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The effectiveness of monetary policy tools in promoting sustainable growth in the Iraqi economy

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Abstract:

Any sustainable growth strategy for an economy must include monetary policy instruments because of the profound influence they have on long-term economic viability. Under the assumption of a statistically significant relationship between monetary policy instruments and sustainable growth indicators in the Iraqi economy, this study aims to assess the efficacy of quantitative monetary policy instruments in stimulating sustainable growth processes and increasing economic growth rates from 2005 to 2023. The research problem is summarized as the tools of monetary policy not playing a strong enough role to positively impact sustainable growth. Open market policy, GDP index, and per capita GDP index all have long-term equilibrium relationships, according to ARDL's findings. Assuming all other variables remain unchanged, the change in quantitative tools can account for 64% of the variation in the GDP. Assuming all other variables stay the same, the findings also prove that the cash reserve index, GDP indicators, and the per capita GDP index have an inverse connection in the long run. In order to make the quantitative tools of monetary policy—such as monetary reserve policy and open market operations—more effective, we suggest that the monetary and financial markets be stimulated and activated

1. Introduction:

One instrument of economic policy that helps maintain stability is monetary policy. Since no modern economy can automatically attain sustainable growth in the absence of a flexible monetary policy, the pursuit of a successful national monetary policy has become an imperative imposed by an acknowledged reality. It fits in well with its environment, is efficient, and has a balanced design. The monetary authority's use of quantitative tools, such as the reserve ratio and open market policy, to affect sustainable economic growth is crucial to the success of this strategy. The power given to the monetary authority by the discount rate, the legal reserve ratio, and open market activities (buying and selling government bonds) represents its ability to manage the amount of money issued or the cash liquidity accessible in the national economy. Monetary policy instruments refer to these variables, which are used to the central bank uses it to manage the money supply. Put simply, monetary policy refers to the actions taken by the central bank to affect the amount of money in circulation, which in turn affects sustainable growth (Duskobilov, 2017). Given the foregoing, it is incumbent upon the monetary authority to attain monetary stability while simultaneously influencing the attainment of sustainable growth via the application of quantitative tools, so ensuring the long-term viability of the Gdp. Traditional methods for transferring the influence of monetary policy are successful to a certain extent in Iraq due to the country's unique characteristics, including as its structural imbalance and its financially and banking system's relative backwardness. To achieve sustainable growth, quantitative tools that are suitable to the country's current economic and monetary conditions have been employed. Regarding the Iraqi economy. The decision to reduce interest rates by the monetary policy committee makes borrowing money cheaper, which encourages more investment. Businesses and consumers may be able to increase their spending if banks loosen their lending policies in anticipation of stronger economic activity. Stocks rise in value as a result of reduced interest rates because they are more appealing to buyers. Investment opportunities may improve and consumer spending could rise as a result (Adediran et al., 2019). When interest rates are low, domestic commodities become more attractive as a substitute for imported items, which leads to a depreciation of the currency. Clouse (2013) argues that when these elements come together, it leads to better production, more jobs, more investment, and long-term sustainability. There is a substantial and ever-expanding corpus of scholarship devoted to the topic of how monetary policy instruments affect sustainable growth. The majority of research indicates that quantitative tools and other crucial instruments of monetary policy significantly influence the attainment of

investment and growth. While there isn't hard proof, a study by Dang et al. (2020) titled "Impact of Monetary Policy on Private Investment: Evidence from Vietnam's Provincial Data" concluded that interest rates, public and local funds, credit channels, and other pertinent monetary policies had a positive effect on investment. Regarding the impact of the currency rate. Examining the unique economic traits of the pre- and post-2012 growth stages brought attention to the fact that the real interest rate and private investment moved in tandem so suddenly. One additional thing we found is that private enterprises have a hard time making investment decisions due to the high level of interest in and competition from both domestic and international investors in local economic growth prospects.

Ani and Onu's (2021) study, "Effect of Monetary Policy on Economic Growth in Nigeria in the Post-Structural Adjustment Program," revealed that the broad money supply had a positive and significant impact on Nigeria's economic growth from 1986 to 2015, subsequent to the structural adjustment program. The interest rate had a negative and significant effect on economic growth in Nigeria during the specified period, while simultaneously exerting a positive and minor influence on economic growth in Nigeria. To improve the financial industry, the central bank should encourage the creation of supplementary financial products that align with the risk appetites and knowledge of financial sector professionals.

A study conducted by Twinoburyo and Odhiambo (2018) entitled "Can Monetary Policy Drive Economic Growth?" Empirical evidence from Tanzania demonstrates that monetary policy exerts no long-term impact on economic growth, regardless of the proxy utilized to assess monetary policy. Nonetheless, the short-term results confirm the existence of monetary policy neutrality, but only when the interest rate functions as an intermediary variable for monetary policy. A negative link emerges between monetary policy and economic growth when the money supply is employed as an indicator of monetary policy. The findings of the study indicate that monetary policy may not serve as a panacea for economic growth in Tanzania. The study by Isibor et al. (2023), entitled "Achieving Sustainable Economic Growth in Sub-Saharan African Countries Using the Tool of Monetary Policy Effectiveness," examines the effectiveness of monetary policy in promoting economic growth in Nigeria from 1980 to 2009. Monetary policy has become a primary tool for economic management in Nigeria, due to the significance of the financial sector in its economic activities. This study utilized the ordinary least squares method for analysis. The tests undertaken demonstrated that the monetary policy interest rate (MPR) is ex-ante. The minimum rediscount rate (MRR), currency exchange rate, and treasury bill investments negatively impact GDP. Throughout the

study period, it was noted that monetary policy was managed, and the instruments did not adequately stimulate economic growth.

A study by Aliu (2022) entitled "Effectiveness of Monetary Policy in Stimulating Economic Growth in Nigeria" examined the effectiveness of monetary policy in fostering economic growth in Nigeria from 1990 to 2019. Secondary data were predominantly obtained from CBN publications. The theoretical framework was established on the Keynesian transmission mechanism concept. In the realm of experimental research, diverse advanced econometric methodologies were utilized, encompassing the Augmented Dickey-Fuller unit root test, the ARDL bounds test, and the Error Correction Mechanism (ECM). Thus, all variables were fixed at the beginning difference, except for the monetary policy rate, which was sustained at its level. This suggests that the variables were combined in a certain order, therefore requiring an analysis of the ARDL limits and the error correction mechanism. ARDL Limitations The test results indicated a sustained correlation between the variables, with both the lower and higher limits remaining beneath the threshold established at the 5% significance level. The ECM test result indicates a restoration to equilibrium of 88%. Thus, it is essential that long-term economic growth in Nigeria be significantly influenced by interest rates and reserve requirements, making monetary policy a powerful tool for facilitating economic expansion.

This research study contributes to the literature investigating the correlation between certain quantitative monetary policy tools and sustainable growth in the Iraqi economy, in both the short and long term. The research was divided into paragraphs, presenting a conceptual framework to clarify the relationship, while another section quantifies the influence among the analyzed components.

2. Research methodology:

The researcher employed an inductive approach to present and analyze the contents of monetary policy tools and their effects on sustainable growth, utilizing standard methods exemplified by ARDL, to examine the influence of independent variables on dependent variables using data provided by The Central Bank and the Iraqi Ministry of Planning.

2.1 The importance of research:

The importance of the research is that it addresses the relationship of monetary policy tools to sustainable growth indicators, which is a topic that focuses on the role that monetary policy plays in bringing about important changes in sustainable growth because it is one of the bodies supporting the achievement of sustainable growth. Therefore, it is up to the decision maker to draw up economic policies and know the dynamic effects of each of these policy tools, as well as the effects that they can have in the long term on economic activity.

2.2 Research problem:

In prior years, the state had challenges that obstructed the attainment of sustainable growth, particularly elevated unemployment, and inflation rates. The study problem is the limited effectiveness of monetary policy instruments in transmitting monetary influence to attain sustainable growth through financial measures. The study's problem centers on a primary question regarding the interaction and link between monetary policy instruments and their effectiveness in attaining economic objectives associated with sustainable growth, and to what degree this is achieved. so, the issue centers on the following question: Did monetary policy, with its quantitative instruments, succeed in improving sustainable growth indices in the Iraqi economy?

2.3 Research hypothesis:

There is a statistically significant relationship for some quantitative monetary policy tools on sustainable growth in the Iraqi economy.

2.4 Research objective:

The research aims to measure the effectiveness of some monetary policy tools (open market policy, legal cash reserve ratio) on indicators of sustainable growth in the Iraqi economy. Among them, it aims to:

Explaining the reality of sustainable growth indicators in Iraq by identifying the mechanisms for their implementation.

Identify the effectiveness of the impact between some quantitative tools of monetary policy and sustainable growth indicators.

3. The relationship between quantitative tools of monetary policy and sustainable growth:

3.1 Monetary policy and its tools: Monetary policy is among the economic policies in which interest has been increasing after the exacerbation of financial problems, crises, and global economic instability, and its growth has been linked to the growth of modern economic ideas and monetary theories.

The concept of monetary policy: Monetary policy encompasses the measures and protocols implemented by the monetary authority to regulate liquidity through expansion or contraction, aiming to promote price stability and sustain economic progress. It is defined as a series of procedures and actions implemented by the monetary authorities to regulate cash and credit, hence influencing economic circumstances through the expansion or contraction of liquidity in the economy (Mathai, 2009). The following elucidates its most notable tools:

Open market operations: Open market operations are one of the central bank's methods used to achieve an increase or decrease in the amount of cash reserves in commercial banks and among the public. This tool is used to influence the ability of commercial banks to create credit, as

the central bank, through this tool, enters the market as a seller. Or a purchaser of securities who aims through this to influence the amount of cash reserves of these banks and thus influence the creation of credit according to the prevailing economic condition of inflation or recession. This tool is considered the most effective tool in developed countries that have developed financial markets (Grigolashvili, 2019).

The legal reserve: This is the percentage that the commercial bank maintains for every deposit deposited in it. This percentage is maintained by the commercial bank in the form of liquid money, such as the reserve with the Central Bank, for which it does not receive interest. This percentage represents the minimum reserve that the commercial bank maintains without discrimination. It is obvious that changing this ratio will affect what will remain from each deposit with commercial banks, and thus will affect the ability of these banks to lend and provide liquidity for circulation in the national economy (OECD, 2018).

Discount rate: It represents the expense incurred while borrowing from the central bank. Upon establishing a specific discount rate, the central bank utilizes its authority to modify the rate or other discount conditions. Rate increases are linked to efforts by monetary authorities to offset inflationary pressures, and rate reductions can be interpreted as an invitation for the business sector to enter a period of expansion and easy credit conditions. The efficacy of these modifications is predominantly contingent upon the level of advancement of the financial system, the function of the central bank as a credit provider, and the prevailing economic conditions. In advanced economies, fluctuations in the discount rate significantly impact internal dynamics, impacting fund availability and credit costs, hence determining the nation's international standing. Increases in rates are expected to result in an overall elevation of additional benefits (Ozili, 2022). The Central Bank use the rediscount rate as a mechanism to affect the number of loans extended by commercial banks. The banks interpret the change as a directive to implement a certain policy and efficient procedures, upon which the framework of interest rates will be established to enhance the nation's economy overall. From the perspective of the central bank, adjusting the discount rate influences the loan volume extended by commercial banks, hence impacting the money supply. The central bank increases the discount rate when implementing a restrictive monetary policy to mitigate inflation, which diminishes commercial banks' propensity to borrow from the central bank, and conversely during a recession (Moessner & Nelson, 2008).

3.2 Sustainable growth:

is a multifaceted and protracted phenomenon, constrained by factors such as population dynamics, finite resources, insufficient infrastructure,

suboptimal resource utilization, excessive governmental intervention, and institutional and cultural trends that impede growth. Economic growth is attained through the optimal utilization of available resources and the enhancement of the nation's productive capability. It enables the redistribution of money within the people and society. Cumulative effects, such as minor variations in growth rates, can amplify significantly over a span of a decade or longer. Redistributing money is more feasible in a dynamic and rising society than in a dynamic and static one (Haller, 2012). Sustainability is a theory, methodology, or practice that governs the efficient utilization of contemporary resources to guarantee their availability and adequacy. Sustainability is described as the capacity to make judicious judgments on the utilization and distribution of resources for both economic and non-economic activities to attain specific social, economic, and environmental objectives (Pezzey, 2015).

3.3 The effectiveness of quantitative monetary tools in achieving sustainable growth:

Monetary policy instruments facilitate indirect intervention in the economy to attain economic stability, characterized by price level stability, elevated growth rates, and the stability of the national currency's exchange rates in international markets. The central bank influences the economy by issuing currency and serving as the primary reference for commercial banks during financial crises. It is responsible for managing the money supply, monitoring credit volume, and directing it appropriately. The central bank employs both direct and indirect quantitative monetary policy instruments to regulate the money supply and overall credit volume, as well as additional measures that target specific economic activities or sectors by either channeling or constraining the credit allocated to them. Included are quantitative instruments, referred to as indirect quantitative control tools, as their influence on the money supply and credit volume is mediated through the monetary and financial markets, utilizing specific monetary instruments to affect the circulation of money and the overall credit volume, irrespective of the applications of this credit. It comprises an open market policy, the discount rate, and statutory reserves (Okonkwo et al., 2023). The open market policy is seen as a crucial monetary policy instrument, enabling monetary authorities to regulate credit and money supply in accordance with prevailing economic conditions. The central bank intervenes in the monetary and financial markets by purchasing or selling securities, particularly government bonds, in accordance with current economic conditions. To attain the intended expansion or contraction of the money and credit supply, alterations in the circulating money quantity will necessitate corresponding adjustments in internal prices, costs, and production. Should indications of recession manifest in economic activity,

the central bank will acquire securities from the monetary and financial markets either in cash or by a written check. The seller acquires it from the central bank and subsequently deposits these cash amounts or checks with the commercial bank with which he transacts, resulting in an augmentation of the bank's reserves both at the commercial bank and the central bank. This incentivizes commercial banks to expand the volume of credit by an amount significantly exceeding the increase in reserves. Liquidity at the central bank enhances purchasing power inside the national economy to combat indications of stagnation in economic activity, but the converse applies in instances of inflation (Desalegn et al., 2022). Economic growth is facilitated by promoting and sustaining elevated levels of employment and income, which are contingent upon the country's monetary policy framework. The current tendency aims to integrate the objective of stable exchange rates with the pursuit of elevated employment and income levels. Investment is influenced by alterations in cash reserves inside commercial banks via their instruments and modifications in the money supply, resulting in matching fluctuations in interest rates that subsequently dictate the magnitude of investment (Snijder et al., 2004).

4. The applied aspect of research and hypothesis testing:

This segment of the research seeks to evaluate the validity of the research hypothesis in two phases, employing the Augmented Dickey-Fuller test to assess the stationarity of long-term time series. Performing a co-integration analysis to ascertain long-term correlations among study variables. This is accomplished by the subsequent methods:

4.1 Model description:

Independent variables: include the open market (OM) measured through the currency auction, and the legal reserve (LR).

Dependent variables: It consists of (GDP) and gross domestic product per capita (APC).

4.2 Definition of the model:

It uses the autoregressive distributed lag model (ARDL) proposed by Pesaran. The ARDL model takes the time difference of the lag into account, and the explanatory variables are distributed over periods that the ARDL model combines into a number of distributed lags in terms (parameters) that correspond to the number of explanatory variables, where it takes The explanatory economic factors under study have a period of time to influence the dependent variable distributed between the short and long term, and therefore the ARDL test can be applied (Alabdulrazag & Alrajhi, 2016). and the model is written as follows:

$$GDP = f(OM, LR) \ldots\ldots\ldots (1)$$
$$APC = f(OM, LR) \ldots\ldots... (2)$$

Through equations, it is possible to estimate the ARDL model to measure the short- and long-term relationship, as follows:

$$\Delta \text{GDP}_t \quad = \quad C + \quad \sum_{t-1}^{n} \propto_1 \text{GDP}_{t-1} +$$
$$\sum_{t-1}^{n} \propto_2 \text{OM}_{t-1} + \sum_{t-1}^{n} \propto_3 \text{LR}_{t-1} + \beta_1 \text{OM} + \beta_2 \text{LR} + \mu_t \dots (3)$$
$$\Delta \text{APC}_t \quad = \quad C + \quad \sum_{t-1}^{n} \propto_1 \text{APC}_{t-1} +$$
$$\sum_{t-1}^{n} \propto_2 \text{OM}_{t-1} + \sum_{t-1}^{n} \propto_3 \text{LR}_{t-1} + \beta_1 \text{OM} + \beta_2 \text{LR} + \mu_t \dots (4)$$

where:

GDP: gross domestic product.

APC per capita GDP.

OM open market policy.

LR legal reserve.

Δ: the first difference of the variable. C: constant limit. N: The upper limit of the optimal deceleration period.

$\propto 1, \propto 2, \propto 3$: short-run slope.

$\beta 1, \beta 2$: the long-run slope.

μt: denotes the stochastic error component.

The ARDL test employs Fisher's statistic to evaluate the complementary relationship between the dependent and independent variables in both the long and short terms within a single equation, as well as to measure the impact of each independent variable on the dependent variable (Nkoro & Uko, 2016). We will examine changes in sustainable growth indicators through several quantitative monetary policy tools.

4.3 Discussion of the results:

4.3.1 Analysis of unit root tests in the GDP model:

To ascertain the extent of integration among the model variables, and to determine which models will be employed to elucidate the nature of the relationship between the variables through static tests, and through them, the static of the series can be detected at (I0 I1 I2) by comparing the test of critical values (table values) at the three levels (10% 5 %1%) with the value (t-stst) or calculated t. Table (1) shows that the GDP variable is stationary at the level (I0) (Intercept), and the open market and legal reserve variables are stationary at the first difference (I1) at the 5% level of significance, i.e. the prob value is smaller than the 5% level of significance. Due to the small sample size and the stationarity of the variables at the level and first difference, it is possible to use the ARDL bounds test model, which is more appropriate and provides better results than multivariate cointegration methods in the case of small sample characteristics.

Table 1: Test of the Unit Root of the GDP Model Using the Augmented Dickey-Fuller

	At level			1st difference		
	None	**Intercept**	**Trend & Intercept**	**None**	**Intercept**	**Trend & Intercept**

Prob 5%	**GDP**	0.0171	**0.0000**	**0.0013**	**-**	**-**	**-**
	LR	0.069	**0.1965**	**0.0076**	**0.0011**	**0.0085**	**0.0085**
	OM	0.9059	**0.3519**	**0.3370**	**0.0002**	**0.0014**	**0.0000**

Source: Extracted from Stata17 output

4.3.2: Analysis of the relationship between GDP and some quantitative monetary policy tools:

ARDL employs the F-Bound test to ascertain the existence of cointegration among variables, constituting the initial phase of this model. Table (2) indicates that the F-statistic value (6.027) exceeds the upper limit (I1) at the 5% significance level, signifying the presence of cointegration between the variables, hence leading to the rejection of the null hypothesis (absence of cointegration between the two variables). The alternative hypothesis, indicating the presence of cointegration, is accepted, so affirming the existence of a long-term equilibrium link, at least unidirectionally, between the variables.

Table 2: F - Bound test of The GDP model

ARDL Bounds Test					
Date: 11/07/24 Time: 05:32					
Sample: 2005h1 2023h2					
Included observations: 38					
Null Hypothesis: No long-run relationships exist					
Test Statistic	**Value**	**k**			
F-statistic	**6.027**	**2**			
Critical Value Bounds					
Significance		**I₀ Bound**		**I₁ Bound**	

Significance	I$_0$ Bound	I$_1$ Bound
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Source: Extracted from Stata17 output.

4.3.3: Analysis of the GDP model estimation quality test

Table (3) presents many tests to evaluate the model's quality and ascertain whether it displays standard issues or is free from them. The results indicate that the independent variables explain roughly 49% of the fluctuations in GDP. The computed model is statistically valid, exhibiting a test statistic value (F) of 17.23 and a p-value of 0.0000, which is below the 5% significance level. Therefore, we accept the alternative hypothesis on the relevance of the entire estimated model and reject the null hypothesis. The model exhibits no problems with serial correlation, as evidenced by the

Breusch-Godfrey test, which yielded a probability value (Prob. Chi-Square) of 0.1015, not significant at the 5% level. As a result, the alternative hypothesis is rejected, and the null hypothesis is accepted, signifying the lack of serial correlation regarding independence. values delineated from each other. The model is unaffected by the issue of non-stationarity of variance, as demonstrated by the Breusch-Pagan test, which produced a p-value of 0.9363, exceeding 5%. This signifies the acceptance of the null hypothesis and the rejection of the alternative hypothesis. The formulated model is considered well-defined. The Ramsey RESET test reveals a F statistic of 1.68 and a P-value of 0.1955, surpassing 5%. This results in the rejection of the null hypothesis and the acceptance of the alternative hypothesis, indicating that the estimated model is free from specification error.

Table 3: Model Quality Test of The GDP Model

Source	SS	df	MS	Number of obs = 38
Model	3.873274	2	1.936637	F (2, 35) = 17.23
Residual	3.933573	35	0.112388	Prob > F = 0.0000
Total	7.806847	37	0.210996	R^2 = 0.4961 Adj R^2 = 0.4673 Root MSE = 0.33524
Breusch–Godfrey LM test for autocorrelation				
lags(p)	chi2	df		Prob > chi2
2	30.741	2		0.1015
Parameters				
Breusch–Pagan/Cook–Weisberg test for heteroskedasticity				chi2(1) = 0.01
Variable: Fitted values of D.GDP				Prob > chi2 = 0.9363
Ramsey RESET test for omitted variables				F(3, 27) = 1.68
Omitted: Powers of fitted values of D.GDP				Prob > F = 0.1955

Source: Extracted from Stata17 output.

4.3.4: Analysis of the ARDL test estimation within the GDP model:

To ascertain the presence of a long-term cointegration relationship within the model (domestic product, open market, and legal reserve), the analysis employed the cointegration technique alongside the autoregressive distributed lags (ARDL) model, given that the domestic product series is stationary at the level, while the open market is stationary at the first difference and price. The exchange remains constant at the initial differential. The Johansson test and error correction models are inadequate for elucidating the nature of long-term relationships, as they focus on variables with comparable stability ordering. Consequently, the ARDL approach will be employed as it supports variations in ordering. Table (4) illustrates a significant long-term correlation among the research variables (Gross Domestic Product, Open Market, Cash Reserve), as the statistical

value of (t) surpasses the critical value, and the (P-Value) is below 5%, signifying the rejection of the null hypothesis in favor of the alternative hypothesis. A 1% growth of the open market (OM) leads to a gain in gross domestic product (GDP) of 187,372.7 Dinar, whereas a contraction yields the opposite impact, especially when the money reserve (LR) rises. A 1% increase leads to a decline in gross domestic product (GDP) - 7.542042 Dinar, whereas a drop yields the opposite effect. Moreover, if a short-term imbalance occurs in this connection, diverging from the long-term equilibrium, the error correction model will swiftly repair the mismatch (-.1677). Semi-annually, signifying that 16.77% of the variance from the preceding half will be corrected in the current half.

Table 4: Short-term and long-term GDP model estimators and error correction parameter

ARDL (2 0 1) regression						
Sample: 3 thru 38				Number of obs = 36		
		R-squared = 0.6431				
		Adj R-squared = 0.5836				
	Log likelihood = -647.97749 Root MSE = 1.739e+07					
ADJ	**D.GDP**	**Coefficient**	**Std. err.**	**t**	**P>|t|**	**[95% conf. interval]**	
	GDP L1.	-.1677513	.0517511	-3.24	0.003	-.2734411	-.0620615
LR	OM	187372.7	70188.01	2.67	0.012	44029.67	330715.8
	LR	-7.542042	7.37136	-1.02	0.314	-22.59637	7.512283
SR	LD. GDP	.8832712	.1306932	6.76	0.000	.6163602	1.150182
	LR D1.	1.733869	1.208846	1.43	0.162	-.7349239	4.202663
	_cons	3.70e+07	1.01e+07	3.66	0.001	1.64e+07	5.75e+07

Source: Extracted from Stata17 output.

4.3.5: Analysis of the unit root test APC model:

Table (5) indicates that the GDP per capita variable is stationary at the level (I0), while the open market and legal reserve variables are stationary at the first difference (I1), with a significance threshold of 5%, as the p-value is less than 0.05. Given the limited sample size and the stationary variables at both the level and first difference, the ARDL limits test model is applicable, since it is more suitable and yields superior results compared to multivariate cointegration approaches under small sample conditions.

Table 5: Augmented Dickey-Fuller (ADF) APC Model Unit Root Test

		At level			1st difference		
		None	**Intercept**	**Trend & Intercept**	**None**	**Intercept**	**Trend & Intercept**
Prob 5%	APC	0.0047	0.0003	0.0004	-	-	-
	LR	0.069	0.1965	0.0076	0.0011	0.0085	0.0085
	OM	0.9059	0.3519	0.3370	0.0002	0.0014	0.0000

Source: Extracted from Stata17 output.

4.3.6: Analysis of the relationship between GDP per capita income and some quantitative monetary policy tools:

The ARDL model employs the F-bound test to ascertain the existence of cointegration among variables, constituting the initial phase of the analysis. Table (6) indicates that the F-statistic value (6.066) exceeds the greater threshold (I1) at the 5% significance level, signifying the presence of cointegration among the variables, hence leading to the rejection of the null hypothesis (absence of cointegration among the variables). The alternative hypothesis, indicating the presence of cointegration, is accepted, so affirming the existence of a long-term equilibrium link, at least unidirectionally, between the variables.

Table 6: F - Bound test of the APC model

ARDL Bounds Test				
Date: 11/07/24 Time: 05:32				
Sample: 2005h1 2023h2				
Included observations: 38				
H0: no levels relationship				
Test Statistic	Value	k		
F-statistic	6.066	2		
Critical Value Bounds				
Significance	I_0 Bound		I_1 Bound	
10%	3.17		4.14	
5%	3.79		4.85	
2.5%	4.41		5.52	
1%	5.15		6.36	

Source: Extracted from Stata17 output.

4.3.7: Analysis of the APC model estimation quality test:

To assess the model's quality, several tests are presented in Table (7) to determine if the model exhibits standard issues or is devoid of them. The findings demonstrate that the independent variables account for approximately 37% of the variations in the average per capita GDP share, and the estimated model is statistically valid. The test statistic (F) was 10.60, and the p-value was 0.0003, which is below the 5% significance level. Consequently, the alternative hypothesis on the relevance of the calculated model as a whole was accepted, while the null hypothesis was rejected. The model does not exhibit serial correlation, as indicated by the Breusch-Godfrey test, with a probability value (Prob. Chi-Square) of 0.0812, which is not significant at the 5% level. Consequently, the alternative hypothesis is dismissed, and the null hypothesis is upheld,

indicating the absence of serial correlation in terms of independence. values separated from one another. The model is not affected by the issue of non-stationarity of variance, as indicated by the Breusch-Pagan test, where the probability value (0.9718) exceeds (5%), therefore supporting the acceptance of the null hypothesis and the rejection of the alternative hypothesis. The estimated model is regarded as well characterized by The Ramsey Regression Equation Specification Error Test indicates that the F test statistic is 1.02 and the P-value is 0.3994, exceeding 5%. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting that the estimated model is not afflicted by mischaracterization issues.

Table 7: Model quality test The of the APC model

Source	SS	df	MS	Number of obs = 38
Model	47.019798	2	23.509899	F (2, 35) = 10.60
Residual	77.6323199	35	2.21806628	Prob > F = 0.0003
Total	124.652118	37	3.36897616	$R^2 = 0.3772$ Adj R^2 = .3416 Root MSE = 1.4893
Breusch–Godfrey LM test for autocorrelation				
lags(p)	chi2	df		**Prob > chi2**
2	29.342	2		**0.812**
Parameters				
Breusch–Pagan/Cook–Weisberg test for heteroskedasticity **Variable: Fitted values of D.GDP**				**chi2(1) = 0.00** **Prob > chi2 = 0.9718**
Ramsey RESET test for omitted variables **Omitted: Powers of fitted values of D.GDP**				**F(3, 27) = 1.02** **Prob > F = 0.3994**

Source: Extracted from Stata17 output.

4.3.8: ARDL Test Estimation Analysis APC Model:

Table (8) illustrates a significant long-term correlation among the research variables (average per capita GDP, open market, money reserve), as the statistical value of (t) surpasses the tabular value, and the (P - Value) is below (5%), signifying the rejection of the null hypothesis in favor of the alternative hypothesis. An expansion of the open market by 1% yields a per capita GDP increase of 0.0031344 Dinar, whereas a contraction generates the opposite impact; additionally, an increase in cash reserves similarly results in a rise of 0.0031344 Dinar. A 1% decrease leads to a fall of -1.99 in the per capita GDP share. The preservation of monetary reserves leads to reduced liquidity, hence influencing investment and production, and

ultimately reducing per capita distribution. A reduction produces the contrary effect, resulting in an imbalance in this link. In the short term, the error correction model will address the imbalance at a rate of (-1728171) semi-annually, signifying that (17.28%) of the prior half's imbalance will be corrected in the current half.

Table 8: Short-term and long-term APC model estimators with error correction parameter

	ARDL (2 0 1) regression						
	Sample: 3 thru 38				Number of obs = 36		
		R-squared		= 0.6495			
		Adj R-squared		= 0.5911			
	Log likelihood = -18.332812		Root MSE		= 0.4411		
ADJ	**D.GDP**	**Coefficient**	**Std. err.**	**t**	**P>|t|**	**[95% conf. interval]**	
	GDP L1.	-.1728171	.0542606	-3.18	0.003	-.2836321	-.0620022
LR	**OM**	-1.99e-07	1.85e-07	-1.08	0.290	-5.76e-07	1.78e-07
	LR	.0031344	.0017491	1.79	0.083	-.0004378	.0067065
SR	**LD. GDP**	.8218667	.1262475	6.51	0.000	.5640349	1.079699
	LR D1.	4.97e-08	3.09e-08	1.61	0.119	-1.35e-08	1.13e-07
	_cons	1.162884	.292138	3.98	0.000	.5662583	1.759509

Source: Extracted from Stata17 output.

5. Conclusions:

The ARDL F-statistic bounds test demonstrates the existence of a long-term equilibrium relationship, within the model parameters of the Iraqi economy. The long-term estimation results demonstrate a positive and significant elasticity among economic variables in both the short and long term, thereby corroborating the research hypothesis that posits a correlation between specific quantitative monetary policy instruments and their beneficial effects on particular indicators of sustainable growth in Iraq .

The existence of a long-term relationship (co-integration) among the analyzed variables: gross domestic product, open market, and cash reserves. The independent variables (open market, cash reserve) explain roughly 65% of the fluctuations in GDP.

A sustained positive correlation exists between average per capita GDP and open market policy in Iraq, such that each adjustment in open market policy by a certain percentage will yield an approximate 31% variation in the per capita share in Iraq equivalent to that percentage.

The results of the Ramsey RESET test demonstrated that all models included in the study were sufficiently characterized, with a significance level over 5%, resulting in the acceptance of the alternative hypothesis and the rejection of the null hypothesis.

There is a sustained inverse link between cash reserves and average per capita output in Iraq, such that a change in cash reserves by a certain percentage lead to an estimated (199%) alteration in average per capita output corresponding to that percentage.

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