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Research Paper

Analysis of the impact of monetary policy tools on the gross domestic product in Iraq for the period (2005-2020)

Rawaa Yahya Khalaf[1], Elaf Muhsin Ali[2], Zahid. K. Badan[3*]
[1,3*]College of Administration and Economics, University of Maysan-Iraq.
[2]AL-Imam AL-KadhUm College. Maysan-Iraq.

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ABSTRACT

Monetary policy in Iraq, as it is in other countries, aims to achieve balance and economic stability, and to control the general level of prices, in addition to other goals that seek to be reached by the monetary authority. From the rise in crude oil prices in global markets, and it was found that there is a joint integration between the variables of the model, which means that the variables included in the model have the ability to correct structural imbalances and the possibility of overcoming obstacles facing the Iraqi economy, that monetary policy plays a simple and traditional role in its impact on the whole One of the important variables, so the researchers recommended developing a strategy that makes the extractive sector the locomotive of growth in the Iraqi economy and contributes to creating forward and backward links between the economic sectors and achieves economic development in Iraq.

Corresponding Author:
Zahid. K. Badan
College of Administration and Economics, University of Maysan-Iraq.
Email: dr.zahidbadan@gmail.com

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1. INTRODUCTION

Monetary policy is one of the most important macro policies in the country, as it contributes to achieving balance and stability, and it is the main moral body concerned with that task. And at a high speed, compared to other economic variables, that monetary policy in the Iraqi economy was and still plays a traditional role and did not witness a clear improvement in its impact on a number of important variables,

as a number of important changes and events took place at the macro level, and contributed to weakening the role of money in achieving Stability in the general level of prices, except through the large bleeding of the dollar that is obtained from oil exports from the gate of the currency sale window in the Central Bank, that is, monetary stability and the general level of prices and facing inflation and unemployment through monetary policy, which offers the money supply a victim to achieve balance Without doing economic activity and stimulating the productive sectors in the Iraqi economy, the research revealed the existence of a long-term equilibrium relationship between the variables of the study by testing the joint integration between the dependent variable and the independent variables. One of the results reached by the research is the ability of monetary variables to modify the course of economic events in Iraq Through the amount of flexibility of variables in affecting the dependent variable represented by economic growth in Iraq during the period (2005-2020).

- **Research Hypothesis:** Despite the abundance of money supply coming from the Ministry of Finance, the monetary policy did not perform its role as planned in achieving stability and addressing economic problems, due to the incomplete financial markets and the lack of development of the Iraqi banking system, in addition to the presence of chronic structural imbalances accompanying changes in the economy. Iraqi during the period (2005-2020).
- **Search Goal:** The research aims to identify the ability and impact of monetary policy tools and the extent of their effectiveness in the Iraqi economy, and try to search and detect the amount of flexibility for each variable in affecting economic activity, so that the planner can take it into consideration in the future, for reform and drawing up macroeconomic policies in Iraq.
- **First: Monetary Policy in Iraq:** Monetary policy represents a set of procedures undertaken by the Central Bank of Iraq in order to control the monetary mass, with the aim of achieving the goals it seeks to achieve, as managing the monetary mass is one of the first concerns of monetary policies, and this means that efficient management contributes to achieving the levels drawn and planned, in prices, levels of inflation and unemployment in Iraq. [1] The monetary variables, which are the money supply, the exchange rate, and the interest rate, are among the most important monetary variables that have a clear and significant impact on monetary policy, as they can show economic activity in most countries, with the exception of some rentier countries, in which the size of the money supply is in response to changes in prices. Crude oil, and it can reflect the image of stability and economic activity. When there is a change in the exchange rate or a change in the money supply, or the interest rate, this leads to significant and important changes in the volume of gross domestic production and is reflected in employment in the economy and the general level of prices [1].

The money supply has witnessed significant increases since the year (2005), due to a number of reasons, including the lack of independence of the central bank from the Ministry of Finance and the governmental political changes, in addition to building the general budget with a large deficit, and this is a result of the overdraft, in addition to the devastating political events and what It was accompanied by inflation in the state's expenditures, which was reflected in military spending during the war period on terrorist organizations represented by al-Qaeda and ISIS organizations during the research period, meaning an increase in the monetary mass to meet the large demand for local cash from the Iraqi dinar, and it is reflected in the demand for foreign currency for the purpose of importing goods, services and equipment military. [2] Monetary policy since (2005) aims to reduce the general level of prices, which is called repressed inflation, which is offset by a dollar hemorrhage to face the rise in commodity prices, resulting from the inability of the productive system to meet the local demand for consumer goods and services in the daily life of the Iraqi citizen. (Al-Halfi, 2012, 8) The Iraqi government was exposed to great challenges after the year (2005), and this shows the importance of achieving balance and stability in the exchange rate and the interest rate to achieve stability in the inflation rate. Table 1 shows that the exchange rate is high as a result of a special situation in the Iraqi economy and rentier countries, as it is called a Resources, when the foreign currency increases and current expenditures in the country increase, the demand for goods and services increases with it. On the other hand, the commodity sector is unable to increase the purpose of goods and services, in order to achieve a balance between the monetary current and the commodity current, and the economy is exposed to major problems after the decline in crude oil prices and the increase in expenditures. Sovereignty, it is called the curse of the resources that the dual and unilateral economy is exposed to. As the exchange rate reached (1896) dinars to one dollar in (2005), this was accompanied by

the end of the war against the former regime and the flow of dollars through the International Coalition Authority and the Interim Government in the form of salaries for employees, and the large import of goods and services that satisfied the total demand.

[3] As the exchange rate of the Iraqi dinar increased from (1453) dinars in the year (2006) and then to (1255) Iraqi dinars in the year (2009), and then it rose to (1170) in the year (2012) and continued to rise to the year (2013) to be the average growth (1.62% during the period (2002-2013), then it rose slightly to (1166) dinars in (2014) and was stable until the year (2020) at a price of (1190) Iraqi dinars per dollar, despite the stability that lasted for a long time and was accompanied by stability in The level of prices and the decrease in compulsory unemployment rates clearly until the spread of terrorist organizations, and the accompanying internal and external migration and the loss of a large part of the migrant individuals for their work, so unemployment rates rose due to the complications of terrorism and investigation operations, in addition to that the government was interested in liberation operations at the expense of economic activities in the country [4].

The reduction of the exchange rate by the monetary authority entails great risks to the Iraqi economy, foremost of which is the reduction of the value of goods imported from abroad, so he worked to highlight the condition (Marshall Lerner), so the value of imported goods was less than their counterparts produced in the Iraqi economy, which made the Iraqi consumer refrain from Buying locally produced goods, which negatively affected the gross domestic product. (Al-Daroubi: 2011, 285)

The ability of the monetary authority to control the exchange rate and the monetary mass depends on the crude oil prices in the global markets. 2006) at a growth rate of (35.7%), and the increase was continuous in the monetary mass in the narrow sense, so it was (36914707) billion Iraqi dinars in the year (2008) and decreased to (51380) billion dinars in the year (2012) and the rise and increase in the monetary mass continued in response to the increase in Current expenditures resulting from the rise in crude oil prices, and the increase in the monetary mass continued until the year (2020) with a monetary mass amounting to (40479112) billion Iraqi dinars, as the growth rate was (48.4%) during the period (2005-2020) [5].

Table 1. Money Supply, Exchange Rate and Interest Rate in Iraq for the Period (2005-2020) Billion Dinars

Year	GDP	IR(%)	M	ER
2005	25728748.6	6.35	22734254.4	1896
2006	46923315.7	5.6	34050969	1453
2007	65798566.8	7.1	45145710	1469
2008	85431538.8	7.12	36914707.8	1467
2009	100100816.6	7.25	31422753	1255
2010	147641254	16.75	48249768.6	1193
2011	120429277.2	8.83	37328	1170
2012	146453468.5	6.25	51380.9	1170
2013	192237070.3	6	55929.4	1170
2014	227221851.2	6	104670.7	1166
2015	243518658.5	6	39057185.3	1188
2016	236708036	6	43261711.1	1190
2017	185550902.2	6	48578232.7	1190
2018	186397293.8	4.14	55001711.8	1190
2019	220905643.8	4	34482375.6	1190
2020	221765433.2	4	40479112.9	1190

- **Second: Model Description:** To learn about the nature of mathematical relationships between economic variables, which are represented in gross domestic product (GDP) as a dependent variable, money supply (M), exchange rate (XR) and interest rate (IR) as explanatory independent variables, as in Table 2:

Table 2. Variables of the Model and the Nature of the Variable

Variable	Sign	The Nature of the Variable
gross domestic product	GDP	Dependent
Cash Supply	M_SUPPLy	Independent
Exchange Rate	XR	Independent
Interest Rate	IR	Independent

- **Stability Tests:** Stability tests are a necessary work for conducting standard work and an introduction to it, and the Dickie Fuller test was relied upon to detect stability and the degree of integration for each variable after testing [6].
- **Dickie Fuller:** A Dickie Fuller test was performed to verify the stability of the chains and whether they are integrated in their original level or not. If it is found to be stable in all variables at level I (0), then the OLs method can be used without concern without a false regression, but if otherwise is proven, then in this case the test method will differ as in the following table [7].

Table 3. Test of the Whooping Root of the Unit More

Unit Root Test Table (ADF)					
At Level					
		GDP	**XR**	**M**	**XI**
With Constant	t-Statistic	-2.8953	-1.8921	-0.4483	-2.2062
	Prob.	0.0473	-0.3291	0.8702	2.2125
		*	no	no	no
With Constant & Trend	t-Statistic	0.2341	-1.2897	-0.1126	-2.3201
	Prob.	0.9939	0.8541	1.0330	0.3971
		no	no	no	no
Without Constant & Trend	t-Statistic	-2.5569	-0.9070	1.3650	-0.5029
	Prob.	0.0149	0.3090	1.9491	1.4809
		**	n0	n0	n0
At First Difference					
		d(GDP)	**d(XR)**	**d(M)**	**d(XI)**
With Constant	t-Statistic	-2.1971	-3.6249	-2.3870	-2.9790
	Prob.	0.0149	0.0190	0.0109	0.0498
		**	**	*	*
With Constant & Trend	t-Statistic	1.9109	-3.8761	-2.2651	-3.0609
	Prob.	1.0001	0.0409	0.0261	0.0490
		n0	**	**	**
Without Constant & Trend	t-Statistic	-1.1409	-3.8141	-1.0092	-3.1361
	Prob.	0.0170	0.0010	0.0272	0.0032
		**	***	**	***

Table 2 shows the stability of the variables and ensuring their stability at level I (0) or in the first difference I (1), and the stability and significance of the variable (GDP) and the rest of the independent variables represented by money supply, interest rate and exchange rate, whose significance was proven after taking the difference The first one has I (1), and this means that the variables are stable at a different order of integration, which confirms that they are free from false regression at this level of stability and rest.

2. METHODOLOGY

2.1 Formulation of the Mathematical Model

$$GDPPt = a0 + \sum_{i=0}^{r} a1i\Delta M\,t-1 + \sum_{i=0}^{r} a2i\Delta XE\,t-1 + \sum_{i=0}^{r} [a3i\Delta XIt-1]$$

The appropriate model for estimating the model variables is according to the (ARDL) methodology, due to the fact that the variables are stable in different degrees. Therefore, the researchers see the use of this methodology to estimate the model parameters and know the effect of the independent variables on the dependent variable, and by taking the logarithms to obtain the flexibility coefficient for each variable and knowing the degree of Flexibility for each variable, and providing a logical explanation according to economic theory as shown below: [8]

Table 4. Regression Analysis According to the (ARDL) Methodology

Selected Model: ARDL				
Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Prob.***
LOG(D(M)	0.209	0.085	2.458	0.041
LOG(D(XR)	-0.150	0.042	-3.571	0.001
LOG(D(XI)	0.090	0.0281	3.214	0.021
C	61.721	14.018	4.402	0.026
R-squared	0. 8302	Mean dependent var		57391122
Adjusted R-squared	0. 8131	S.D. dependent var		28153484
S.E. of regression	1202723.	Akaike info criterion		30.924
Sum squared resid	8.68E+13	Schwarz criterion		31. 364
Log likelihood	-1014.511	Hannan-Quinn criter.		31. 024
F-statistic	56.20	Durbin-Watson stat		2. 001
Prob (F-statistic)	0.000000			

The (ARDL) methodology proved the significance of the estimated parameters in the model, and the researchers used the logarithmic function because it represented the model as the best representation, in addition to the quality of the model through the modified coefficient of determination (R2) of 81%), meaning that the independent variables represent the model by the amount of the coefficient of determination, And the percentage of the effect of the variables that were not included in the model was (19%), in addition to the significance of the model, which was indicated by the (F) test, which has a value of (56.2) and a significant level (0.0000), and the (D.W) test showed that the model does not suffer from the problem of self-correlation The value was (2.001), which is in the acceptance region, and the test shows the results of the model, as all elasticities estimated by adopting the logarithmic function that represented the model are best represented, and the variables were in the form of elasticities, to reflect the significant power of interpreting the changes that occur in the independent variable and lead to changes in the variable dependent by the amount of elasticity coefficient for each variable through the following:

1) Every one-time change in the money supply leads to a change in the gross domestic product by an elastic coefficient of (20%), which means that an increase in the money supply leads to an increase in the gross domestic product.
2) The exchange rate is a significant and negatively influencing variable, and this is consistent with the data of the Iraqi economy, which show that the increase in the exchange rate leads to a decrease in the gross domestic product, and that the decrease in the exchange rate of the local currency affects positively, and this is in accordance with the Marshall Lerner condition, as every change in the exchange rate A one-time exchange rate leads to adverse changes in the gross domestic product (GDP) with an elastic coefficient of (15%)
3) The third variable, represented by the exchange rate, will affect the gross domestic product with low flexibility and inversely, because the changes that occur in the gross domestic product are not affected by the change in the volume of investment, and then the increase in demand for factors of production, and then the increase in the total supply of goods and services. Changes in the gross domestic product from changes in oil exports and the price of crude oil in the global oil markets, as every change in the exchange rate by one time leads to an inverse change in the dependent variable by the amount of the elasticity coefficient [9].

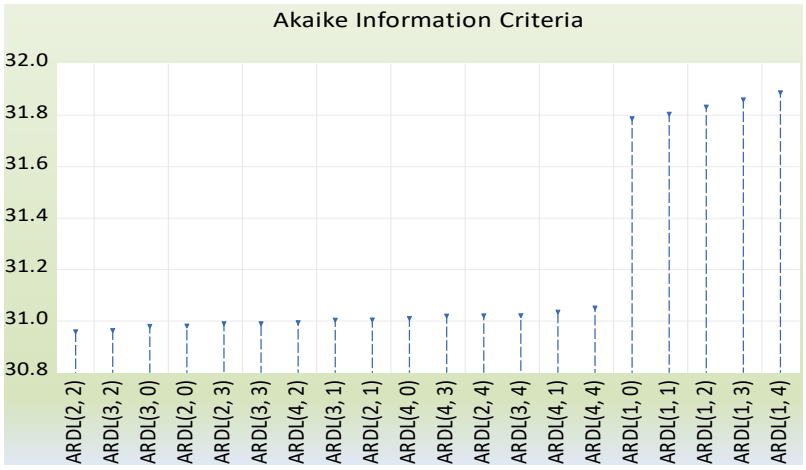

Figure 1. The Optimal Model for the Optimal Hysteresis of the AIC Model

Figure 1 shows that the model has a time lag (2.2). This was based on an Akaiki criterion, and the non-significant lagging variables were deleted, which shows the best combination of the model as it gives the least apical and the least longitudinal wave of the variables as in the previous figure, which identified the lagging variables automatically as In the statistical bag, it means a time lag of one period [10].

- **Third: Cointegration Test:** The difference in the integration of the variables and the degree of stability forced the researcher to adopt the Autoregressive Time Lagging Model (ARD) in order for the model to be compatible with the research requirements, so the researchers excluded the Johansen test to test the co-integration, that this test assumes that all variables are stable to one degree, and therefore the integration The joint between the monetary mass and the gross domestic product, or between the exchange rate and the interest rate as independent variables and the gross domestic product as a dependent variable, as the test assumes that if the value of (F) calculated is greater than the upper limit of the critical value, the null hypothesis that means the absence of long-term equilibrium is rejected The alternative hypothesis, which means that there is co-integration between the model variables, is accepted [11].

Table 5. Test Limits

F-Bounds Test		**Null Hypothesis: No Levels Relationship**		
Test Statistic	**Value**	**Signif.**	**I (0)**	**I (1)**
			Asymptotic: n=1000	
F-statistic	12.43	10%	4.01	4.40
k	1	5%	4.87	5.27
		2.5%	5.28	5.87
		1%	5.71	6.41
Actual Sample Size	66		Finite Sample: n=70	
		10%	3.10	3.62
		5%	3.76	4.32
		1%	5.15	5.95
			Finite Sample: n=65	
		10%	3.14	3.62
		5%	3.78	4.34
		1%	5.35	6.01

Table 5 shows that the calculated (F) value is (12.43), and when compared with the upper and lower values at different levels of significance from 1% to 10%, it turns out that the (F) test and its calculated value are greater than the minimum critical values, and thus we reject The null hypothesis, and we accept the alternative hypothesis, which states that there is a long-term equilibrium relationship, as the

variables have the ability to correct their imbalances and integrate during the long term, to be effective and influential in the dependent variable.

- **Fourth: Heterogeneity Test:** For the purpose of making sure that the model is free from the problem of homogeneity in variance, through the test of detecting the problem or not, by means of this test the researchers were able to identify the amount of residuals and detect them if they suffer from homogeneity, or from the problem of difference in variance, and Table 6 shows The value of Prob was about (0.043) and the value was (5.42), at a level less than (0.05), which means that the model does not suffer from the problem of heterogeneity and the acceptance of the null hypothesis, which confirms that the model is free from the problem of heterogeneity of variance [12], [13], [14].

Table 6. Heterogeneity of Variance Test

Heteroskedasticity Test: ARCH			
F-statistic	5.421	Prob. F (1،18)	0.0272
Obs*R-squared	6.641	Prob. Chi-Square (1)	0.0161

3. CONCLUSION

1) The standard test proved the existence of joint integration between the independent variables and the dependent variable that represents the gross domestic product, which means that the variables have the ability to overcome the problems they suffer from, and the ability to correct structural imbalances during the long term.
2) It was found through the research that the monetary policy tools have a weak effect on economic activity, and this is clear through the significance in the regression analysis, which means that the problem is the ineffectiveness of the monetary policy tools.
3) The Iraqi economy has been suffering since (2005) and before it from the Dutch disease and the rule of the oil sector, which caused a new and old situation called (the resource curse) that made Iraq a mere market for the disposal of products imported from abroad, and caused great damage to the productive commodity sectors.
4) The economic growth in Iraq is illusory and unreal because it did not create added value in the economy, but rather depends on oil exports to the outside world, which reflected the great importance of the oil sector in achieving economic growth, and is considered the main source of obtaining foreign currency.
5) The rise in crude oil prices in the global market did not create interaction in the Iraqi economy between the commodity market represented by the Gross Domestic Product, and the money market represented by monetary policy, which missed the great opportunities to achieve real growth in the Iraqi economy.

3.1 Recommendations

1) The need to develop an effective strategy to link financial returns and economic activity in Iraq, through coordination between monetary policy tools and economic growth.
2) Work to diversify the productive base and search for the locomotive of growth in the Iraqi economy by relying on monetary policy tools, and supporting the productive and service sectors to create diversity in sources of income and disposal of oil rents (Dutch disease)
3) Serious pursuit of good management of oil revenues, in order to play the important role in creating interdependence and interdependence with the forward and backward links between the various economic sectors and making vertical and horizontal integration between the sectors a long-term strategy, and thus the extractive sector has a major role in building a healthy economy.
4) The researchers recommend the necessity of conducting licensing rounds in the agricultural and industrial production sectors, similar to what happened in the oil sector, benefiting from direct investments, and the accompanying technology, to exploit the natural resources in the country.

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Author Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Rawaa Yahya Khalaf	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
Elaf Muhsin Ali	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
Zahid. K. Badan	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

Not Applicable.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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BIOGRAPHIES OF AUTHORS

	**Rawaa Yahya Khalaf,** is affiliated with the College of Administration and Economics at the University of Maysan in Iraq. Her research is mostly about monetary policy, macroeconomics and economic development in Iraq. She has co-authored some published work looking at how monetary policy tools affect Iraq's Gross Domestic Product, and in those studies she uses econometric approaches like the ARDL method, sometimes people call it an "approach" rather than just a technique. Overall, her scholarship helps shed light on things like economic stability, managing the price level and the structural imbalances, that are present in the Iraqi economy.
	**Elaf Muhsin Ali,** is affiliated with AL-Imam AL-Kadhum College, Maysan, Iraq. Her research interests kind of revolves around monetary economics and macroeconomic policy analysis within the Iraqi setting. She has co-authored published research that examines the link between monetary policy instruments and economic output in Iraq, using quantitative and econometric approaches, and yes that part is pretty central. Overall her work add to the expanding regional scholarship on economic stability and policy effectiveness in post-conflict and transitional economies like Iraq. Email: Elafmohsin1989@gmail.com
	**Zahid. K. Badan,** is affiliated with the College of Administration and Economics, University of Maysan in Iraq. His research is looking at macroeconomic policy, monetary economics, and the wider economic development issues that are specific to Iraq. He also has co-authored published research where the focus is on how monetary policy instruments affect Iraqs Gross Domestic Product, and he uses econometric modeling in that work. Overall his academic contributions help the ongoing attempts to understand stabilization mechanisms, and also structural adjustment processes, especially as Iraqs economic landscape keeps shifting over time. Email: dr.zahidbadan@gmail.com