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The Impact of Gross Domestic Product Response to the Money Supply Shock in the Iraqi Economy for the Period (2004-2021)

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Abstract

The research aims to clarify the response of the GDP to the M1 shock. It includes access to the results using standard methods, where the standard model was built according to quarterly data using the program STATA 17. According to the joint integration model ARDL, the research found a long-term equilibrium positive for the relationship between GDP and the money supply in Iraq, as the change in the money supply by a certain percentage will lead to a change in GDP by about 71% of that percentage. In the event of a shock in the Iraqi economy, the impact of the M1 will differ from what it was before the shock, as the shock will increase its effectiveness towards GDP by about 10% more than before the shock. At the same time, the relationship between them remains positive. One of the most important recommendations is to work to achieve a proportional balance between the money supply and GDP. This is done through the control of monetary policy to reach a real balance between the monetary and commodity sectors. It contributes to addressing the chronic imbalances of most economic sectors, especially in productivity and its vulnerability to monetary economic shocks.

Paper type: *Research paper.*

Keywords: Money Supply M1, Gross Domestic Product, Shocks, Cointegration.

1. Introduction

The Iraqi economy has witnessed many economic shocks, most of which are external due to the dependence of the Iraqi economy on one resource, and the success of monetary policy in any country depends largely on the stability of this relationship between the money supply and the economic variables according to the degree of response because the money supply is the most important element that achieves balance in the money market and economic stability and works alongside other policies in achieving the general economic goals, which are reducing inflation rates and achieving a certain level of economic growth, as well as the balance of payments. Through this important role, the monetary authority, represented by the Central Bank, can achieve specific goals according to priorities determined by the economic problem that the economy suffers from, with an almost complete disconnection between price changes and output, although they together and in their relationship reflect the macroeconomic path with its balance and stability. The picture is clear in the Iraqi economy, and monetary policy aims to achieve relative stability through the price gate through the money supply to stimulate the performance of the output as an expression of the overall activity. The monetary authority faces this target of a decrease in the effects achieved in the output. Based on the above, the research sought to analyse and measure the response of the GDP to the impact of the money supply shock, as well as try to identify the nature of the relationship and the role that the money supply can play in affecting the GDP in Iraq. It is therefore important that this policy has the credibility to respond to economic shocks, which can help curb economic cycles and improve macroeconomic performance in achieving the ultimate goals.

1.1 Literature Review

Numerous studies have addressed the topic of monetary supply and its impact on macroeconomic indicators, including gross domestic product (GDP), both locally and internationally. We will review some of these studies closely related to our research topic to gain insight into their results and build on their findings to advance scientific research. We will categorise these studies as follows:

Liang and Huang (2011) explained the relationship between M2 and US GDP as well as a brief forecast of future US economic sentiment based on the current policy direction from the Federal Reserve. The most important conclusion is that changes in GDP play an important role in estimating the change in M2. Shehab (2013) concluded that there is a direct relationship between money supply and GDP, and one of the most important recommendations is the need to document the relationship between money supply, interest rates, investment, and GDP growth. clear national monetary policy. Mutair (2014) proved that the results of the causal test of the study model show that there is a unidirectional causal relationship extending from the narrow and wide money supply to the nominal GDP, and this reflects the possibility of monetary policy affecting output and thus the M2 money supply and economic growth in the long run. It also represents the Central Bank of Iraq's power to manage the money supply through its foreign currency holdings earned from oil income, and by following a managed exchange rate policy, it can design an independent monetary policy through which it can influence macroeconomic variables. These results are confirmed by an error-corrected model of the model variables. Thus, the results show the applicability of the monetary business cycle theory to the relationship between changes in money supply and nominal output. Al-Hamdani et al.'s (2018) research proves that the effect of money supply on GDP for the period 2005–2015 has a very strong effect, reaching R² (93%), and this indicates that the change in GDP is explained by the money supply. by (93%), and this makes the views and ideas of the monetary school more appropriate in the case of Iraq in light of the shift towards market mechanisms and the fact that monetary inputs can be a strong explanation for changes in the gross domestic product, in addition to the increase in the money supply, if balanced with GDP. The adoption of this approach is a reason to achieve monetary stability in Iraq. Viet Le (2021) found a negative association between the real interest rate and inflation as well as between the money supply and the real interest rate. Finally,

the findings suggest that the late money growth rate is positively associated with the GDP growth rate, while it is adversely related to the GDP growth rate. The research problem lies in the negative effects left by the shock of money supply on the gross domestic product in Iraq during the period studied in the short or long term.

The research objectives is to measure and analyze the impact of the money supply shock on the gross domestic product during the period under study by building a standard model.

2. Material and Methods

The spatial limits of research are limited to the case of the Iraqi economy, the approved research period for analysis and measurement purposes extends from 2004–2021, which is the period during which Iraq witnessed important economic changes at the level of economic policy and the economic system in general. For measurement purposes, the number of observations has been increased for the same period by adopting quarterly data to ensure the use of stability tests.

2.1 Research hypothesis

The research hypothesis is based on the existence of a significant causal relationship extending from the M1 to the gross domestic product in Iraq. This hypothesis branches into:

1. The presence of a positive link between a money supply shock and the gross domestic product that positively affects economic activity in Iraq
2. The existence of a negative relationship between a monetary shock and the gross domestic product negatively affects economic activity in Iraq.

2.2 Concept of money supply

The central bank possesses numerous powerful tools at its disposal to affect credit allocation and investment (Hussein and Hamdan, 2020). and The money supply is the most important tool used by the monetary authority represented by the Central Bank to influence the relevant economic variables, and in the context of identifying the concept of M1, or what some economists call the monetary mass, it has been defined as "a set of means of payment available to society during a certain period, which are in the possession of individuals, projects, and various institutions" (Al-Hamdani, 2018), and it is also defined as "the set of monetary units circulating in the economy during a certain period" (AwadAllah, 1998), and the American Central Bank after 1980 defines the money supply. The nominal, that is, the monetary value of the money supply in a country without calculating its purchasing power, while the real money supply was defined as both the monetary value of the money supply and the general level of prices, and therefore the real money supply represents "the nominal money supply divided by the general level of prices", MS / P (Abdman, 1999). The term "money supply" refers to "the total balance of publicly owned local means of payment in the state," and the concept of "public" refers to individuals, commercial institutions, and all groups that keep money except for the central government or the treasury because they enslave the cash balances in the possession of the government or Treasury Directorate is one of the components of the money supply due to the importance of money that is produced from non-commercial operations, while the money that the public possesses in a form intended for spending consists of legal money and bank money, or "deposits money" (Khalil, 1982, p. 57).

2.3 Money Supply Metrics

The Central Bank followed a set of procedures and measures to manage and control the money supply in order to achieve price stability and ensure access to a sound financial system, and it has directed these procedures and measures toward enhancing confidence in the local currency and in the banking system as an attempt to curb cash leakage from banks by reducing currency in circulation (Dagher and Ashour, 2014). The main content of monetary policy is managing the money supply, whether directly (through money aggregates) or indirectly (through targeting inflation through interest or the exchange rate). Measuring the money supply is important, so it is necessary to track the money supply measures and clarify their components that differ in different systems. The financial and monetary aspects of the economy are as follows:

1. **Monetary Base (M_0):** It is called the first standard monetary rule, and it is the easiest and most widespread. It is a measure of the amount of notes and coins in circulation in an economy, in addition to what is available in the form of cash reserves of commercial banks at the central bank. It is a narrow measure for measuring the money supply (Kazem and Al-Atabi, 2020).

2. **The Narrowest (M_1):** It includes a group of currencies in circulation and demand deposits, or current accounts, and current accounts of companies that do not pay interest, such as travelers' checks issued by banks, so the narrow measurement includes currency and what is similar to a currency in terms of immediate performance. The flexibility represented in current accounts and traveler's checks is included in the measurement (Al-Dagher, 2019).

3. **A broader measure (M_2):** In addition to savings deposits (including money market deposit accounts), M1 includes certificates of deposit and some highly liquid components that are a condition for inclusion within this measure, whereby M2 is called the sum of M1 and is considered liquid money. Whether they are legal or deposits, in addition to quasi money, referring to savings and other deposits of high liquidity (Arnold, 2019),

4. **The broadest measurement (M_3):** Developed countries have adopted a more comprehensive concept of money supply (M_3), which includes currency, current, and savings deposits, in addition to all deposits that are created by government institutions operating in the field of economic activity, due to the great development in this field. Monetary and financial, the development of financial markets and the emergence of intermediary financial institutions, and their innovation of various types of financial derivatives (Saeed and Muhammad, 2019).

5. **Money supply with the measure of liquidity (L) Liquidity:** It includes money supply according to the concept of (M_3) in addition to the remainder of non-banking economic units' financial assets, such as public securities and bonds represented by loans, whether issued by the government or private projects, and bonds issued by specialised investment companies and banks. Real estate, government deposits, savings bonds, and commercial papers The short-term government securities, which range between 3 and 6 months, the most important of which are Treasury bills, are distinguished by their high liquidity and a high degree of guarantee in terms of their ability to be sold when needed, with exposure to limited fluctuations in their prices. As for the long-term government bonds, i.e., those that mature in a period of more than a year, it is possible to retrieve their amount easily when they mature, and given the long term of their maturity, they are usually less liquid than treasury bills and more profitable than them (Sayyid Ali and Al-Essa, 2004).

2.4 Determinants of Money Supply

There is a set of determinants that affect the volume of the money supply, whether the cash in circulation or the cash in commercial banks or other banks, including: (Salman and Muhammad, 2020)

1. **Cash in circulation with individuals or outside banks (c):** It is considered the most influential factor in the money supply, due to the central bank's inability to control the behaviour of individuals, and how to spend or dispose of these funds.

2. **Banks cash reserve (R):** It represents the volume of money in the vaults of commercial banks as negotiable liquid cash, and it is also important in influencing the amount of money offered, and it and the cash in circulation represent what is known as the cash basis or the high-strength balance ($B = C + R$) Both variables (C, R) are positively associated with the money supply.

3. **The monetary multiplier (m):** It represents the ratio of the money supply to the monetary base $m = \frac{MS}{B}$, and whenever the value of the money multiplier is greater than (1), the greater the money supply when the monetary basis (B) is fixed or changed less than the change in the money supply $MS > B$.

4. **Price Index (IP):** It is the amount of change in the general level of consumer prices during a period (a year) and is a measure of the level of inflation in the economic activity in the country. Whenever the general level of prices decreases or increases, this is reflected positively on the money supply. There is an inverse relationship between inflation and the amount of money.

5. **There are other factors:** that the central bank uses to influence the money supply, which are the interest rate and the legal reserve ratio, but they are less influential than the previous variables, especially the monetary base.

2.5 Analysis of the behavior of M_1 and GDP at constant prices

The central bank manages the money supply to achieve monetary stability using quantitative and monetary tools, and the current ratio in circulation outside the banking system represents the money supply in the narrow sense of M_1 (Akawee and Abdullatif, 2023). As shown in Table (1), it amounted to (21721167) million dinars in 2007, at an annual growth rate of (40.5%) compared to 2006, and continued to rise during the subsequent years except for the year 2015, when it amounted to (65803115) million dinars, growing at a negative yearly rate of (11.5%) compared to 2014, due to the events that Iraq witnessed, including the loss of control over several provinces and the recessionary situation as a result of the war against the terrorist organization ISIS, which generated a crisis in the local market. However, it was observed in the year 2016 that the index returned to the rise as the money supply reached 75523952 million dinars to face the damages of the war against the terrorist organization, especially after the liberation. And it continued to rise, reaching the highest value of 119,944,017,000 dinars in 2021, with a yearly growth rate of 11.5%. The gross domestic product at constant prices also witnessed a variation during the period as a result of the structural imbalances of the production system and its dependence on the outside, due to its dependence on the crude oil resource being the largest contributor to the formation of domestic income and financing other sectors, which led to an economic imbalance and the dependence of economic policy on oil revenues. This is evident from Table (1), where the GDP at constant prices reached (101845262.4) million dinars in 2004 and rose to (120626517.1) million dinars in 2008, with an annual growth rate of 8.2% compared to 2007. In 2013, the output reached the gross domestic product of 174.9 billion dinars, with a growth rate of 7.6% compared to 2012 due to the increase in oil revenues as a result of the improvement in oil prices. As for the year 2020, the gross domestic product decreased to (196985514.2) million dinars, at a negative annual growth rate of (-11.6%), after it had reached (5.9%) in 2019, and this is due to the drop in oil prices in global markets and thus the drop in revenues. oil due to the Corona pandemic.

It is observed in the course of the two directions that there is a convergence between the path of the real domestic product and the money supply in most of the years of the period studied, which reflects the regularity of the growth rates of the M_1 and this is due to the fact that monetary policy was able to some extent to make the growth of the money supply commensurate with the growth of the gross domestic product.

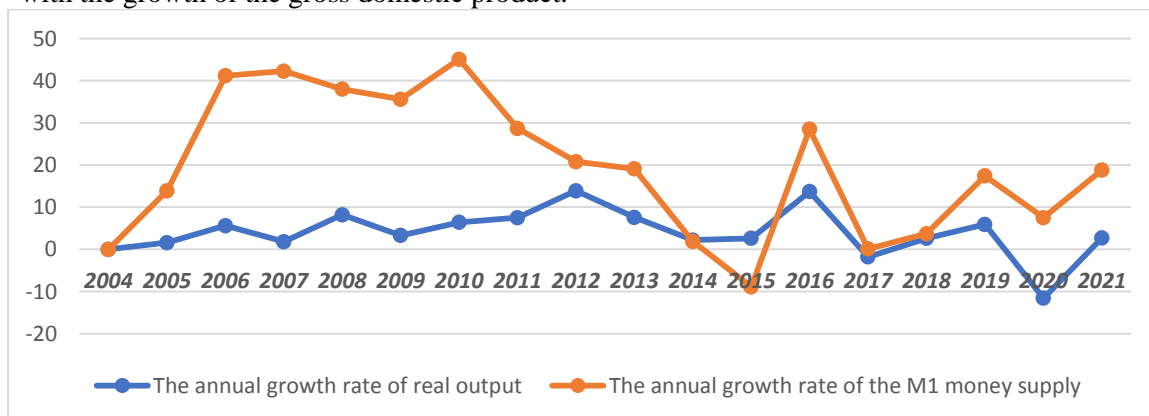


Figure 1: GDP growth trends at constant prices and money supply.

Table 1: Behavior of GDP at constant prices and money supply for the period (2004-2021)

years	GDP at constant prices basis 100 = 2007 million dinars	annual growth rate %	Money Supply M1 Million dinars	annual growth rate %
	1	2	3	4
2004	101845262.4	-	10148626	-
2005	103551403.4	1.6	11399125	12.3
2006	109389941.3	5.6	15460060	35.6
2007	111455813.4	1.8	21721167	40.5
2008	120626517.1	8.2	28189934	29.8
2009	124702075	3.3	37,300,030	32.3
2010	132687028.6	6.4	51743489	38.7
2011	142700217	7.5	62692098	21.2
2012	162587533.1	13.9	66880017	6.9
2013	174990175	7.6	74591912	11.5
2014	178951406.9	2.2	74371269	(0.3)
2015	183616252.1	2.6	65803115	(11.5)
2016	208932109.7	13.7	75523952	14.8
2017	205130066.9	(1.8)	76986584	1.9
2018	210532887.2	2.6	77828984	1.1
2019	223075021	5.9	86771003	11.5
2020	196985514.2	(11.6)	103353665	19.1
2021	202468281.8	2.7	119944017	16.1

Source:

- Column (1) Planning Ministry, Central Agency for Statistics and Information, Directorate of National Accounts, various annual totals. Column (3) Central Bank of Iraq, General Directorate of Statistics and Research, Annual Bulletin, for separate years. Column (2,4) is calculated by the researcher. The ratios in brackets are negative.

-The annual growth rate was calculated according to the following formula:

$$R = \frac{X_1}{X_0} - 1 * 100 \quad (1)$$

Where: (R annual growth rate), (X_0 data for the base year), (X_1 data for the comparison year) (Al-Quraishi, 2001).

2.6 The impact of the GDP response to the impact of the money supply shock in Iraq**2.6.1 Description of the standard model**

The research deals with measuring and analyzing the impact of the money supply, which is represented by the M1 as an independent variable, on the gross domestic product (GDP) of Iraq as a dependent variable, and the model's general form is determined by the following equation:

$$\text{GDP} = f(\text{MS}) \quad (2)$$

$$\Delta \text{GDP}_t = C + \sum_{t-1}^n \alpha_1 \text{GDP}_{t-1} + \sum_{t-1}^n \alpha_2 \text{MS}_{t-1} + \beta_1 \text{MS} + \mu_t \quad (3)$$

As follows:

GDP: gross domestic product.

MS: Money supply.

Δ denotes the first difference of the variable.

C is the constant term.

N represents the maximum lag length for optimal lag selection.

$\alpha_1, \alpha_2, \alpha_3$ are the slope coefficients in the short-term.

β_1 and β_2 are the slope coefficients in the Long-term.

μ_t represents the random error term.

2.6.2 Define standard form data

Gross domestic product (LnGDP) data was used in millions of Iraqi dinars at constant prices for the base year of 2007, as well as money supply (LnMS) in millions of Iraqi dinars at current prices. The time series of these two variables were converted from annual data to (Quarterly) for the duration (2004.Q₄ - 2021.Q₁). The (Litterman) approach was employed, and the natural logarithm formula was utilized, thus the total number of observations is (72), and Figure (2) illustrates the data used in estimating the model.

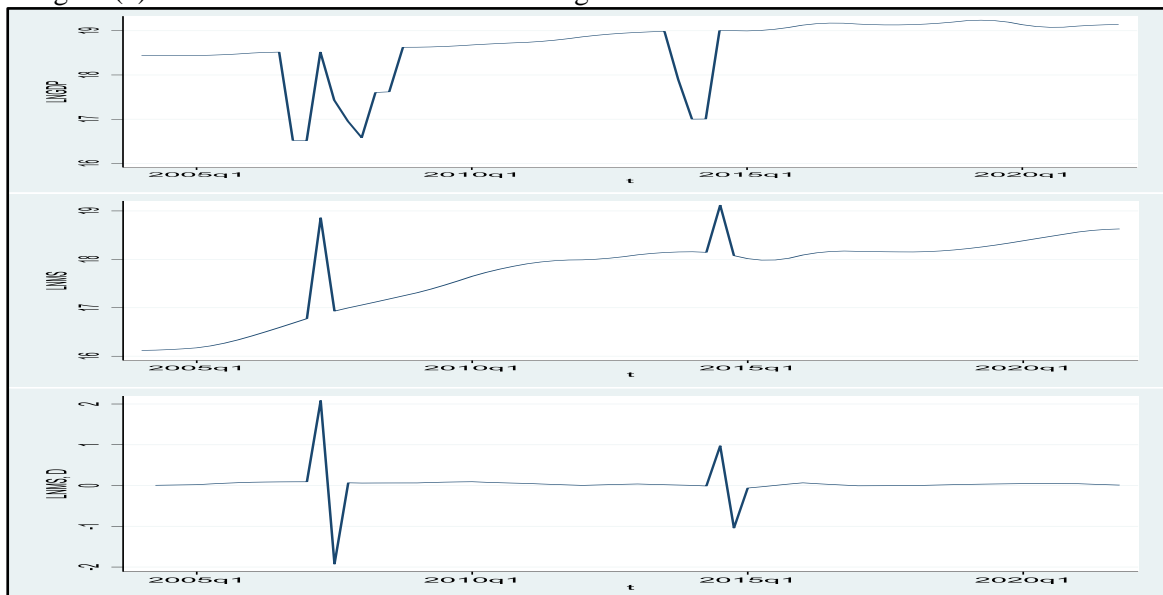


Figure 2: Data of Gross Domestic Product (LnGDP) and Money Supply (LnMS) in Iraq for the period (2004.Q₁ – 2021.Q₄).

2.6.3 Unit root tests

Table (2) shows that the time series of the variable (LnMS) is stationary at the first difference [I(1)], while the time series of the variable (LnGDP) is stationary at the level [I(0)], through a statistical value (T) greater than tabular for both tests (ADF, PP), as well as a statistical value (P-Value) less than (5%), which means rejecting the null hypothesis that the time series is not static and accepting the alternative hypothesis that the time series is static (LnMS) at the first difference [I(1)] and the time series of the variable (LnGDP).

Table 2: Test ADF, PP for the GDP of Iraq

Unit root tests:								
Variables	At the level* (Level)				the first difference			
	ADF		PP		ADF		PP	
	T-Statistic	Prob	T-Statistic	Prob	T-Statistic	Prob	T-Statistic	Prob
LnMS	-1.969	0.300	-2.138	0.229	-9.408	0.000	-16.929	0.000
LnGDP	-3.219	0.019	-3.023	0.033	-8.357	0.000	-10.109	0.000

Source: Based on the results of the statistical program Stata17. Note: * The model considers the intersection limit as well as the first difference at the level.

2.6.4 cointegration test

Table (3) shows co-integration occurs between both of the variables used for research (gross domestic product, money supply), as the value of the calculated (F-Bounds Test) statistic of (9.618) is greater than all upper tabular limits and by The levels of significance (1%, 5 %, 10%, respectively, which means rejecting the null hypothesis in the absence of cointegration and accepting the alternative hypothesis in the presence of cointegration between the two research variables (gross domestic product and money supply).

Table 3: Estimation results of the (F – Bounds Test) cointegration test of the (ARDL) model

Pesaran/Shin/Smith (2001) ARDL Bounds Test								
H0: no levels relationship				F = 9.618				
				t = -4.181				
Critical Values (0.1-0.01), F-statistic, Case 3								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
k_1	4.04	4.78	4.94	5.73	5.77	6.68	6.84	7.84
accept if F < critical value for I(0) regressors								
reject if F > critical value for I(1) regressors								
Critical Values (0.1-0.01), t-statistic, Case 3								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
k_1	-2.57	-2.91	-2.86	-3.22	-3.13	-3.50	-3.43	-3.82
accept if t > critical value for I(0) regressors								
reject if t < critical value for I(1) regressors								

2.6.5 Standard model estimation quality test

It is noted from the results of Table (4) that the independent variable (money supply) explains about (97%) of the changes that occurred in the GDP of Iraq. Taha (11.94) and the value of (P - Value) has (0.000), which is less than (5%), implying acceptance of the alternative hypothesis of the estimated model's significance as a whole and rejection of the null hypothesis; additionally, the rest of the estimated model does not suffer from the problem of serial correlation, as demonstrated by the (Breusch - Godfrey) test, where the value of (Prob) is (0.289) which is greater than (5%), and therefore the null hypothesis is accepted and the alternative hypothesis is rejected, and the model does not suffer from the problem of variance instability, as demonstrated by the (Breusch - Pagan - Godfrey) test. It has a Prob value (0.623) greater than (5%), indicating that the null hypothesis is accepted and the alternative hypothesis is rejected, and the model that was estimated is well described, as confirmed by the (Ramsey RESET) Ramsey Regression Equation Specification Error Test, as the value reports the statistical E for

the F test (2.24). and one Its P-value is (0.093), which is greater than (5%), indicating that the null hypothesis is rejected and the alternative hypothesis is accepted, implying that the estimated model is free of categorization error. Furthermore, the estimated model parameters are stable, as demonstrated by the (CUSUM & CUSUM - squared) tests in Figure (3), where the estimation line sits between the two confidence limits, implying that the null hypothesis is accepted and the alternative hypothesis is rejected.

Table 4: Results from ARDL model quality tests

Source	SS	df	MS	Number of obs	=	68
Model	10.9003509	8	1.36254387	F(8, 59)	=	11.94
Residual	6.73138379	59	.114091251	Prob > F	=	0.0000
				R-squared	=	0.6182
				Adj R-squared	=	0.5665
Total	17.6317347	67	.26316022	Root MSE	=	.33777

Breusch-Godfrey LM test for autocorrelation			
lags(p)	chi2	df	Prob > chi2
1	1.126	1	0.2886

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: fitted values of D.lngdp

chi2(1) = 0.24
 Prob > chi2 = 0.6225

Ramsey RESET test using powers of the fitted values of D.lngdp
 Ho: model has no omitted variables
 F(3, 56) = 2.24
 Prob > F = 0.0932

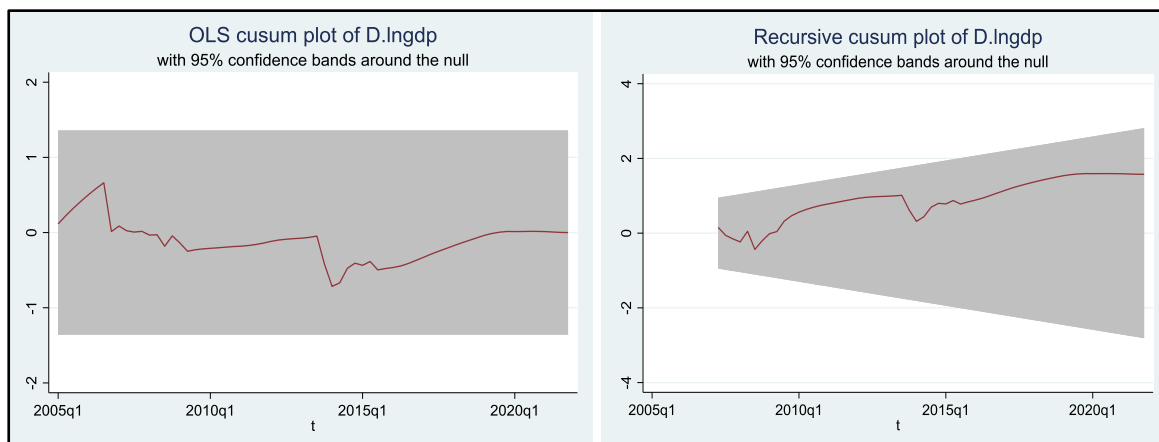


Figure 3: (Cusum) and (Cusum - Q) test for the stability of ARDL model parameters.

2.6.6 ARDL Model Estimation

1) Statistical interpretation: Table (5) indicates the existence of a significant long-term relationship between the two research variables (gross domestic product (LNGDP), money supply (LNMS)), As the statistical value of (T) is more than that of the tabular value, and the value of (P - Value) is lower than (5%), the null hypothesis is rejected and an alternate theory is accepted, when the money supply (LNMS) increases by (1%), it will lead to an increase in the gross domestic product (LNGDP) by (0.71%), while the converse occurs when there is a reduction, and the occurrence of any imbalance in this The short-term relationship to the long-term equilibrium, the error correction model will rebalance at a rate of (-0.3417) quarterly, which means that (34.17%) The last quarter's imbalance will be remedied in the current season.

2) Economic Explanation: It is noted from Table (5) that there is a positive, long-term equilibrium relationship between the gross domestic product and the money supply in Iraq, as a change in the money supply by a certain percentage will lead to a change in the gross domestic product of Iraq by about (71%) of that percentage of the oil product below the real one, as a result of the presence of many From the economic sectors, such as agriculture and idle industry, which need the necessary funding for that, and this matter can be achieved by reducing the interest rate or raising the exchange rate of the Iraqi dinar (devaluation of the dinar), which leads to an increase in the money supply, which works to reduce the cost of local investment, which will contribute to increasing the production of the agricultural sector And industrial and thus increase the gross domestic product of Iraq. The failure of these sectors to rise has other, more important reasons, which are the political, security, legal, and tax environment, as well as the availability of the national political will.

Table 5: shows the results of the ARDL model estimation for Iraq's GDP

ARDL(3,4) regression						
Sample: 2005q1 - 2021q4			Number of obs	=	68	
Log likelihood = -17.855103			R-squared	=	0.6182	
			Adj R-squared	=	0.5665	
			Root MSE	=	0.3378	
D.lngdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ADJ						
lngdp L1.	-.3416935	.0817189	-4.18	0.000	-.5052125	-.1781744
LR						
lnms	.7054686	.193263	3.65	0.001	.3187504	1.092187
SR						
lngdp LD.	.3581143	.1156634	3.10	0.003	.1266725	.5895562
L2D.	.3818656	.1701447	2.24	0.029	.0414068	.7223244
lnms D1.	.973784	.1891333	5.15	0.000	.5953291	1.352239
LD.	.1797646	.2275373	0.79	0.433	-.2755365	.6350658
L2D.	-.3705104	.1795073	-2.06	0.043	-.7297036	-.0113172
L3D.	-.3906158	.1308362	-2.99	0.004	-.6524185	-.1288132
_cons	2.064687	1.41048	1.46	0.149	-.7576768	4.88705

2.6.7 DYNARDL Model Estimation

1) Statistical interpretation: It appears from Table (6) that the estimated model is significant as a whole, through the value of (Prob) for the F statistic that is less than (5%) and thus adopting the alternate hypothesis while rejecting the null hypothesis and the independent variable (money supply) explains about (71%) of Changes in the gross domestic product as a result of the shock in the economy, when the money supply (LNMS) increases by (1%), The GDP will rise (LNGDP) by (0.76%), and vice versa in the case of a reduction.

2) Economic Explanation: When a shock occurs The impact of the M_1 on the Iraqi economy will differ from what it was before the shock, as the shock will increase its effectiveness towards the gross domestic product by about (10%) than what it was before the shock, while the positive relationship between them remains, as a result of the presence of many economic sectors idle due to the availability of alternatives for their commodities from abroad, but the occurrence of the (negative) shock in the economy will lead to the revitalization of these sectors due to their high price compared to local commodities, and thus the demand for local commodities increases with the presence of normal profit and/or economic profit, and therefore the increase in the money supply will increase the domestic product Total.

Table 6: DYNARDL model estimation results

Source	SS	df	MS	Number of obs	=	71
Model	23.8995701	3	7.96652336	F(3, 67)	=	53.75
Residual	9.93042406	67	.148215285	Prob > F	=	0.0000
				R-squared	=	0.7065
				Adj R-squared	=	0.6933
Total	33.8299941	70	.48328563	Root MSE	=	.38499

ln gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
L1_lngdp	.7984461	.0788986	10.12	0.000	.6409638	.9559285
L1_lnms	-.5999583	.138773	-4.32	0.000	-.8769503	-.3229664
_lnms	.7646441	.130445	5.86	0.000	.5042749	1.025013
_cons	.8227161	1.449464	0.57	0.572	-2.070427	3.715859

3. Discussion of Results

3.1 Impact of Money Supply (M_1) Shocks on GDP

The Central Bank can conduct operations on the open market by trading in existing securities of the Ministry of Finance. Nevertheless, the currency auction is likely to remain the main tool of the CBI's monetary policy (Hamdan and Hussein, 2020). The central bank takes a set of measures to change the money supply to influence the gross domestic product. This is done by using the interest rate and the exchange rate to influence the money supply, which in turn affects the gross domestic product. Below is a simulation process using Monte Carlo simulation to see how the GDP responds to an increase in money supply times of shock in the economy are as follows:

1 -Increasing the money supply by (%10): It is clear from Figure (4) that a 10% increase in the money supply will result in a rise in the GDP by about (7.5%) in the first quarter of 2004, and the GDP will continue to rise in the following quarters, reaching its peak in the tenth quarter at about (8%). This increase continues at about (8%) in the long term even after eight years from the occurrence of the first increase in the money supply.

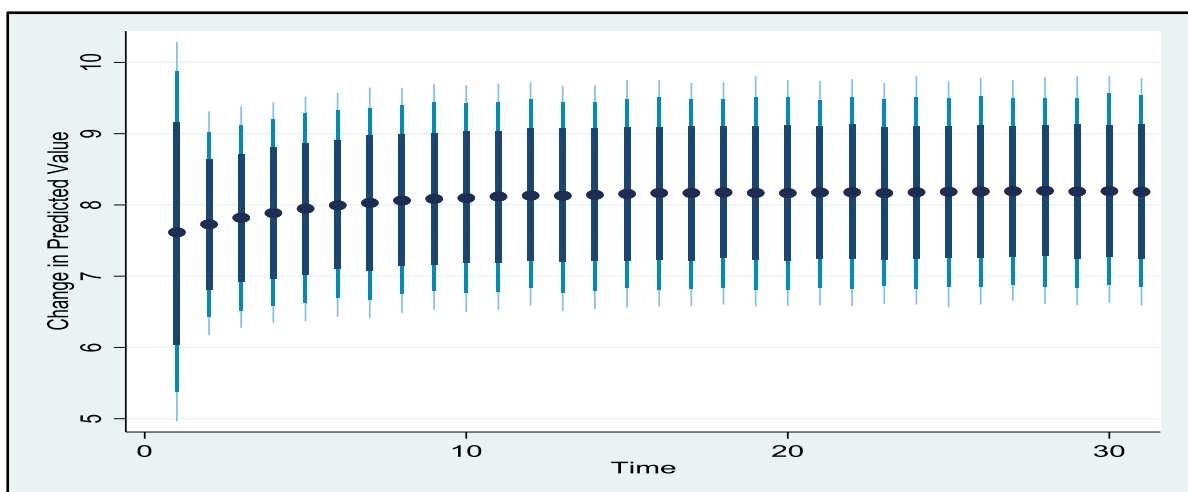


Figure 4: shows the GDP reaction to an increase in the M_1 by (10%).

2 -Increasing the money supply by (%25): Figure (5) below shows that a (25%) rise in the money supply will result in an increase in the gross domestic product by about (18%) in the first quarter of 2004, and the increase in the gross domestic product will continue in the following quarters, reaching its peak in the tenth quarter at about (20%, as a result, this rise is going to continue in the long run, even after eight years of the first increase in the money supply.

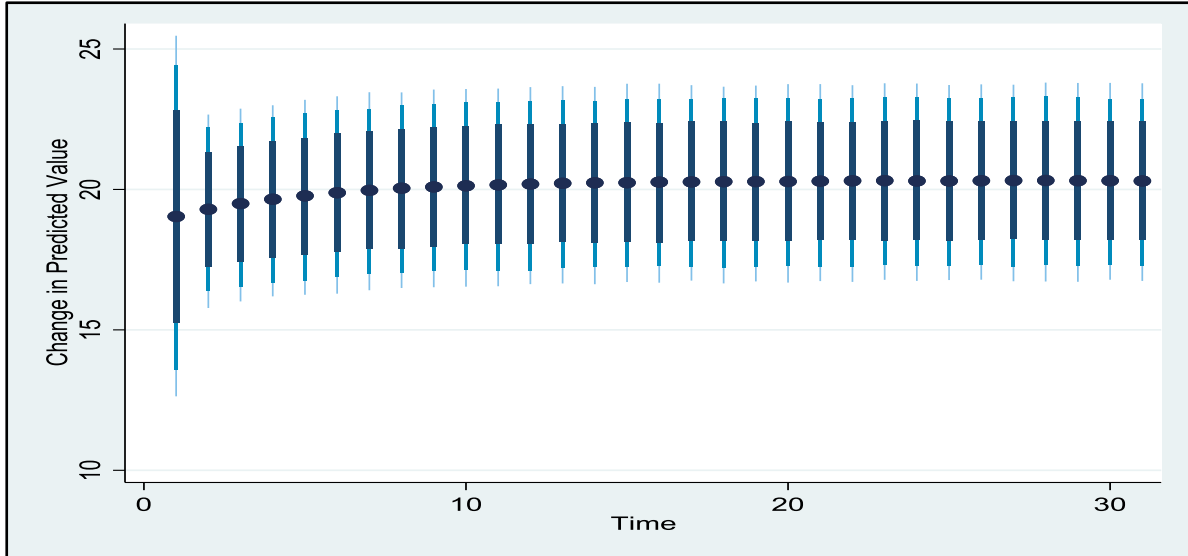


Figure 5: GDP response to an increase in the M_1 by (25%)

3 -Increasing the money supply by (%50): It is noted from Figure (6) below that an increase in the money supply by (50%) will lead to an increase in the gross domestic product by about (38%) in the first quarter (the first three months), but this percentage will soon increase in the second quarter. (The second three months of the same year) and it continues to increase to reach its peak at (41%) about two and a half years after the increase, and with the passage of a year and a half after the first increase in the interest rate, the decline in the money supply will reach about (60%), and this increase will continue for the term long, even eight years after the first increase in the money supply.

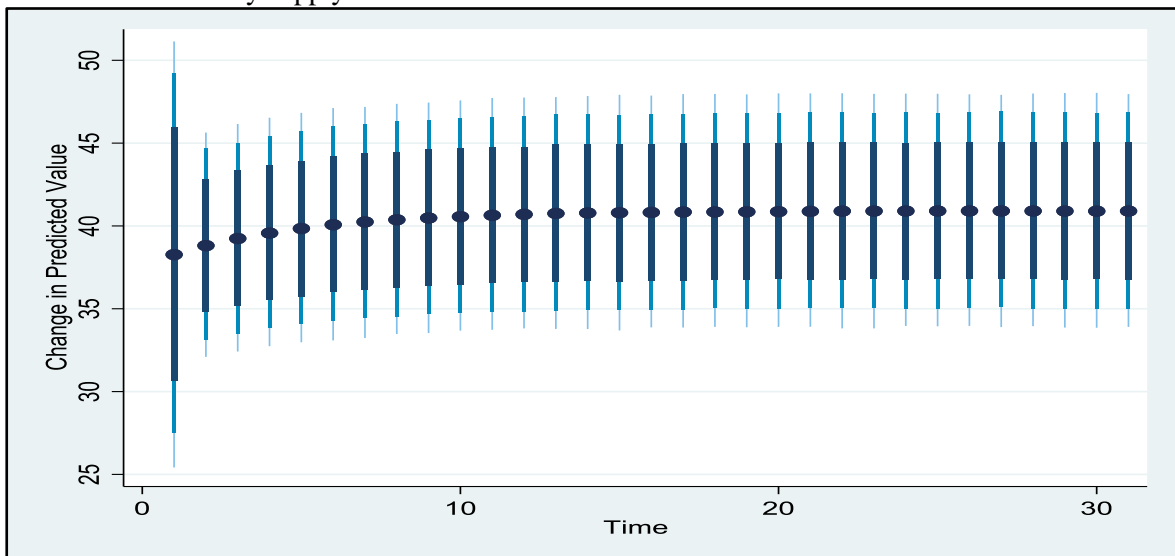


Figure 6: GDP response to an increase in the M_1 by (50%)

4. Conclusions

1. Accepting the research hypothesis, which states that "there is a causal and indicative reason that extends from the money supply to the gross domestic product," that is, the existence of a long-term equilibrium direct relationship between the GDP and the money supply in Iraq, as changing the money supply by a specific percentage will result in a change in the gross domestic product about 71% of that percentage, as a result of the presence of many economic sectors, like agricultural and industrial sectors,

2. By analyzing the course of the gross domestic product and the money supply, it was found that the annual growth rates were close in most of the study period's years, and this reflects the regularity of the M_1 growth rates and the ability of monetary policy to adjust the money supply by the state of Iraq's economy, i.e., the harmony of the cash flow with the real flow of goods and services.

3. Monetary policy, through increasing the M_1 , could not lead to an increase in actual production, and the reason is that the use of loans in the field of investment does not have positive effects due to the loans being directed towards service or real estate sectors, and these were planned and allocated for production. Thus, the increase in the money supply loses its positive effects on increasing investment and, thus, output.

4. When the money supply (LNMS) increases by 1%, there will be an increase in the gross domestic product (LNGDP) by 0.76%, and vice versa in the case of a reduction.

5. When a shock occurs in the Iraqi economy, the effect of the money supply will differ from what it was before the shock, as the shock will increase its effectiveness towards the gross domestic product by about 10% than it was before the shock, while the positive relationship between them remains.

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أثر استجابة الناتج المحلي الإجمالي لصدمة عرض النقد في الاقتصاد العراقي للمدة (2004-2021)

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مستخلص البحث

يهدف البحث الى توضيح استجابة الناتج المحلي الإجمالي لصدمة عرض النقد (M_1) ويتضمن الوصول الى النتائج استخدام الأساليب القياسية حيث تم بناء النموذج القياسي وفق بيانات ربع سنوية باستخدام برنامج (STATA₁₇). توصل البحث وفق انموذج التكامل المشترك ARDL الى وجود علاقة طردية توازنه طويلة الاجل بين الناتج المحلي الإجمالي وعرض النقد في العراق، إذ أن تغير عرض النقد بنسبة معينة سيؤدي الى تغير الناتج المحلي الإجمالي بحوالي (71%) من تلك النسبة. وعند حصول صدمة في الاقتصاد العراقي فإن تأثير عرض النقد سيختلف عما كانت عليه قبل الصدمة، إذ ستزيد الصدمة من فاعليته تجاه الناتج المحلي الإجمالي بحوالي (10%) عما كانت عليه قبل الصدمة مع بقاء العلاقة طردية بينهما. ومن اهم التوصيات العمل على تحقيق توازن متناسب بين المعروض النقدي والناتج المحلي الإجمالي ويتم ذلك من خلال تحكم السياسة النقدية للوصول الى توازن حقيقي بين القطاع النقدي وقطاع السلع والخدمات يسهم في معالجة الاختلالات الزمنية لأغلب القطاعات الاقتصادية، وخصوصاً في الإنتاجية وتأثرها بالصدمة الاقتصادية النقدية.

نوع البحث: ورقة بحثية.

المصطلحات الرئيسية للبحث: عرض النقد M_1 ، الناتج المحلي الإجمالي، الصدمات، التكامل المشترك.

*البحث مستل من أطروحة الدكتوراه