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Budgetary Surpluses, Deficits, and Money Supply (M2) in Iraq: A Bayesian Vector Autoregression Perspective

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Abstract

This study examines the relationship between Iraq's general budget performance (deficit/surplus) and the money supply (M2) from January 2004 to June 2024. The primary purpose of the research is to analyze how fluctuations in the money supply impact fiscal outcomes in Iraq, a country heavily reliant on oil revenues. Utilizing the Bayesian VAR (BVAR) approach, the study incorporates prior information to enhance the analysis of multivariate time series data. The findings reveal a very weak negative correlation between M2 and the budget performance, indicating that changes in the money supply do not significantly influence Iraq's fiscal health. Instead, the budget is primarily affected by its own dynamics and external factors, such as oil prices. The study concludes that enhancing fiscal management and diversifying revenue sources are crucial for achieving stable economic growth and ensuring fiscal sustainability in Iraq.

Keywords: Budget Deficit, Money Supply, M2, Bayesian VAR, Fiscal Performance.

1- Introduction

Iraq, a nation heavily reliant on oil revenue, has faced significant economic challenges in recent decades. Government budget deficits and surpluses have been recurrent features of its economic landscape, often influencing monetary policy and economic stability. This study delves into the intricate relationship between Iraqi government budget balances and money supply dynamics.

A government budget deficit arises when government expenditures exceed its revenues, while a surplus occurs when the reverse is true. Money supply refers to the total amount of currency and other liquid assets circulating in an economy. These two concepts are interconnected within the framework of macroeconomic theory. Governments often resort to deficit financing to fund expenditures, which can lead to an expansion of the money supply through various mechanisms, such as borrowing from the central bank or issuing government bonds. Conversely, budget surpluses can potentially reduce the money supply (Friedman, 1971; Dornbusch & Fischer, 1990).

Understanding the nexus between government budget balances and money supply is crucial for several reasons. Firstly, changes in the money supply can significantly impact inflation, interest rates, and economic growth. Excessive money supply growth can lead to inflationary pressures, while insufficient growth can hinder economic activity (Blanchard, 2006). Secondly, government budget deficits and surpluses can have implications for fiscal sustainability and public debt. Persistent deficits can lead to a buildup of public debt, which can impose a burden on future generations (Reinhart & Rogoff, 2010).

While numerous studies have explored the relationship between government budget deficits and money supply in various contexts (e.g., Cebula, 1997; Wachtel & Young, 1987), the specific case of Iraq warrants further investigation. The country's unique economic structure, political instability, and reliance on oil revenue present distinct challenges that may influence the transmission mechanism between fiscal and monetary policies (Habib, 2020; Alnasrawi, 2001).

This study aims to address the following research objectives:

1. To analyze the historical trends in Iraqi government budget deficits and surpluses and their correlation with changes in the money supply.
2. To investigate the mechanisms through which government budget operations influence the money supply in Iraq, including the role of the Central Bank of Iraq.
3. To provide policy recommendations for sustainable fiscal and monetary policies in Iraq.

In studying the relationship between government budget deficits and money supply, particularly in the context of Iraq, the Bayesian Vector Autoregression (BVAR) method offers an advanced approach for analyzing dynamic relationships among macroeconomic variables over time. The BVAR method is an extension of the traditional VAR model, which models multiple time series simultaneously by considering the lagged values of each variable as predictors of the others. However, the BVAR approach integrates Bayesian inference, allowing for the incorporation of prior beliefs about parameters. This addition helps mitigate issues of overfitting that can arise in high-dimensional datasets with many parameters relative to observations, a common scenario in economic studies involving complex interactions (Koop & Korobilis, 2010).

In particular, the BVAR model is useful for studying fiscal and monetary dynamics due to its ability to account for time-varying relationships and structural changes in economic policies. Iraq's economic structure and reliance on oil revenue may lead to volatility and shifts in the impacts of budget deficits on the money supply, inflation, and other macroeconomic indicators. The BVAR model's flexibility can help capture these variations over time, enhancing the robustness of findings in this context (Bańbura, Giannone, & Reichlin, 2010). Additionally, the method allows for the use of informative priors, such as the Minnesota prior, which imposes restrictions on the coefficients to reflect economic theory, thus refining the precision of estimated relationships between variables (Doan, Litterman, & Sims, 1984).

This study’s focus on Iraq's M2 money supply and budgetary balance intends to bridge a gap in the literature by providing an in-depth analysis of the Iraqi context. Given Iraq’s oil reliance and limited fiscal diversification, understanding how budgetary surpluses or deficits influence the money supply can offer insights into potential vulnerabilities and areas for policy improvement. In examining the period from 2004 to 2024, this study will utilize econometric models, such as the Bayesian Vector Autoregression (B-VAR), to assess the dynamic relationships between these variables and provide evidence-based recommendations for stabilizing Iraq's macroeconomic framework in the face of oil market fluctuations.

2-Literature Review

The relationship between money supply and fiscal policy, particularly concerning budget deficits or surpluses, is critical to understanding economic stability and growth in any economy. For Iraq, a country with a highly oil-dependent economy and complex fiscal challenges, this relationship holds significant implications for both short-term macroeconomic management and long-term policy development. Changes in Iraq’s money supply, notably the M2 aggregate, and shifts in its budgetary balance reflect intertwined dynamics influenced by oil revenue fluctuations, governmental fiscal decisions, and broader monetary policies. This study aims to analyze the interrelation between the Iraqi government’s budgetary position (deficit or surplus) and the money supply (M2), illuminating how fiscal policies impact monetary conditions in Iraq.

Theoretically, the relationship between money supply and government budget balances has been widely debated. According to the Keynesian framework, a budget deficit can drive economic growth by stimulating aggregate demand, leading to increased money supply if financed by borrowing from the central bank or monetary

expansion. However, the monetarist perspective argues that excessive deficits may lead to inflationary pressures due to increased money supply, which, if unchecked, can destabilize the economy (Friedman, 1968). Empirical studies across different economies have yielded mixed results on the exact nature of this relationship, varying based on factors such as economic structure, monetary policy frameworks, and the financing methods for budget deficits.

For oil-rich economies like Iraq, the relationship between money supply and budget balance is more intricate. Oil revenues constitute the bulk of the Iraqi government's income, accounting for nearly 90% of its budgetary revenue (IMF, 2023). When oil prices are high, Iraq tends to experience budget surpluses, which can lead to decreased borrowing needs and potentially limit excessive money supply growth. Conversely, when oil prices fall, the government may face substantial budget deficits, potentially leading to increased borrowing or monetary financing, thus impacting money supply (World Bank, 2021). Understanding how fluctuations in oil revenue affect the relationship between fiscal balance and money supply is essential for effective policy-making, especially in a country where oil revenue volatility can lead to fiscal instability.

Empirical research on Iraq highlights the fiscal and monetary impacts of its oil dependency. According to Hasanov et al. (2018), the Iraqi economy is particularly susceptible to oil price shocks, which directly affect both budget balance and money supply. Studies have demonstrated that during periods of oil revenue shortfalls, the Iraqi government often resorts to borrowing from both domestic and international sources to finance budget deficits (Mahdi & Mohamed, 2020). This borrowing, when conducted through domestic channels, often leads to an expansion in the money supply, as the Central Bank of Iraq (CBI) may purchase government securities to aid financing efforts. Consequently, changes in the fiscal stance of the Iraqi government are not only a reflection of oil price trends but also a key determinant of monetary supply movements.

Research on developing economies underscores the broader economic effects of such fiscal-monetary dynamics. A study by Prabheesh et al. (2020) emphasized that in countries with limited diversification, fiscal deficits tend to increase money supply due to dependency on central bank financing. The presence of such dynamics in Iraq suggests that shifts in the government's budget position could have significant implications for inflation, exchange rates, and overall economic stability. Thus, comprehending the link between Iraq's fiscal balance and money supply is critical, as it can help policymakers predict potential macroeconomic instabilities and adopt preemptive measures to mitigate them.

The relationship between budgetary balances (deficits and surpluses) and money supply (M2) is essential for understanding macroeconomic stability in countries like Iraq, where oil revenue dependency and fiscal vulnerabilities shape monetary dynamics. Using the Bayesian Vector Autoregression (BVAR) method, this study investigates the interactions between Iraq's fiscal stance and money supply, specifically focusing on how budgetary deficits and surpluses affect M2 growth over time. This literature review presents the theoretical underpinnings of the relationship, empirical studies on similar economies, and highlights gaps that this study aims to fill.

2-1- Fiscal Policy, Money Supply, and Economic Stability

Theoretical perspectives on the interaction between fiscal policy and money supply can be traced back to Keynesian and Monetarist frameworks, which offer divergent views on how government budgets impact economic stability and monetary expansion. According to the Keynesian view, government deficits can stimulate economic activity by increasing aggregate demand, especially during periods of recession or economic downturns. In this context, increased government spending—often financed by debt—can lead to a rise in the money supply if central banks adopt accommodative policies (Blanchard & Perotti, 2002). Keynesians argue that such fiscal expansion can help support growth, though it may introduce inflationary pressures if not carefully managed (Mankiw, 2021).

In contrast, the Monetarist approach, spearheaded by economists like Friedman (1968), suggests that an excessive increase in money supply due to deficit financing can lead to inflationary pressures. Monetarists posit that inflation is inherently a monetary phenomenon, largely driven by excess money supply growth. When governments finance deficits by borrowing from central banks, it increases the monetary base, potentially leading to inflation if growth

in output does not match the increase in demand. For oil-dependent economies such as Iraq, this relationship is complex, as fluctuations in oil revenue impact both the fiscal stance and monetary policy, necessitating a nuanced approach to understanding this interaction.

More recent theoretical advances introduce the concept of fiscal-monetary interactions, highlighting how government budget balances and central bank policies affect each other in dynamic ways. The fiscal theory of the price level (FTPL) argues that fiscal policy can influence price levels if government liabilities are perceived to be unsustainable, leading to inflationary expectations and affecting money supply growth. Leeper (1991) expanded on this by introducing the idea of 'active' and 'passive' monetary and fiscal policies, wherein an 'active' fiscal policy with large deficits requires 'passive' monetary policy to stabilize debt, potentially impacting the money supply. These insights are critical for countries like Iraq, where budget surpluses or deficits depend on volatile oil revenues, making sustainable monetary and fiscal policies challenging (Ahmed et al., 2018).

2-2- Empirical Evidence

Empirical studies on the interplay between budget deficits or surpluses and money supply (M2) in oil-dependent economies provide essential insights, especially relevant to the Iraqi economy. Given Iraq's reliance on oil, its budgetary balance is sensitive to fluctuations in oil prices, which often necessitates monetary adjustments to stabilize the economy. This section discusses empirical findings from studies on oil-rich countries and emerging economies, including Iraq, focusing on how fiscal balances impact money supply through various channels and emphasizing the relevance of Bayesian Vector Autoregression (BVAR) in capturing these dynamic relationships.

2-2-1-Fiscal Deficits, Monetary Policy, and Money Supply Growth

Studies on oil-dependent economies reveal that fiscal deficits, often spurred by oil revenue fluctuations, can significantly influence money supply. When oil prices decline, governments in these economies experience budget deficits, leading to increased borrowing or central bank financing to cover these shortfalls (Farzanegan & Markwardt, 2009). In the case of Iraq, where oil accounts for nearly 90% of government revenues, fiscal deficits during periods of low oil prices can have a marked impact on monetary policy. The government's tendency to borrow domestically during these periods expands the monetary base, subsequently increasing the money supply (IMF, 2023).

For example, Hasanov et al. (2018) found that in the Gulf Cooperation Council (GCC) countries, fiscal deficits during periods of low oil prices led to an expansionary monetary response, with central banks often financing government debt. This monetary response increases money supply, contributing to inflationary pressures and impacting exchange rates. Similarly, Mahdi and Mohamed (2020) observed that in Iraq, government borrowing, largely to finance fiscal deficits during low oil revenue periods, has led to substantial increases in the M2 money supply, further influencing inflation rates and affecting economic stability.

In non-oil-exporting countries, empirical findings reinforce these dynamics but in different contexts. For instance, Prabheesh et al. (2020) analyzed fiscal-monetary interactions in emerging economies, using BVAR models to capture time-varying dynamics. Their results indicate that in economies with fiscal deficits reliant on central bank financing, there is a strong tendency for increased money supply, supporting inflationary trends. These studies emphasize that fiscal deficits financed through monetary channels tend to increase the M2 aggregate, particularly in countries where external financing options are limited or unreliable.

2-2-2- Effects of Budget Surpluses on Money Supply in Oil-Dependent Economies

Conversely, when oil prices are high, oil-dependent countries such as Iraq tend to experience budget surpluses, reducing reliance on borrowing and, consequently, limiting the increase in money supply. During surplus periods, governments may avoid extensive domestic borrowing, leading to lower growth in M2, as observed by Farzanegan and Markwardt (2009) in Iran and Hasanov et al. (2018) in the GCC countries. In these periods, central banks often adopt tighter monetary stances, preventing excess liquidity from entering the economy and thus managing inflationary pressures.

For Iraq, high oil revenues leading to budget surpluses present an opportunity to stabilize the economy by reducing the monetary base. However, studies suggest that Iraq's dependence on oil revenues poses challenges in maintaining monetary stability. The International Monetary Fund (IMF, 2023) reported that, although budget surpluses allow Iraq to reduce borrowing, the unpredictability of oil prices requires a cautious fiscal-monetary approach to avoid adverse effects on money supply growth and inflation.

2-2-3- Bayesian Vector Autoregression (BVAR) and Dynamic Analysis

Bayesian Vector Autoregression (BVAR) models have become increasingly popular for analyzing complex economic relationships in volatile economies, especially for countries with oil-dependent revenues. The BVAR method is advantageous because it allows for the incorporation of prior information and captures dynamic relationships over time, which is crucial for analyzing fiscal-monetary interactions in Iraq. In cases where fiscal policy responses are influenced by fluctuating oil prices, as in Iraq, BVAR provides a flexible framework for understanding how these responses impact monetary aggregates, particularly M2.

Several studies illustrate the effectiveness of BVAR models in analyzing fiscal-monetary dynamics. For example, Prabheesh et al. (2020) used BVAR models to study emerging economies and found that fiscal deficits financed by central bank borrowing led to increased money supply, confirming that BVAR is useful in capturing the time-varying nature of fiscal-monetary interactions. Similarly, Karlsson (2013) emphasized that BVAR is well-suited to capture structural changes and policy shifts, especially in economies where fiscal responses are sensitive to external shocks such as oil price volatility.

3- Method

3-1- Prior Distributions in BVAR Models

The incorporation of prior distributions is what distinguishes BVAR from standard VAR models. Priors serve to shrink parameter estimates toward zero or some specified values, which mitigates the risk of overfitting and yields more stable forecasts. A commonly used prior in BVAR modeling is the Minnesota prior (Litterman, 1986), which is based on the assumption that economic variables tend to revert to a stable growth path over time, allowing the model to prioritize simpler structures unless data indicate otherwise.

- Minnesota Prior: Assumes that each variable follows a random walk process, allowing the model to "shrink" coefficients on lagged variables toward zero, especially for distant lags. This prior is effective in reducing overparameterization while maintaining a high degree of model flexibility.
- Natural Conjugate Priors: These are often used when computational simplicity is preferred, as they allow for closed-form solutions in posterior inference. Conjugate priors are particularly suitable for cases where the computational power is limited, as they reduce the complexity of posterior sampling.
- Hierarchical Priors: Recent advancements have introduced hierarchical priors, which add layers to prior distributions, making them more adaptable to data and better suited for capturing complex relationships among variables.

3-2- Bayesian Inference and Posterior Distribution

Once priors are specified, Bayesian inference is applied to combine these priors with the observed data, yielding a posterior distribution for each parameter. The posterior distribution $p(\theta/Y)$ reflects the updated beliefs about the model parameters θ after observing the data Y. Bayesian inference is usually performed through Markov Chain Monte Carlo (MCMC) methods or Gibbs sampling, especially when the posterior distribution is complex and does not have an analytical solution.

The posterior mean or median is then used to estimate the parameters, providing both point estimates and credible intervals, which are Bayesian counterparts to confidence intervals. This feature is valuable for quantifying the uncertainty surrounding forecasts, which is crucial in macroeconomic applications.

4- Data and Estimation Results

The data consists of monthly figures representing the budget deficit (negative values) or surplus (positive values) and money supply (M2) from January 2004 through July 2024 (Figure 1). Each entry reflects the financial health of the government budget for that month, with positive values indicating a surplus (excess revenue over expenditures) and negative values indicating a deficit (expenditures exceeding revenues).

Figure 1 shows the trend diagram of the variables and their seasonally adjusted time series.

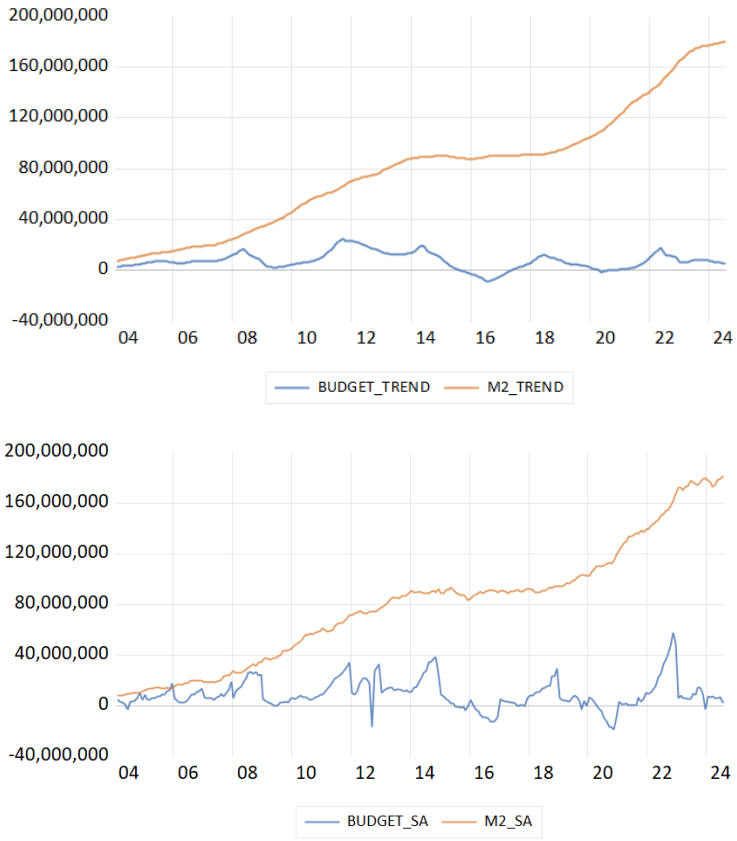

Figure 1: The trend and seasonally adjusted time series of the variables

To interpret the dataset related to the deficit or surplus statistics of Iraq's general budget alongside the money supply (M2) from January 2004 to June 2024, we can analyze the data's trends and implications.

The budget data reflects significant fluctuations between deficits and surpluses over the years, particularly with dramatic changes around key events or changes in economic conditions. Following the 2003 invasion, the budget shows a recovery phase with significant surpluses from 2004 onwards as the government regained control and oil revenues increased. A sharp decline in budget performance is noted, with substantial deficits emerging around 2015, coinciding with falling oil prices, security issues, and rising expenditures due to conflict and reconstruction needs.

An increase in M2 can indicate greater liquidity in the economy, potentially reflecting the government's efforts to boost economic activity through fiscal measures during deficit periods. The interplay between Iraq's general budget deficits and surpluses with trends in the money supply (M2) over the identified years reflects the country's economic conditions, reliance on oil revenues, and broader fiscal challenges. The data suggests that while Iraq has periods of recovery and surplus, managing deficits in the context of monetary policy will be critical for achieving stable economic growth and ensuring fiscal sustainability in the years ahead. Future policy measures should be informed by these historical patterns to adapt to changing economic conditions and challenges.

A correlation coefficient quantifies the degree to which two variables move in relation to each other (Table 1). In the case of Iraq's general budget (deficit/surplus) trend and the money supply (M2) trend from January 2004 to June 2024, a correlation of -0.056327 indicates the following:

Table 1: correlation coefficient

Correlation	BUDGET_SA BUDGET_TREND	M2_SA M2_TREND
BUDGET_SA BUDGET_TREND	1 1	0.043 -0.057
M2_SA M2_TREND	0.043 -0.057	1 1

The value -0.056327 suggests a very weak negative correlation between Iraq's general budget performance and the money supply (M2). This indicates that as M2 increases, there is a negligible tendency for the budget deficit/surplus to decrease, and vice versa. In practical terms, this means there is little to no consistent relationship between the two variables over this period. The weak correlation suggests that fluctuations in money supply do not significantly impact the budget situation, which might be indicative of other overriding factors influencing Iraq's budgetary health, such as oil revenues, economic policies, public spending priorities, and external factors like global economic conditions.

Given Iraq's reliance on oil revenue, the budget may be more responsive to oil price fluctuations and broader economic contexts rather than just changes in the money supply. For example, increases in M2 could occur during periods of expansionary monetary policy, but without corresponding increases in budget surpluses, primarily due to high expenditures or lackluster revenue collection.

4-1- Unit root Test

In order to perform the unit root test and determine the stationarity or non- stationarity of the variables, given that the data is monthly, therefore, the HEGY unit root test was used. The results of this test are presented in Table 2. The Null Hypothesis of this test is that the time series has a unit root at specified frequency. This test has been done on the values of seasonally adjusted government budget deficit/surplus growth and m2 growth.

Table 2: Results of HEGY unit root test

Seasonal Unit Root Test for GBUDGET_SA		**Significance Level**			**Seasonal Unit Root Test for GM2_SA**		**Significance Level**		
	Test Stat.	1%	5%	10%		Test Stat.	1%	5%	10%
Frequency 0	-3.700084				Frequency 0	-1.734583			
n=220		-2.55	-1.94	-1.62	n=220		-2.55	-1.94	-1.62
n=240		-2.61	-1.95	-1.62	n=240		-2.61	-1.95	-1.62
n=234		-2.59	-1.94	-1.62	n=225		-2.57	-1.94	-1.62
Frequency 2PI/12 and 22PI/12	15.21395				Frequency 2PI/12 and 22PI/12	19.24895			
n=220		29.36	8.49	4.00	n=220		29.36	8.49	4.00
n=240		30.68	8.08	3.67	n=240		30.68	8.08	3.67

n=234		30.28	8.20	3.77	n=225		29.69	8.39	3.91
Frequency 4PI/12 and 20PI/12	18.52936				Frequency 4PI/12 and 20PI/12	8.742328			
n=220		29.36	8.49	4.00	n=220		29.36	8.49	4.00
n=240		30.68	8.08	3.67	n=240		30.68	8.08	3.67
n=234		30.28	8.20	3.77	n=225		29.69	8.39	3.91
Frequency 6PI/12 and 18PI/12	17.01933				Frequency 6PI/12 and 18PI/12	13.73384			
n=220		29.36	8.49	4.00	n=220		29.36	8.49	4.00
n=240		30.68	8.08	3.67	n=240		30.68	8.08	3.67
n=234		30.28	8.20	3.77	n=225		29.69	8.39	3.91
Frequency 8PI/12 and 16PI/12	16.82970				Frequency 8PI/12 and 16PI/12	9.654802			
n=220		29.36	8.49	4.00	n=220		29.36	8.49	4.00
n=240		30.68	8.08	3.67	n=240		30.68	8.08	3.67
n=234		30.28	8.20	3.77	n=225		29.69	8.39	3.91
Frequency 10PI/12 and 14PI/12	18.15897				Frequency 10PI/12 and 14PI/12	10.39304			
n=220		29.36	8.49	4.00	n=220		29.36	8.49	4.00
n=240		30.68	8.08	3.67	n=240		30.68	8.08	3.67
n=234		30.28	8.20	3.77	n=225		29.69	8.39	3.91
Frequency PI	-4.165454				Frequency PI	-2.987012			
n=220		-2.55	-1.94	-1.62	n=220		-2.55	-1.94	-1.62
n=240		-2.61	-1.95	-1.62	n=240		-2.61	-1.95	-1.62

n=234		-2.59	-1.94	-1.62	n=225		-2.57	-1.94	-1.62
All seasonal frequencies	18.17728				All seasonal frequencies	18.42793			
n=220		26.99	7.82	3.71	n=220		26.99	7.82	3.71
n=240		28.04	7.45	3.43	n=240		28.04	7.45	3.43
n=234		27.72	7.56	3.51	n=225		27.25	7.72	3.64
All frequencies	17.62375				All frequencies	17.63316			
n=220		24.95	7.32	3.49	n=220		24.95	7.32	3.49
n=240		25.97	6.98	3.24	n=240		25.97	6.98	3.24
n=234		25.67	7.08	3.31	n=225		25.21	7.23	3.43

According to the results of the unit root test, it can be seen that both variables are stationary at a significant level of 5%.

4-2- Bayesian VAR estimation

Bayesian VAR estimation combines the strengths of Bayesian methods with the flexibility of VAR models in multivariate time series analysis. By incorporating prior information and providing a structured approach to uncertainty, BVAR is a powerful tool for econometric modeling and forecasting, especially in contexts where classical methods may struggle with small sample sizes or complex variable relationships.

Table 3: Bayesian VAR estimation

	GM2_SA	GBUDGET_SA
GM2_SA(-1)	0.330663	3.513583
	(0.05426)	(5.00978)
GM2_SA(-2)	0.015908	0.273136
	(0.03950)	(3.63535)
GBUDGET_SA(-1)	-0.000509	0.313274
	(0.00058)	(0.05423)
GBUDGET_SA(-2)	0.000358	0.023504
	(0.00042)	(0.03955)
C	0.872879	-28.87897
	(0.22640)	(20.9545)

Standard errors in ( )

Impulse response functions and variance decomposition analysis are used to use the estimation results of vector autoregression model. The analysis and review of these two are presented below.

Table 4: variance decomposition analysis

Variance Decomposition of GM2_SA:

Period	S.E.	GM2_SA	GBUDGET_SA
1	3.302448	100.0000	0.000000
2	3.482067	99.79799	0.202008
3	3.505861	99.80006	0.199945
4	3.509191	99.79831	0.201687
5	3.509679	99.79727	0.202730
6	3.509753	99.79695	0.203050
7	3.509765	99.79687	0.203128
8	3.509766	99.79685	0.203145
9	3.509767	99.79685	0.203149
10	3.509767	99.79685	0.203149

Variance Decomposition of GBUDGET_SA:

Period	S.E.	GM2_SA	GBUDGET_SA
1	307.2221	0.002408	99.99759
2	322.1369	0.121588	99.87841
3	324.3380	0.183757	99.81624
4	324.6629	0.203109	99.79689
5	324.7132	0.207917	99.79208
6	324.7211	0.208972	99.79103
7	324.7224	0.209187	99.79081
8	324.7226	0.209229	99.79077
9	324.7227	0.209237	99.79076
10	324.7227	0.209238	99.79076

The variance decomposition analysis presented in the tables provides insights into the contributions of GM2_SA (a measure of money supply) and GBUDGET_SA (government budget) to the forecast error variance of each variable over a specified number of periods.

Variance Decomposition of GM2_SA:

- **Period 1:** At the initial period, 100% of the variance in GM2_SA is attributed solely to its own shocks, with no impact from GBUDGET_SA.
- **Periods 2-10:** As time progresses, the influence of GBUDGET_SA begins to emerge but remains minimal, contributing only about 0.2% to the variance of GM2_SA by the second period and maintaining

a similar level (approximately 0.203%) through to the tenth period. The overwhelming majority of the variance (around 99.8%) continues to be attributable to GM2_SA itself.

Variance Decomposition of GBUDGET_SA:

- **Period 1:** A striking contrast is observed, with 99.99759% of the variance in GBUDGET_SA attributed to its own shocks, and only a negligible 0.002408% due to GM2_SA.
- **Periods 2-10:** The contributions from GM2_SA to the variance of GBUDGET_SA remain extremely low throughout the observed periods, only increasing to about 0.209% by the tenth period. The vast majority of the variance for GBUDGET_SA remains consistently derived from its own fluctuations, around 99.79%.

The results indicate a clear distinction in how the two variables influence each other over time. GM2_SA is largely driven by its own dynamics, with only a slight influence from GBUDGET_SA.

Conversely, GBUDGET_SA is predominantly influenced by its own shocks, with GM2_SA playing a negligible role in explaining its variance.

Overall, the dynamics suggest a relatively weak interaction between the money supply and government budget in terms of their immediate variances, indicating that while both variables affect their own behavior significantly, they do not heavily influence one another in the short to medium run.

Impulse response functions allow for the analysis of how target variables respond to unexpected impulses in other variables, making them valuable for examining the effects of structural changes. Essentially, they illustrate how one variable reacts to a data shock in each of the other variables. When analyzing the results of these shocks, two key factors are important: first, the significance of the shock's impact, and second, the gradual reduction of its effect over time, which demonstrates the model's validity. In vector autoregression models, graphs of impulse response functions are particularly useful for exploring and analyzing the impact of shocks from explanatory variables.

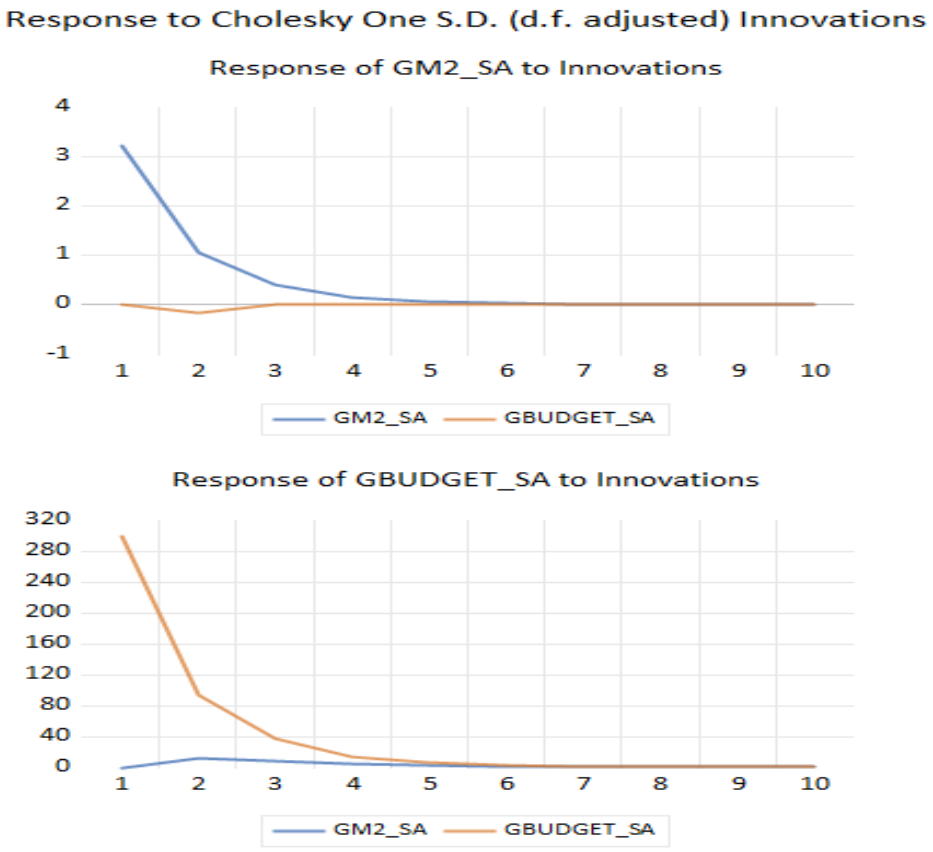

Figure 2: Results of Impulse response functions

The graph above illustrates that M2 growth only exhibited a negative reaction to shocks from government budget growth after a certain period, eventually stabilizing to a neutral response. In contrast, shocks originating from this variable persisted for up to four periods and resulted in a positive reaction within the variable itself.

The graph below shows that the response of government budget deficit or surplus growth to shocks from M2 growth was negligible and statistically insignificant. Conversely, positive shocks from the budget deficit or surplus created effects that extended over five periods.

5- Conclusion

The analysis of Iraq's budget deficits and surpluses alongside money supply (M2) trends from January 2004 to June 2024 reveals several critical insights regarding the country's fiscal health and monetary dynamics. The observed significant fluctuations in budget performance are closely tied to external factors, particularly oil prices and broader economic conditions, rather than a robust relationship with changes in the money supply. The weak negative correlation between the budget situation and M2 growth (-0.056327) indicates that the money supply does not substantially influence Iraq's fiscal outcomes. This suggests that other elements, such as government spending priorities and revenue collection efficiency, play a more significant role in shaping the budget profile.

The variance decomposition analysis demonstrates that while GM2_SA (money supply) experiences almost complete independence from GBUDGET_SA (government budget), the reverse is true: the budget is largely affected by its own dynamics, indicating a need for targeted fiscal policies rather than relying on monetary adjustments to manage budgetary health.

Given these findings, several policy suggestions can be made:

Diversification of Revenue Sources: To mitigate reliance on volatile oil revenues, the government should pursue strategies to diversify its income sources. This can be achieved through the promotion of non-oil sectors, such as agriculture, tourism, and manufacturing, which can create a more stable economic environment.

Strengthening Fiscal Management: Improved fiscal management is essential to enhance budgetary performance. This includes establishing more effective budget planning and execution mechanisms that prioritize sustainable expenditures and improve revenue collection processes to ensure that public spending aligns with available resources.

Monetary Policy Evaluation: Policymakers should reassess the role of monetary policy in influencing fiscal outcomes. Since changes in money supply have shown minimal direct impact on budget performance, there is an opportunity to focus on targeted monetary interventions that can stimulate economic growth without exacerbating fiscal imbalances.

Boosting Economic Resilience: Strengthening economic resilience through structural reforms will be vital. This includes enhancing infrastructure, investing in human capital, and fostering an environment that encourages private sector growth and innovation.

Crisis Management Planning: Given the historical context of fiscal volatility during periods of economic downturns (e.g., falling oil prices), developing comprehensive crisis management frameworks is crucial. This should encompass strategies for rapid response to budget shortfalls and economic shocks, ensuring that the government can maintain essential services and economic stability.

Monitoring External Influences: Ongoing assessment of external economic conditions, including global oil markets and geopolitical factors, will be important for adjusting fiscal and monetary strategies. Timely analysis and adaptive policies can help the government navigate potential economic challenges more effectively.

In conclusion, a comprehensive approach that focuses on enhancing fiscal discipline, diversifying the economy, and refining monetary policy will be essential for achieving stable economic growth and ensuring the long-term sustainability of Iraq’s budget. This multifaceted strategy should be informed by historical trends while being adaptable to the dynamic economic landscape.

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