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-RESEARCH ARTICLE-

ANALYSING THE RELATIONSHIP BETWEEN THE MONETARY MULTIPLIER AND ITS COMPONENTS IN THE IRAQI ECONOMY

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─Abstract─

The money multiplier is the center of monetary policy because it acts as the transmission mechanism of the alterations in the money supply that in turn affect interest rates and

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other real economic variables and the central bank's control over the monetary base, or high-powered money. The money multiplier is thus crucial for monetary policymakers because it offers an understanding of the factors responsible for changes in the money supply. Through the money multiplier, policymakers can reduce such fluctuations by manipulating the monetary base. The purpose of the current study is to value the economic relevance of the connection among the money multiplier and its variables in the Iraqi economy case. The research includes extra indicators by employing the ARDL model with monthly data during the period 2015-2024. The study concludes that the money multiplier and the variables in the money multiplier continue to keep the long-run equlibirium relation among them. The study also finds the most economic and statistical important determinant of the long-run level of the money multiplier is the time deposit/demand deposit ratio.

Keywords: Money Multiplier, Monetary Policy, ARDL Model, Iraqi Economy, F-Statistic and Chi-Square.

INTRODUCTION

Examining the relationships between the movement of monetary variables and changes in monetary policy instruments, and the relation among monetary variables' variations and economic activity shifts, is the basic challenge of the money role in stabilisation policies (Chugunov et al., 2021). Where these relations are robust and stable, it is feasible to provide precise expectations concerning the result of initial monetary instruments' adjustments in economic indicators or in the general economic targets (Amaral et al., 2022). The main difficulty is the ability of the monetary authorities to control the changes in the money supply so that they can attend to the needs of the real economy, as monetary policy has long been seen as the most rapid and efficient in affecting economic activity through the money supply (Woodford, 2022).

The money multiplier is the main connecting conduit between the central bank's objectives-based monetary base, the common term for high-powered money, and money supply changes that influence interest rates as well as other real economic indicators (Vallet et al., 2022). It is, therefore, essential to give monetary authorities indicators of the variables that cause these changes (Alaarajy et al., 2024). Using the money multiplier to help guide adjustments in the money base, the authorities can minimize money supply fluctuations. Analyzing the money multiplier in the monetary policy context, therefore, is essential in the understanding of the monetary base and money supply connection, ensuring that the home economy's liquidity satisfies the requirements of the real economy and generates a stable amount of inflation (Zenchenko et al., 2022). Through the manipulation of the monetary base, the central bank strives to achieve a desirable money growth rate by using an understanding of the connection of the money multiplier and its constituents as the foundation for the provision of the money supply surveillance as well as money supply control (Wullweber, 2021). This

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facilitates the determination of the most important indicators as well as the causes of money supply changes (Doan Van, 2020). The money multiplier, in addition, acts as an essential early warning indicator of the occurrence of liquidity deficits in the economy (Alessandri et al., 2025).

The study attempts to quantify and estimate the connection among the money multiplier and its component parts, in an attempt to identify how much the component parts affect the overall multiplier. The analysis in that way enables money authorities to set a given money supply growth rate and move the monetary base accordingly. The study attempts to answer the following issues: Does the money multiplier exhibit a stable, permanent connection with the component parts in the long run? Which among the component parts has the most effect in the value of the money multiplier value? The study structure includes five parts as follows: theoretical underpinnings of the money multiplier, literature review of the related literature, econometric and economic examination, findings, and recommendations for policy.

THEORETICAL FOUNDATION OF THE MONEY MULTIPLIER CONCEPT

The money multiplier concept simply describes the relationship among the money that arises internally and the external means of funding (Dou & Ji, 2021). The external funding, also known as the "outside money," includes the money that comes from outside the private sector. In other words, outside money, also known as monetary base or high-powered money, is the aggregate money in the economy (C) plus the reserves (R) that the central bank keeps with the commercial bank (reserve balances) (Cedillo Lazcano, 2021).

$$H \equiv C + R \_\_\_\_\_ (1)$$

By way of comparison, inside money refers to assets that are, or by, private credit that acts as a medium of exchange (Gorton, 2020). Since, as a liability, it is a liability for a given private party while at the same time being an asset for another, inside money can briefly be defined as being "financed by debts in the private sector" (Block et al., 2024). The money multiplier is shown in the relation (2) by being the ratio of the money supply in total to the monetary base (Ryan & Whelan, 2023).

$$m = M2/MB \_\_\_\_\_ (2)$$

For ease of analysis, applying the natural logarithm to Equation (2) expresses the money supply as the sum of the logarithms of the money multiplier and the monetary base, as shown below:

$$m2 = mm + mb \_\_\_\_\_ (3)$$

When analysing the constituents of the money supply and the monetary base, they can

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be represented as follows:

$$M2=CC+DD+TD \quad (4)$$
$$MB=CC+RR+ER \quad (5)$$

Where, CC represents currency in circulation outside the banking system, DD denotes demand deposits, TD refers to time deposits, RR indicates the required reserves held by the central bank, and ER signifies excess reserves.

By substituting the components of the money supply and the monetary base into the money multiplier equation, the money multiplier can be expressed as follows:

$$mm = \frac{CC+DD+TD}{CC+RR+Er} \quad (6)$$

By dividing both the numerator and denominator by DD, the money multiplier can be reformulated in terms of ratios as follows:

$$mm = \frac{Cr+1+TDr}{Cr+RRr+ERr} \quad (7)$$

Where, Cr denotes the ratio of demand deposits to currency in circulation outside the banking system, TDr represents the ratio of time deposits to demand deposits, RRr indicates the ratio of required reserves held by the central bank to demand deposits, and ERr signifies the ratio of excess reserves to demand deposits.

The money supply (M), as the quantity that the description in Equation (2) and central bank supervision regulate, is known to be set by the combination of the money multiplier and the monetary base (Wenye & Jinyang, 2025). Instability in the money multiplier lowers the effectiveness of the central bank in controlling the money supply. The stability of the money multiplier is in the form of the ratio of bank reserves to deposits alongside the ratio of demand deposits to the money in the hands of the people or in existence (Juniper et al., 2021). Since bank reserves consist of both required as well as excess reserves, a higher ratio of excess reserves lowers the stability in the money multiplier (Afanasyeva & Korovin, 2020). In such an instance, an increase in excess reserves adds less value in the expansion in the money supply, given the assumption money creation is by the bank lending the new deposit until all the excess reserves disappear. New deposits, in the beginning, account as excess reserves, then the bank isn't constrained by funding sources in their credit creation in this case (Lee, 2021). The function of money in the causal mechanisms in the economy at the macro level is then closely related to the money multiplier stability and its reliance on bank reserves (Alamin, 2024).

RELATED WORK

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Xie (2024) examined the impact of digital money on Russia's money multiplier. The research offered crucial information concerning digital money and the money multiplier connection by exploring indicators like the share of circulating digital money, the reserve-to-deposit ratio, the time deposit ratio, and the leakage of the currency-based rate. The digital money has an impact on the reserve requirements, and the responses of the regulations can increase or reduce the required reserves. By reducing the cost of transactions and making the long-term deposit term more appealing, digital money also has an impact on the time deposit ratio, consequently contributing to an increase in the money multiplier. The study's outstanding result was the confirmation of the positive relationship between the money multiplier's magnitude and the digital money proportion in the financial landscape. The research stressed that as the status and scope of digital money increase, their role in the money multiplier also enlarges accordingly, stressing the availability of adaptive policy actions by central banks, financial institutions, and regulators.

Ono (2021) used two monthly panels and a VAR structure to study money creation and the existence of the money multiplier in Russia. The findings indicated that the deposit multiplier was applicable in the past, less sophisticated financial systems where lending was liquidity constrained by bank reserves. In the contemporary environment, credit demand, however, became the overriding determinant of lending. The research also showed that money supply components, that is, bank reserves and the real monetary base, failed to display a statistically significant impact in the real money balances of Russia in the recent decades. Economic theory, however, indicates that nominal interest rates should exert a statistically significant negative influence on real money balances (Eggertsson et al., 2024). Granger causality tests and impulse response analyses were applied to assess the responsiveness of money to shocks in supply-side variables (monetary base and required reserve ratio) and demand-side factors (interest rate) (Shojaie & Fox, 2022). The results showed a bidirectional causal relationship between real money balances and interest rates, alongside a unidirectional causal effect of reserve requirements and the monetary base on real money balances, observed only in the first sample at a 10% significance level.

Ofoi and Sharma (2021) examined the money multiplier's role in the context of the Pacific Island economies' bank loan transmission channel, paying special consideration to Papua New Guinea. Using the VAR model with six variables interest rate, inflation rate, loans, deposits, monetary reserves, and real output the quarterly data in the period Q1 1980, Q4 2017 were examined, and the VAR model was approximated by the Ordinary Least Squares (OLS) method. The analysis of the impulse response function showed that the money multiplier was unstable and weakly related to bank credit. Besides, the study signalled that the central bank may lack the powers to sufficiently guide monetary policy or offer suitable lendable funds in order to undergird the private credit sectors (Arshad et al., 2021). However, an endogenuously predetermined by demand relationship, as indicated by a statistically significant positive correlation, was

noticed in the case of between credit and bank deposits, based on which the endogenous credit and deposit variables are suggested.

Anwar et al. (2024) explored the impact of money in cash form and electronic money on the money multiplier and money velocity based on quarterly observations from 2009 to 2022.If the findings were correct, then both electronic money and money in cash form impacted the money multiplier over time HOLDERS LABEL In the context of the velocity of money, both currency and electronic money presented long-term impacts.The study showed a negative connection amid the currency ratio and money velocity, while the result of the impulse response function presented a positive connection amid electronic money and the money multiplier.Variance decomposition, in addition, presented that electronic money has a high impact amid money velocity and the money multiplier, indicating that monetary policymakers must observe electronic money closely and regard it as an imperative cause amid the stability of the money supply.LEVEL LABEL Labus (2020) attempted to explain the money multiplier concept and the money multiplier's impact amid inflation in the Republic of Serbia from 1997 to 2015.According to proper statistical procedures, the observations presented a statistically significant negative connection amid the money multiplier, the broad money supply (M3), and inflation, in that the M3 multiplier relies on the broad money supply, presenting that broad monetary aggregate changes present an augmented impact amid inflation amid narrow aggregates such as M1 or M2.A major conclusion highlighted the central bank's role in observing the broad money supply amid the money multiplier in order to avoid voluminous fluctuations amid the inflation level.

DATA AND METHODOLOGY

To achieve this, the study utilises data on monetary variables, including the money multiplier (MM), the ratio of time deposits to demand deposits (TDR), the ratio of required reserves to demand deposits (RRR), the ratio of excess reserves to demand deposits (ERR), and the ratio of currency in circulation to demand deposits (CR). These variables are derived from monthly data published by the Iraqi Central Bank (CB) for the period 2015 to 2024, as illustrated in Figures 1 to 5. The objective of the study is to evaluate both the short-term and long-term effects of CR, RRR, ERR, and TDR on MM using the Autoregressive Distributed Lag (ARDL) model, alongside comprehensive statistical testing. The econometric specification is presented as follows:

$$\Delta MU = c + \lambda MU_{t-1} + \beta_1 CR_{t-1} + \beta_2 ERR_{t-1} + \beta_3 RRR_{t-1} + \beta_4 TDR_{t-1} \sum_{i=1}^{n} a_1 \Delta MU_{t-i} + \sum_{i=0}^{m} a_2 \Delta CR_{t-i} + \sum_{i=0}^{m} a_3 \Delta ERR_{t-i} + a_4 \Delta TDR_{t-i} + \beta_5 RRR_{t-i} + \mu_t$$

Additionally, several other indicators will be utilised to evaluate the economic (practical) significance, as detailed below (Mitton, 2022):

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1. $E_s^S = \left|\frac{\beta s_x}{s_y}\right| = \left|\frac{\beta s_{cr}}{s_{mu}}\right|$
2. $E_{\overline{y}}^S = \left|\frac{\beta s_x}{\overline{y}}\right| = \left|\frac{\beta s_{cr}}{\overline{mu}}\right|$
3. $E_{\overline{y}}^{IQR} = \left|\frac{\beta(p75x-p25x)}{\overline{y}}\right| = \left|\frac{\beta(p75cr-p25cr)}{\overline{mu}}\right|$
4. $E_s^{IQR} = \left|\frac{\beta(p75x-p25x)}{s_y}\right| = \left|\frac{(p75cr-p25cr)}{s_{mu}}\right|$

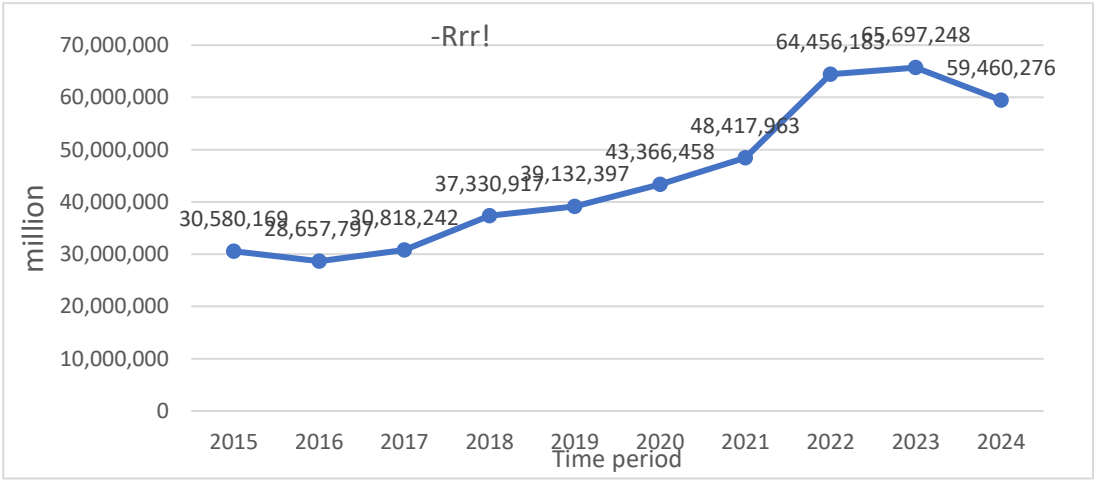

Figure 1: Volume of Required Reserves
Source: Central Bank of Iraq, Annual Statistical Bulletin for Various Years.

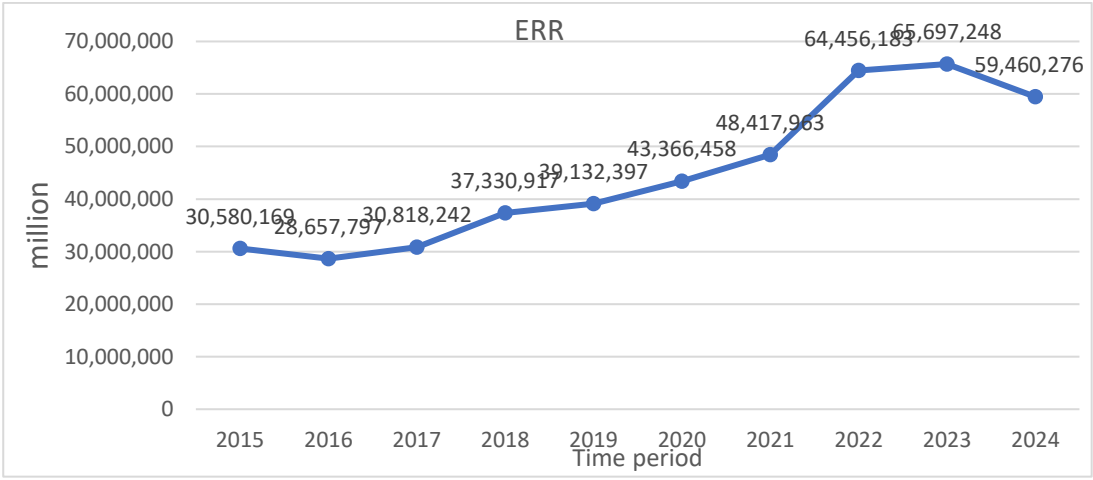

Figure 2: Volume of Excess Reserves
Source: Central Bank of Iraq, Annual Statistical Bulletin for Various Years.

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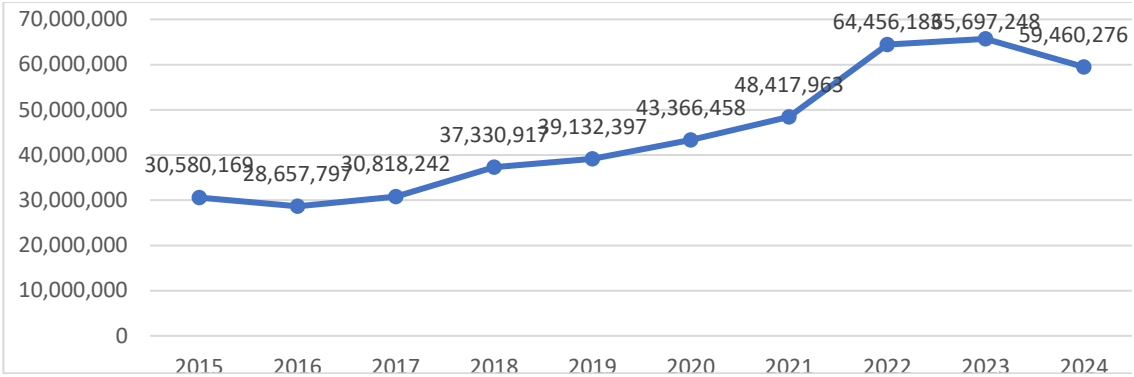

Figure 3: Demand Deposits (Million Iraqi Dinars)
Source: Central Bank of Iraq, Annual Statistical Bulletin for Various Years.

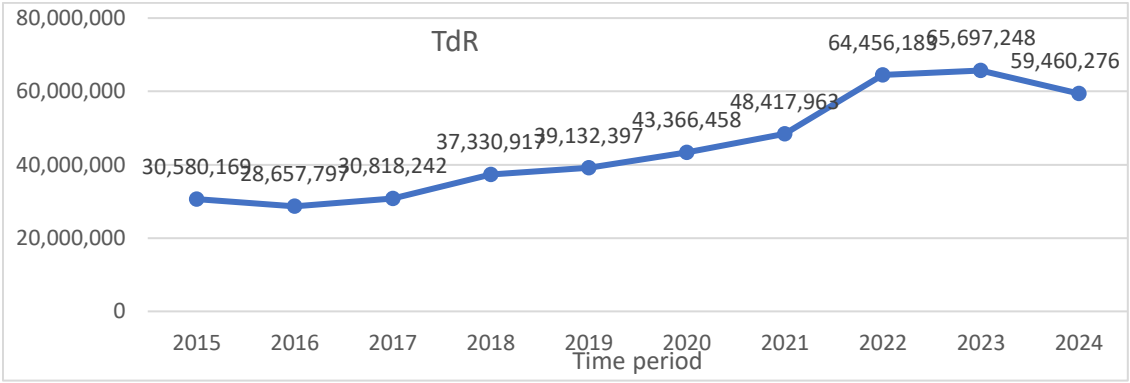

Figure 4: Time Deposits (Million Iraqi Dinars)
Source: Central Bank of Iraq, Annual Statistical Bulletin for Various Years.

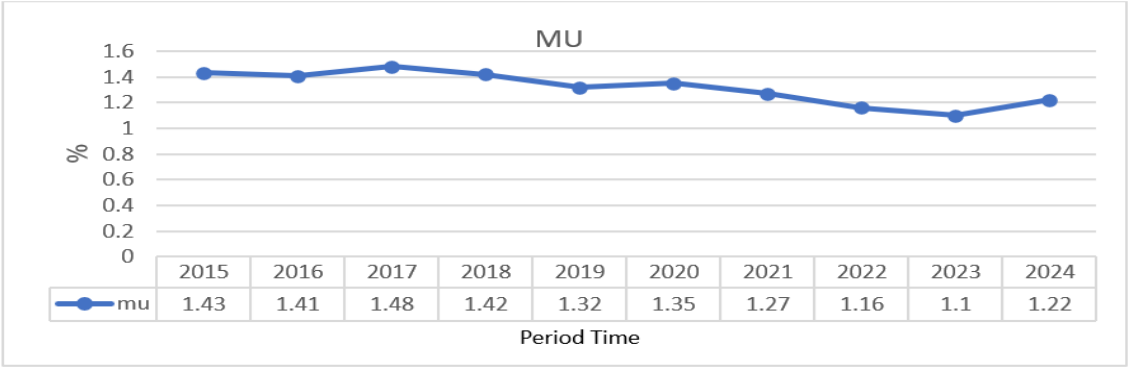

Figure 5: Money Multiplier
Source: Central Bank of Iraq, Annual Statistical Bulletin for Various Years.

Analysing the Impact of Money Multiplier Components

Model Specification and Time Series Stationarity Test

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The model is formally specified as follows:

$$MU = F(CR, ERR, RRR, TDR)$$

Where, MM denotes the money multiplier, CR represents the ratio of demand deposits to currency in circulation, ERR indicates the ratio of demand deposits to excess reserves, RRR refers to the ratio of demand deposits to required reserves, and TDR signifies the ratio of demand deposits to time deposits.

The ADF test was conducted on monthly data for 2015–2024 using EViews 12 to determine stationarity and the order of integration. Table 1 presents the results. At a 5% significance level, ERR is integrated of order I(0) and stationary at LEVEL, both with and without an intercept and trend. At a 1% significance level, TDR is also integrated of order I(0) and stationary at LEVEL with an intercept and trend. In contrast, MM, RRR, and CR become stationary only after first differencing at a 1% significance level, with or without an intercept and trend. Since no unit roots were detected and there is no evidence of spurious regression, these series are integrated of order I(1). Therefore, all series are integrated of orders I(0) and I(1).

Table 1: Unit Root Testing of Augmented Dickey-Fuller

UNIT ROOT TEST RESULTS TABLE (ADF)						
Null Hypothesis: The variable has a unit root.						
At Level						
		MU	CR	RRR	ERR	TDR
With Constant	t-Statistic	-1.2	-1.9	-1,7	-2.9	-1.24
	Prob.	0.6	0.3	0.3	0.03	0.6
		N_0	N_0	N_0	**	N_0
With Trend & Constant	t-Statistic	-3.1	-2.4	-3.8	-1.6	-4.9
	Prob.	0.09	0.3	0.7	0.01	0.0004
		*	N_0	N_0	**	***
Without Trend & Constant	t-Statistic	0.3	0.8	0.6	0.5	0.3
	Prob.	0.6	0.3	0.3	0.03	0.6
		N_0	N_0	N_0	N_0	N_0
First Difference						
		d-MU	d-CR	d-RRR	d-ERR	d-TDR
With Constant	t-Statistic	-11	-11	-12	-13	-14
	Prob.	0	0	0	0	0
		***	***	***	***	***
With Trend & Constant	t-Statistic	-11.2	-11.5	-12.7	-13.7	-14.3
	Prob.	0	0	0	0	0
		***	***	***	***	***
Without Trend & Constant	t-Statistic	-11.2	-11.6	-12.4	-13.8	-14.3
	Prob.	0	0	0	0	0
		***	***	***	***	***

Estimation of (ARDL) Model for the Money Multiplier Function

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The initial step after assessing the stationarity of the variables is to estimate the ARDL model for MM. Table 2 presents both the estimation outcomes and the corresponding ARDL outputs. The model exhibits a high level of explanatory power, with R^2 = 0.985653, indicating that the independent variables explain 98% of the variation in MM. The results further confirm the model's overall statistical significance, based on the F-test probability at a 1% level, leading to the acceptance of H1 ($b \neq 0$) and rejection of H0 ($b = 0$). Moreover, the AR component ensures stationarity, and the coefficient of lagged MM (one-period lag) is below one (0.859824), satisfying a critical condition for the ARDL Bound Testing Approach and confirming that the model is dynamically stable.

Table 2: ARDL Model Testing Approach (Iraq 2015-2024)

Variable	Coefficient	Error-Std	t-Statistic	Probability
MU -1	0.8	0.06	12.9	0
MU -2	-0.12	0.05	-2.4	0.01
CR	-0.01	0.01	-1.4	0.1
ERR	-0.4	0.02	-17	0
Err -1	0.3	0.03	8.8	0
RRR	-0.4	0.08	-5.2	0
RRR -1	0.4	0.08	5	0
TDR	-0	0.08	-0	0.9
TDR -1	0.3	0.08	3.9	0.0001
C	0.3	0.07	5.2	0

Estimating Optimal Lag Periods

Figure 6 indicates that the optimal lag structure is (1,0,0,1,1), as determined by the Akaike Information Criterion (AIC).

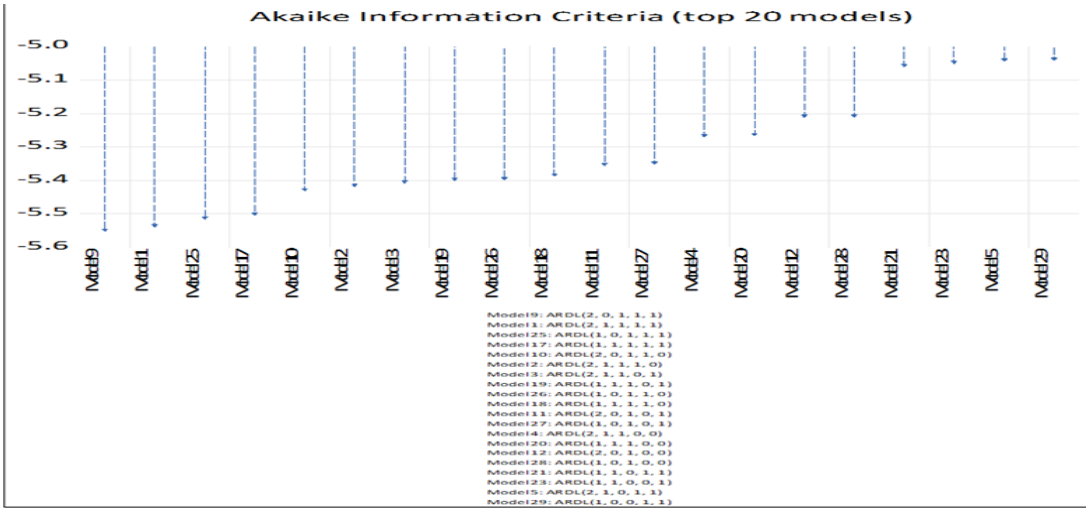

Figure 6: Lag Periods Optimality

Bound Test for the Estimated Model of the Monetary Multiplier Function

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Table 3 presents the results of the bound test. The computed F-statistic = 6.678793, exceeding all critical values (both lower and upper bounds) at a 1% significance level, indicates that the variables maintain a long-term equilibrium relationship. Consequently, H0 (b = 0) is rejected, and H1 (b ≠ 0) is accepted.

Table 3: Money Multiplier Estimated Model

Value	K	Test Statistic
6.6	4	F-Statistic
I_o	I_1	Siginf.
2	3	10%
2.5	3.4	5%
2.8	3.8	2%
3.2	4	1%

Diagnostic Tests

Table 4 reveals that, at 5% significance, the F-statistic and Chi-Square probabilities in the Breusch-Pagan-Godfrey Heteroscedasticity Test are not significant, signifying that the heteroscedasticity does not exist in the model being estimated. Similarly, the Breusch-Godfrey Test proves that the F-statistic and Chi-Square probabilities are not significant at 5%, solidifying no existence of serial correlation among the residuals.

Table 4: Test Results Diagnostic

Breusch-Pagan Godfry			
F-Statistic	1.5	Prob. F (9)	0.13
Obs R-Squared	13	Chi-Square (9)	0.13
Scaled Explained SS	11	Chi-Square (9)	0.23
No Serial Correlation up to 2 Lags			
Obs R-Squared	2.8	Chi-Square 2	0.2
F-Statistic	1.2	F (2.1)	0.2

Furthermore, as can be seen in Figure 7, the Jarque-Bera Test probability (0.83), which is more than 5%, proves that the residuals are in agreement with a normal distribution.

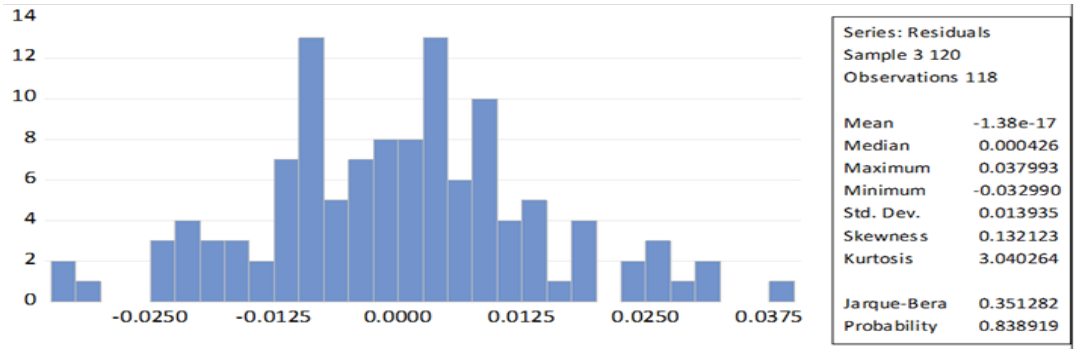

Figure 7: Distribution of Residual

Short-Run and Error Correction Estimates of the Money Multiplier

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The findings in Table 5 show that there exists a positive correlation in the current period MM as against its first lag value. In particular, the increase in the previous period's MM by 1% leads to an increase in the current period's MM by 0.12%, which has a 1% level of significance. The inverse relationship in MM exists, as opposed to its remaining components. In economic principles, there is an increase in the previous period's RRR by 1%, while there is a decrease in the previous period's ERR by 1%, by -0.46% and -0.45%, respectively, at a 1% level of significance. The error adjustment term (coefficient) is negative, i.e., (-0.262443) 1%, while in the short run, 26% of the short-run disequilibrium gets adjusted in order to regain long-run equilibrium. The period needed to gain the long-run equilibrium is given as follows:

$$\frac{1}{-0.262443} = \frac{1}{Coefficient} = 3.8103,$$

This corresponds to an adjustment period of roughly five months and twenty-one days.

Table 5: Error and Short-Term Estimation

Variable	Std_Error	t-Statistic	Coefficient	Prob.
D(MU_-1)	0.04	2	0.1	0
D_ERR	0,.03	-18	-0.4	0
D_RRR	0.08	-5	-0.4	0
D_TDR	0.07	-0	-0	0.9
Coint_Eq_-1	0.04	-6	-0.2	0
SE Regression	Akaike		0.01	-5
Log	Hannan		337	-5
R-Squared	Mean Dependent		0.7	-0
Adj. R-Squared	S.D. Dependent		0.7	0
Sum R-Squared	Schwarz		0.02	-5

Predictive Performance Test of the Error Correction Model

The result in the predictive performance under the unconstrained ECM is given by the Figure 8, with a Theil inequality coefficient of 0.740 that is almost close to zero. Furthermore, the covariance proportion (CP = 0.996193) is almost close to one, the bias proportion (BP = 0.000028) is almost close to zero, while the variance proportion (VP = 0.003779) is also almost close to zero. These findings establish that the constructed model estimate is good for predicting the future path of MM and appraising the success in the implementation of monetary policy decisions in targeting set goals.

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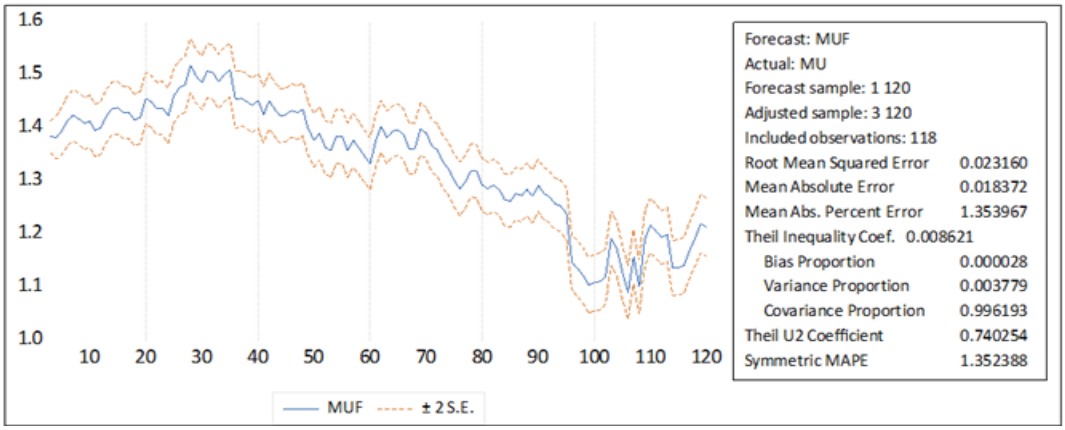

Figure 8: Error Correction Model for Predictive Performance

Structural Stability Diagnostics of Model Parameters

As can be depicted by the CUSUM test in Figure 9, the cumulative residual that stays in the critical bounds suggests that the model's estimated parameters are stable at a 5% level of significance. In addition, the CUSUM of Squares test supports the stability of the variables of the model at the same level of significance, where the cumulative sum of the squared residuals stays in the critical bounds.

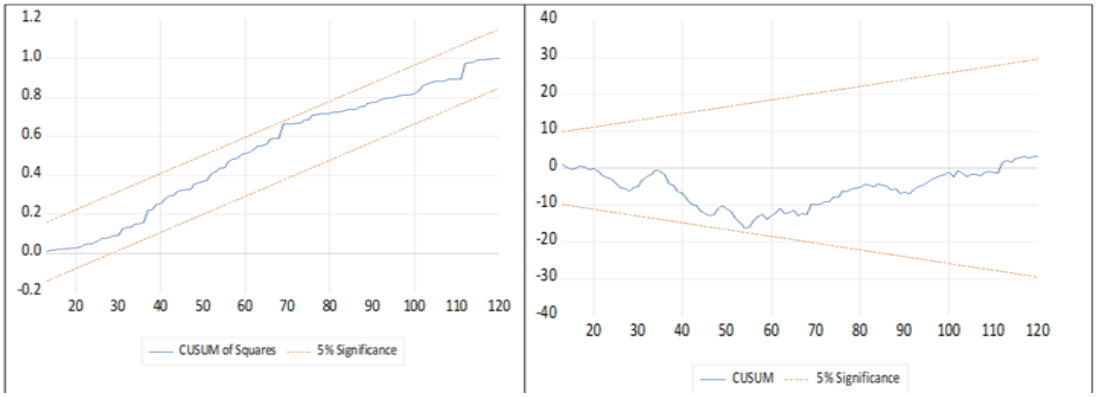

Figure 9: Model Parameters Test for Structural Stability

Estimating Long-Term Parameters

Even though their signs conform to economic theory, the CR and RRR are not statistically significant, as indicated by the long-run relationship test for MM against its components given in Table 6. In particular, there is a long-run negative relationship among CR, RRR, and MM, in agreement with the theoretical expectations. The fall in deposits puts a limit to bank credit, reducing the impact of the credit multiplier in affecting MM. Likewise, the fall in deposits decreases the impact of the deposit multiplier in affecting MM. In short, the low impact of CR in affecting MM indicates a

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high money-on-the-street money-holding propensity. The case of RRR is that its lack of statistical signifying in MM is a result of its virtual ineffectiveness as a monetary policy in Iraq, having remained almost constant over a considerable period of time. On the other hand, MM has an inverse relationship in relation to ERR. As economic theory has foretold, an increase in ERR by 1% leads to the fall of MM by 0.6%, having a 1% level of signifying. The MM-TDR relationship has a positive sign. For a rise in TDR by 1%, MM by 1.27%, in agreement with theoretical expectations.

Table 6: Long-Term Parameters Test Results

Variable	Std_Error	t-Statistic	Coefficient	Prob.
CR	0.03	-1.5	-0.06	0.12
ERR	0.07	-7	-0.5	0
RRR	0.13	-0.6	-0.08	0.5
TDR	0.15	8	1.2	0
C	0.09	15	1.4	0

Economic Significance

In model estimation, attention is typically directed towards statistical significance, measured by the P-value of estimated parameters, to determine whether it falls below or exceeds 5%. Several factors, including sample size, influence statistical significance. In large samples, most parameters are likely to be statistically significant, whereas in smaller samples, many parameters may appear statistically insignificant. Consequently, when analysing an economic relationship between an independent and dependent variable, focus should be placed on economic significance, specifically the direction of the relationship (alignment with theory) and the magnitude of the coefficient. These elements direction and magnitude reflect economic (practical) significance, while statistical significance concerns whether the critical value surpasses the tabulated threshold and the associated P-value.

It is thus important to make a distinction between statistical and economic significance and not confuse the two. In the case of regression analysis, the t-statistic and P-value show statistical significance, while the coefficient shows economic significance in the sense of direction and magnitude. Note that non-significance in statistics does not mean no economic effect, a very wrong assumption in research that most studies tend to make. Most studies tend to assume that non-significant P-values mean no economic impact, yet this is wrong.

In order to reduce the situation, a group of indicators has emerged in order to clarify economic relevance and deepen economic interpretation. The proposal addresses the American Statistical Association's (2016) criticisms of over-reliance on P-values in ascertaining the impact of independent variables over the dependent variables. In spite of all that, the P-values are still predominant in studies because they have long existed in statistical practice and cannot in the short term be substituted. In line with that, the

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alternative indicators by (Mohajeri et al., 2020) are adopted in order to estimate economic (practical) significance as follows:

$$E_{\overline{y}}^{S} = \left|\frac{\beta s_x}{\overline{y}}\right| = \left|\frac{\beta s_{cr}}{\overline{mu}}\right| = \left|\frac{-0.060777\times0.1563}{1.3395}\right| = 0.0070$$

$$E_{\overline{y}}^{S} = \left|\frac{\beta s_{err}}{\overline{mu}}\right| = \left|\frac{-0.550166\times0.1016}{1.3395}\right| = 0.0417$$

$$E_{\overline{y}}^{S} = \left|\frac{\beta s_{rrr}}{\overline{mu}}\right| = \left|\frac{-0.080587\times0.0429}{1.3395}\right| = 0.00258$$

$$E_{\overline{y}}^{S} = \left|\frac{\beta s_{tdr}}{\overline{mu}}\right| = \left|\frac{1.277962\times0.0507}{1.3395}\right| = 0.0483\text{D-}$$

$$E_{s}^{S} = \left|\frac{\beta s_x}{s_y}\right| = \left|\frac{\beta s_{cr}}{s_{mu}}\right| = \left|\frac{-0.060777\times0.1563}{0.1157}\right| = 0.0821$$

$$E_{s}^{S} = \left|\frac{\beta s_{err}}{s_{mu}}\right| = \left|\frac{-0.550166\times0.1016}{0.1157}\right| = 0.4831$$

$$E_{s}^{S} = \left|\frac{\beta s_{rrr}}{s_{mu}}\right| = \left|\frac{-0.080587\times0.0429}{0.1157}\right| = 0.0298$$

$$E_{s}^{S} = \left|\frac{\beta s_{tdr}}{s_{mu}}\right| = \left|\frac{1.277962\times0.0507}{0.1157}\right| = 0.5600$$

$$E_{\overline{y}}^{IQR} = \left|\frac{\beta(p75x-p25x)}{\overline{y}}\right| = \left|\frac{\beta(p75cr-p25cr)}{\overline{mu}}\right| \frac{-0.060777(p75\text{cr}-p25\text{cr})}{1.3395} = 0.02268$$

$$E_{\overline{y}}^{IQR} = \left|\frac{\beta(p75err-p25err)}{\overline{mu}}\right| = \left|\frac{-0.550166(p75\text{err}-p25\text{err})}{1.3395}\right| = 0.2053$$

$$E_{\overline{y}}^{IQR} = \left|\frac{\beta(p75rrr-p25rrr)}{\overline{mu}}\right| = \left|\frac{-0.080587(p75rrr-p25rrr)}{1.3395}\right| = 0.3008$$

$$E_{\overline{y}}^{IQR} = \left|\frac{\beta(p75tdr-p25tdr)}{\overline{mu}}\right| = \left|\frac{1.277962(p75tdr-p25tdr)}{1.3395}\right| = 0.4770$$

$$E_{s}^{IQR} = \left|\frac{\beta(p75x-p25x)}{s_y}\right| = \left|\frac{(p75cr-p25cr)}{s_{mu}}\right| = \left|\frac{-0.060777(p75cr-p25cr)}{0.1157}\right| = 0.2626$$

$$E_{s}^{IQR} = \left|\frac{\beta(p75err-p25err)}{s_{mu}}\right| = \left|\frac{-0.550166(p75err-p25err)}{0.1157}\right| = 2.377$$

$$E_{s}^{IQR} = \left|\frac{\beta(p75rrr-p25rrr)}{s_{mu}}\right| = \left|\frac{-0.080587(p75rrr-p25rrr)}{0.1157}\right| = 0.3482$$

$$\textbf{(A)} \quad E_{s}^{IQR} = \left|\frac{\beta(p75tdr-p25tdr)}{s_{mu}}\right| = \left|\frac{1.277962(p75tdr-p25tdr)}{0.1157}\right| = 5.5227$$

Based on the results in Table 7 and utilising the indicators for assessing the economic (practical) significance of each parameter of MM components, the findings are as follows:

Table 7: Estimated Parameters of Economic Significance Indicators

Variables	ES_1	ES_2	Es_3	ES_4
TDR	0.04	0.5	0.4	-0.2
RRR	-0	0.02	-0.3	-2.3
ERR	0	0.4	-0.2	-0,3
CR	-0	0.08	0.02	5

Indicator ES1: The measure has a small, almost insignificant impact. A rise of one standard deviation in the value of CR causes a decrease of 0.007% in MM around its

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mean. Likewise, MM drops by 0.04% around its mean as ERR increases by a standard deviation. Also, an increase of a standard deviation in the value of RRR leads to a fall of 0.003% in MM. On the other hand, MM and TDR are positively correlated; an increase in TDR's standard deviation increases MM by 0.05% around its mean. These findings are consistent with theoretical predictions.

Indicator ES2: Based on the measure, MM falls by 0.08% of the mean of MM for every standard deviation of the rise in CR, as economic theory predicts. ERR is having the negative correlation, where every standard deviation increases decreases MM by half the mean of MM. One standard deviation in RRR causes a 0.02% movement in the deviation of MM around the mean. TDR remains positively correlated with MM, where the incidence of an increase in the standard deviation lifts MM by 0.56% of the mean of MM, as expected by the theory.

Indicator ES3: The indicator of ES3 presents the adverse association of MM and CR, ERR, and RRR in the transition across the first to the third quartile (25th to 75th percentile). These transitions lower MM by 0.02%, 0.20%, and 0.30% of the mean, respectively, as the theory predicts. On the other hand, TDR shows a positive association with MM; the transition across the first to the third quartile raises MM by 0.47% above the mean, in agreement with theoretical predictions.

Indicator ES4: This indicator shows that increases in CR, ERR, and RRR are negatively correlated with MM as the values change from the 25th to the 75th percentile. The resulting fall in MM are 0.26%, 2.37%, and 0.34% of its standard deviation, as expected by theory. In the meantime, TDR and MM are still positively correlated; the change in the first to the third quartile raises MM by 5.5% of its standard deviation, as economic theory predicts.

DISCUSSION AND CONCLUSION OF RESULTS

In order to measure the long-run impact of MM components upon its overall value, the research made use of the ARDL model in order to measure and study the connection among MM and its components in the Iraqi economy. Besides, economic (practical) sign indicators were used as added value in the explanation of these components' effects upon MM. The main findings are presented as the following:

1. MM as well as its elements show an unconditional long-term association.
2. The MM is not statistically affected by the CR. This can be explained by the vast amount of money in circulation in relation to bank deposits, as money is hoarded and not banked. Indicators of economic significance agree, indicating that the impact of the CR over MM is trivial.
3. RRR doesn't statistically significantly contribute to MM. However, based on economic (practical) consideration, it shows an economic signification meaningful

effect based on economic signification measures.

4. Statistical as well as economic (practical) value judgments confirm that TDR is the most influential element of MM. In Iraq, TDR is being used by the banks to provide credit, thus pushing MM (Shani et al., 2024).
5. The most important finding of the study is that MM in Iraq is unstable. This instability is in the main because of high CR and ERR ratios. Since reserves contain both needed and surplus elements, much volume of ERR makes MM unstable. Money creation is the process whereby banks make loans in new deposits until ERR are completely being used, where initial deposits are the excess reserves (Alaarajy et al., 2024). In such a situation, in the expansion of credit, money sources are not binding, so that MM growth doesn't result in a proportional expansion in the money supply as far as enough ERR are available. An unstable MM, therefore, makes the task of monetary authorities in controlling the money supply at the time the quantity relation between MB and MM goes weak.

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