

-RESEARCH ARTICLE-

THE IMPACT OF MONETARY POLICY ON GROSS DOMESTIC PRODUCT IN IRAQ: NEW EVIDENCE USING THE AUTOREGRESSIVE DISTRIBUTED LAG MODEL

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—Abstract—

The influence of monetary policy on Iraq's GDP throughout the unusually long period of 1985–2022 is thoroughly reviewed in this paper. The research examines the intricate relationships between important economic variables, such as GDP, inflation, money supply, exchange rates, and interest rates, using the Autoregressive Distributed Lag (ARDL) model. The findings reveal a significant negative correlation between the exchange rate and GDP, aligning with established economic theories that underscore the critical relationship between these two fundamental factors. Similarly, inflation exhibited a significant negative influence on GDP, further corroborating the theoretical expectations that higher inflation can detrimentally affect economic output. However, in sharp contrast to mainstream economic assumptions, evidence reveals no statistically significant link between interest rates and GDP, challenging the prevalent notion that higher interest rates consistently lead to reduced economic growth. Moreover, this article illustrates a significant positive correlation between money supply and GDP, which reinforces theoretical predictions regarding the role of liquidity in fostering

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economic activity. These findings collectively support the notion of long-term equilibrium among the study variables, suggesting that while some relationships adhere to traditional economic models, others prompt a re-evaluation of expectations. Based on overall findings that have been produced, the study strongly recommends that Iraq's central bank use unorthodox monetary actions that will stimulate GDP growth. Such strategies should include the enhancement of productivity-focused frameworks that prioritize economic resilience and sustainable development, ultimately positioning Iraq for a more robust economic future.

Keywords: Monetary Policy Tools, GDP, ARDL.

INTRODUCTION

A high, stable, and sustainable GDP growth rate is a key pillar of economic stability and prosperity aim of any macroeconomic policy framework, which is essential for nurturing and fostering long-term economic prosperity in any nation (Ahmad et al., 2021; Chen et al., 2024; Cristina et al., 2021). Monetary policy serves as a critical and significant instrument that profoundly influences key macroeconomic variables, thereby fostering overall economic stability and health across various sectors (Deih, 2023; Munthe et al., 2024). The various tools and mechanisms of monetary policy such as exchange rates, control of money supply, and determination of interest rates operate as intermediate aims or objectives that are intended to support broader and more comprehensive overarching aims, including the crucial stimulation of the real economy and the substantial enhancement of overall growth rates (Jordà et al., 2024; Zhao et al., 2023). In the unique and complex context of Iraq, the Central Bank holds the essential responsibility for designing, implementing, and enforcing sound monetary policy that aligns its efforts with the dual objectives of promoting robust economic growth while simultaneously ensuring long-term price stability within the overall economy (Abdullah et al., 2023; Alyaseri & Awthaeafa, 2021; Khudhair & Ghadeer, 2023). However, it is of utmost importance to note that the Iraqi economy remains heavily reliant and dependent on the oil sector, which accounts for over 50% of the total GDP. Additionally, productivity in other sectors continues to experience a prolonged period of stagnation, which critically hinders overall economic development and progression. Given the pivotal and influential role that monetary policy plays in shaping various economic outcomes, this research work aims to address a fundamental and pressing research question:

****Is there a significant and meaningful relationship between monetary variables and GDP in Iraq?**

**** Leveraging a comprehensive time-series dataset from 1985 to 2022 and utilizing the ARDL model, the study seeks to critically and rigorously examine the intricate effects of various facets of monetary policy on GDP within the unique context of the Iraqi**

economy. This important research contributes valuable and significant insights into the existing body of literature. From a policy perspective, it provides essential insights that assist policymakers in designing and formulating more effective and efficient monetary strategies, particularly those that concern exchange rates, interest rates, inflation, and the money supply itself. Furthermore, this study underscores the substantial and often underappreciated influence of political factors on GDP, thereby offering a comprehensive framework for managing political risks during periods of geopolitical uncertainty and instability that can affect the economy. Unlike many previous studies that often focus narrowly and specifically on the relationship between money supply and GDP, this work seeks to integrate a broader range of relevant monetary factors and influences. Additionally, it extends the empirical evidence over a sustained period characterized by diverse and fluctuating monetary policies, thus enabling a more nuanced analysis and more precise estimations of economic relationships and interactions. The use of advanced and sophisticated methodologies, such as the ARDL model, contributes to the delivery of fresh, innovative insights when compared to earlier research investigations. The structure of this comprehensive article is as follows: Section 1 includes a thorough review of prior studies that focus on the relationship between various monetary policy tools and economic outcomes. Section 2 outlines the econometric methodology, pertinent data sources, and the empirical model that is utilized in the analysis. Section 3 presents and discusses the empirical results obtained from the study findings. Finally, the last section, Section 4, presents the key findings and draws meaningful conclusions based on the research conducted throughout the study.

LITERATURE REVIEW

The monetary policy instrument relationship and GDP relationship is complex and multifaceted, which develops a big debate among researchers because of the lack of a unified consensus regarding the extent of monetary policy's effect on GDP. In theoretical discourse, various schools of thought show distinct viewpoints on this relationship (Marangos, 2025; Verdie et al., 2024).

The **Classical school**, in the Quantity Theory of Money ($MV = PY$), confirms the principle of money neutrality. So, changes in the money supply have no influence on real GDP but the value of money, ultimately affecting the over-all price levels. In classical theories, it is argued that the economy naturally gravitates toward full employment which renders monetary interventions ineffective in changing the output (Long et al., 2024).

On the contrary, the **Keynesian school** challenges strict money neutrality. Keynesians see that monetary policy can influence real GDP, in economies with unemployment. They state an increase in the money supply enhancing effective demand, so stimulating employment and production. Based on Keynes, monetary policy affects real variables

indirectly by the effect on interest rates, driving investment, output, and employment. Yet, Keynes recognized a "liquidity trap," a scenario in which the rise in the money supply does not reduce interest rates sufficiently for the stimulation of economic activities. However, Keynes acknowledged the effectiveness of monetary policy in the near term while arguing that its long-term consequences were neutral (Ahmed & Cassou, 2021).

Monetarists state that expansionary monetary policy may raise GDP in the short term by increasing aggregate demand. According to them, a rise in the money supply increase expenditure on goods and services, as there are idle productive resources. This triggers a chain reaction: businesses raise production, more employment, and investment increases because of the falling interest rates (Chugunov et al., 2021). Yet, in the long term, monetarists state that such policies merely cause inflation, with no lasting impact on GDP once the economy operates at full capacity. One of the monetary policy tools is the **exchange rate** emerging as particularly influential, with both positive and negative impacts on aggregate economic variables. Nowadays devaluation, for instance, is capable of raising the trade balance by more competitive imports costlier and exports, so increasing domestic production and employment (Prokopowicz, 2022).

Similarly, **inflation** is usually detrimental to GDP and economic growth, as rising prices cause doubt, hinder long-term planning, and disrupt economic stability. Lastly, the **interest rate** is pivotal in shaping GDP by the influence of aggregate demands. Lower interest rates, by expansionary monetary policy, decrease the cost of borrowing. This increase in aggregate demand makes higher GDP at the end (Azam & Khan, 2022). These theoretical frameworks are the intricate dynamics between monetary policy tools and GDP which provides a foundation to understand their nuanced effects on various economic contexts.

Many practical studies related to the current study, with a literature review help to understand the Impact of monetary policy on GDP. These studies have discussed the relations between monetary policy instruments and GDP in advanced and developing countries (Olawale & Obinna, 2023). The results have turned controversial as there are no well-defined and widely accepted factors for the prediction of the monetary policy instrument impacts on GDP, thus determining how monetary factors influence the behavior of GDP. However, experimental studies can be reviewed regarding monetary policy instruments that affect GDP in line with the monetary policy channels (variables) used.

(Akalpler & Duhok, 2018), investigated the relationship between monetary policy and economic growth in an emerging economy, with a focus on Malaysia. Using the Ordinary Least Squares (OLS) model, the study analyzed time-series data from 2002 to 2014, examining key indicators such as GDP, inflation, interest rates, and money

supply. The findings showed positive correlations between these monetary policy tools and Malaysia's economic growth, with interest rates, inflation, and money supply each of which shows a significant positive relationship with GDP. In the same way, (Iorember et al., 2022) studied the monetary policy influence on the economy in Nigeria, which incorporates variables like interest rates, money supply, and financial inclusion. The Dynamic ARDL model was employed to analyze data from the first quarter of 2004 to the fourth quarter of 2020 along with 30 forecasted quarters showing a statistically significant short-run effect of money supply on economic growth. Also, long-term aid from interest rates, money supply, and financial expenses. These results show a multifaceted and enduring instrumental influence of monetary policy on the development of the economy in emerging economies. In a related work, (Amaral et al., 2022) studied the monetary policy effect on economic growth in the United States which takes into consideration both short- and long-run impacts as calculated by GDP. In this study, a Vector Auto regression model examines the relationships between interest and Granger causality tests for determining predictability. Additionally, the Impulse Response Function test examines how one of the variables responds to changes in another overtime using second quarter 1959 to second-quarter 2022 time-series data. The finding is that there is evidence that monetary expansion is good for economic growth in the short run but that its effects are temporary in the long run. However, over time, inflation, by the Consumer Price Index, is greatly affected by monetary expansion. It appears that continued expansion of the money supply will lead to long-term inflationary problems.

In addition, (Stojanović et al., 2023) examined the monetary policy effect on GDP in Serbia. Correlation and regression analysis was from 2004 to 2020. A strong effect of monetary and credit policy on the country's GDP was found. Moreover, (Hameed, 2010) Examined the impact of money supply, interest rates, and inflation on overall GDP growth in Pakistan. To reach this result, the study used data from the past thirty years in Pakistan showing that interest rates with a slight relationship with the Gross Domestic Product (GDP), although the money supply growth has a significant effect on the GDP of the economy. In the same way, (Simionescu et al., 2017), analyzed the relationship between GDP and monetary variables in Romania using a Bayesian model with quarterly data from Q1 2000 to Q2 2015. The results, contradicting studies in advanced countries, show that the monetary variable influences the GDP. Furthermore, (Bediako et al., 2022) used a predictive Friedman data analysis to examine how monetary policy affects price stability and GDP in Ghana. The study, VAR analysis, showed a statistically weak relationship between the stability of price and GDP and a statistically significant relationship by multiple regression between monetary policy, price stability, and GDP. (El Husseiny, 2023) investigated the relative efficiency of financial and monetary policies in the promotion of the expansion of GDP in Egypt by an ARDL model. So, both financial and monetary policies showed a positive long-term effect on economic activity making a monetary policy more effective than financial policy in

stimulating nominal GDP growth. (Ayub & Shah, 2015) studied the monetary policy impact on GDP in Pakistan with money supplies, interest rates, and inflation significantly impacting GDP. (Mehtar & Al-Faryan, 2022) tested the impacts of private sector credit on business activities by the least squares method, which reveals that private sector credit and external debt enhance investment in infrastructure, crucial for GDP growth. (Arigor et al., 2021) studied the impacts of monetary policy on agricultural GDP performance in Nigeria, showing that exchange rate and credit to the agricultural sector have significant and positive long-term effects. (Cachanosky & Hoffmann, 2016) studied how the changes in interest rates affected production allocation in 10 European countries during the pre-2008 crisis period, finding that the low interest rate policy of the European Central Bank influenced resource allocation across industries, possibly explaining the slow recovery from the crisis in Europe. (Haldane, 2018) investigated the monetary policy impact on GDP, finding a significantly positive influence on the majority of social classes in the UK, with minimal impact on income and wealth inequality, and an overall positive impact on household welfare.

METHODOLOGY AND DATA

Data

The open-access datasets from 1985 to 2022 from the Iraqi Ministry of Planning and the Iraqi Central Bank are used in this research. Real Gross Domestic Product (RGDP), Inflation (Inf), Exchange Rate (Exg), Interest Rate (Int), and Money Supply (Ms) are the most important factors that have been taken into account here. Table 1 provides a concise overview of the factors under investigation.

Table 1: Descriptive Overview of the Model

Symbol	Exg	Int	Ms	Gdp	Inf
Variables	Exchange Rate	Interest Rate	Money Supply	Gross Domestic Product	Inflation
Unit of Measurement	Exchange Rate Volatility	Interest Rate Change Index	Money Supply Variation Rate	Real Gross Domestic Product	Inflation Rate
Dependent & Independent Variables	Independent Variable	Independent Variable	Independent Variable	Dependent Variable	Independent Variable
Expected Sign	-	+/-	-		+/-

Model Specifications

For empirically studying the monetary policy instrumental relationship with Gross Domestic Product in Iraq, this study relies on previous literature specifications regarding the monetary policy effect on Gross Domestic Products. More specifically,

our econometric model has been specified as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^n \beta_1 \Delta GDP_{t-i} + \sum_{i=1}^n \beta_2 \Delta EXg_{t-i} + \sum_{i=1}^n \beta_2 \Delta Inf_{t-i} + \sum_{i=1}^n \beta_2 \Delta Int_{t-i} + \sum_{i=1}^n \beta_2 \Delta Ms_{t-i} + \epsilon_t \quad (1)$$

In equation (1), the following variables are considered: *GDP*, Gross Domestic Product; *Exg*, Exchange Rate (*IQD/USD*); *Inf*, Inflation; *Int*, Interest Rate; *Ms*, Money Supply; Δ , Differential Factor; α_0 , Constant Coefficient; *nn*, Maximum Time Lag; β_1, β_2 , Short-run Slopes; λ_1, λ_2 , Long-run Slopes; *t*, Time Period (1985-2022); ϵ_t , Stochastic Indicator or Error Term.

EXPERIMENTAL RESULTS

Unit Root Test

From figure 1, and figure 2 above, the independent variable, Exchange Rate (*Exg*), is stationary at the level of (I0) degree, while the other is stationary at the initial difference (I1).

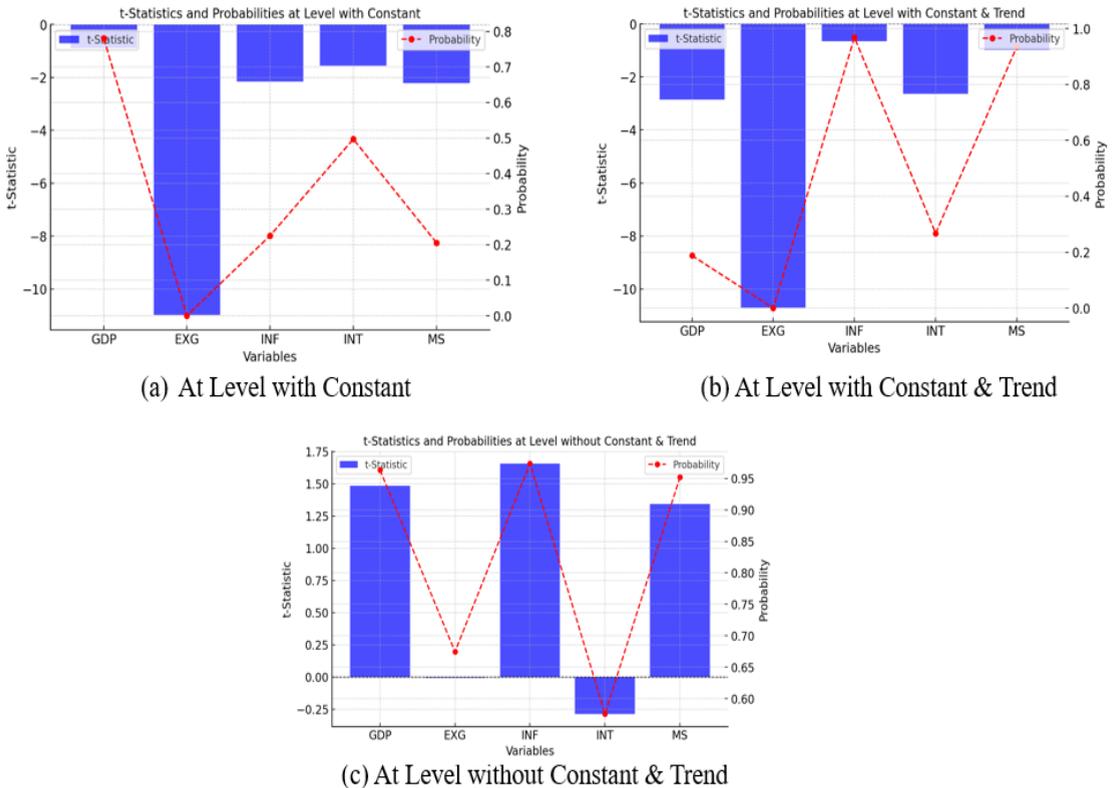


Figure 1: Unit Root Tests for Study Variables at level
Source: Researchers' work based on EViews 10 outputs

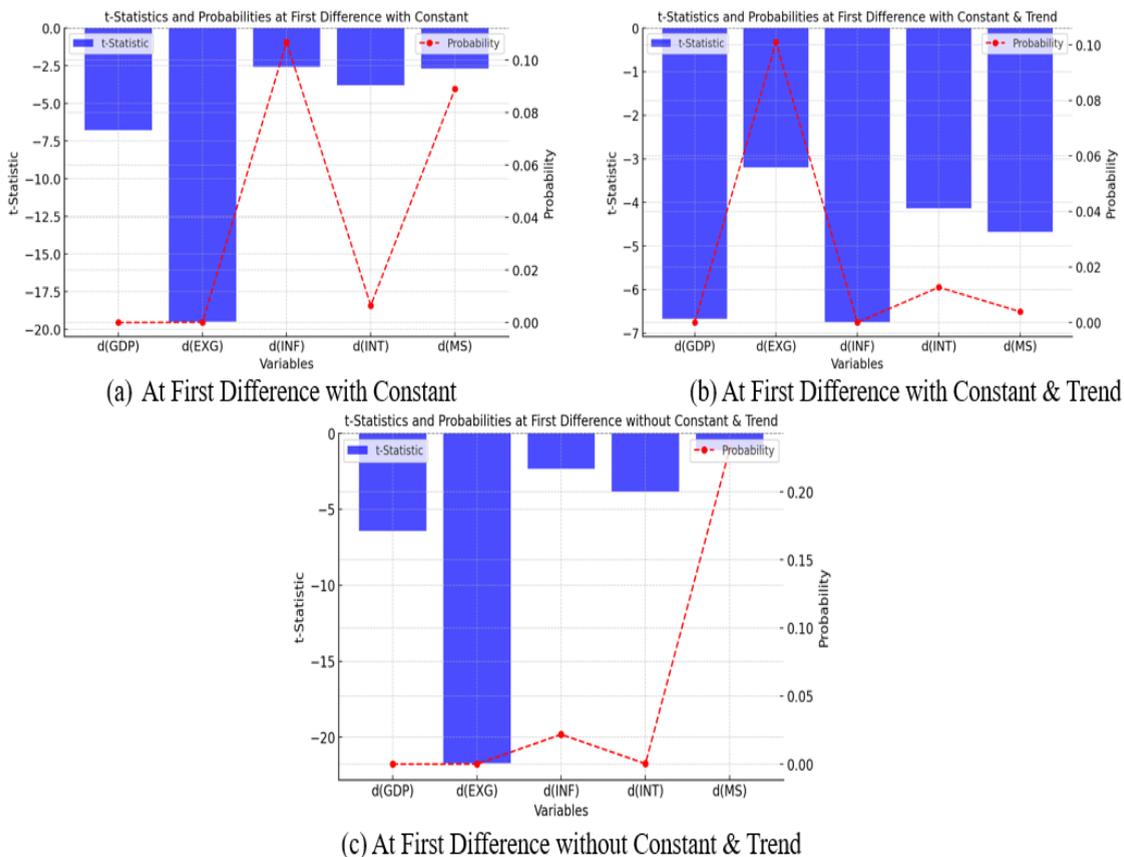


Figure 2: Unit Root Tests for Study Variables at First Difference
Source: Researchers' work based on EViews 10 outputs

Cointegration Test Using Bounds Test Technique

The bound testing strategy checks for cointegration between research variables against upper critical values of the F-statistic. If the value of the F-statistics is higher than such values, then the hypothesis of zero long-run relationship under the null hypothesis is not accepted in favour of the alternative hypothesis of cointegration, as summarized in Table 2. Also, since the value of the F-statistics is higher than upper and lower bounds for all significance values, there is a long-run relationship between the variables (Pesaran et al., 2001).

Table 2: Results of F Bounds Test Estimation

F-Bounds Test	Test Statistic	F-statistic	k				Actual Sample Size				t-Bounds Test	Test Statistic	t-statistic					
	Value			10%	5%	1%		10%	5%	1%		Value		10%	5%	2.5%	1%	
Null Hypothesis: No levels relationship		12.73607	4				33						-6.2537					
	Signif.		10%	5%	2.5%	1%	Finite Sample : n=35	10%	5%	1%	10%	5%	1%	Signif.	10%	5%	2.5%	1%
	I(0)	2.45	2.86	3.25	3.74	2.696		3.276	4.59	2.752					3.354	4.768	I(0)	-2.57
	I(1)	3.52	4.01	4.49	5.06	3.898	4.63	6.368	3.994	4.774	6.67	I(1)	-3.66	-3.99	-4.26	-4.6		
Asymptotic: n=1000							Finite Sample : n=30											

Source: Researchers' effort based on EVIEWS 10 outputs

Significance Test of Error Correction Bound:

With a 178% correction rate, Table 3 demonstrates that the error correction term is considerable and negative. This checks for cointegration between the variables and validates the existence of a long-term link. The outcome shows that there is convergence towards the long-term connection and that short-term deviations are effectively addressed over time.

Table 3: Error Correction Bound Estimation Outcome

Estimation Coefficient	-1.781426
T-Test Statistics	-8.921907
Test significance	0.0000
Result	Significant
	Error Correction Bound

Source: Based on researchers' efforts relying on REVIEWS 10.0 outputs

The method of selecting the optimal combination from among slow-gap formations:

Figure 3 below illustrates that the optimal combination is (2, 4, 2, 0, 4), as it achieves the lowest values across all applied statistical criteria.

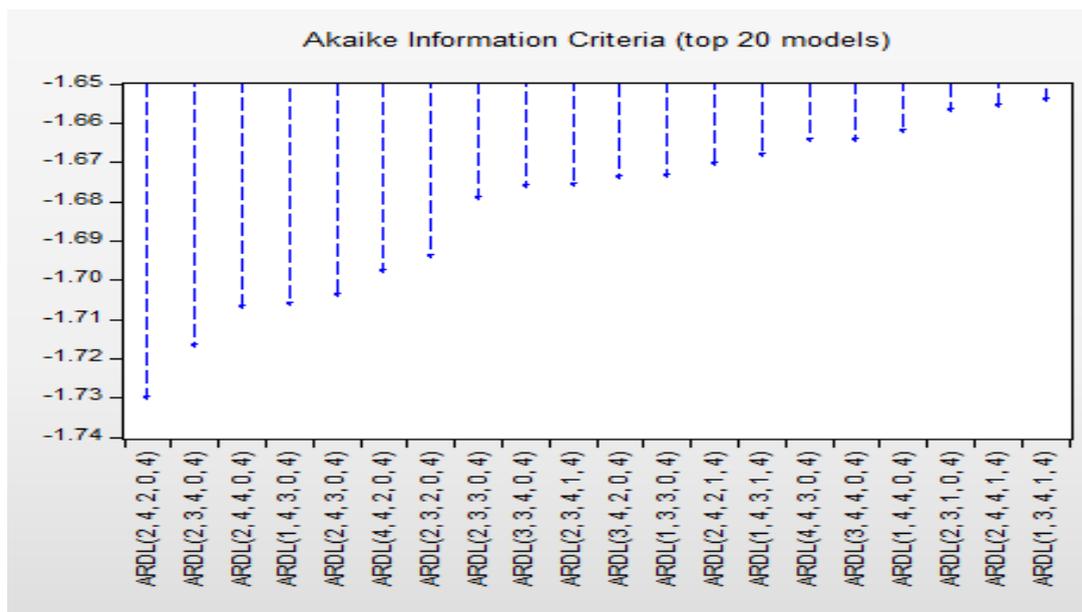


Figure 3: The Best Combination Test

Source: Based on researchers' fieldwork relying on EViews 10.0 outputs

Test of Autocorrelation of Residuals:

The Breusch-Godfrey Serial Correlation LM test findings are shown in Figure 4, where

the p-value above the 5% significance threshold. The null hypothesis is therefore accepted, proving that the model has autocorrelation (Gerrard & Godfrey, 1998).

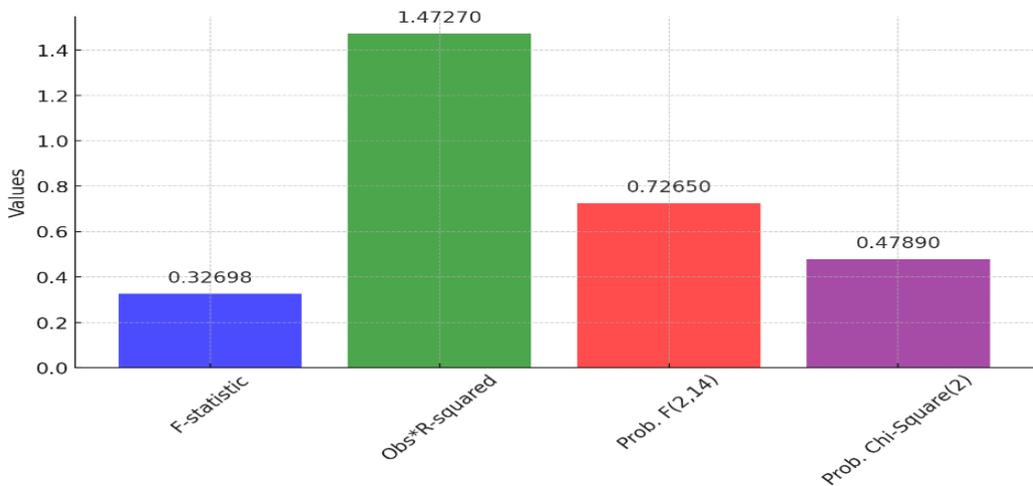


Figure 4: Results of the Autocorrelation Problem Test

Source: Based on researchers' fieldwork relying on EVIEWS 10.0 outputs

Test of Heteroskedasticity of Estimated Residuals

Figure 5 presents the Breusch-Pagan-Godfrey test results for detecting heteroscedasticity. The findings indicate that the estimated model is free from heteroskedasticity, as the p-values exceed the 5% significance level. Consequently, the null hypothesis is accepted, confirming that the estimated errors exhibit homoscedasticity (Gerrard & Godfrey, 1998).

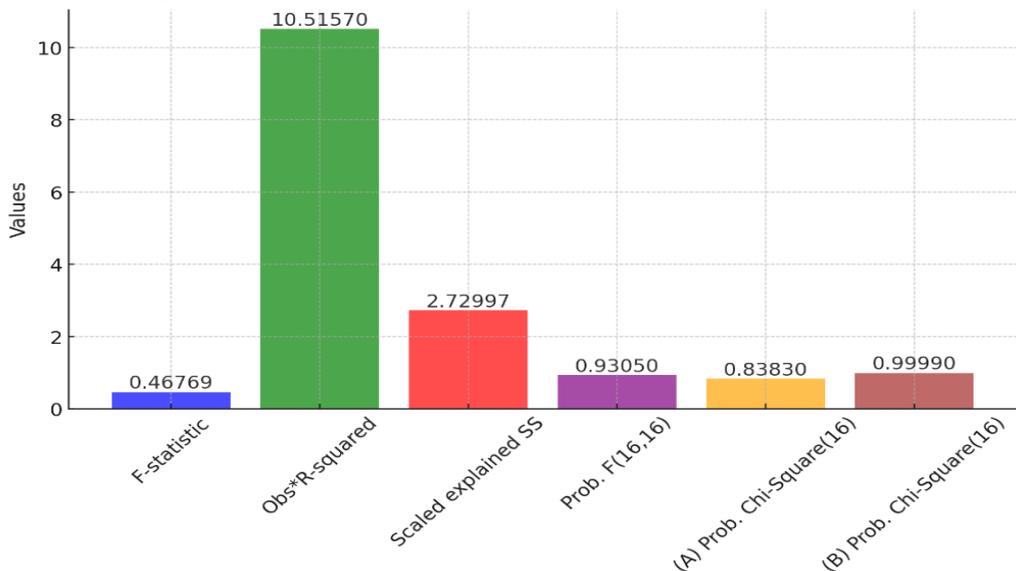


Figure 5: Breusch-Pagan-Godfrey Test

Source: Based on researchers' fieldwork relying on EVIEWS 10.0 outputs

Test of Normal Distribution of Residuals

The Jarque-Bera test for residuals is shown in Figure 6, which verifies that the residuals have a normal distribution. The assumption of normalcy is supported by the p-value of 0.966353, which is more than the 5% significance threshold (Gerrard & Godfrey, 1998).

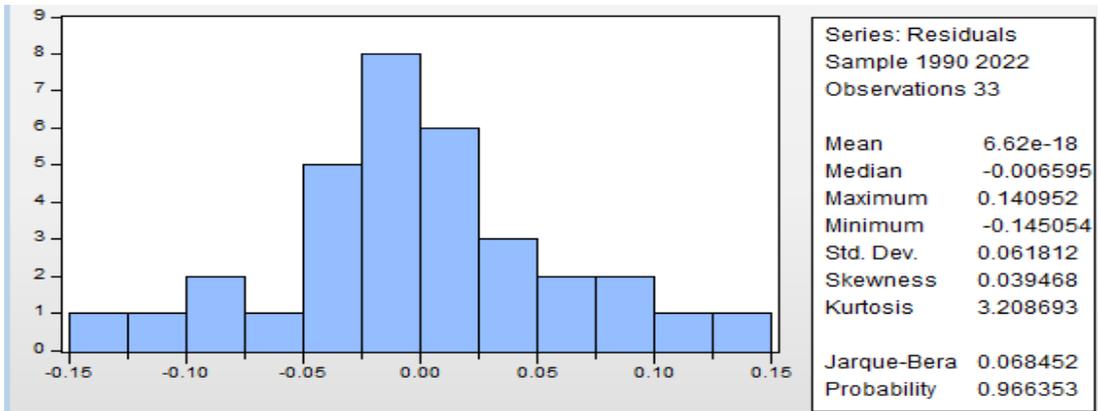


Figure 6: Examination of the Residuals' Normal Distribution

Source: Based on researchers' fieldwork relying on EViews 10.0 outputs

Test of Structural Stability of Estimated ARDL Model

We use the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests to evaluate the structural stability of the long-term and short-term lag parameters. These tests ascertain if there are any structural changes to the data over time. If the CUSUM and CUSUMSQ statistics' graphical representations stay within the crucial boundaries at the 5% significance level, structural stability has been confirmed. The structural stability of the calculated ARDL model is confirmed by the fact that both test statistics fall within the confidence ranges, as shown in Figures (7) and (8).

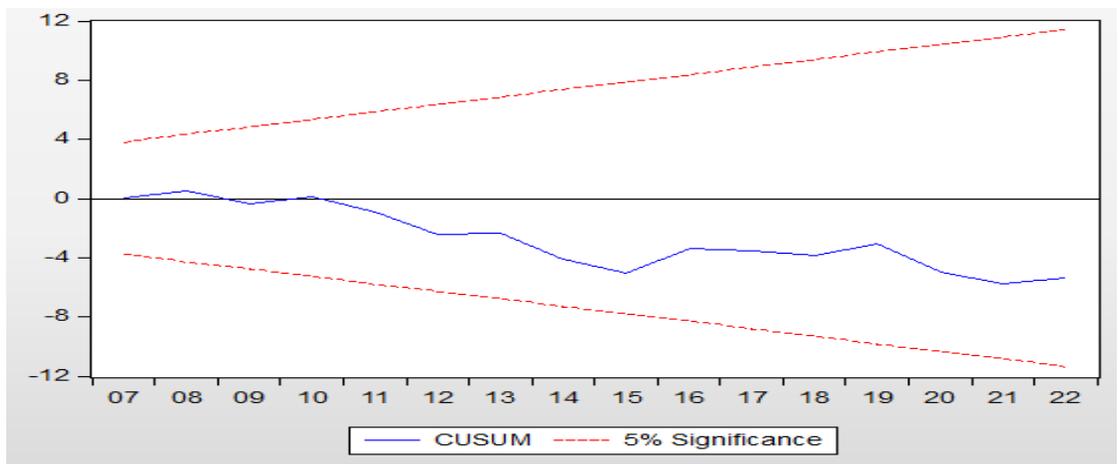


Figure 7: Structural Stability Assessment of Short-Term and Long-Term Lag Parameters

Source: Based on researchers' fieldwork relying on EViews 10.0 outputs

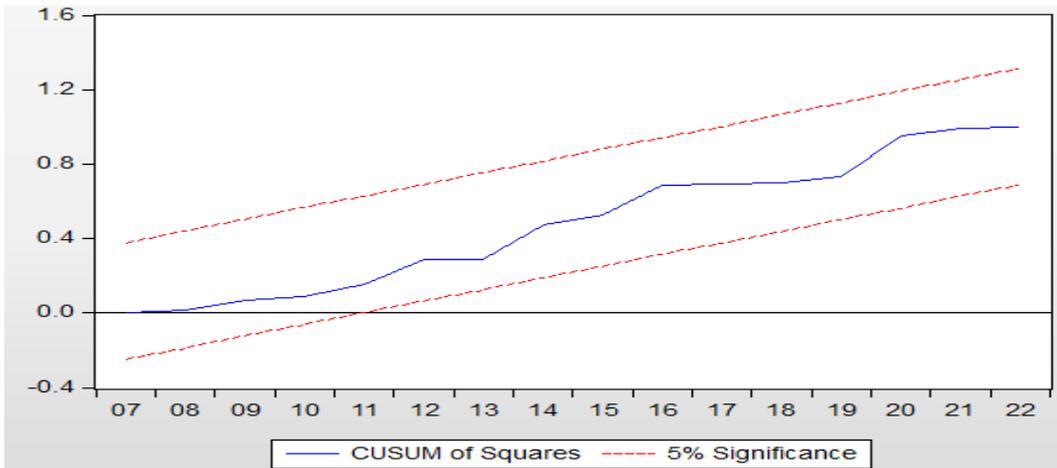


Figure 8: Evaluation of Structural Stability in Short-Term and Long-Term Lag Parameters

Source: Based on researchers' fieldwork relying on EViews 10.0 outputs

Test of Residual Stability

Table 4 presents the results of the autocorrelation and partial autocorrelation tests. The findings indicate that all p-values are non-significant, falling within the confidence bounds. This confirms that the residuals exhibit stability.

Table 4: Autocorrelation Test of Residuals

Date: 05/20/24 Time: 02:03
 Sample: 1985 2022
 Included observations: 33
 Q-statistic probabilities adjusted for 16 dynamic regressors

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*
		1 -0.110	-0.110	0.4373	0.508
		2 -0.104	-0.118	0.8415	0.657
		3 0.038	0.013	0.8975	0.826
		4 -0.094	-0.102	1.2466	0.870
		5 -0.113	-0.135	1.7693	0.880
		6 0.209	0.165	3.6467	0.724
		7 -0.093	-0.079	4.0305	0.776
		8 0.119	0.147	4.6827	0.791
		9 0.074	0.061	4.9458	0.839
		10 -0.104	-0.043	5.4932	0.856
		11 0.022	0.058	5.5184	0.903
		12 0.018	-0.029	5.5360	0.938
		13 -0.249	-0.193	9.1061	0.765
		14 0.013	-0.092	9.1160	0.824
		15 0.058	-0.023	9.3334	0.859
		16 -0.189	-0.204	11.765	0.760

*Probabilities may not be valid for this equation specification.

Source: Based on researchers' fieldwork relying on REVIEWS 10.0 outputs

Test of Problem Specification:

Table 5 presents the outcomes of the Ramsey RESET Test, indicating that the estimated model does not suffer from specification errors. The p-values exceed the 5% significance level, leading to the acceptance of the null hypothesis, and confirming the absence of specification issues.

Table 5: Results of the Ramsey RESET Test

Ramsey RESET Test	Equation: UNTITLED	Specification: D(GDP) D(GDP(-1)) D(GDP(-2)) EXG EXG(- 1) EXG(-2)	EXG(-3)	D(MS	Omitted Variables: Squares of fitted values	t-statistic	
			EXG(-4)	(-1))		Value	1.202284
			D(INF)	D(MS(-2))		df	15
			D(INF(-1))	D(MS(-3))		Probability	0.2479
		EXG(-2)	D(INF(-2))	D(MS(-4))			
		D(INT)	D(MS)	C			

Source: Based on researchers' fieldwork relying on EViews 10.0 outputs

Interpretation of Long-Term Relationship Results

Table 6 provides a comprehensive overview of critical observations regarding the intricate relationship between independent variables and Gross Domestic Product (GDP). First and foremost, the exchange rate (EXG) reveals a notable and significant inverse relationship with GDP, where a one-unit decrease in EXG results in a corresponding increase of 0.06 in GDP. Given that exchange rate variations have a significant impact on a country's international trade dynamics, this conclusion is in line with accepted economic theory. Specifically, when the local currency experiences depreciation, it tends to boost demand for goods that are produced domestically, while simultaneously reducing the nation's reliance on imports. This shift not only stimulates domestic production but also serves to contribute effectively to overall economic growth. Secondly, the inflation rate (INF) exhibits a robust inverse relationship with GDP, indicating that a one-unit decline in INF precipitates an increase of 0.32 in GDP. The presence of high inflation often generates a climate of economic uncertainty, which can impede growth prospects. In contrast, lower levels of inflation enhance the monetary value of currency, promote broader economic stability, and foster conditions that are conducive to economic prosperity. Thirdly, there is an interesting but non-significant direct correlation between GDP and the long-term interest rate (Int). a finding that appears to contradict conventional economic theory and assumptions. This particular outcome can be attributed to underlying structural imbalances present within various production sectors and the notable absence of a well-developed financial market infrastructure. Such deficiencies limit the overall influence of interest rates on economic activity and growth. Finally, there is a strong direct correlation between GDP and the money supply (MS). Specifically, a one-unit increase in MS results in a corresponding rise of 0.27 in GDP. The implementation of expansionary monetary policies that focus

on increasing the money supply tends to lead to lower interest rates. This, in turn, encourages higher levels of investment and consumption, spurring increased aggregate demand, which ultimately drives economic growth further forward.

Table 6: Results of Long-Term Relationships

Levels Equation	Case 3: Unrestricted Constant and No Trend	Variable	EXG	D(INF)	D(INT)	D(MS)	EC = D(GDP) - (
		Coefficient	-0.06789	-0.32738	0.075785	0.275288	0.0679*EXG -
		Std. Error	0.031485	0.100479	0.129725	0.122775	0.3274*D(INF) +
		t-Statistic	-2.15624	-3.2582	0.584199	2.242214	0.0758*D(INT) +
		Prob.	0.0466	0.0049	0.5672	0.0395	0.2753*D(MS))

Source: Based on researchers' fieldwork relying on EViews 10.0 outputs

CONCLUSIONS

The oil sector in Iraq contributes more than (50%) to its GDP, while productivity in other sectors declines. Therefore, policymakers need to understand how monetary policy tools in Iraq can affect the country's GDP to formulate appropriate economic policies. This study utilizes annual data from 1985 to 2022 and the ARDL model to empirically analyze the long and short-term influences of rates of exchange and of interest, inflation, and money supply on Iraq's GDP. The primary findings reveal a cointegration among model variables, indicating a long-term equilibrium monetary relationship and gross domestic product (GDP). The results suggest that independent variables (exchange rate, inflation, and money supply) align with economic theory and hold statistical significance. Conversely, the interest rate variable does not adhere to economic theory and lacks statistical significance. This study carries significant implications for policymakers. It emphasizes the necessity for monetary authorities to pursue non-conventional monetary policies to effectively influence GDP. Moreover, monetary authorities should prioritize interest rates as an intermediary target to efficiently impact economic activity and achieve ultimate objectives through financial market development. Furthermore, ensuring price stability is essential for safeguarding the value of money, reducing economic fluctuations, and promoting overall stability and prosperity.

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