Analysis of the quantitative tools of monetary policy and its impact on the money supply in Iraq for the period (2004-2021)

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Abstract : The quantitative tools are considered one of the most important tools of monetary policy affecting the macroeconomic variables, through which it exercises its role in influencing the monetary and financial markets, as the Iraqi economy faces many economic crises that negatively affect the money supply in Iraq. Achieving the stability of the money supply, and which of these tools is more effective, and to prove the research hypothesis (that the quantitative tools have an effective and significant role in determining the money supply in Iraq for the period (2004-2021)) The quantitative tools were analyzed and measured using the (ARDL) model, and the results proved that there are A co-integration relationship, and the research reached conclusions, the most important of which was that there is difficulty in direct targeting of market problems through monetary policy tools. Therefore, the monetary authority resorts to using the variables that deal with it directly and are linked to a stable relationship with the ultimate goals. The researcher recommended focusing on monetary tools that have a short-term effect in dealing with crises that occur in the real market (goods and services market), so that the response to these measures is quick.

Keywords- Quantitative tools of monetary policy, money supply

INTRODUCTION: Monetary policy is one of the important economic policies, which plays a central role in building the basic elements of economic growth, if the appropriate environment is available to activate the tools of this policy on the one hand, and the elites that make monetary policy on the other hand, and these two conditions are achieved through which monetary stability and social welfare are achieved. , which is considered one of the most important guarantees for the success of the market economy, because the lack of a stable monetary system leads to imbalance and imbalance in all economic accounts. Therefore, the matter requires the preparation of monetary policy that is appropriate to the requirements of economic reform, as well as the possibility of benefiting from some of the policy trends that have been applied in emerging economies whose economies witnessed remarkable development during the same period of time. This appeared clearly in the recent trends of monetary policy in Iraq after 2003 and the Central Bank's independence in 2004 as the supreme monetary authority responsible for managing the monetary sector, which imposed on it greater responsibility in drawing monetary policy objectives that represent its directions away from influences that may deviate the course of currency.

Research problem:
The research problem is summarized in the following question:
Can quantitative tools be effective in determining the money supply in Iraq?

research importance:
The importance of the research comes through the role played by the quantitative tools of monetary policy in Iraq and its impact on the money supply, through which economic stability can be enhanced.

Research hypothesis:
The quantitative tools have an effective and significant role in determining the money supply in Iraq for the period (2004-2021).

Search goal:
The research aims to identify the effectiveness of quantitative tools and their impact on the money supply in Iraq during the period (2004-2021).

Research Structure:
The descriptive and quantitative analysis method was adopted to reach the goal of the research, and in order to test the research hypothesis, the research was divided into three sections. And the third dealt with measuring the impact of quantitative tools on the money supply in Iraq for the period (2004-2021.

The first topic: Quantitative tools and money supply conceptual framework
The first requirement: quantitative tools (indirect)
First: the concept of quantitative tools
The tools used by the central bank to influence the volume of credit, the money supply, and the interest rate in the economy, and under each type of these means there is a set of tools, known as (indirect credit control tools), as they

are considered as the traditional weapons of the central bank and used for the purpose of achieving economic goalsSecond: the types of quantitative tools

1-The discount price.

It is the interest rate that the central bank charges from commercial banks in return for what it obtains from discounting bills of exchange and other securities in exchange for loans granted to them. The rediscount rate is one of the oldest tools used by central banks, but it has become of little importance in modern times, especially in developing countries. If there are signs of inflation, the central bank will raise the interest rate, then the cost of lending will increase for all commercial banks and their clients, then it will limit the volume of borrowing and reduce the available means of payment, and the opposite occurs when there are signs of deflation, so the central bank will reduce the interest rate to encourage borrowing, which leads to an increase in the means of payment paying off**.**

2-The legal reserve ratio

This method is considered one of the modern means used by central banks to influence the ability of commercial banks to provide credit and create deposits. If the percentage is low, the ability of commercial banks to grant credit and create deposit money will increase, thus increasing the money supply through the cash multiplier and creating inflationary assets, and vice versa in the case of deflationary assets. In the implementation of the monetary policy, that is, the legal cash reserve must be kept by commercial banks at the beginning of their establishment. It is determined according to the law, as each commercial bank must deposit a certain percentage of its capital in the account of the Central Bank, and this percentage is not fixed, but rather changes according to the monetary policy that it pursues. The central bank of the country. It is worth noting that the ratio of the legal reserve on deposits varies according to their terms. This ratio may be high on demand deposits compared to the ratio of the legal cash reserve on savings deposits and fixed deposits. These ratios do not become an effective tool of monetary policy unless the central bank has the authority to change them.

3-Open market operations

Here, the central bank buys and sells securities, usually treasury bills and bonds. When the central bank wants to reduce the money supply, it follows a deflationary policy. It sells securities to the public according to a specific amount of money in circulation, and vice versa. If the central bank wants an increase in the money supply, it follows an expansionary policy. It will buy securities from the public, thus introducing a sum of money into the trading range. Open market operations have become the best choice for many countries with developed financial markets. The purpose of the central bank's expansionary and deflationary policy is to reduce the inflationary gap in the economy, as the monetary authority It seeks to counter this by influencing the volume of cash in circulation through selling government bonds and vice versa when deflationary gaps occur.

The second requirement: the offer of criticism

First: the concept of money supply

The money supply defines the amount of money in the possession of society at a specific time, as this quantity represents the means of payment of different coins, whether coins or paper and deposits that existed at a certain moment among the members of society6, and is defined as the amount of money or the sum of monetary units in the possession of society during A certain period of time, that is, the money supply represents a stock of money and not a cash flow of money. The difference between the two terms is that the cash flow represents the amount of money that is measured during a certain period of time, while the cash balance is a specific amount of money that is measured at a specific moment in time**.**

1-Measures of money supply.

There is a wide debate among economists about giving a specific definition of the money supply or the method of calculating it during a certain period of time, and this disagreement revolves around a basic point which is that which elements make up the money supply.

A- Currency in circulation (Mo):

The currency in circulation can be considered a measure of the money supply as it constitutes an important penalty and has a direct impact on the money supply, and it is meant by the currency in circulation in the hands of the public or the currency outside the banking system, i.e. the money supply increases with the increase in the currency in circulation and decreases as a result of its decrease8.

B_ money supply in the narrow sense (M1)

The narrow definition is meant to offer or, as it is sometimes called, the monetary block, which is a group of payment methods circulating in a country during a certain period of time, meaning that they are the means of payment actually used in circulation that are kept by individuals and projects in the form of cash balances, and are considered among the means of immediate payment every Of paper money and auxiliary money, in addition to the current deposits of the private sector with commercial banks, and these components are expressed by the symbol (M1)9.

C- Money Supply in the broad sense M2:

It is the money supply in its narrow sense in addition to time deposits, and the money supply is subject to continuous changes that arise due to the policies of the Central Bank and the group of commercial banks10, and it is usually taken as the symbol (M2) in international monetary statistics11, and is sometimes known by the term local or internal liquidity and consists of current demand deposits And the currency is in circulation in the hands of the public, in addition to time deposits in commercial banks. This definition is consistent with the concept of the modern quantitative theory of money for Friedman.

Let us criticize here that the financial sector in developed countries has provided a large part of the financial assets that can be transferred to means of payment easily and quickly and at the same time generate a return, and these assets are considered means close to money so that they can replace money as a store of value and also can be used as purchasing power

D- Money supply in the broadest sense (M3)

It is a comprehensive measure of the quantity offered of money. It includes both paper and metal money and bank deposits. It is considered one of the main indicators for measuring inflation. The broader concept of money supply refers to the liquidity of society as a whole, as it determines the money supply on the basis of local liquidity, but it extends to broader dimensions that include other deposits. It is determined by adding savings deposited outside commercial banks, i.e. deposited with savings institutions such as savings funds and savings and loan associations, to the local liquidity.

Second: Factors Affecting Money Supply:

1-Non Borrowed Reserves (NBR)

The effect of these reserves on the money supply is a direct effect because their increase leads to a rise in the ability of the banking system to grant loans or create money, and its decrease will lead to a decrease in this ability. There are several reasons that lead to a change in the non-borrowed reserves**.**

A- Financial flows resulting from the transfer of capital or goods between countries. Increased exports lead to commercial banks receiving amounts from abroad, thus enhancing their balances with the Central Bank and vice versa in the case of imports.

B- The change that occurs as a result of dealing with the state departments with the public, and the central bank performing its function as the state bank. Government spending that is paid by a check drawn from the central bank in favor of the public will lead to an increase in the reserves of commercial banks, and vice versa, provided that the check is deposited with commercial banks and not withdrawn in cash from central bank**.**

C- Open market operations, which is the central bank's buying and selling of securities, and this matter is related to the central bank's policy.

The most important factor of these factors is open market operations through the impact on bank reserves12**.**

2-Borrowed Reserves (BR).

In theory, it has the same effect as non-borrowed reserves, but there are differences in practice

A- Commercial banks do not borrow reserves from central banks or financial markets except when necessary, and this is usually when their reserves drop below the level of the mandatory reserve.

B- The Central Bank's ability to lend or not lend to commercial banks for any reason whatsoever, and this bank has no right to object because the Central Bank may see that the borrowing process is a result of the bank's mismanagement or an increase in discounted lenders, which may lead to inflation in the economy.

3-The percentage of cash reserves that banks must keep to cover public deposits and to face cash withdrawals on them and thus secure the liquidity of the banking system 13. The increase in demand for surplus reserves means that they are not used in granting loans or creating credit money, and this negatively affects money.

4-The currency in circulation with the public (C).

In the short term, this currency is considered stable because it is linked to technical and social factors, but in reality it is affected by a number of variables in the long term, the most important of which is 14.

A- Real income level (y) An increase in real income leads to an increase in the demand for cash. The rate of increase in demand for bank deposits is greater than the rate of increase in demand for currency. This is because the increase in income leads to an increase in the volume of exchanges that are settled by cash. Linearity is greater than those exchanges that are settled by the currency in circulation.

B- The tax-to-income ratio (t). The higher this ratio is, the more motives the public has for tax evasion.

A- The interest rate (i) that banks raise on deposits. The higher the interest rate on current accounts, for example, the commissions charged by these banks seem low, which encourages the public to reduce the size of their currency balances and pushes them towards bank deposits.

5-Legal Reserve Ratio:

Banks usually have low reserves that exceed legal reserves. To maximize the profits of banks, they expand in granting credit to the maximum extent permitted by these reserves, but this process is actually governed by considerations of

profitability, liquidity, risks, and rates of return on banks' investments in credit, and here it does not work. Only by the minimum necessary standard to meet the needs of withdrawals and debt settlement, but rather it seeks to achieve the greatest profit when the rate on each of its assets is equal, but it will remain restricted to the size of the deposits that it can obtain and the necessary minimum requirements, and here we will see what is the behavior of the public and commercial banks and their role Influencing the money supply:

First: The influence of the public on the money supply comes through its desire to keep the currency in circulation instead of commercial deposits**.**

Second: Among the five factors affecting the money supply, which can be affected by interest rates in the market, are the two factors, the proposed reserves and the excess reserves, both of which are determined by the decisions taken by the banks.

The second topic: analysis of the reality of the quantitative tools of monetary policy and money supply in Iraq for the period (2004-2021).

The first requirement: analysis of the reality of quantitative tools

First: the re-discount price

Through the data of Table No. (1), it is clear to us that there is a clear discrepancy in the re-discount rate offered by the Central Bank of Iraq, starting from June (2004) and reaching the highest percentage in the year (2007), when the index of the re-discount rate reached (6%) In the year (2004) and continued its rise in the year (2005), when it reached (7%) by an increase of one point, then it jumped to record a high level in the year (2006), when it reached (16%), recording the highest level of rise in one year, as it reached Equivalent to double and more, and it continued to rise in the year (2007), when it reached its maximum during the study period, which recorded an amount of (20%). Banks, according to this price, will avoid making their clearings in a transparent manner, but it decreased again at continuous rates, reaching (16.75%) in the year (2008), then it decreased again at a record price that reached the level of double from the previous year, as it reached (8.83%) in the year (2009). This is an indication that the Central Bank took this measure as a test of the ability of banks to absorb monetary measures. The decline continued at constant rates until the year (2010), when the rediscount rate reached (6%) for (6) years, which is a clear indication of the stability of banking work towards The leader of monetary policy, and by moving to the year (2016), the rediscount rate declined from its previous levels, recording a constant rate of (4%) for a period of (6) years, up to the year (2021).

Second: open market operations.

This tool is an effective tool and is used to control and control monetary performance (money supply), and it is one of the fastest means that have an effective impact on market performance. On this basis, the researcher was keen to clarify the growth rates of these operations during the period from (2004-2021), which witnessed growth rates Sometimes positive and negative, as shown in Table (1.(

Through the data of table (1), it is clear to us that in the year (2004) the Central Bank of Iraq opened its activity in open market operations with an activity that recorded (12) auctions to sell foreign currency worth (1.674) billion dinars, and this is the first step that contributed to the entry of the Central Bank into the market after a period of estrangement that lasted more than (30 years) as a result of Iraq entering successive wars that contributed to curtailing the role of the central bank and turning it into a tool in the hands of the government, and thus it became subordinate to the financial authority and during that period the inflation rates were very high because Iraq did not possess any foreign reserves and a monetary closure due to the decision International Conference (558 of 1991) regarding the imposition of economic sanctions on Iraq, and from that moment on, the issue of hard currency and its availability became a dilemma that the Central Bank suffers from, and it is a result of the lack of local exports abroad.

The year (2005) recorded a remarkable development, as it recorded a double and a half increase from the year (2004), with a growth rate of (108%). (2006), where a growth rate of (58%) was recorded with sales amounting to (1.651) billion dinars, due to the military operations to combat terrorism, then it returned to the rise, recording a positive amount of sales that reached (3.219) billion dinars in the year (2007), with a growth rate of (94% from the previous year, and the fluctuation in this tool continued once in the negative and again in the positive, so it recorded in the year (2008) a growth rate that reached (11.85), then it decreased again in the year (2009) and recorded a negative growth rate amounted to (-33%) and this rate continued It declined as it reached (-43%) in the year (2010), and returned to the rise in the year (2011) recording (76%) as a growth rate with sales amounting to (2.400) billion Iraqi dinars, and its rise continued in the year (2012) with a growth rate of (63%) and an amount Sales (3.900) billion dinars, then decreased again in the year (2013), recording a sales volume of (3.307) billion dinars, an indicator of a growth rate of (-15%), and it increased slightly from its previous level, recording a positive growth rate of (5%), with a slight increase in The volume of sales that recorded (3.412) billion dinars, and this increase continued in the year (2015), when it recorded a growth rate of (39%) with sales amounting to (4.832) billion dinars, then it decreased again in the year (2016) and continued to decline until the end of the study period. Where it recorded a negative growth rate in the year (2016) amounting to (99-%), with sales of (65) billion Iraqi dinars, and the rise returned in the year (2017), when

the amount of sales was recorded (195) billion, with an increase in the growth rate of (195%), and a decline Simple, in the year (2018), which recorded the amount of sales that reached (140) billion Iraqi dinars, it recorded a low growth rate of (-28%), and this rate returned to the rise, as the amount of sales in the year (2019) reached (346) billion dinars, and it recorded a growth rate By (147%), then it decreased again in the year (2020) half from the previous year, as a sales volume amounted to (164) billion dinars, recording a decrease of (-52%) at the growth rate, and work on issuing these transfers was stopped as of 10/ 6/2020 until further notice.

Third: the legal reserve ratio.

It is clear from the data of Table (1), which shows the development of the legal reserve ratio. We note that this percentage was constant, as it was recorded for the period from (2004) to (2009), a very high percentage, reaching (25%), and that this percentage constitutes a real burden on the Commercial Bank As we previously mentioned, it affects its ability to grant credit, and in the year (2010) the Central Bank started a new policy aimed at giving some allowances that contributed to a decrease in the legal reserve ratio, as the period (2010-2021) recorded a legal reserve ratio of (15%). An active part of the banking performance, especially commercial banks, as it contributed to raising the cash liquidity in these banks by (10%) over the previous period, which actually contributed to the transition of this tool from being a (coercive) control tool to a tool aimed at growth and determining what the Central Bank holds as a guarantee Firstly, for the continuity of the work of these banks, and secondly, to give the banks a cash space to exercise their role. As a result of the continuity of this policy for more than (10) years, we note that the Central Bank has established this percentage, in response to the requirements of banking work locally.

Table(1)

The development of quantitative tools in Iraq for the period (2004-2021)

Year	%Re-discount price	open market operations	%The legal reserve ratio
2004	6	1.674	25
2005	7	3.494	25
2006	16	1.651	25
2007	20	3.219	25
2008	16.75	3.600	25
2009	8.83	2.400	25
2010	6.25	1.363	15
2011	6	2.400	15
2012	6	3.900	15
2013	6	3.307	15
2014	6	3.482	15
2015	6	4.832	15
2016	4.33	65	15
2017	4	195	15
2018	4	140	15
2019	4	346	15
2020	4	164	13
2021	4	-	15

Source: Central Bank of Iraq, Annual Statistical Bulletin, General Directorate of Statistics and Research for the period (2004-2021)

(-) Open market operations were suspended in (2021)

The second requirement: the development of the money supply in the broad sense of M2 in Iraq for the period (2004-2021)

Through table (2), it is noted that the money supply in the broad sense, M2, recorded clear growth rates during the period (2004-2014), as it reached (11499) billion dinars in 2004, rising to reach (90568) billion dinars in 2014, and that the increase in the money supply in the broad sense After 2003, due to the lifting of economic sanctions and the significant increase in oil revenues from foreign currency, which led to an increase in foreign assets, and an improvement in the monetary position of the government, which gave the government the opportunity to finance its public expenditures, both investment and current, by converting foreign assets into the local currency, while the year 2015 witnessed decline and a negative growth rate of

(-6.67%) compared to 2014 due to the decrease in the M1 money supply and the decrease in quasi-money (other deposits) from (17875) billion dinars in 2014 to (14914) billion dinars in 2015, as a result of the political crises and the repercussions of the war on terrorism, in addition to the decrease in net foreign assets As a result of the decrease in oil revenues and this is due to the expansionary effect of the net debt of the private sector and the government, while the money supply in the broad sense recorded an increase at the end of 2016 at a growth rate of (6.6%) over the year 2015. This increase in the money supply M2 is due to the growth of its two main components: the money supply M1, to increase (69613) billion dinars in 2015 to (75524) billion dinars in 2016, and the increase in other deposits from (14914) billion dinars in 2015 to (14942) in 2016, while the money supply in the broad sense began to rise and record

high growth rates to reach a growth rate of (%) 16.59) in 2021, after it reached (-6.67%) in 2015, and this increase in the growth rates of the money supply M2 is a result of the increase in the money supply M1, which amounted to (119944) billion dinars in 2021, with an increase of (50331) billion dinars over the year 2015. In addition to the increase in other deposits to reach (19942) billion dinars in 2021, after it reached (14914) billion dinars in 2015, and it is noted that other deposits still constitute low percentages, as they amounted to (17.16%) of the total M2 in 2021 compared to (14.26%) in 2020. This increase in the percentage of participation is due to the increase in banking awareness and public confidence in the banking sector as a result of the high rates of Emiratisation.

table (2)
The structure of the broad money supply (M2) in Iraq for the period (2004-2021) in billions of dinars

Year	M1	quasi coins (other deposits)	M2	annual growth	M1/M2 %	quasi money/M2
2004	10149	1350	11499	-	88.26	11.74
2005	11399	3260	14659	27.48	77.76	22.24
2006	15460	5590	21050	43.60	73.44	26.56
2007	21722	5199	26921	27.89	80.69	19.31
2008	28190	6672	34862	29.50	80.86	19.14
2009	37300	8055	45355	30.10	82.24	17.76
2010	51743	8546	60289	32.93	85.82	14.18
2011	62474	9593	72067	19.54	86.69	13.31
2012	63736	11600	75336	4.54	84.60	15.40
2013	73832	13696	87528	16.18	84.35	15.65
2014	72693	17875	90568	3.47	80.26	19.74
2015	69613	14914	84527	-6.67	82.36	17.64
2016	75524	14942	90466	7.03	83.48	16.52
2017	76986	15871	92857	2.64	82.91	17.09
2018	77829	17562	95391	2.73	81.59	18.41
2019	86771	16670	103441	8.44	83.88	16.12
2020	103353	16553	119906	15.92	86.20	13.80
2021	119944	19942	139886	16.66	85.74	14.26
المتوسط				16.59	82.84	17.16

Source: Central Bank of Iraq, Annual Statistical Bulletin, General Directorate of Statistics and Research for the period (2004-2021).

The third topic: measuring the impact of quantitative tools on the money supply in Iraq for the period (2004-2021)

First: a description of the standard model

From the economic analysis of monetary policy tools represented by (quantitative tools) and money supply, and in order to test the research hypothesis and achieve its objectives, the standard model of quantitative tools (independent variables) and its impact on money supply (dependent variable) can be described in Iraq. The model variables have been described as follows:

.1Independent variables

They are variables that affect and are not affected by the dependent variable, and explain the change that occurs in the dependent variable. The following variables have been adopted as independent variables:

a. Re-discount price

B. Open Market operations

T. The legal reserve ratio

 2.The dependent variable

It is called the internal variable whose value is determined from within the model, and it is a variable affected by the independent variable.

Broad Money Supply M2

3. Random Variable Ui

They are variables that were not included in the model because they are difficult to measure and include (all variables that affect the model but are not included in it.(

Second: formulating the standard model

The model includes an equation, which includes a dependent variable and independent variables. It is a standard equation for the standard model estimated from independent and dependent variables. The equation includes quantitative tools as independent variables and money supply as a dependent variable, which can be explained by the following standard formulas:

$$M2 = \mathbf{B}\,0 - \mathbf{B}\,1\ RDP + \mathbf{B}\,2\ OMO - \mathbf{B}\,3\ LR + + ui$$

Third: Estimating the Autoregressive Distributed Deceleration (ARDL) modelIn order to measure the effect of quantitative tools represented by (rediscount rate RDP, open market operations OMO, and the legal reserve ratio LR) on the money supply in the broad sense (M2), we make an initial estimate of the model.

table (3)

Autoregressive estimation of distributed lag for quantitative tools on (M2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
M2(-1)	1.284623	0.121270	10.59308	0.0000
M2(-2)	-0.257603	0.198180	-1.299845	0.1985
M2(-3)	-0.165354	0.115684	-1.429364	0.1580
RDP	-0.031910	0.140069	-0.227818	0.8205
OMO	-1.33E-05	0.003833	-0.003459	0.9973
LR	-0.570903	0.411976	-1.385768	0.1709
LR(-1)	0.885851	0.393070	2.253672	0.0278
C	-3.285801	1.818793	-1.806583	0.0758
R-squared	0.963260	Mean dependent var		16.52174
Adjusted R-squared	0.959044	S.D. dependent var		13.48442
S.E. of regression	2.728922	Akaike info criterion		4.954342
Sum squared resid	454.2680	Schwarz criterion		5.213369
Log likelihood	-162.9248	Hannan-Quinn criter.		5.057107
F-statistic	228.4740	Durbin-Watson stat		2.006799
Prob(F-statistic)	0.000000			

Source: From the researcher's work based on the results of the program (Eviews: 12)

Table (3) shows the results of the initial estimate of the ARDL model for the relationship between quantitative tools and money supply in the broad sense (M2). Through the results of the initial estimate, it was shown that the coefficient of determination R2 reached (0.963260), which gives explanatory power to the estimated model, that is, the predictive power of the explanatory variables Those included in the model explain (96%) of the changes in the dependent variable, and the remaining percentage (4%) is due to variables not included in the estimated model. The Adjusted R2 coefficient of determination reached (0.959044), and the model is significant as indicated by the calculated F value, as it reached (228.4740) and at a significant level, so we accept the alternative hypothesis and reject the null hypothesis, and accordingly there is a relationship between the independent variables (ROP, OMO, LR) and the dependent variable (M2).

Fourthly: test the limits

The economic meaning of the autoregressive distributed retardation model is to verify the existence or absence of a co-integration relationship and a long-term equilibrium relationship between quantitative tools and money supply.

Table (4)

Limits test of the effect of quantitative tools on (M2)

Test Statistic	Value	k
F-statistic	3.830930	3
Critical Value Bounds		

Significance	Minimum (0)I	upper limit (1)I
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source: From the researcher's work based on the results of the program (Eviews: 12)

It is clear from Table (4) The existence of a co-integration relationship between the quantitative tools and the money supply in its broadest sense during the research period, as the calculated value of f is equal to (3.830930) in the limits test according to the ARDL model, and it is statistically significant at the level of significance of 5%, i.e. higher than the critical value At its upper limit of (3.67) and its lowest limit (2.79), this means rejecting the null hypothesis, which states that there is no long-term equilibrium relationship between the dependent variable and the independent variable.

Fifth: Diagnostic tests for the estimated model

We will perform the most important diagnostic tests to ensure the integrity and absence of the estimated model from important standard problems, according to the following:

Table (5)

LM Test effect of quantitative tools on (M2)

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	**0.409673**	**Prob.F**	**0.6657**
Obs*R-squarested	**0.945093**	**Prob.Chi-Square**	**0.6234**

Source: prepared by the researcher based on the statistical program (Eviews: 12)

It is clear from Table (5) that the results of the serial correlation test between the residuals of the estimated model under study show that the model is free from the autocorrelation problem by using the LM test, because the Chi-Square value was about (0.1056), which is greater than the level of significance (0.05), and therefore The model does not suffer from the problem of serial correlation, and thus we accept the null hypothesis and reject the alternative hypothesis, which states that there is a problem.

Sixthly: Error Correction Model (ECM) according to the ARDL methodology

The error correction model is one of the most important methods that are used to describe the form of the relationship between economic variables in the short and long-term period because it shows the effect of the time regress of the variables included in the model on the same variables, and this model can be applied to small samples unlike previous standard methods that cannot be It is used in such samples, and the error correction vector model requires the existence of a cointegration relationship in order to be applied, and it is in fact an autoregressive model used to describe the reciprocal relationship between stable variables.

Table (6)

The results of the error correction model (ECM) effect of quantitative tools

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	0.422958	0.107819	3.922861	0.0002
D(M2(-2))	0.165354	0.102926	1.606533	0.1133
D(LR)	-0.570903	0.363694	-1.569736	0.1216
CointEq(-1)*	-0.138335	0.030620	-4.517820	0.0000

Source: prepared by the researcher based on the statistical program (Eviews: 12)

Table (6) indicates that the CointEq (-1)* error correction parameter met the two basic conditions, which are negative and significant (-0.138335). The value of the error limit also indicates that there is a correction from the short to the long term at a rate of (2%) .

Seventh: Estimating the long-term relationship according to the ARDL methodology

Table (7)

The results of estimating the long-term relationship according to the ARDL methodology

| Long run form				
	Coefficient	Std. Error	t-Statistic	Prob.
RDP	**-0.230673**	**1.042568**	**-0.221254**	**0.8256**
OMO	**-9.58E-05**	**0.027705**	**-0.003459**	**0.9973**
LR	**2.276706**	**1.140135**	**1.996873**	**0.0503**
C	**-23.75247**	**14.96861**	**-1.586819**	**0.1177**
(EC = M2 - (-0.2307*RDP -0.0001*OMO + 2.2767*LR - 23.7525				

Source: prepared by the researcher based on the statistical program (Eviews: 12)

When estimating the long-term relationship between the variables, it is clear from Table (7) that (the rediscount rate, and open market operations) did not have any effect on the money supply in the long term, because the value of Prob. It was greater than (10%), and this indicates the insignificance of the relationship between (rediscount rate, open market operations) and money supply, and this is contrary to economic logic as a result of the weakness of the policy followed by the monetary authority in Iraq in order to influence the money supply, while the variable (ratio legal reserve) had an impact on the money supply in the long run, because the value of Prob. It is less than (10%), and this indicates a significant relationship between the legal reserve ratio and the money supply, and this applies with economic logic, as the legal reserve ratio tool contributed to increasing the money supply due to the ability of commercial banks to double their deposits and stimulate the central bank to increase the capacity of economic activity and address the deficit Banks for the provision of liquidity and the removal of monetary bottleneck.

Eighth: Testing the stability of the model parameters
In order to detect the stability of the estimated model for the long and short-term parameters through the (CUSUM) test of the cumulative sum of the residuals, as this test works to ensure the stability and consistency of the long-term parameters with the short-term parameters of the estimated model, and the test shows whether or not there is any structural change in the data The structural stability of the parameters estimated in the error correction model is achieved, as the graph of the (CUSUM) test was within the critical limits at the level of significance (0.05), and if the graph was outside the critical limits, it indicates the structural instability of the parameters.

Figure (1)
The results of the CUSUM test of the effect of quantitative tools on the money supply
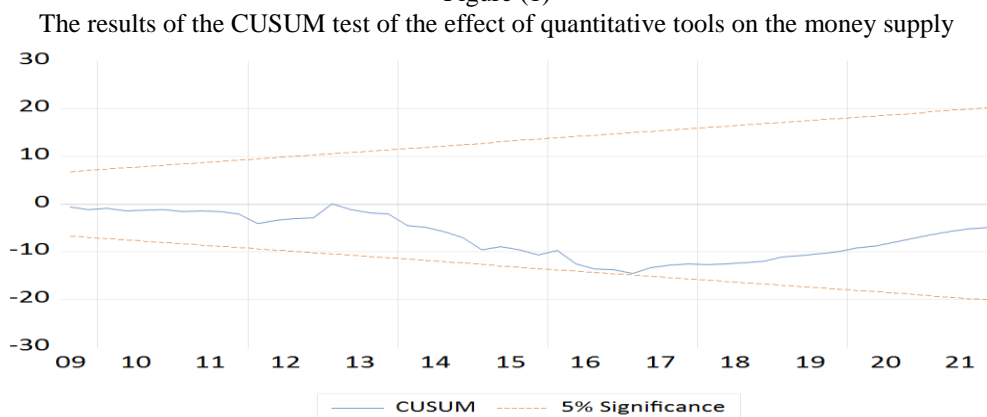
Source: prepared by the researcher based on the statistical program (Eviews: 12)

Conclusions and recommendations

First: conclusions
1-The researcher concluded that there is difficulty in directly targeting market problems through monetary policy tools, so the monetary authority resorts to using the variables that deal with it directly and are linked to a stable relationship with the final goals.

2-The researcher concluded that the quantitative tools of monetary policy are very effective tools and contribute to controlling monetary stability within the country and controlling the exchange rate of the local currency against foreign currencies.

3 -The researcher concluded through the initial assessment that there is an explanatory relationship for the estimated model, meaning that the predictive power of the explanatory variables included in the model explains 96% of the changes in the dependent variable.

4 -The researcher concluded that the tools (discount rate, open market operations) did not have a long-term effect on the money supply, because the value of (Prob) was greater than 10%, and this explains the insignificance of the relationship between money supply, open market operations and the re-discount price. It is an indication of the weakness of the policy adopted by the monetary authority in Iraq in order to influence the money supply.

Second: Recommendations
1 -Focusing on monetary tools that have a short-term effect in dealing with crises that occur in the real market (goods and services market) so that the response to these measures is quick.

2-The researcher recommends that the discount rate imposed by the central bank should be flexible in proportion to the requirements of the money market and the ability of commercial banks to fulfill their obligations towards the monetary authority, as well as simplify the procedures for granting credit by those banks to individuals.

3-The researcher recommends keeping the money supply (currency in circulation) because every expansion of the cash issuance will have a negative reflection on the value of the Iraqi dinar due to the turbulence of the exchange market at the present time.

4-The researcher recommends the need for coordination between fiscal and monetary policy in order to reduce contradictions and conflicts and achieve common goals between them, in a way that works to achieve a stable demand for cash and ensures the effectiveness of monetary policy through its tools to control and control the money supply.

5- Transforming monetary policy tools after controlling the money supply and controlling inflation rates as an ultimate goal to achieving other goals to reduce unemployment, which is a problem that the Iraqi economy suffers from.

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