0065
D(X)	0.724637	0.955260	0.758575	0.4540
D(X(-1))	2.047622	1.064451	1.923642	0.0639
C	-0.341840	0.300269	-1.138447	0.2639

R-squared	0.278085	Mean dependent var	0.097059
Adjusted R-squared	0.205893	S.D. dependent var	1.139241
S.E. of regression	1.015208	Akaike info criterion	2.978195
Sum squared resid	30.91942	Schwarz criterion	3.157767
Log likelihood	-46.62932	Hannan-Quinn criter.	3.039434
F-statistic	3.852039	Durbin-Watson stat	1.848508
Prob(F-statistic)	0.019156		

*Note: p-values and any subsequent tests do not account for model selection.

Source: Prepared by the researcher based on the statistical program (EViews.12).

Appendix (4) Bound Test

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	29.07735	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
Actual Sample Size	34		Finite Sample: n=35	
		10%	3.223	3.757
		5%	3.957	4.53
		1%	5.763	6.48
			Finite Sample: n=30	
		10%	3.303	3.797
		5%	4.09	4.663
		1%	6.027	6.76

Source: Prepared by the researcher based on the statistical program (EViews.12).

Appendix (5) Long term relationship

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X)	1.901209	0.940703	2.021052	0.0523
C	-0.234433	0.205888	-1.138642	0.2639

Source: Prepared by the researcher based on the statistical program (EViews.12).

Appendix (6) Test of Stability Problem

Heteroskedasticity Test: ARCH			
F-statistic	0.531852	Prob. F(1,31)	0.4713
Obs*R-squared	0.556616	Prob. Chi-Square(1)	0.4556

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/22/23 Time: 10:12
Sample (adjusted): 2020M04 2022M12
Included observations: 33 after adjustments

Source: Prepared by the researcher based on the statistical program (EViews.12).

Appendix (7): Autocorrelation Problem Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.307868	Prob. F(2,28)	0.7375
Obs*R-squared	0.731591	Prob. Chi-Square(2)	0.6936

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/22/23 Time: 10:12
Sample: 2020M03 2022M12
Included observations: 34
Presample missing value lagged residuals set to zero.

Source: Prepared by the researcher based on the statistical program (EViews.12).