

Measuring and Analyzing the Reality of Monetary Shocks and Their Repercussions on the Gross Domestic Product Rate in the Iraqi Economy for the Period (2005-2022)

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Abstract:

Monetary shocks are an important indicator to evaluate the performance of monetary policy in any country, as the less the country is exposed to monetary shocks, the more it is a guide to setting future visions for monetary policymakers and the state of the economy is known, and monetary decision makers can intervene by controlling many monetary variables to achieve monetary stability, but failure in monetary stability causes monetary shocks, which leaves their effects on the level of economic stability. Through their effects on GDP and prices, monetary shocks include several types including cash supply shocks, cash demand shocks, and exchange rate shocks. This is reflected in the impact of cash shocks on the markets, with some participants adjusting their cash balances through the commodity and services markets, while others adjusting their balances through stocks and bonds in the stock markets. The impact of these shocks on output and prices varies, but these variables are unevenly affected by monetary shocks depending on how long the cash shocks occur. This research focused on the most prominent problems facing the Iraqi economy, namely the monetary shock and its impact on GDP. The results of the research found that the shock of the money supply, the speed of circulation and the exchange rate cause changes in the level of GDP, as the GDP is positively related to the speed of money circulation and the money supply, and a negative relationship with the parallel exchange rate. The research concluded that there is a statistically significant long-term relationship between GDP and M1, V, and EX, which shows that monetary variables explain a large part of the change in GDP

Keywords

Monetary Shocks , Gross Domestic Product – GDP , Iraqi Economy , Monetary Policy , Vector Autoregression , Impulse Response Functions

1. Introduction:

The topic of monetary relations is of interest to economic policymakers, especially monetary policymakers. Monetary policy is one of the most important areas of economic policy, as it takes monetary variables as a subject of study, taking into account the relationship between money and macroeconomic activity on the one hand, and the conducive climate that monetary stability constitutes for the practice of economic activity on the other hand. It is no secret that many monetary policies, especially in developing countries, are one of the most important causes of

internal or external economic imbalances and imbalances, along with other economic variables, and since the most important goals of monetary policy are to achieve economic stability to some extent in light of balanced growth, this means that there is a close correlation between economic and monetary activity, and this is shown through the link between economic problems, including unemployment and inflation. Moreover, there must be a coherence between monetary policy and macroeconomic policy in order to achieve economic stability. Attention to the issue of monetary shocks and their associated impact on macroeconomic variables determining economic stability is mainly based on the effectiveness of monetary policy in dealing with oil shocks and economic fluctuations, and as a result of the effects of monetary shocks on macroeconomic stability

Since the subject of monetary shocks has become one of the topics of concern for monetary policy makers at the level of the countries of the world due to the effects of these shocks on many variables of economic stability, the research has exposed the most prominent monetary problems in the economy of any country, namely monetary shocks such as (money supply shock, money circulation speed shock and exchange rate shock) and their impact on GDP

Importance of Research

Macroeconomic variables are related to a set of relations that have positive repercussions on achieving economic stability for any country, so monetary policymakers must take into account the correlation between macroeconomic variables when formulating monetary policy in order to reduce these negative effects when avoiding monetary shocks and to benefit from important and effective monetary strategic studies of monetary problems within these national economies.

Research Problem:

The research problem is to show the efficiency and effectiveness of monetary policy in Iraq in light of an economic environment characterized by instability and constant fluctuations, especially with regard to sudden monetary shocks (such as money supply, speed of money circulation, exchange rate fluctuations in the parallel market) and their effects on GDP stability and economic growth levels.

Research Objective:

The research seeks to achieve the following objectives:

- A– Definition of Critical Shocks in terms of Concept and Types.
- B– Analysis of the economic and monetary nature of the Iraqi economy.
- C– Identify the types of monetary shocks that Iraq suffers from and their impact on the GDP .

Research Hypothesis :

The research is based on the hypothesis that :

Monetary shocks in the Iraqi economy have asymmetric effects on one of the variables of economic stability) GDP ,(and their effects vary from time to time depending on the nature of

these shocks and the time they arise ,reflecting the sensitivity of the Iraqi economy to monetary fluctuations and the exchange rate.

Research Method

A quantitative analytical method was adopted by studying the theoretical ideas and frameworks regarding monetary shocks and their impact on the macroeconomic variables under study.

The first topic

The Theoretical and Conceptual Framework of Monetary Shocks

First: Monetary Shocks (Concept and Types)

Shock is any situation that was not foreseen, or it is the occurrence of a severe and sudden change in economic variables, and this shock is either positive or negative, as the positive shock leads to an increase in the value of the variable, while a negative shock leads to a decrease in the value of the variable, or it means events that affect the economy¹ and have an external or internal source .

Shock is the main cause of the crisis, as the crisis means the existence of a defect that has a material impact on the entire system, and this imbalance is caused by a sudden event, and a crisis may be referred to as a catastrophe if it is not controlled at the beginning of the crisis, as a disaster is a sudden event caused by the action of nature, or it is a sudden and sharp change, and it can be said to be an accidental or random shock².

Second: Types of Monetary Shocks

1. Cash Supply Shocks

Money supply shocks are defined as "the sudden change in the money supply that leads directly or indirectly to changes in some macroeconomic variables such as the level of national product, the level of full employment, the general level of prices, the exchange rate of foreign currency, and others.³ It is also defined as "the event that leads to a sudden change in the economy and economic variables."

The money supply shock is either positive or negative, the shock wave (represents an increase in the money supply to a degree greater than what the national economy demands), and the opposite

¹ Khudair Abbas Hussein Al-Waeli, The Impact of Economic Shocks on Some Macroeconomic Variables in Iraq for the Period (1980-2011), Master's Thesis, University of Karbala, Faculty of Administration and Economics, 2012, p. 11.

² Muhammad Saleh Salman, Measurement and Analysis of Monetary Shocks in the Iraqi Economy for the Period (1980-2005), A Standard Study, Journal of Economic and Administrative Sciences, University of Baghdad, Vol. 16, No. 58, June 2010, p. 142.

³ Al-Sayyid Muhammad Ahmed Al-Seriti, Muhammad Ezzat Muhammad Ghazlan, Economics of Money, Banks and Financial Markets, Dar Al-Roya Publishing, 1st edition, 2010, p. 74.

occurs in the case of a negative money supply shock, which is called an economic crisis (a crisis is an imbalance that has a material impact on the entire system).

This shock occurs as a result of a sudden event or sudden change in the money market, such as a sudden disturbance or change in the interest rate, the exchange rate, or through the money supply, if the monetary policy measures represented by the exchange rate work effectively against those shocks, and the monetary authority may sometimes require many variables in order to achieve the objectives of the monetary policy, such as the official exchange rate, the nominal interest rate, and the total credit, the real shocks may be. It is reflected in the variables in the GDP, and that many countries are exposed to this type of shocks, and its reasons are the reliance on modern technology or the occurrence of disturbances in the prices of oil and raw materials, which has a direct impact on the growth rate of the GDP. As for external shocks, they occur as a result of external changes that cannot be controlled, such as changes in export revenues that lead to the occurrence of the shock, i.e. export returns are low and cause a negative shock, while when export returns rise, it causes a positive shock through an increase in revenues denominated in hard currency. External shocks occur as a result of fluctuations in crude oil prices in the global market, changes in foreign subsidies, or the forms of grants received by some developing or poor countries, such as the US aid provided to Egypt, which achieved a positive shock after the Gulf War, and the decline in growth rates in rich or developed countries causes a decrease in the demand for raw materials that are produced by developing countries.² It also defines an unintentional monetary shock or intentional monetary shocks in one of the monetary policy variables such as (exchange rate, interest rate, money supply, demand for money, credit) and the resulting indirect or direct effects on macroeconomic variables.

The intended cash shock is sudden changes in the average cash balances, for example, when the central bank buys large quantities of government bonds, which leads to a rise in their prices and their owners sell them at a time of high prices and benefit from them, and when replacing government bonds with cash balances, it will lead to a decrease in the prices of bonds and an increase in the additional cash balances they own, and then the rise of the new additional reserves of the banks, so these banks work using the additional reserves to buy Bonds from the open market and providing loans to lenders on simple and easy terms for them.

As for the unintentional monetary shock, it is the unexpected disturbances or changes in one of the monetary variables, such as turbulences or fluctuations in the demand for money as a result of the change in the behavior of the individual who deals in the market in order to change the money balances he owns, or the change in the money supply as a result of the fluctuations of the monetary policy management.

¹ Sawsan Karim Hodan, Nour Abdul Wahab Abdul Razzaq, The Impact of Monetary Shocks on the Gross Domestic Product in Iraq for the Period (2004-2018), Al-Dinanir Magazine, Issue (23), p. 467.

² Fakher Abdul Sattar Haidar, (2002), Economic Analysis of Stock Price Changes, Central Library, Dar Al-Marrikih, Saudi Arabia, p. 25.

2. Shocks to the demand for money

Demand for money shocks are defined as random changes in the demand for money as a result of changes in the demand for money by individuals, public and private sector institutions, and the external sector, resulting from changes in price levels or any other reasons. The increase in income increases the percentage of money held, i.e., the increase in the demand for money, in addition to influencing this, the interest rate is a major factor in the demand for money, but it is inversely related to it, as the increase in the interest rate reduces the demand for money, as it invests Individuals and establishments invest cash balances in short-term bonds to obtain a high yield and vice versa in the event of a low interest rate. ⁽¹⁾

3. Exchange rate shock

An exchange rate shock is defined as a sudden and sharp change in the value of a national currency against foreign currencies, leading to imbalances in macroeconomic indicators, especially in countries with fragile economies. This shock directly affects price levels by increasing the cost of imports, which contributes to rising inflation rates and erosion of purchasing power. Its negative effects on GDP are also reflected in a decline in domestic demand and a decline in production. These shocks call for urgent monetary intervention to control the market and reduce Undesirable effects^{),2}

Second Topic

The Reality of Monetary Policy in the Analysis of the Iraqi Economy for the Period (2005-2022)

First Requirement: Iraqi Economy (Economic Characteristics and Structure)

First: Characteristics of the Iraqi Economy

The Iraqi economy has been characterized by a number of features that can be summarized as follows³:

First: The rise in the prices of raw materials for agricultural and industrial production produced inside Iraq, which has made these sectors unable to compete, has played a major role in relying on imports from abroad.

Second: Increase in demand for foreign currency for the purposes of imports and foreign payments against the oil supplier only.

Third: The Iraqi economy has been exposed to confusing shocks due to the oil supplier's impact on violent fluctuations with the increase in imports and government tunnels relying on the oil supplier.

¹Ali Iyad Hassan, Hussein Dekan Darwish, The Impact of the Monetary Shock on the Stock Markets in (Iraq, Jordan), Journal of Management and Economics, Volume (9), Issue (4), 2017, p. 30.

² Moses, M. (1986). Nominal Exchange Rate Systems and Real Exchange Rate Behavior: Evidence and Implications. Carnegie-Rochester Public Policy Conference Series, 25, 117-214

³ Ahmed Buraihi Ali, (2011) Oil Economy and Oil Investment in Iraq, First Edition, Bayt Al-Hekma, Baghdad, p. 54.

Fourth: The society's habit of not contributing to the financing of public expenditures from family income, business sector profits, and the laxity of the tax authorities, in addition to the exceptional circumstances that Iraq went through prevented changes in economic development, including the first Gulf War (Iraqi-Iranian War), the Second Gulf War, and international economic sanctions and their consequences, which cast a shadow on the reality of the Iraqi economy, and the devastating effects that followed that exhausted the basic structure of all economic sectors that stimulate economic growth. Structural imbalances in the Iraqi economy are as¹ follows :

(First) Imbalance of the productive structure: The imbalance of the production structure resulted from the atrophy of the non-oil sectors due to the heavy dependence on the oil sector, which led to a state of monetary enrichment without real progress, so the Iraqi society turned towards intensive consumption and dependence on the outside until the rate of economic exposure reached about (93%).⁽²⁾

(Second) Lack of Rationality in Government Spending: The public expenditures followed by the Iraqi government were characterized by unwiseness, as the adoption of an ill-considered consumption policy by the state and the acquisition of the largest percentage of the state budget by the state of about (73%) in 2018, while the unemployment rates reached about 35% of the size of the labor force for the same year ³Therefore, it was necessary to direct the expenditures towards government investment, which would work to achieve growth and development in the economy, reduce the high unemployment rates, and thus contribute to the diversification of the base of the national economy and improve its productive structure.

Third: External indebtedness: Iraq suffered from the external debt crisis after the outbreak of its war with Iran, which at that time amounted to \$86 billion in 1980, knowing that Iraq's total debt until 2003 amounted to about \$125 billion, of which 48% was to Arab countries such as Kuwait and Saudi Arabia and 26.4% to the Paris Club countries, while the rest were private debts to foreign non-governmental companies and institutions ⁴

(Fourth) Financial and administrative corruption: Iraq ranked fifth at the international level in terms of financial and administrative corruption in government institutions and departments,

¹ Ismail Obaid Hammadi, (2004) Structural Imbalances in the Iraqi Economy: Diagnosis and Remedies: A Vision for the Future of the Iraqi Economy, Baghdad, Iraq Center for Studies, p. 41.

² Nabil Jaafar Abd al-Ridha, Khaled Matar Meshari, (2016) The Future of the Rentier State in Iraq, First Edition, Basra, Al-Ghadeer Printing and Publishing Company Limited, p. 137.

³ Iraqi Council of Representatives, General Budget Report for 2008, p. 11.

⁴Adnan Hussein Younis et al., (2016) Structural Imbalances in Rentier States, First Edition, Dar Al-Ayyam for Publishing and Distribution, Amman, p. 71.

according to the 2018 report of Transparency International¹, so it has become very difficult for Iraq to achieve high growth rates and maintain its sustainability unless these distortions are removed and an economic policy is formulated that pushes economic indicators forward according to economic data.

Second: Structural Imbalances in the Iraqi ² Economy

The imbalance is evident when the oil sector dominates the majority of other sectors, whether in terms of its revenues, which amount to more than 90% of the export revenues, and it has been considered a major source of financing government investment spending and development programs over the past decades, and it is also a major financier of the state budget, while other sectors constitute only a small percentage of GDP, and this is noted in Table (1), which shows the extent of the structural imbalance in the Iraqi economy. The table shows that the contribution of the oil sector to GDP is very high compared to other sectors (agriculture and industry). This shows that the Iraqi economy is rentier dependent on a single source of income generation, and this is a result of the wrong economic policies that have led to negative effects on the country's economy, such as the low level of employment in the economic sectors, as well as the decrease in the productive capacity in the agricultural and industrial commodity sectors, as well as the decrease in the volume of commodity supply offset by the increase by individuals on goods and services, which the productive sectors were unable to provide³. Iraq relies on a large percentage of oil exports to finance the general budget, despite the government's attempts to diversify the sources of public revenues, and that this diversity contributes to the development of productive sectors, which may achieve growth in the GDP, reduce the level of unemployment, improve the income of individuals and raise the level of their welfare⁴.) billion barrels, and this raises the reserve ceiling by about 14 billion barrels or higher⁵.

¹Hussein Karim Ati, Iraq in Perceptions of Corruption in Transparency International Reports: Spotlight and Remedies, discussion paper published at [www.http://nazaha.iq](http://www.nazaha.iq)

²Ismail Obaid Hammadi, Structural Imbalances in the Iraqi Economy - Diagnosis and Ways to Treat - A Vision in the Future of the Iraqi Economy, Baghdad, Iraq Center for Studies, 2014, p. 41.

³Imad Abdul Latif Salem, The State and the Private Sector in Iraq, 1st Edition, Bayt al-Hikma, Baghdad, 2001, p. 48.

⁴Shaima Hamed Al-Alwani, The Impact of Foreign Trade Liberalization on Some Sustainable Development Indicators in Iraq for the Period (2004-2018), Unpublished Master's Thesis, Faculty of Administration and Economics, Iraq, University of Fallujah, 2020, p. 60.

⁵Ali Ahmed Daraj Al-Dulaimi, Saad Abdulkarim Hammad, The Effect of Public Expenditure and Family Expenditure on the Flow of Foreign Direct Investment in Iraq for the Period (2003-2014) Using the Error Correction Vector (VEC) Model, Journal of Anbar University for Economic and Administrative Sciences, Vol. 11, No. 26, p. 55.

Table (1)
The contribution of the oil sector compared to other sectors to the GDP in Iraq for the period
(2005-2022) is one billion dinars

Years	Percentage of the oil sector's contribution to GDP	Percentage of Contribution of Other Sectors to GDP ^{1*}
2005	53.6	46.4
2006	47.0	53
2007	47.6	52.4
2008	50.3	49.7
2009	39.5	60.5
2010	41.2	58.8
2011	45.1	54.9
2012	46.0	54
2013	40.5	59.5
2014	36.4	63.6
2015	26.3	73.7
2016	23.7	76.3
2017	31.3	68.7
2018	38.3	61.7
2019	38.9	61.1
2020	25.2	74.8
2021	31.6	68.4
2022	40.1	59.9

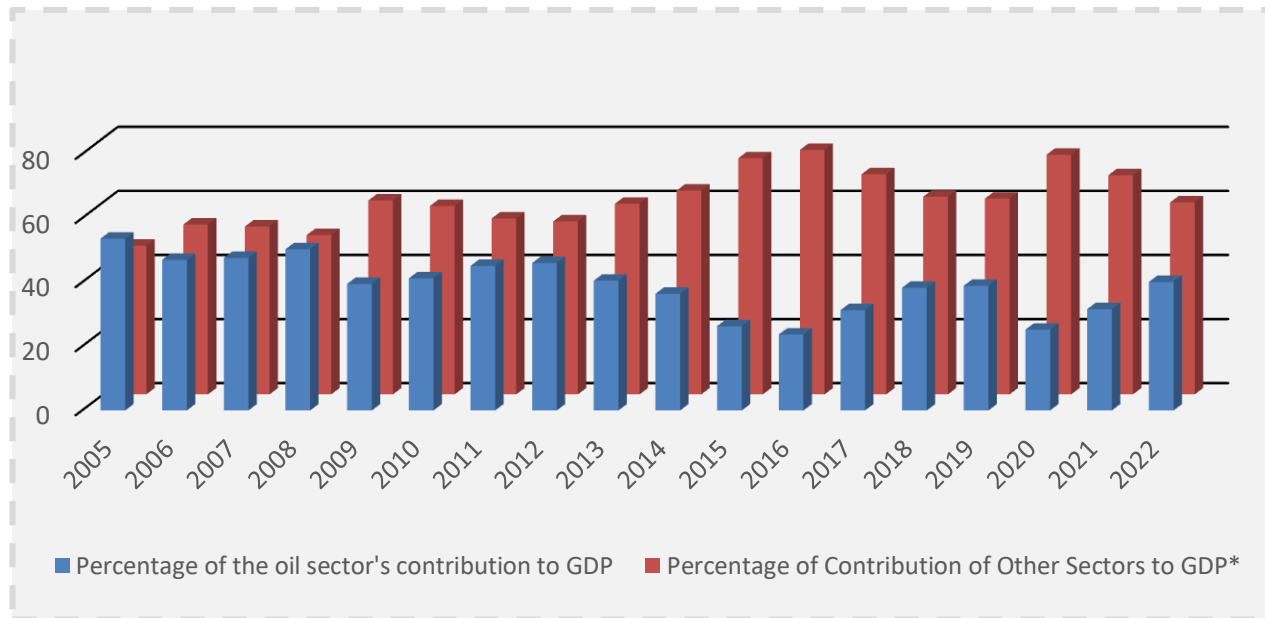
Source: Prepared by the researcher based on: Central Bank of Iraq, Department of Statistics and Research, for the period (2005 -2022).

It can be seen from Table (1) that the oil sector contributes and dominates the GDP, where in 2004 its highest contribution was 66.8% and its lowest contribution was in 1620 (7).23%). This is due to

* The percentage of contribution by the researcher was calculated according to the following formula: Oil revenues/GDP * 100

the entry of ISIS terrorist gangs and the decline in global oil prices, which has led to a decrease in the contribution of the oil sector to the GDP.

Figure (1)
Contribution of the oil sector to GDP compared to other sectors



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

The Second Requirement : Analysis of the Performance of Monetary Policy in the Face of External Shocks

Monetary policy is of great importance in contemporary economic thought, especially the measures taken by the monetary authorities, as the management of money and credit and the regulation of the general liquidity of the economy in order to achieve macroeconomic goals, foremost of which comes to push the wheel of economic growth or reduce inflation by using tools employed by the Central Bank in order to achieve this, as the monetary policy aims to achieve development and economic stability, which is one of the goals it seeks to achieve, in addition to achieving A desirable level of operation while maintaining an appropriate degree of stability in the overall level of prices, keeping the balance of payments out of balance to curb imbalances in economic activity ⁽¹⁾

First: Analysis of the Evolution of the Money Supply

¹ Ahmed Saleh Hassan Kazim, Thaer Saadoun Mohammed, The Role of Monetary Policy in Managing Macroeconomic Stability in Iraq for the Period 2004-2018, Tikrit Journal of Administrative and Economic Sciences, Issue (52), 2020, p. 337.

The period (2005-2022) witnessed fundamental changes in the monetary field, as the Central Bank of Iraq was granted independence in accordance with Law No. 56 of 2004, and the Central Bank succeeded in taking a set of measures to control the money supply, including replacing the old currency with a new national currency with good specifications that prevent its counterfeiting, and this helped to enhance the confidence of individuals in it, as well as rebuilding the reserves of the Central Bank of Iraq from foreign currency, which represents a cover for the local currency and a source of stability for the Central Bank of Iraq This led to a transition to a freer economy and less interference from the government¹. In order to determine the development of the performance of monetary policy, which is inferred through the following indicators:

1. Narrow Cash Supply(M1)

Through the data of Table (2), which reflects these indicators, it is clear that they have witnessed remarkable changes resulting from economic developments at the local and international levels, which in turn have had direct and indirect effects on the Iraqi economy, which required measures undertaken by the Central Bank of Iraq and within the tasks that fall on its shoulders to maintain economic and financial stability. Among these tasks is to maintain the stability of the value of the exported national currency to secure the requirements of the economy's needs by providing full coverage for it. Among the foreign reserves, which witnessed positive developments, especially in the narrow money supply, which witnessed an increase from JD11399 billion in 2005 to JD15460 billion in 2006, with a growth rate of (35.6%). The narrow money supply increased to JD37300 billion in 2009, with a growth rate of (32.3%). This is due to increased public expenditure resulting from foreign exchange revenues².

The tight money supply increased to 51743 billion dinars in 2010, with a growth rate of 38.7%. This increase is due to the increase in oil revenues, which resulted in an increase in government spending, and when analyzing the factors affecting the money supply, we find that the government's monetary position played an expansionary role, and this increase is also attributed to the increase in the cash reserves and the increase in government³ deposits. The narrow money supply decreased to JD77593 billion in 2014 with a negative growth rate of (0.9%) due to the fact that the over-bank currency accounted for (49.6%) of the money supply in 2014 compared to (50.4%) of current deposits, which reflects the increase in the percentage of the contribution of the currency outside banks to the money supply during this year in contrast to the decline in the percentage of the contribution of current deposits as a result of the recession in the level of economic activity and as a result of the sharp and exceptional decline witnessed in oil prices

¹ Sinan Al-Shabibi, Features of Monetary Policy in Iraq, Paper Presented to the Thirty-First Annual Meeting of the Council of Governors of Central Banks and Arab Monetary Institutions, Abu Dhabi, Arab Monetary Fund, 2007, p. 17.

² Central Bank of Iraq, General Directorate of Statistics and Research, Annual Economic Report, 2009, p. 16.

³ Central Bank of Iraq, General Directorate of Statistics and Research, Annual Economic Report, 2010, pp. 6-7.

globally during the second half of the year¹. It increased to JD86771 billion in 2019, with a growth rate of (11.4%). This is mainly due to the growth of foreign currency outside the banks as well as the increase in grants granted by the government to the unemployed as a result of the protests². The tight cash supply increased to 103353 billion dinars in 2020 with a growth rate of 19.1%. This is due to the increase in public expenditure during the spread of the health crisis of the Corona pandemic, the purchase of medical supplies and the rehabilitation of hospitals, as well as the granting of grants to families during the implementation of comprehensive³ urbanization. The tight money supply increased to JD 146487 billion in 2022 with a growth rate of (22.1%), mainly due to the increase in oil revenues following the easing of restrictions on closure measures between countries and the return of trade exchange, as well as the increase in Iraq's oil share in accordance with the OPEC agreement, which was reflected in the increase in the percentage of foreign reserves as a source of protection, which reflects the prudential policy adopted by the Central Bank in maintaining the balance of foreign reserves⁴.

2. Wide cash supply(M2)

In order to track the course of developments in the broad sense, the money supply in the broad sense is clear that it has exceeded the standard ratio of (20%) as it recorded an increase from (14684) billion dinars in 2005 to (21080) billion dinars in 2006 at a rate of (43.5%). In 2015, it decreased by (84527) with a negative growth rate of (9.0%). It increased again in 2022 by about (168291) and a growth rate of (20.3%). The increase in M2 domestic liquidity came as a result of the growth of the money supply.

Table (2)
The development of the money supply in the Iraqi economy for the period
(2005-2022) billion dinars

Years	Offer Criticism Narrow M1	Growth Rate M1 %	Wide Cash Supply M2	Growth Rate M2 %	Gross domestic product Gross Domestic Product (GDP) Current Prices	1M to GDP%	M2 to GDP% ratio
2005	11399	-	14684	-	103551	11.0081	14.18045
2006	15460	35.6	21080	43.5	109389	14.13305	19.27068

¹Central Bank of Iraq, General Directorate of Statistics and Research, Annual Economic Report, 2014, p. 30.

²Central Bank of Iraq, General Directorate of Statistics and Research, Monetary Policy Report, 2019, p. 1.

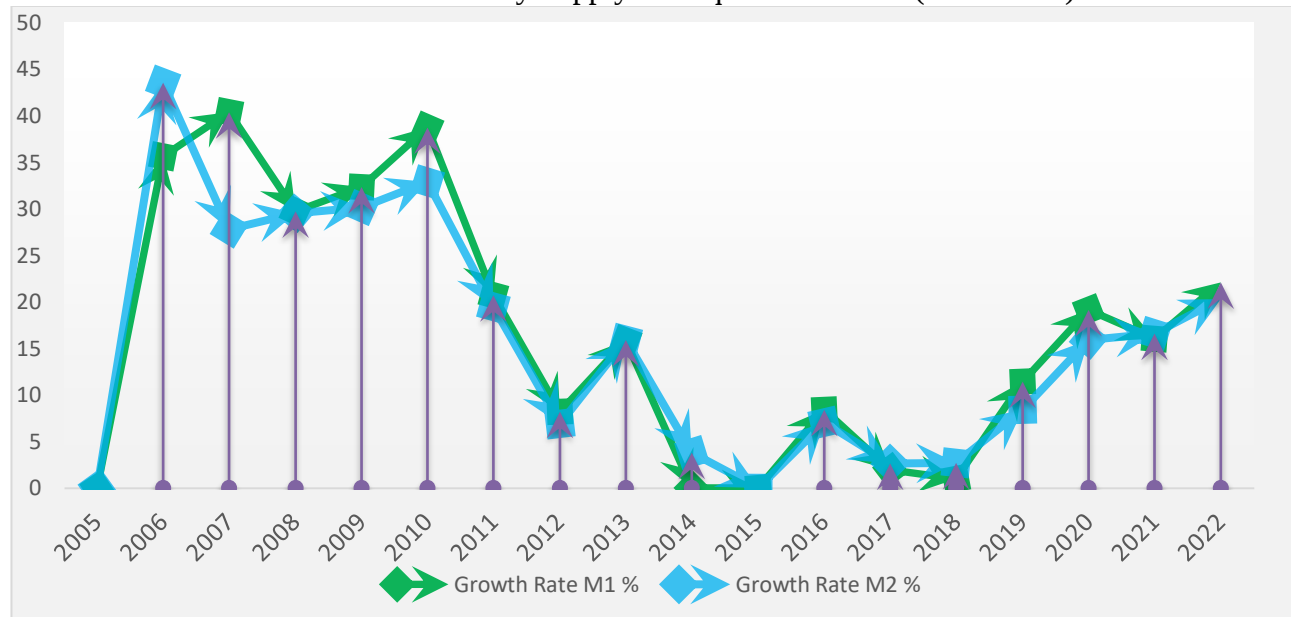
³ Central Bank of Iraq, General Directorate of Statistics and Research, Annual Economic Report, 2020, p. 24.

⁴Iraqi Ministry of Planning, General Directorate of Statistics and Research, Monetary Policy Report, 2022, p. 41.

2007	21721	40.4	26956	27.8	111455	19.48858	24.18555
2008	28189	29.7	34919	29.5	120626	23.36893	28.94815
2009	37300	32.3	45437	30.1	124702	29.91131	36.43646
2010	51743	38.7	60386	32.9	132687	38.99628	45.51011
2011	62473	20.7	72177	19.5	142700	43.77926	50.57954
2012	67622	8.2	77187	6.9	162587	41.59127	47.47428
2013	78318	15.8	89512	15.9	174990	44.7557	51.15264
2014	77593	0.9-	92988	3.8	178951	43.35991	51.96283
2015	69613	10.2-	84527	9.0-	183616	37.91227	46.03466
2016	75523	8.4	90466	7.0	208932	36.14717	43.29926
2017	76986	1.9	92857	2.6	205130	37.53035	45.26739
2018	77828	1.0	95390	2.7	210532	36.9673	45.30903
2019	86771	11.4	103441	8.4	222141	39.06123	46.56547
2020	103353	19.1	119906	15.9	195402	52.8925	61.36375
2021	119944	16.0	139885	16.6	198496	60.42641	70.47245
2022	146487	22.1	168291	20.3	212408	68.96492	79.23007

Source: Central Bank of Iraq, General Directorate of Statistics and Research, Annual Economic Reports for the Period (2005-2022)

Figure (2)
Evolution of the Money Supply in Iraq for the Period (2005-2022)



Source: The researcher's work based on the data of the table (2).

Second: The Speed of Money Circulation and the Monetary Stability Factor in Iraq

This indicator shows the number of times one Iraqi dinar is spent during the year, and from the data of Table (3), it is clear that the speed of money circulation during the study period (2005-

2022) has witnessed a slight fluctuation, so we find an increase at times and a decrease at other times, after it was recorded about (6.45) times in 2005, and in 2006 it was recorded (6.18) times with a growth rate in the GDP (29.99%), while in 2009 it witnessed a decrease in the number of times it is spent. One dinar during the year compared to the previous year to record (3.50) times and a negative growth rate in the gross product (16.05%), and the reason for this is due to the mortgage crisis that affected the economies of the world, and this percentage was almost stable with a slight rise and decrease until 2015, when it decreased to (2.98) times, and the GDP recorded a negative growth of (21.97%) due to the sharp and sudden decline in oil prices, then it decreased in 2020 to (1.92) times, and the GDP recorded a negative growth of (24.39%) Due to the spread of the Corona disease, the year 2022 increased to (2.61) times and the GDP recorded a growth of (27.19%), which reflects the improvement in the level of economic activity and its exit from the state of recession due to the shocks it was exposed to (health, economic).

As for the monetary stability index, which shows the extent of compatibility in the money supply with the demand for money, as one of the factors affecting the level of total activity, in a way that allows the achievement of certain economic goals (such as the stability of the prices of goods and services, the stability of exchange rates, and the availability of an appropriate structure for interest rates), which will have a positive impact on the stability of the financial system, and this coefficient indicates the existence of economic stability in the case that its value is equal to the correct one, but if the percentage of the monetary stability factor exceeds that. or less, the loss of monetary stability indicates either in favor of inflation in the event that the coefficient is greater than the correct one, and that there are pressures and possible increases in prices due to the imbalance between the cash flow and the commodity flow, or in favor of economic recession and the disappearance of inflationary pressures if the monetary stability factor is less than one. Among the data is Table (3), which monitors the extent of inflationary pressures suffered by the Iraqi economy during the study period, to record (2.43%), and it is clear that the value of this index, after recording its highest level in 2007, has decreased to its lowest level in 2019 to record (-5.11%), which is attributed to the shocks to the economy and the negative repercussions it left on most macroeconomic indicators, including the decline in growth rates in GDP, as for 2022. The percentage of this index reached (0.81%), based on the above, it is clear that there is a decline in the growth rates of domestic liquidity and by a percentage less than the growth rate of GDP.

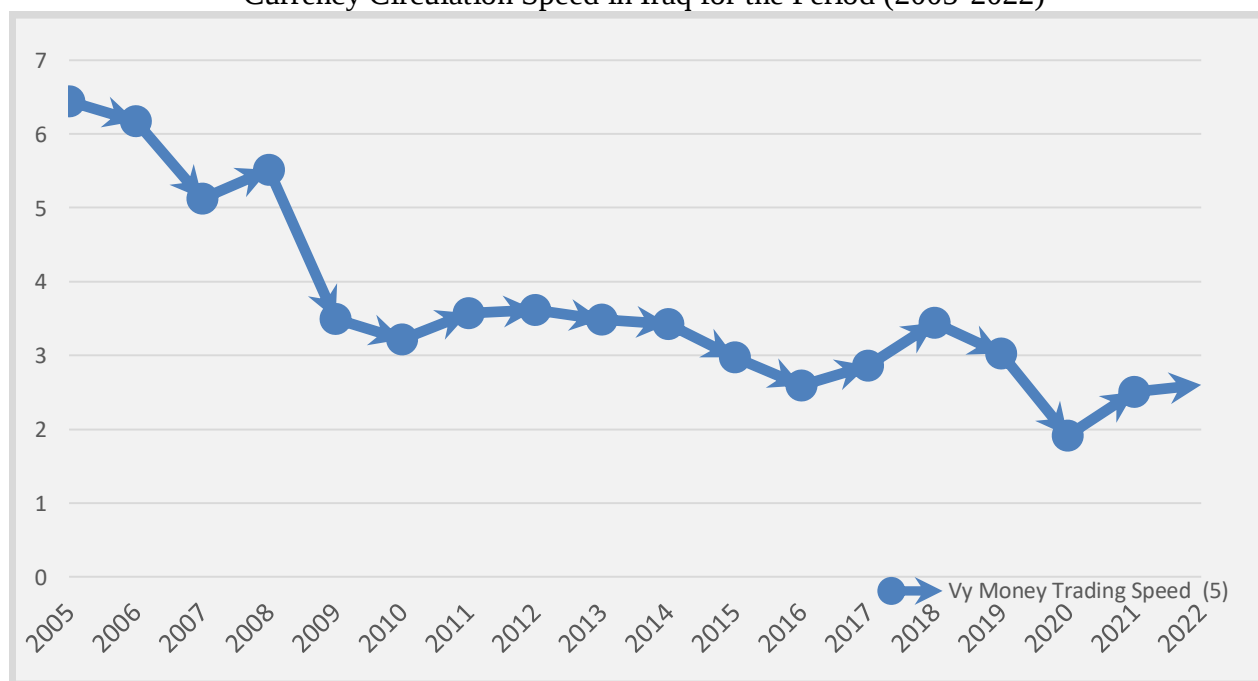
Table (3)
The speed of money circulation in Iraq for the period (2005-2022) billion dinars

Years	Gross Domestic Product (GDP) at Current Prices (1)	Growth Rate % (2)	Cash Supply M1(3)	Growth Rate % (4)	Vy Money Trading Speed (5)	Monetary Stability Coefficient $2/4 = 6$
2005	103551	-	11399	-	6.45	-
2006	109389	29.99	15460	35.6	6.18	1.19

2007	111455	16.65	21721	40.4	5.13	2.43
2008	120626	39.57	28189	29.7	5.52	0.75
2009	124702	-16.05	37300	32.3	3.50	-2.01
2010	132687	27.90	51743	38.7	3.22	1.39
2011	142700	33.86	62473	20.7	3.58	0.61
2012	162587	9.61	67622	8.2	3.62	0.85
2013	174990	11.58	78318	15.8	3.49	1.36
2014	178951	-2.61	77593	-0.9	3.43	0.34
2015	183616	-21.97	69613	-10.2	2.98	0.46
2016	208932	-5.45	75523	8.4	2.60	-1.54
2017	205130	12.78	76986	1.9	2.87	0.15
2018	210532	21.31	77828	1.0	3.45	0.05
2019	222141	-2.23	86771	11.4	3.03	-5.11
2020	195402	-24.39	103353	19.1	1.92	-0.78
2021	198496	51.50	119944	16.0	2.51	0.31
2022	212408	27.19	146487	22.1	2.61	0.81

Source: Prepared by the researcher in reliance on the Central Bank of Iraq, General Directorate of Statistics and Research, Annual Economic Reports for the Period (2005-2022)

Figure (3)
Currency Circulation Speed in Iraq for the Period (2005-2022)



Source: From the researcher's numbers based on the data of Table (3)

Third: Analysis of the Exchange Rate Reality in Iraq

After 2003, under the Central Bank of Iraq Law No. (56) of 2004, the Central Bank gained its independence in formulating and implementing monetary policies. This independence was a pivotal step in the framework of the restructuring of the Iraqi economy towards adopting a market economy, by building more efficient monetary and institutional foundations. One of the most prominent measures taken at the time was the reform of the exchange rate system in line with economic changes, in an effort to achieve monetary stability and enhance the value of the national currency. Prior to this shift, Iraq had adopted a multi-exchange rate system, with disparities between official and market rates reaching large levels, with a hybrid parallel market that played a pivotal role in determining the exchange rate according to a full float system, leading to a clear distortion of the official exchange system¹.

Through the foreign currency auction mechanism, the Monetary Authority was able to unify the exchange rates by meeting the demand for foreign currency and meeting the needs of banks and individuals, as well as financing imports. This contributed to achieving a kind of balance between the Iraqi dinar and foreign currencies. It also succeeded in curbing inflation rates by employing monetary policy tools to control the exchange rate and control liquidity levels, which helped to enhance the general economic stability².

Table (4) shows the evolution of the official and parallel exchange rates of the Iraqi Dinar against the US Dollar during the period 2005-2022, in addition to the percentage of the difference between the two markets. It is clear from the data that the monetary policy adopted by the Central Bank of Iraq has succeeded to a great extent in reducing the gap between the official and parallel rates, reflecting the efficiency of the monetary intervention tools used.

The exchange rate in the parallel market witnessed notable fluctuations during the period (2005-2022), as it gradually decreased after the intervention of the Central Bank through the currency auction, and the value of the dinar improved until 2014. However, unstable security and economic conditions, especially after 2015, led to a rise in the price in the parallel market as a result of the increase in demand for the dollar and the emergence of the phenomenon Dollarization. Despite the central bank's interventions to control the market, the price rose again after the

¹Hussein Attia Hassan, The Impact of Trade Openness on Exchange Rate Changes in the Parallel Market: Selected Models: A Standard Study, Ph.D. Thesis, Faculty of Administration and Economics, University of Al-Qadisiyah, 2025, p. 122.

²Mazhar Muhammad Saleh, The Exchange Rate System in Iraq: A Diagnostic Model for the Iraqi Reality, Iraqi Journal of Economic Sciences, Eighth Year, Issue 25, 2010, p. 2.

decision to devalue the dinar in late 2020. In 2021 and 2022, the exchange rate in the parallel market reached JD14 and JD1482, respectively¹.

Years	Official Exchange Rate	Parallel Exchange Rate	Percentage difference between the two prices
2005	1469	1472	0.20
2006	1467	1475	0.54
2007	1255	1267	0.96
2008	1193	1203	0.84
2009	1170	1182	1.03
2010	1170	1185	1.28
2011	1170	1196	2.22
2012	1166	1233	5.75
2013	1166	1232	5.66
2014	1166	1214	4.12
2015	1187	1247	5.05
2016	1190	1248	4.88
2017	1190	1258	5.71

**Table
(4)
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for the Period (2005-2022)

¹ Hussein Attiyah Hassan, a source mentioned above, p. 123.

2018	1190	1223	2.77
2019	1190	1221	2.60
2020	1190	1234	3.69
2021	1450	1474	1.65
2022	1462	1482	1.37

Source: Central Bank of Iraq, Annual Reports (2005-2022) Miscellaneous Pages

- The percentage of difference between the two prices was calculated by the researcher

Third Topic

Analysis of the Impact of Monetary Shocks on GDP for the Period (2005-2022)

First: Description of the Standard Model

The standard model in this study is based on the analysis of the dynamic relationship between GDP and monetary shocks, and in accordance with the purpose of the study in diagnosing the nature of the relationship between the studied variables, and the study is based on the theoretical foundations to explain the interaction between economic variables, where GDP represents the dependent variable, while monetary shocks represent independent variables, and include: narrow money supply (M1), and the speed of money circulation (V), and the parallel market exchange rate (EX).

This relationship is estimated using modern standard analysis tools, with the aim of revealing the general trends of the relationship and determining its statistical significance, which contributes to building an analytical framework that reflects the impact of monetary shocks on macroeconomic performance:

The dependent variable is the gross domestic product, symbolized by the symbol (GDP)

Independent variables

The market exchange rate, symbolized by the symbol (EX)

Narrow cash supply, symbolized by the symbol (M1)

The speed of circulation of money is denoted by the symbol (V)

The random variable is denoted by the symbol μ

Second: Statistical Characteristics of Data

Table (5) shows the statistical characteristics of the study variables, we note that the Gross Domestic Product (GDP) variable reached its highest value of (3011528) billion Iraqi dinars in 2022, and the lowest value of (532353.587) US dollars in 2005, with a standard deviation of (746300), and the probability value of the Jarque-Bera coefficient reached (1.018)) which is greater than (0.05) and this means that the variable is distributed naturally and does not suffer from a problem.

As for the variable of narrow money supply (M1), it reached its highest value of (146487) in 2022, and the lowest value of (11399) in 2005, with a standard deviation of (109.9), and the probability value of the Jarque-Bera coefficient was (0.272767), which is greater than (0.05), which means that the variable is naturally distributed and does not suffer from a problem.

As for the parallel exchange rate variable (EX), it reached its highest value of (1482) in 2022, and the lowest value of (1182) in 2009, with a standard deviation of (35818), and the probability value of the Jarque-Bera coefficient was (4.28), which is greater than (0.05), which means that the variable is naturally distributed and does not suffer from a problem.

As for the variable of the speed of money circulation (V), its highest value was (6.45) in 2005, and the lowest value was (1.92) in 2009, with a standard deviation of (1.28), and the probability value of the Jarque-Bera coefficient was (3.140), which is greater than (0.05), which means that the variable is distributed naturally and does not suffer from a problem.

Table (5)
Statistical Characteristics of Data for the Period (2005-2022)

	M1	GDP	EX	V
Mean	67129.06	1898938.	1280.333	3.671667
Median	72568.00	1958026.	1233.500	3.440000
Maximum	146487.0	3011528.	1482.000	6.450000
Minimum	11399.00	532353.6	1182.000	1.920000
Std. Dev.	35818.33	746300.4	109.9256	1.287159
Skewness	0.281291	-0.300970	1.180772	1.022798
Kurtosis	2.782762	2.002482	2.631457	2.950940
Jarque-Bera	0.272767	1.018030	4.284536	3.140152
Probability	0.872508	0.601087	0.117388	0.208029
Sum	1208323.	34180877	23046.00	66.09000
Sum Sq. Dev.	2.18E+10	9.47E+12	205422.0	28.16525
Observations	18	18	18	18

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

Third: Unit Root Test

Determining whether the variables under study have a unit root is an essential step before estimating the short- or long-term relationship between them. In this context, the unit root tests, the extended Dickie–Fuller test (ADF) and the Phelps–Peron test (PP), were applied to determine the stability of time series. The estimation was performed according to various formulas, including equations with constants, equations with trend, and without them, to accurately diagnose the nature of the series. The following results summarize their findings Tests

1- Dickie Fuller Extended Test (ADF)

From Table (6), we can see that both the money supply (M1) and the speed of money circulation (V) are stable at the level and significantly at (1%) with a fixed limit and a temporal trend, while the exchange rate has not stabilized at the level, but has become stable at (Differences 1) and at a statistical significance (5%), without a breakthrough or trend, while the GDP (GDP)) has not settled at the first level or difference according to the (ADF) test, so the test of the appropriate standard model (such as the common integration model) depends on the results of other tests such as (Phelps-Peron PP) test.

Table (6)
Sleep Test – Dickie Fuller

UNIT ROOT TEST TABLE (ADF)					
<u>At Level</u>		EX	GDP	M1	V
With Cons...	t-Statistic	-1.6202	-0.9118	0.6831	-3.5846
	Prob.	0.4662	0.7779	0.9908	0.0090
		n0	n0	n0	***
With Cons...	t-Statistic	-2.1137	-2.0455	-5.0614	-3.5843
	Prob.	0.5277	0.5648	0.0006	0.0396
		n0	n0	***	**
Without C...	t-Statistic	0.3298	1.6655	2.0275	-2.4212
	Prob.	0.7775	0.9756	0.9891	0.0161
		n0	n0	n0	**
<u>At First Difference</u>		d(EX)	d(GDP)	d(M1)	d(V)
With Cons...	t-Statistic	-2.5376	-1.4238	-0.5237	-1.8635
	Prob.	0.1119	0.5644	0.8784	0.3469
		n0	n0	n0	n0
With Cons...	t-Statistic	-2.8691	-0.9395	-0.3181	-1.7651
	Prob.	0.1797	0.9439	0.9883	0.7085
		n0	n0	n0	n0
Without C...	t-Statistic	-2.5857	-0.7870	0.3501	-1.8799
	Prob.	0.0105	0.3708	0.7827	0.0578
		**	n0	n0	*

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

2- Phelps – Peron PP Test

In addition to the Dickey Fuller Extended Test, we test (PP) to enhance the test results, as the (PP) test is more accurate than the (ADF) test , especially in small samples, and Table (7)

shows the test results of this model, as we note that the speed of money circulation (V) is stable at the level, and is statistically significant (5%) without a constant and direction. While the rest of the variables were not stable until the first difference was taken, which are both GDP and exchange rate, while the money supply (M1) did not stabilize at the first difference, and since it was stable at the Dickie Feller test, and since the degrees of rest are different between the level and the first difference, the (ARDL) model is the appropriate model for testing the research variables.

Table (7)
Sleep Test – Phelps Peron

		UNIT ROOT TEST TABLE (PP)			
<u>At Level</u>		EX	GDP	M1	V
With Cons...	t-Statistic	-1.6904	-1.4161	1.0169	-2.2395
	Prob.	0.4315	0.5695	0.9964	0.1946
		n0	n0	n0	n0
With Cons...	t-Statistic	-1.3985	-2.2588	-0.5878	-2.1180
	Prob.	0.8528	0.4500	0.9765	0.5265
		n0	n0	n0	n0
Without C...	t-Statistic	-0.1030	0.9967	3.9303	-2.1815
	Prob.	0.6446	0.9144	1.0000	0.0290
		n0	n0	n0	**
<u>At First Difference</u>		d(EX)	d(GDP)	d(M1)	d(V)
With Cons...	t-Statistic	-2.7361	-2.5244	-0.9581	-3.2155
	Prob.	0.0733	0.1143	0.7634	0.0234
		*	n0	n0	**
With Cons...	t-Statistic	-3.1818	-2.4025	-1.2339	-3.3536
	Prob.	0.0969	0.3750	0.8950	0.0666
		*	n0	n0	*
Without C...	t-Statistic	-2.7454	-2.2767	-0.0511	-3.0612
	Prob.	0.0067	0.0230	0.6622	0.0027
		***	**	n0	***

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

1- Drafting the Standard Model

After revealing the stillness, and the results of the time series test, we found that the variables adopted in the research, some are stable at the level and others at the first difference, and since the dormancy ranks are different, so the appropriate model for the co-integration test is the (ARDL) model, according to the following equation:

$$GDP = \beta_0 + \beta_1 EX + \beta_2 M_1 + \beta_3 V + \varepsilon$$

β_0 Fixed limit.

$\beta_1, \beta_2, \beta_3$ Long-term transactions through which to know the possibility of a joint integration.

ε Random error limit .

Fourth: Analysis of the Distributed Slowdown Model of the Impact of Monetary Shocks on the Gross Domestic Product

After the test of the time series inertia, another stage comes which is the estimation of the distributed slowdown self-regression model (ARDL) of the monetary shock function (EX, M1, V) and its relationship to the gross domestic product (GDP), we observe through the results received

from the program according to the (ARDL) analysis and as shown in Table (8) the significance of the statistical parameters between the variable, and the degree of this significance varies according to the degree of slowdown, and this indicates the existence of a relationship between the dependent variable (GDP) and the independent variables (EX, M1, V), and the value of (R²) reached (99%), which means that the independent variables (EX, M1, V) explain (99%) of the changes in the dependent variable (GDP), while the remaining percentage is the result of changes outside the model, and the value of the corrected model (R²) reached (99%), and the estimated model is considered significantly, and this is explained by the value of (F) calculated and amounted to (43042) with a score of (0.0000%) which is less than 1%, and as for the value of (D-W) it is higher than the value of (Adjusted R²) and this indicates that the model is free of standard errors and problems.

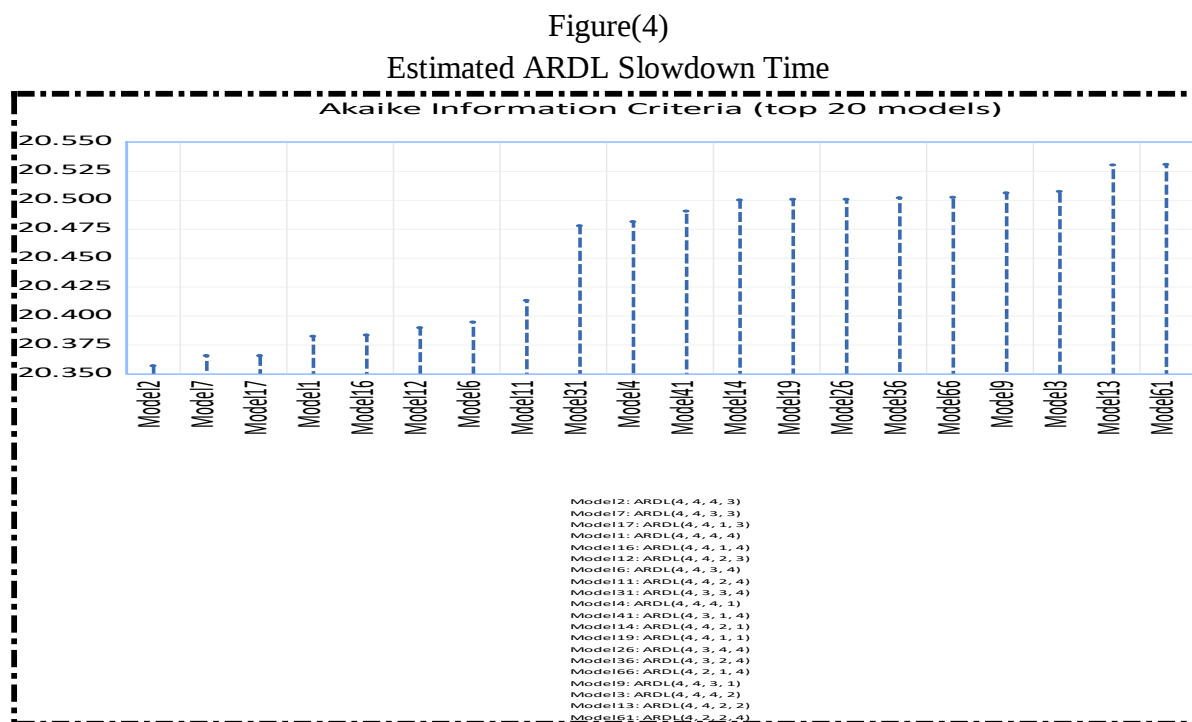
Table (8)
Distributed Slowdown Self-Regression Model (ARDL)

Dependent Variable: GDP Method: ARDL Date: 08/02/25 Time: 17:36 Sample (adjusted): 2006Q1 2022Q1 Included observations: 65 after adjustments Maximum dependent lags: 4 (Automatic selection) Model selection method: Akaike info criterion (AIC) Dynamic regressors (4 lags, automatic): M1 V EX Fixed regressors: C Number of models evaluated: 500 Selected Model: ARDL(4, 4, 3, 4)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	2.931465	0.094950	30.87387	0.0000
GDP(-2)	-3.725615	0.228650	-16.29394	0.0000
GDP(-3)	2.343407	0.212507	11.02745	0.0000
GDP(-4)	-0.614932	0.077508	-7.933824	0.0000
M1	-17.57474	7.932281	-2.215598	0.0317
M1(-1)	59.63639	28.48170	2.093850	0.0418
M1(-2)	-77.20028	41.56387	-1.857389	0.0697
M1(-3)	49.21527	29.42263	1.672701	0.1012
M1(-4)	-11.63716	8.552993	-1.360595	0.1803
V	-131489.2	41387.16	-3.177053	0.0027
V(-1)	363034.1	109793.0	3.306533	0.0018
V(-2)	-351330.8	114621.9	-3.065128	0.0036
V(-3)	140688.9	46531.91	3.023493	0.0041
EX	-2944.366	541.1258	-5.441187	0.0000
EX(-1)	8411.986	1713.559	4.909074	0.0000
EX(-2)	-10506.13	2347.882	-4.474726	0.0000
EX(-3)	6551.059	1628.634	4.022426	0.0002
EX(-4)	-1709.490	485.7852	-3.519026	0.0010
C	146288.2	28225.45	5.182849	0.0000
R-squared	0.999941	Mean dependent var	1979192.	
Adjusted R-squared	0.999917	S.D. dependent var	622066.4	
S.E. of regression	5653.681	Akaike info criterion	20.35687	
Sum squared resid	1.47E+09	Schwarz criterion	20.99246	
Log likelihood	-642.5983	Hannan-Quinn criter.	20.60765	
F-statistic	43042.02	Durbin-Watson stat	2.566558	
Prob(F-statistic)	0.000000			

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

The Akai Information Standard (AIC) was adopted to select the optimal model among 500 possible ARDL models, and the graph showed that the ARDL model (4,1,3) was the best as the

lowest AIC value score was about 20.35, and a comparison of the top 20 models shows that the differences in the AIC standard are minimal, which enhances the stability of the results and the reliability of the chosen model



Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

Sixth: Testing the Limits of Joint Integration

Table (9) builds the results of the boundary test according to the (ARDL) model to measure the long-term relationship between the monetary shock and GDP, we note that the calculated (F-statistic) value of (10.2056) exceeds the upper limit of the tabular value and the minimum (I~0) and when it is statistically significant (1%), and thus We reject the null hypothesis and accept the alternative hypothesis, which suggests that there is a long-term co-integration between the monetary shock and GDP.

Table (9)
Boundary testing for co-integration according to the ARDL methodology

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-Statistic k	10.20567 3	10%	Asymptotic: n=1000	
		5%	2.37	3.2
		2.5%	2.79	3.67
		1%	3.15	4.08
Actual Sample Size	65	10%	Finite Sample: n=65	
		5%	2.492	3.35
		1%	2.976	3.896
			4.056	5.158

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

Sixth: Testing the parameter and long-term equation

Table (10) shows the results of the test of the long-term relationship of the co-integration between the variables of the monetary shock as independent variables and the GDP as a dependent variable, according to the (ARDL) methodology with quarterly data during the study period (2005-2022), and the results of the test indicate the significance of the estimated parameters of the model, which is explained by the value of (Prob.) as its value came with a significant level of less than (0.05), and for the equation of the long-term relationship, it is clear to us through the value of the fixed limit that it is significant and statistically significant, as the value of (Prob) is less than (0.01), thus we reject the null hypothesis and accept the alternative hypothesis that there is a long-term joint integration between monetary shocks and GDP.

In order to estimate the long-term relationship based on the value of the parameters shown in the table below, in order to interpret the equation statistically and match it with the economic theory, the regression equation can be written as follows:

$$GDP = 2227464 + 37.14478M1 + 318281.8V - 2988.7EX + \varepsilon \dots \dots (2)$$

The equation indicates that there is a long-term relationship between monetary shocks and GDP, as GDP is positively correlated with the tight money supply, i.e., an increase in the money supply by one unit leads to an increase in GDP by (37.14478), which is consistent with economic theory, and GDP is directly related to the speed of money circulation, as the relationship was very strong, and this means that an increase in the money supply by one unit leads to an increase The GDP is (31828.8) units, as for the exchange rate, it is negatively related to the GDP, as an increase in the exchange rate by one unit leads to a decrease in the GDP by (2988.7) units, and this is in accordance with the economic logic, as the increase in the exchange rate is what explains the deterioration of the value of the Iraqi dinar and the US dollar, and any increase in the exchange rate is considered an increase in the cost of imports, because most of the domestic needs are met. The increase in the quantity required on these commodities to meet local needs is directly reflected in the increase in demand for the US dollar, and thus the increase in the supply of the local currency, which leads to a decline in its value against hard currencies.

Table(10)
Long term parameter testing according to ARDL methodology

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
M1	37.14478	3.473693	10.69317	0.0000
V	318281.8	108158.5	2.942735	0.0051
EX	-2998.725	722.2001	-4.152208	0.0001
C	2227464.	372139.4	5.985565	0.0000
EC = GDP - (37.1448*M1 + 318281.7703*V - 2998.7253*EX + 2227464.1464)				

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

Seventh: Error Correction Test (ECM) according to the (ARDL) methodology

The next stage involves verifying the short- and long-term correlations between monetary shocks and GDP after proving a long-term equilibrium relationship (co-integration). This will be done by estimating the error correction model, which is a crucial step in ARDL tests, this test relies on the error correction limit (Coint Eq (-1)) to clarify the correction relationship between the short and long run. If the error correction limit is negative and statistically significant, this implies that there is a co-integration relationship between the dependent variable and the interpreted variables, and the results shown in Table (11) indicate that the error correction coefficient or adjustment speed (ECM-j) is **(0).065675-)** which is negative and at a significant level of less than (1%), thus achieving the necessary and sufficient condition for the existence of a long-term equilibrium relationship between the dependent variable and the independent variables in the short term, and a correction of 6.56% of the current period is made for any shock or change in the independent variables that has disturbed the equilibrium in the past. This shows that there is an equilibrium relationship between monetary shocks and GDP, with a significant impact at the level of 1%. This means that if a monetary shock of 1% occurs over time, it leads to an increase in GDP by 6%.65%, with a period of time (0.15037594) annual semesters, thus rejecting the null hypothesis ($H_0=0$), and accepting the alternative hypothesis ($H_1 \neq 0$) that there is a common integration in the short term between the study variables.

Table (11)
Error Correction Model (ECM) according to the ARDL methodology

ARDL Error Correction Regression				
Dependent Variable: D(GDP)				
Selected Model: ARDL(4, 4, 3, 4)				
Case 2: Restricted Constant and No Trend				
Date: 08/02/25 Time: 17:38				
Sample: 2005Q1 2022Q4				
Included observations: 65				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	1.997140	0.072171	27.67225	0.0000
D(GDP(-2))	-1.728475	0.109289	-15.81557	0.0000
D(GDP(-3))	0.614932	0.055587	11.06258	0.0000
D(M1)	-17.57474	6.454992	-2.722659	0.0091
D(M1(-1))	39.62217	17.53862	2.259139	0.0287
D(M1(-2))	-37.57811	18.18634	-2.066283	0.0445
D(M1(-3))	11.63716	7.140926	1.629643	0.1100
D(V)	-131489.2	36857.59	-3.567493	0.0009
D(V(-1))	210641.9	63651.15	3.309317	0.0018
D(V(-2))	-140688.9	42399.42	-3.318180	0.0018
D(EX)	-2944.366	397.0361	-7.415865	0.0000
D(EX(-1))	5664.560	994.6673	5.694930	0.0000
D(EX(-2))	-4841.569	1023.861	-4.728736	0.0000
D(EX(-3))	1709.490	421.8273	4.052583	0.0002
CointEq(-1)*	-0.065675	0.008818	-7.447522	0.0000

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

Eighth: Diagnostic Tests

1- Self-correlation testing in the ARDL model

Table (12) shows that the (ARDL) model estimating the relationship between monetary shocks (EX, M1, V) and Gross Domestic Product (GDP) is free of the problem of self-correlation according to the (Test) test, i.e. accepting the hypothesis of nullity that states that there is no problem of self-correlation, because the value of (2.50) Prob is insignificant at the level of (5%) for all models, i.e., the errors are independent of each other.

Table (12)
Self-Connection

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	2.282099	Prob. F(2,50)	0.1126
Obs*R-squared	5.437135	Prob. Chi-Square(2)	0.0660

Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

2- Error Inconsistency Test in the ARDL Model

We can see through Table (13) that the estimated model is free of the problem of variance heterogeneity as the value of Prob (1.62) F was insignificant, i.e., the residuals have a homogeneous variance and the differences between their variances are insignificant.

Table (13)
Contrast Heterogeneity Test

Heteroskedasticity Test: ARCH			
F-statistic	4.81E-05	Prob. F(1,62)	0.9945
Obs*R-squared	4.96E-05	Prob. Chi-Square(1)	0.9944

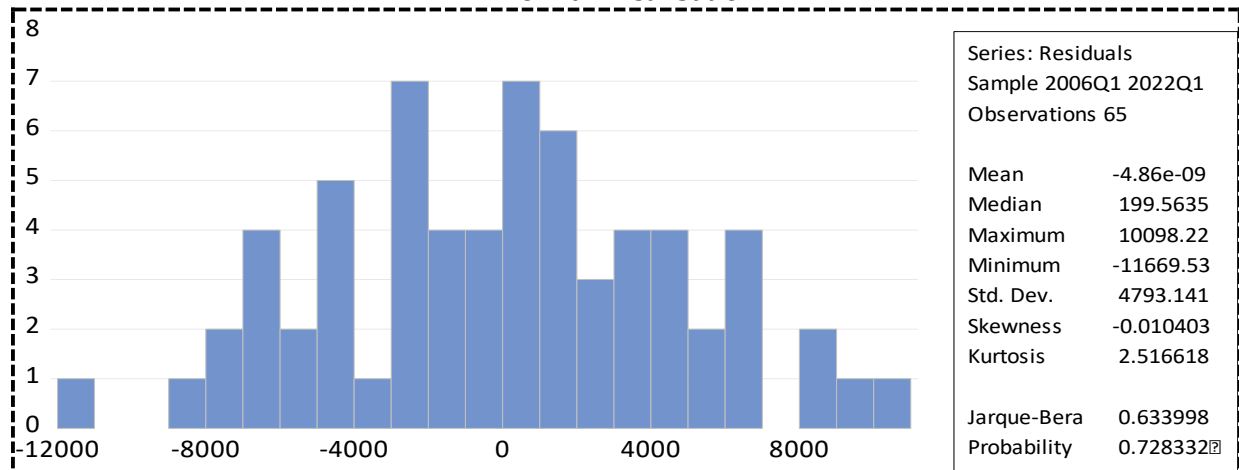
Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

3- Natural Distribution Test

Figure (5) illustrates the problem of the normal distribution of the estimated model, and the statistical results indicate that the null hypothesis that random errors are naturally distributed in the estimated model is not rejected, as the probability value of the Jarque-Bera coefficient was

insignificant at the level of (0.05), and therefore it can be said that the remainder of the model is distributed in a natural way and the estimated model does not suffer from statistical problems.

Figure (5)
Normal Distribution

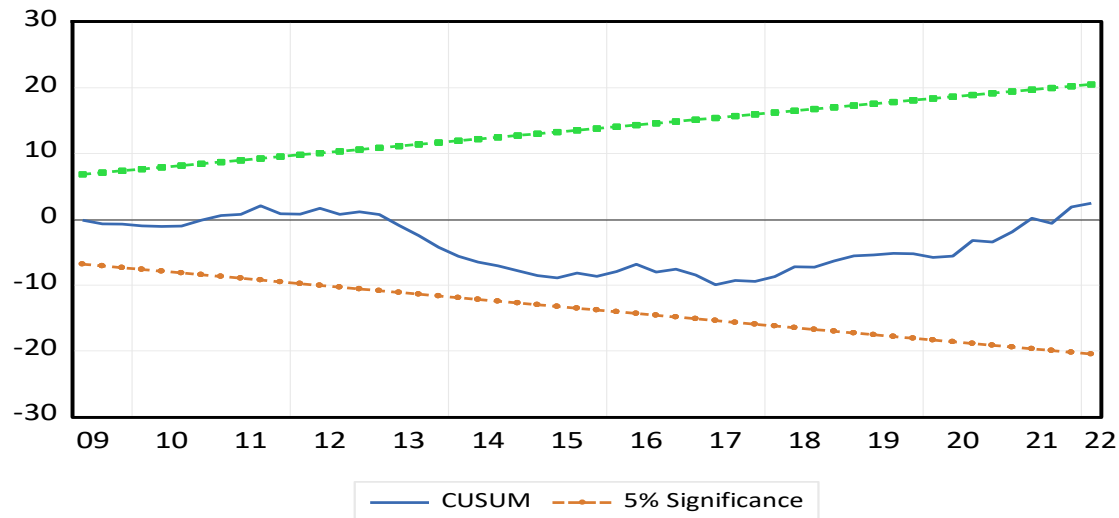


Ninth: Stability Test for ARDL Model Parameters

ARDL stability tests are one of the primary tools for verifying that time series are free of structural changes, and they rely mainly on two tests: the CUSUM test and the CUSUM of Squares test. The importance of these tests lies in their ability to detect the stability of the model, and the consistency of the long-term estimated parameters with those of the short term. Within the critical threshold of 5% significance, this indicates that the model is stable and that there are no structural changes affecting the results, enhancing the reliability of the estimates.

Figure (6) shows the result of the cumulative total residue test (CUSUM), as the line of the cumulative sum of the residues is within the critical lines at the level of (0.05), which indicates the stability of the tested model and the absence of structural changes that affect the relationship between the variables during the time period.

Figure (6)
Cumulative Total Residual CUSUM

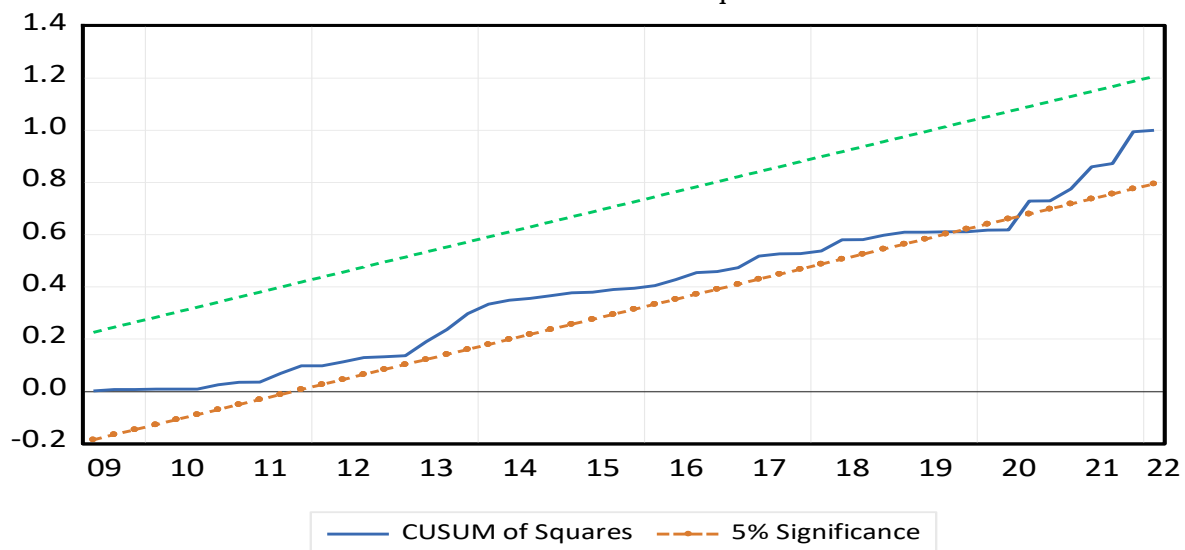


Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

The graph in Figure 7 indicates that the cumulative sum of quadratic residues has deviated slightly from the critical values limits in 2020 and this indicates a slight structural deviation in values and long-term estimated parameters instability.

Figure (7)

The cumulative sum of the residual squares of CUSUM.



Source: Prepared by the researcher based on the data of the statistical program EVEIWS12

Conclusions and recommendations

First: Conclusions

1. Monetary shocks directly affect economic activity, as the change in the monetary mass (M1), the speed of money circulation (V), and the exchange rate (EX) are among the most important monetary instruments that are reflected on the GDP.

2. The relationship between monetary policy and GDP is two-way: expansionary monetary policies can stimulate the economy, while exchange-rate shocks can weaken purchasing power and reduce production.
3. The exchange rate in the parallel market reflects economic and monetary instability, and it is a sensitive instrument that quickly shows its impact on GDP through price fluctuations and the movement of foreign trade.
4. The existence of a statistically significant long-term relationship between GDP and M1, V, and EX, which shows that monetary variables explain a large part of the change in GDP.
5. The monetary mass (M1) has a positive and moral effect on GDP, which means that expansionary monetary policies contribute to stimulating economic growth, and the speed of money circulation (V) has a very strong positive effect, and indicates that improving the efficiency of the monetary system has effects on GDP, while the parallel exchange rate (EX) has an inverse effect and is highly geographically significant. In other words, the rise in the price of the dollar in the parallel market leads to a significant decline in GDP, which reflects the fragility of the monetary situation.
6. The model explains the existence of a short-term relationship, and this lies through the results of the Error Correction Model (ECM) test, which measures the long-term relationship in the short term after the necessary and sufficient condition in this test has been met.

Second: Recommendations

1. Enhancing the stability of the exchange rate in the parallel market through effective measures by the Central Bank, including reducing the gap between the official and parallel rates.
2. Raising the efficiency of monetary policy so that it is not limited to increasing the monetary mass, but also includes controlling the speed of money circulation and supporting the banking sector.
3. Periodically monitor the parallel market, as an indicator of the effectiveness of monetary policy and market confidence.
4. Diversify monetary policy instruments including open market instruments, mandatory reserves, and interest rate to reduce monetary shocks.
5. Use the results of the model to build early warning policies for monetary shocks based on M1, V, and EX fluctuations.

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