ISSN 2664-3995 (Print) & ISSN 2664-6757 (Online)
South Asian Research Journal of Business and Management
Abbreviated Key Title: South Asian Res J Bus Manag

| Volume-7 | Issue-3 | May-Jun- 2025 | **DOI: https://doi.org/10.36346/sarjbm.2025.v07i03.003**

Original Research Article

Measuring the Asymmetric Effects of Broad Money Supply Policy and Its Impact on Public Spending Using the Bootstrap NARDL Model: Iraq as a Case Study

Assist. Pro. Dr. Ghassan Ibrahim Ahmed[1]*

[1]College of Administration and Economics, Tikrit University, Iraq

***Corresponding Author:** Assist. Pro. Dr. Ghassan Ibrahim Ahmed
College of Administration and Economics, Tikrit University, Iraq

Article History
Received: 28.03.2025
Accepted: 05.05.2025
Published: 08.05.2025

Abstract: The Iraqi economy suffers from increased public spending due to the rise in money supply resulting from the growth in hard currency oil revenues. Therefore, this research aims to determine the relationship between broad money supply and public spending. The study is based on the hypothesis that a monetary policy shock, represented by money supply, has a positive and proportional impact on public spending. To test this hypothesis, the inductive method was employed alongside the analysis of several macroeconomic variables and the measurement of asymmetric effects using the dynamic cumulative multiplier, in order to obtain results that could be generalized. The study found that the broad money supply affects public spending, with a coefficient of determination (R^2) of 0.418%. The short-run symmetric relationship further confirms that a 1% increase in money supply leads to a 0.32% increase in public spending in the second month, rising to 0.45% in the third month, and stabilizing at 0.40% until the end of the study.

Keywords: Money Supply, Public Spending, Asymmetric Effects, NARDL.

INTRODUCTION

The topic of the asymmetric effects of monetary policy particularly broad money supply policy is one of the key issues that significantly impacts the Iraqi economy. This is primarily due to the country's dependence on oil exports, which renders it vulnerable to asymmetric shocks resulting from fluctuations in global oil prices. This vulnerability reflects a structural imbalance in the economy, where oil revenues account for more than 92% of total public revenues. Consequently, the economy faces internal imbalances stemming from its mono-commodity nature, the inefficiency of prevailing monetary policies, and the economic sanctions imposed during the 1990s following the Second Gulf War. Additionally, the unstable security situation, especially after 2003, has affected both the volume of the money supply and government spending in its civilian and military dimensions. Government expenditures increased in efforts to achieve security stability, raise salaries, wages, and allowances, while the volatility in oil revenues due to global price fluctuations reduced Iraq's foreign currency income. This led monetary policy to adopt new currency issuance strategies and expand broad money supply in response to increased public spending. However, these measures failed to achieve a real increase in gross domestic product and instead exacerbated inflation rates and dependency on oil exports, which in turn fueled the rise of financial corruption in Iraq.

Research Importance:

The Iraqi economy is subject to asymmetric effects, which necessitate that decision-makers consider the interrelationship between broad money supply and public spending. Public expenditure has been continuously increasing,

particularly due to the state's extensive operational spending, rendering the economy more vulnerable to asymmetric shocks largely dependent on global oil price fluctuations.

Research Problem:

The Iraqi economy suffers from various imbalances due to its reliance on oil revenues, making it susceptible to asymmetric shocks. However, to what extent can monetary policy, represented by a broad money supply, contribute to addressing the imbalances in public spending, which is primarily dependent on oil revenues?

Research Objective:

The study aims to determine the relationship between broad money supply and public spending, and how monetary policy, driven by rising global oil prices, can directly influence public expenditure.

Research Hypothesis:

The research is based on the hypothesis that a monetary policy shock expressed through broad money supply has a direct and positive effect on public spending during the study period.

RESEARCH METHODOLOGY

The researcher adopted the inductive method by examining the reality of the Iraqi economy and analyzing the development of certain macroeconomic variables, namely broad money supply and public spending. The relationship between these variables over time was measured using modern econometric techniques, specifically the NARDL model, in addition to assessing asymmetric effects through the dynamic cumulative multiplier to reach generalizable results.

Previous Studies and Literature Review:

- In 2006, *Magda Kandil* presented a study titled "The Growth of Government Spending & the Money Supply: Evidence & Implications Within & Across Industrial Countries". The research aimed to examine the supply and demand channels that determine the asymmetric effects of monetary and fiscal policies. It proposed a time series model to explore the impact of monetary and fiscal shocks on real output growth, inflation, and wage increases, all of which are directly affected by the money supply, government public spending, and energy prices. The study relied on quarterly data from a sample of 17 industrial countries and concluded that an increase in the money supply significantly influences the rise in both government spending and output. Moreover, monetary policy plays a central role in controlling the money supply to serve the public interest.
- Similarly, *Bunescu Liliana & others (2011)*, in their study titled "Is There a Correlation Between Government Expenditures, Population, Money Supply & Government Revenues?", emphasized that financial resources are influenced by a range of monetary, political, and social factors. The study focused on government expenditures, population, and money supply to determine the extent of their correlation with public revenues. The objective was to measure the relationship among these variables and identify which has the most significant impact on financial resources. The study concluded that the money supply is the most influential factor among the mentioned variables.
- In 2018, *Muhammad Ijaz* conducted a study titled "The Interrelationship between Money Supply, Inflation, Public Expenditure & Economic Growth", which aimed to examine the relationship between money supply, inflation, public expenditure, and economic growth in Pakistan for the period 1970–2015. The study employed the ARDL test for data cointegration and the Error Correction Model (ECM) to explore the long- and short-run relationships among the variables. Additionally, Granger causality testing was used to determine the direction of the relationships. The findings indicated a long-run relationship among economic growth, public expenditure, and inflation. The ECM results revealed a short-run relationship among these variables; however, the speed of adjustment was slow, being less than 20%. The causality results indicated a unidirectional relationship from inflation to economic growth, while the relationship between inflation and public expenditure, as well as between inflation and money supply, was bidirectional.
- Meanwhile, the study by *Jihane Benkhaira & Hafid EL Hassani (2023)* titled "Economic Recovery Through the Money Supply & Public Spending in Morocco: An Empirical Investigation" aimed to estimate a Vector Autoregression (VAR) model for the period 1990–2021 to analyze the effect of increased public spending and money supply on economic activity in Morocco using fiscal and monetary tools. The findings indicated a positive relationship between public spending, money supply, and economic growth. The impulse response functions and forecast error variance decomposition showed that public spending had no significant impact on GDP, while money supply demonstrated its real ability to stimulate economic activity in Morocco. The study concluded that money supply has a positive effect on GDP growth.

From the above, it is evident that the present study closely aligns with *Magda Kandil's* research in terms of theme, but differs in methodology, country, and study period. All referenced studies have confirmed the positive impact of money supply on public expenditure.

Section One: Theoretical Foundation of Money Supply and Public Spending

There has long been debate among economists over a fundamental issue concerning which components constitute the money supply. This debate has evolved into a highly complex matter that cannot be fully understood without considering all aspects related to the concept of money supply. The money supply, which is sometimes referred to as the monetary aggregate, comprises all means of payment circulating within a country during a specific time period. It includes all payment instruments used domestically (Aizenman, 1994, p.35) and held by individuals, business enterprises, and public units in the form of cash balances. These balances are considered immediate means of payment and include paper currency, subsidiary coins, and demand deposits of the private sector with commercial banks. These components are statistically represented by M1. The elements included in narrow money supply are those with full liquidity. However, the currency held in the vaults of financial and monetary institutions, such as the central bank and commercial banks, as well as the deposits that commercial banks maintain at the central bank, are not considered part of the money supply, as they are treated as monetary reserves used by banks to meet the daily withdrawal demands of economic units on their deposits (Haider & Others, 2024, p.61).

Money supply is considered a liability of the banking system that is, the currency held by the public, which is issued by the central bank, along with the credit created by commercial banks. These together represent liabilities of the banking system and assets for the public. This liability can be covered by assets equivalent to its value, which result from the actual economic activities undertaken by economic units, represented by their possessions or debts owed by these units. Every liability must be matched by an equivalent right (Andreas & Others, 2012, p.118). There is a distinction between narrow money supply and the monetary base, denoted by M0, which is referred to as the monetary base. It represents the sum of currency in circulation plus bank deposits held at the central bank, excluding the required legal reserves. An expansion in the monetary base which leads to an increase in banking reserves grants commercial banks greater flexibility to extend loans and make financial investments (Cosimo, 2011, p.13). Since bank deposits created by banks constitute a portion of the money supply, any expansion in banking reserves and new deposits results in an overall increase in the total money supply. Thus, monetary authorities can control changes in the money supply by monitoring the monetary base (Yong, 1998, p.56).

Public spending policy is not limited solely to broad money supply but is also influenced by a set of indirect factors that affect income and employment over time. Monetary policy, as expressed through the money supply variable, aims to achieve economic growth and stability. Public spending policy outlines the economic directions and objectives, offering an impression of what may be achieved. It reflects the government's intentions to influence the economy, and its implementation varies from one country to another. For instance, rentier states differ from other types of economies (Marwa & Sameer, 2022, p.12).

By observing the budgets of rentier states, one can notice a mixture of various spending patterns that align with their consumption-based nature. In Iraq, the financing of the general budget depends on oil revenues, specifically in foreign currency (U.S. dollars). Since domestic public spending is in Iraqi dinars, the government exchanges the dollars it obtains from oil sales with Iraqi dinars at the Central Bank a process referred to as monetization. In this process, the Central Bank acquires the foreign currency (dollars) equivalent to the annual domestic public spending. As public spending increases, it drives an increase in the local money supply in Iraqi dinars to meet rising expenditures driven by increased consumption and foreign currency oil revenues. All these factors contribute significantly to the growth of money supply.

Consequently, an increase in the money supply leads to a rise in public spending, both oil-related and non-oil-related, based on the aforementioned relationship. This, in turn, defines the monetary base through the issued currency, which is the primary component of money supply. One can reference the Permanent Income Hypothesis by economist Milton Friedman, which explains how oil-dependent countries deal with income derived from oil revenues. The hypothesis states that when an individual receives additional income, they tend to assume it is permanent and continuous (Haider, 2024, p.67), thereby increasing their consumption. This behavior is reflected in the economic, social, and political realities of oil-producing countries, which often fail to anticipate the consequences of sudden fluctuations in such income an income linked to a commodity with variable pricing. These fluctuations directly affect public spending, which, once increased, becomes difficult to reduce.

Section Two: Analyzing the Relationship Between Money Supply and Public Spending

Monetary policy is considered one of the most important macroeconomic policies due to its significant effectiveness in achieving a country's general economic objectives by managing various monetary variables. Among these, broad money supply plays a particularly substantial role, especially in its impact on public spending. In the case of the Iraqi

economy, public spending operates in parallel with broad money supply. The Central Bank has increasingly become a tool for implementing government decisions particularly during the 1990s, when it functioned as an instrument for executing new currency issuance to finance the budget deficit resulting from international sanctions. Due to the significant budgetary shortfall at that time, it became necessary to resort to monetary issuance, enabled by the government's control over the Central Bank, despite the economic principle that central banks should operate independently. Following the year 2003, the Central Bank of Iraq managed to restore its independence, assuming responsibility for enhancing the value of the Iraqi dinar and combating inflation as a primary objective, in line with Iraqi Central Bank Law No. 56 of 2004. To achieve this, the Central Bank employed both traditional indirect quantitative tools and direct qualitative tools, in addition to newly developed mechanisms such as controlling the monetary base through the foreign currency auction system and managing the credit multiplier mechanism.

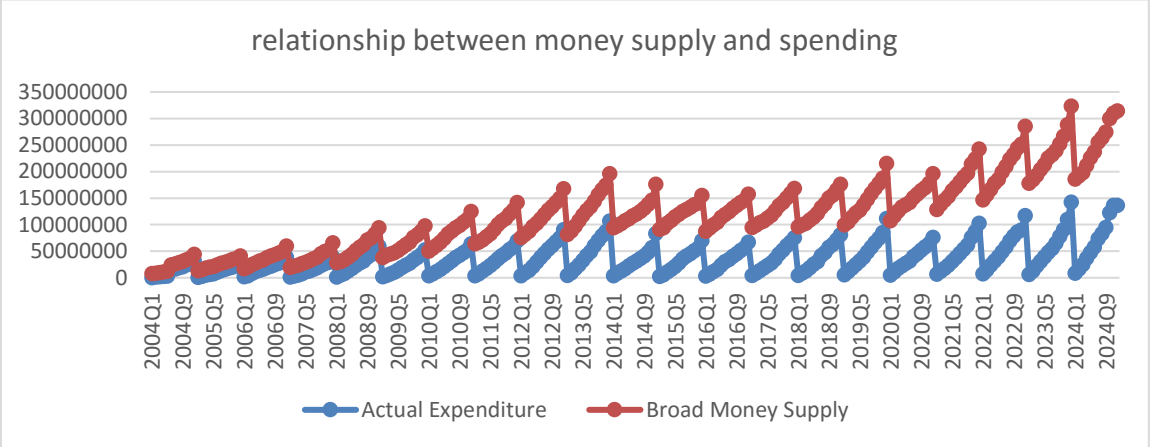

Figure 1: The Relationship Between Broad Money Supply and Public Spending for the Period (2004–2025), Monthly Data

Source: Figure prepared by the researcher based on appendix data using Excel statistical software

Based on Figure (1), which illustrates the trends in broad money supply and public spending, it is evident that the money supply experienced a notable increase in 2004, particularly during the years 2004–2005, though with decreasing growth rates. This trend can be attributed to the Central Bank's efforts to combat inflation, especially following the enactment of the Iraqi Central Bank Law of 2004, which established the bank's independence in managing monetary policy. The decline in money supply was accompanied by a clear decrease in public spending, reflecting a positive correlation between broad money supply and public spending consistent with the logic of economic theory. The period from 2006 to 2009 witnessed an increase in money supply, albeit with fluctuating growth rates. In 2006 and 2007, the increase rates were approximately 35.7% and 41%, respectively. However, 2008 saw a noticeable decline in the growth rate of the money supply, drawing attention to this deviation. The decline in growth rates was mirrored by a similar drop in public spending, confirming the strong interconnection between money supply and both consumption and investment spending. This decline in monthly growth did not persist, as the money supply resumed its upward trend from early 2009 until mid-2010. During this period, the ratio of currency in circulation to money supply was 58% and 47%, respectively, while the ratio of demand deposits to money supply reached 41.6% and 52.8%, respectively.

The increase in the proportion of demand deposits to money supply in 2010 compared to 2009 reflects a rise in banking awareness among individuals. By 2011, the money supply continued to increase, albeit at a slower growth rate of 20.20%, compared to the two preceding years. The compound growth rate for the period 2003–2011 was approximately 30.23%. Over time, broad money supply has generally trended upward, a pattern clearly demonstrated in **Figure (1)**, which shows the parallel development of money supply and public spending.

Section Three: Measuring the Impact of Money Supply Policy on Public Spending in Iraq for the Period (2004–2024)

To investigate the impact of broad money supply on public spending, the Bootstrap Nonlinear Autoregressive Distributed Lag (Bootstrap NARDL) model was employed. This model was developed by Shin & Yu (2014) and serves as a powerful tool for testing cointegration among variables within a single equation. It allows for the examination of asymmetric relationships in both the short and long run, enabling the separation of positive changes from negative ones. The model also utilizes an appropriate bootstrap procedure in response to the weaknesses observed in the traditional ARDL model, offering a distinct perspective on cointegration within critical regions (Chen, 2020, p.3). The Bootstrap NARDL model is designed to study nonlinear cointegrated relationships and can be applied whether the variables are stationary at

level or at first difference. However, it cannot be used if the variables are integrated at the second difference. The model helps detect hidden cointegration by accounting for both positive and negative shocks.

Nonlinear models have recently been used to test for unit roots, representing a significant advancement especially when time series data exhibit structural changes, as is often the case under exceptional conditions such as wars, natural disasters, or pandemics. In such scenarios, conventional tests fail to produce reliable outcomes and instead yield spurious results. Conventional unit root tests are known to overlook structural changes in the time series of the study variables. To address this issue, the Carrion-i-Silvestre et al. (2009) test is employed to detect structural breaks in the variables under study. Additionally, the Guris, Burak (2017) nonlinear unit root test is applied to examine the stationarity of the variables. This test serves as a primary analytical tool for identifying the direction of economic variables and for detecting the sources of shocks that influence the variables in the study (Gengenbach, 2004, p.115).

Table 1: Summary of Unit Root Test Results (Guris & Burak) for the Study Variables

Variables	Without Constant	With Constant	With Constant & Trend	Decision
Broad Money Supply (M2)	-3.0560 (0.0023)	-12.9048 (0.0000)	-13.0080 (0.0000)	I(1)
Public Spending (G)	-4.4950 (0.0000)	-4.7971 (0.0001)	-4.8773 (0.0004)	I(1)

Source: Prepared by the researcher using EViews13 statistical software

Sudden and rapid changes may constitute economic shocks that, over time, can lead to a full-blown economic crisis that is difficult to resolve. The Carrion-i-Silvestre et al**.** test revealed the existence of structural breakpoints in the time series of the study variables, which necessitates reliance on nonlinear models. As shown in Table (1), the results of the Guris & Burak test indicate that the study variables, Broad Money Supply (M2) and Public Spending (G) are stationary at the first difference I (1) across all specified model forms. This implies that the data are suitable for analysis, estimation, and forecasting, and that the results derived are valid and not spurious. After confirming the stationarity of the time series for the aforementioned study variables, it becomes essential to explore the long-run equilibrium relationship between them. In this context, Broad Money Supply (M2) is treated as the independent variable, while Public Spending (G) is considered the dependent variable. To verify the existence of this long-run relationship, the Bounds Test for cointegration was applied. The results of this test are presented in **Table 2**.

Table 2: Summary of Bootstrapping Bound Test Results Based on the Bounds Testing Approach

Test Statistic	Value	K
Overall-F	30.827	2
Test Statistic	Value	K
Critical Value Bounds (Generated Using Bootstrapping):		
Significance Level	I(0) Bound	I(1) Bound
10%	2.713	3.453
5%	3.235	4.053
1%	4.358	5.393

Source: Prepared by the researcher using EViews13 statistical software

The computed F-statistic value of 30.827, which exceeds the critical values at all significance levels (1%, 5%, and 10%), confirms the existence of a long-run equilibrium relationship. Therefore, the alternative hypothesis is accepted and the null hypothesis is rejected. In other words, the two variables broad money supply (M2) and public spending (G) do not diverge in the long term; rather, they exhibit convergent behavior over time. Following the nonlinear stationarity test and the confirmation of cointegration among the study variables, the NARDL model was applied. In this model, public spending (G) is the dependent variable, and broad money supply (M2) is the independent variable. The relationship between them is assumed to be positive, in line with economic theory. Using the nonlinear estimation approach, the results were obtained and presented in Table (3)**.** Since the time series for the study variables are stationary at first difference and a long-run cointegration relationship has been confirmed, applying the nonlinear regression model is appropriate. The computed F-statistic from the NARDL model is 5.908, which is statistically significant at acceptable significance levels. This leads to the acceptance of the alternative hypothesis, which states that at least one of the regression coefficients differs from zero indicating that the model is statistically significant overall. Furthermore, the coefficient of determination (R^2) was estimated at 41%, reflecting the proportion of variation in the dependent variable **(**public spending G**)** explained by the independent variable **(**broad money supply M2**)**. The remaining 59% of variation in public spending is attributed to other external variables not captured within the model.

Table 3: Summary of NARDL Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DG (-1)	-0.115568	0.063214	-1.828205	0.0688
DG (-2)	-0.128484	0.063872	-2.011585	0.0454
DG (-3)	-0.100225	0.062507	-1.603413	0.1102
DG (-4)	-0.145548	0.062012	-2.347085	0.0197
DM2_POS	6.247063	1.361163	4.589503	0.0000
DM2_POS (-1)	2.667322	1.605688	1.661171	0.0980
DM2_NEG	-3.617244	1.158664	-3.121910	0.0020
C	1455334.	2576599	0.564828	0.5727
R-squared	0. 418591		F-statistic	5.908861
Durbin-Watson stat	2.039890		Prob(F-statistic)	0.000002

Source: Prepared by the researcher using EViews13 statistical software.

As shown, the public spending variable (G) responds to positive changes in broad money supply, with an estimated elasticity of 6.247063. This implies that a 1% increase in M2 results in a 6.25% increase in public spending, confirming a strong and statistically significant positive relationship. The estimation results clearly indicate the presence of asymmetry, as positive and negative changes in broad money supply have non-identical effects on public spending. Specifically, public spending reacts more strongly to positive shocks in money supply than to negative ones. This confirms the logical economic relationship whereby an increase in broad money supply leads to a multiplied increase in public spending. Moreover, there is no evidence of autocorrelation among the error terms, as confirmed by the Durbin-Watson statistic value of 2.039890, which falls within the acceptance range. As illustrated in **Figure 2**, the cumulative dynamic multiplier was used to capture the adjustment path and the disequilibrium period following either a positive or negative shock in the independent variable (M2), and their resulting effects on the dependent variable (public spending G), both in positive and negative terms.

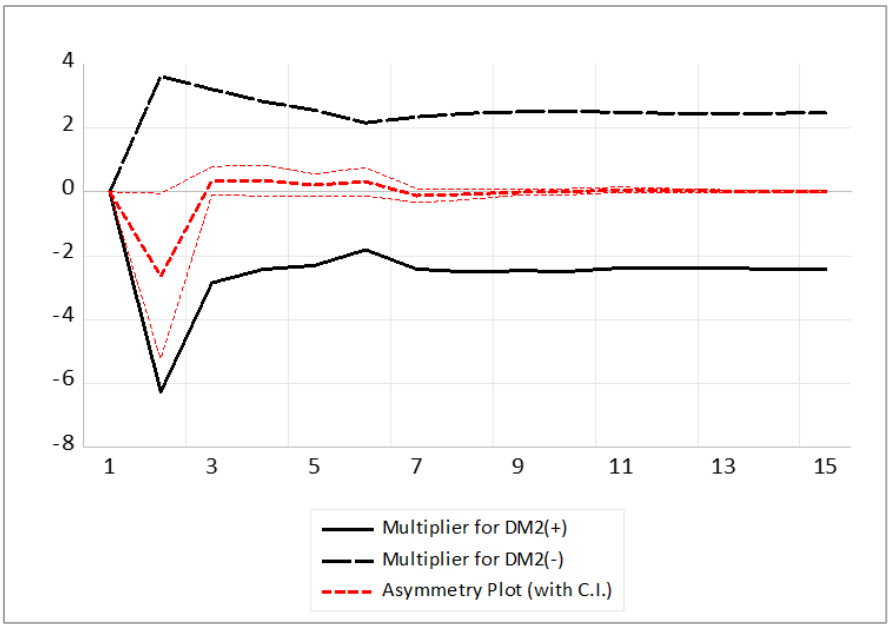

Figure 2

Source: Prepared by the researcher based on the results obtained using EViews13 statistical software.

Figure (2) illustrates the dynamic multiplier of the cumulative impact of positive and negative shocks in broad money supply (M2) on public spending (G) in Iraq over a period of 11 months. The dark red dashed line represents the difference between the effects of a 1% positive and negative shock, while the fine dashed lines indicate the confidence intervals, reflecting the variability in the impact of the two types of shocks. The solid black line shows the effect of positive shocks, whereas the dashed black line represents the effect of negative shocks, highlighting the short-run asymmetric relationship. A 1% increase in M2 leads to a 0.32% rise in public spending in the second month, reaching 0.45% in the third month, and then stabilizing at around 0.40% until the fifteenth month. In contrast, the cumulative effect of negative shocks remained calm and stable throughout the study period, with an impact of approximately 0.22%. This confirms that the cumulative dynamic multiplier of broad money supply has a stronger positive effect on public spending than negative shocks, in line with the research hypothesis.

To ensure the quality of the model used in measuring the impact of broad money supply on public expenditure in Iraq during the period (2004–2025), Table (4) illustrates the results.

Table 4: Illustrates a summary of the results of tests or model quality evaluation.

Test	Indicator	Indicator Value	Prob.
Breusch–Godfrey Serial Correlation LM Test	Autocorrelation Test	3.204	0.5719
Breusch–Pagan–Godfrey	Heteroscedasticity Test	3.742	0.5700
Jarque Bera	Normal Distribution Test	0.68932	0.6327

Source: Prepared by the researcher based on the results of the statistical program Eviews13.

The model is free from autocorrelation among the random variables, as the probability value of the Chi-square statistic reached (0.5719), which is greater than the acceptable natural probability value of (0.05). This indicates the acceptance of the null hypothesis and the rejection of the alternative. Moreover, the Breusch-Pagan-Godfrey test confirmed that the model does not suffer from the problem of heteroscedasticity, as the calculated value was greater than the probability value of (0.05). The Jarque-Bera test also proved that the data are normally distributed. Based on the above, it is evident that there is a positive impact of money supply on public expenditure, thereby confirming the research hypothesis. Furthermore, the study is consistent with the findings of Magda Kandil, as referenced in the literature review and prior studies, which affirmed the existence of a direct relationship between money supply and public expenditure. This increase is attributed to the rise in operational expenditures, salaries, and reliance on oil revenues, along with the neglect of other sectors.

CONCLUSIONS AND RECOMMENDATIONS

First: Conclusions

1. The enormous oil revenues contribute more than 92% of public revenues, based on which the money supply increases through monetization, leading to a significant rise in public expenditure undertaken by the Iraqi government, especially in consumption. This indicates the rentier nature of the Iraqi economy and the structural deficit across all its sectors.
2. The rate of public expenditure depends heavily on the money supply, with this rate estimated at (0.418%), which reflects the value of R^2 obtained in the regression model. This indicates the increase in consumption expenditure and the government's intervention in economic activity.
3. The econometric results showed the stability of the time series of the study variables broad money supply (M2) and public expenditure (G) in their first differences. Accordingly, the Nonlinear Autoregressive Distributed Lag (NARDL) model was adopted to measure nonlinear phenomena.
4. The econometric results proved that the broad money supply variable has a statistically significant and positive impact on public expenditure, with an elasticity coefficient of (6.2%), meaning that a 1% change in money supply leads to an increase in public expenditure by the mentioned elasticity.
5. The results of the behavior of the two curves representing positive and negative shocks confirmed the short-term asymmetric relationship, where a 1% increase in money supply leads to a rise in public expenditure by (0.32%) in the second month, increasing to (0.45%) in the third month and stabilizing at (0.40%) until the end of the study period. It was also shown that the positive effect is greater than the negative one.

Second: Recommendations

1. It is essential to achieve balanced economic growth across all economic sectors to contribute to the commodity base, especially since the Iraqi productive apparatus is highly flexible and responds extensively to developmental changes aimed at eliminating the rentier phenomenon that afflicts the Iraqi economy.
2. It is necessary to direct surplus oil revenues toward infrastructure and public services in order to advance the Iraqi economic reality and provide the appropriate infrastructure for launching comprehensive economic development.
3. Public expenditure must be linked to the return on the Iraqi dinar spent to ensure the efficiency of public spending and to tie the general budget to clearly defined future goals that achieve sustainable economic growth.
4. Growth in public spending must be achieved without reliance on oil revenues by fostering non-oil economic growth, such as activating tax revenues and prioritizing projects oriented toward exports or at least those aimed at covering domestic consumption to reduce the proportion of foreign components.
5. Increasing the money supply without proper study exacerbates consumption expenditure, leads to a continuous rise in the general price level, and exposes the economy to both external and internal shocks.

REFERENCES

- Magda Kandil,2016, The growth of government spending & the money supply: Evidence & implications within & across industrial countries, Journal of Economic studies.
- Muhammad Ijaz, 2018, The Interrelationship between Money supply, inflation, public expenditure & economic growth, European Online Journal & Social Sciences, Vol 7, NO1.

- Jihane Benkhaira & Hafid EL Hassani,2023, Economic recovery through the money supply & public spending in morocco: an empirical investigation, African Journal of Economic & Management Studies, ISSN:2040-0705.
- Bunescu Liliana, Mihaiu Diana & Comaniciu Carmen, 2011, is there a correlation between government expenditures population money supply & government revenues?, International Journal of Arts & Sciences CD-ROM.ISSN:1944-6934: 4(12):241-254.
- Chen, Xin, 2020, Identification of Seasonality in Time Series with python machine learning client for SAPHANA.
- Aizenman, Joshua, 1994, Monetary & Real Shocks, Productive Capacity & Exchange Rate Regimes Economica VOL.61, P34-39.
- Haider Mohsen & Alaa Abbas, 2024, Measuring the effect of the relationship between money supply & public spending in Iraq for the period (2022-2024), AL-Qadisiyah Journal for Administrative & Economic Sciences, QJAE, Volume 26, Issue 4(2024), P60-76.
- Andreas G. Georgantopoulos & Anastasion D.Tsamic, 2012, The Interrel ationship between Money Supply, prices & Government Expenditures & Economic Growth: A causality Analysis for case of Cyprus, International Journal of Economic Sciences & Applied Research 5(3), p115-128.
- Yong U. Glasure, Aditi Angirasa & Aie-Rie Lee,1998, The impact of money supply & government spending on economic development & energy: The case of Taiwan, The Journal of energy & development, Vol.24, NO.1, PP55-65.
- Gengenbach, C, Palm & Urbain, J. 2004, Panel Unit Root Tests in the Presence of Cross-Sectional Dependencies: Comparison & Implications for Modelling, Econometric Reviews, 29(2):111-145.
- Marwa Ibrahim Abd AL- Bannah & Sameer Siham Dawood AL-Kafaji, 2022, Compatibility between government spending & broad money supply in Iraq's GDP growth for the period (2004-2020), International Journal of Health sciences 6(S3), 12376-12324.
- https://cbiraq.org/DataValues.aspx?dtFrm=01/31/2004&dtTo=04/07/2025&tmId=154&dtformat=MMM,yyyy
- https://cbiraq.org/DataValues.aspx?dtFrm=01/31/2004&dtTo=04/07/2025&tmId=184&dtformat=MMM,yyyy

Appendix 1

Years	Actual Expenditure	Broad Money Supply	Years	Actual Expenditure	Broad Money Supply
2004Q1	468749	7445000	2015Q1	2826894	88444238
2004Q2	1119353	7671000	2015Q2	5823480	88621868
2004Q3	1920634	7899000	2015Q3	11237128	91248122
2004Q4	2618212	8261000	2015Q4	16135540	91762010
2004Q5	3488315	8502000	2015Q5	21570927	92930011
2004Q6	15097975	9147000	2015Q6	28186469	91422026
2004Q7	16540405	9367000	2015Q7	35520403	89513378
2004Q8	18797954	9705000	2015Q8	41353105	87471120
2004Q9	20869089	9775000	2015Q9	45435844	87179092
2004Q10	24374839	9588000	2015Q10	50680027	86752666
2004Q11	26800967	9885000	2015Q11	55475580	85292706
2004Q12	32117491	12254000	2015Q12	70397515	84527272
2005Q1	1010030	12474000	2016Q1	2943531	84418246
2005Q2	2527842	12899000	2016Q2	7058029	86573324
2005Q3	4757612	13650000	2016Q3	11687629	87960801
2005Q4	6332496	13732000	2016Q4	15639813	89080003
2005Q5	7432887	13888000	2016Q5	23911618	89342320
2005Q6	10352309	13792000	2016Q6	30328588	88901115
2005Q7	13160137	14036000	2016Q7	34459129	89925264
2005Q8	15705267	13278000	2016Q8	40681257	90540554
2005Q9	18229751	13138000	2016Q9	45198901	91225709
2005Q10	20267030	14051000	2016Q10	51455567	90685636
2005Q11	22791497	13272000	2016Q11	56131024	90106348
2005Q12	26375175	14684000	2016Q12	67067437	90466370
2006Q1	2087710	15267000	2017Q1	4161531	90454105
2006Q2	4096114	15826000	2017Q2	8817856	90359096
2006Q3	8110930	16701000	2017Q3	13496166	90180057
2006Q4	11358817	16842000	2017Q4	17977964	88855348
2006Q5	14333493	17128000	2017Q5	22896085	89550630
2006Q6	16459986	17486000	2017Q6	27924908	90045251
2006Q7	19257550	18820000	2017Q7	35226042	91205230
2006Q8	21938206	19440000	2017Q8	45085375	90811987
2006Q9	24742634	19145000	2017Q9	52226418	89870649
2006Q10	27352221	19538000	2017Q10	60413958	89904869

2006Q11	30206873	19658000	2017Q11	67344150	91129944
2006Q12	38806679	21080000	2017Q12	75490115	92857047
2007Q1	1350445	18329063	2018Q1	4274429	91625221
2007Q2	3084154	18521249	2018Q2	8792330	90831209
2007Q3	4946238	18677529	2018Q3	13042887	89517337
2007Q4	7473210	19144052	2018Q4	18821427	89802803
2007Q5	11251064	18147866	2018Q5	25276526	88948026
2007Q6	13101040	18791275	2018Q6	30488415	90973298
2007Q7	16008157	19577348	2018Q7	41587673	90927911
2007Q8	18617390	20301736	2018Q8	47736089	91487579
2007Q9	23147986	22524744	2018Q9	57218567	93170025
2007Q10	26411509	23444731	2018Q10	63159398	92856914
2007Q11	28960902	23522876	2018Q11	71483665	93702138
2007Q12	39031232	26956076	2018Q12	80873189	95390725
2008Q1	1607046	27037186	2019Q1	5650331	94252953
2008Q2	4995678	25349193	2019Q2	11440142	93722387
2008Q3	7975770	25910917	2019Q3	18429560	95621659
2008Q4	12954951	26081245	2019Q4	24629112	97104080
2008Q5	17400673	26580025	2019Q5	31432960	96043053
2008Q6	22952019	28481094	2019Q6	38824983	98466307
2008Q7	27721807	29825484	2019Q7	48371033	99501960
2008Q8	31612445	30879575	2019Q8	57626488	1.01E+08
2008Q9	38556973	32536077	2019Q9	66448687	1.02E+08
2008Q10	43450505	31294688	2019Q10	74456452	1.03E+08
2008Q11	49385768	33579985	2019Q11	85050465	1.03E+08
2008Q12	59403375	34919675	2019Q12	1.12E+08	1.03E+08
2009Q1	2129132	36057912	2020Q1	5133306	1.03E+08
2009Q2	4687280	37659037	2020Q2	10749424	1.06E+08
2009Q3	7573558	36973388	2020Q3	17377596	1.08E+08
2009Q4	10659729	36720694	2020Q4	22756417	1.11E+08
2009Q5	14480889	36957496	2020Q5	27478471	1.1E+08
2009Q6	19308998	37811325	2020Q6	31354308	1.1E+08
2009Q7	23562094	38806875	2020Q7	40056757	1.11E+08
2009Q8	27604557	39690346	2020Q8	45685763	1.12E+08
2009Q9	33073579	42982641	2020Q9	51734178	1.12E+08
2009Q10	38198670	42921266	2020Q10	57865491	1.12E+08
2009Q11	43521533	43813715	2020Q11	64360943	1.14E+08
2009Q12	52567025	45437918	2020Q12	76082443	1.2E+08
2010Q1	3861589	46211046	2021Q1	6569312	1.22E+08
2010Q2	7688959	47666215	2021Q2	12277142	1.26E+08
2010Q3	11624023	49264741	2021Q3	17443689	1.29E+08
2010Q4	15931096	51224102	2021Q4	23521979	1.3E+08
2010Q5	21249373	53050750	2021Q5	31132696	1.33E+08
2010Q6	26691602	55851298	2021Q6	38121117	1.34E+08
2010Q7	32432019	55873827	2021Q7	45761687	1.35E+08
2010Q8	37881009	56388061	2021Q8	53831475	1.36E+08
2010Q9	42410560	56213464	2021Q9	61572130	1.35E+08
2010Q10	47319988	57299232	2021Q10	76094426	1.38E+08
2010Q11	51839037	58201459	2021Q11	86918080	1.37E+08
2010Q12	64351984	60386086	2021Q12	1.03E+08	1.4E+08
2011Q1	3583740	60808829	2022Q1	7255950	1.4E+08
2011Q2	7539833	59739929	2022Q2	14376295	1.42E+08
2011Q3	12735146	58452768	2022Q3	23493321	1.43E+08
2011Q4	17828846	59265111	2022Q4	31762676	1.46E+08
2011Q5	22951921	59602270	2022Q5	39234031	1.46E+08
2011Q6	28861159	62321706	2022Q6	49194107	1.5E+08
2011Q7	35791501	64438666	2022Q7	58206045	1.52E+08
2011Q8	41786546	65125368	2022Q8	69559692	1.54E+08
2011Q9	46753668	65110706	2022Q9	78752863	1.54E+08
2011Q10	53102654	67148300	2022Q10	86690376	1.57E+08
2011Q11	58146385	68973332	2022Q11	89755993	1.62E+08

2011Q12	69639523	72177951	2022Q12	1.17E+08	1.68E+08
2012Q1	3843468	71626698	2023Q1	6426561	1.72E+08
2012Q2	9032673	72389840	2023Q2	13023221	1.71E+08
2012Q3	13879760	73592642	2023Q3	22668192	1.7E+08
2012Q4	21146963	75216016	2023Q4	30885582	1.73E+08
2012Q5	29653611	73207937	2023Q5	39353032	1.73E+08
2012Q6	37979778	72682903	2023Q6	47800622	1.78E+08
2012Q7	46132256	72968245	2023Q7	54842345	1.77E+08
2012Q8	53576997	73768559	2023Q8	65192198	1.74E+08
2012Q9	60540661	73543262	2023Q9	78256734	1.74E+08
2012Q10	67880750	74254439	2023Q10	90642812	1.76E+08
2012Q11	75091126	74863727	2023Q11	1.1E+08	1.79E+08
2012Q12	90374783	77187497	2023Q12	1.42E+08	1.81E+08
2013Q1	4470874	77336835	2024Q1	8791176	1.77E+08
2013Q2	9491016	78554690	2024Q2	16562552	1.76E+08
2013Q3	16788178	80238418	2024Q3	25077042	1.73E+08
2013Q4	24036601	83367590	2024Q4	37143371	1.75E+08
2013Q5	32741459	84979975	2024Q5	47827406	1.78E+08
2013Q6	41687042	85218485	2024Q6	58253981	1.79E+08
2013Q7	48892341	84998414	2024Q7	73848906	1.81E+08
2013Q8	60192555	83919472	2024Q8	83272067	1.8E+08
2013Q9	70225129	85886119	2024Q9	94878893	1.8E+08
2013Q10	79434769	86592362	2024Q10	1.23E+08	1.77E+08
2013Q11	87274923	86959526	2024Q11	1.36E+08	1.74E+08
2013Q12	106873027	89512076	2024Q12	1.36E+08	1.78E+08
2014Q1	3858545	90436700			
2014Q2	8647883	88921947			
2014Q3	13035950	89146380			
2014Q4	17347076	90306439			
2014Q5	22215339	88797216			
2014Q6	27602713	88852188			
2014Q7	31470255	88970432			
2014Q8	36274228	88497577			
2014Q9	41474407	89683842			
2014Q10	47857507	90633315			
2014Q11	56938729	89370875			
2014Q12	83556226	92988876			