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The Role of Monetary Policy in Controlling on Inflation Rate in Iraq for The Period (2004 - 2020)

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ABSTRACT

This paper demonstrated the role of monetary policy in controlling the inflation rate in Iraq. For this purpose, a modeling technique of the Autoregressive Distributed Lagged (ARDL) model has been used, and Monthly data has been collected for the period 31/12/2004 to 31/7/2020. Hence, stationary's unit root test result implies that the inflation rate is stationary at the level, and other variables are stationary at the first difference. However, the Johansen Cointegration Test results reveal the relationships between inflation rate and all variables in the long run. Moreover, the Granger causality result shows two-direction causality between narrow money supply and exchange rate granger causes inflation rate. Unidirectional granger causality between inflation rate granger causes board money supply and interest rate. Finally, the outcome of the ARDL model reveals that the money supply and exchange rate are significant and positively related to inflation. The implication is that an increase in the money supply and exchange rate leads to high inflation in Iraq. The interest rate has a significant and contradictory relationship with the interest rate and inflation rate in Iraq. It indicates that an increase in the interest rate leads to a decrease inflation rate in Iraq.

INTRODUCTION

Inflation is described as a steady rise in the economy's overall price level. Inflation is a mechanism whereby the price index rises when the value of money decreases. The inflation rate is strongly linked to the gross domestic product, money supply, exports, import rates, exchange rate, interest rate, fiscal deficit, government spending, tax revenue, etc. (Bashir et al., 2011). Otherwise, price management is one of the most significant aspects of economic planning and is normally administered by Iraq's Central Bank (CBI). Furthermore, the consumer price index (CPI) as a calculation of inflation is primarily measured by the money supply, interest rate, exchange rate, and other factors (random parameters such as the financial crisis) that impact inflation. However, the value at which the overall level of price for goods and services in an economy may be expressed or described as inflation over a period of time. Because of its effects on economic sectors, inflation has typically remained an issue in every country. that may be attributed to the fact that as the general price level rises, the worth of money declines, hence the number of goods each unit of currency will buy decreases. A variety of theories have been proposed as to why a nation is facing an inflationary wave. Some of these factors include a rise in demand that exceeds supply, an increase in manufacturing costs, and some economic structural issues in calculating inflation, and two crucial indexes were used. These are the Consumer Price Index (CPI) and Producer Price Index (PPI). The CPI calculates the shift in a consumer's buying power, while the PPI calculates the change in the producers' purchasing power (Fabian & Charles, 2014)[1]. Many economists have described inflation in various ways, but one thing runs through them all. Economists concede that inflation is growing for overall prices over time (Mankiw, 2010)

Regardless, the inflation rate is a macroeconomic issue that seriously affects economic and social indices. The Iraqi economy was damaged by this occurrence and bore the consequences. Business instability, wealth redistribution, investment constraints due to increased borrowing costs, political instability, pricing, market distortions such as exchange rates, interest rates, affecting international investment inflows, and domestic energy prices in a world with inadequate demand control are examples of these consequences. That has resulted in inefficient resource allocation, making the economy less competitive and reducing its ability to respond to external shocks. Containing inflation has proven to be one of the most problematic facets of Iraqi economic management for the reasons mentioned above. As a result, inflation in Iraq has been characterized by sharp fluctuations, with down from a negative inflation rate of 16.1 percent in 1996, 448.5 percent reported in 1994 (Al-Jafari & Altaee, 2019).

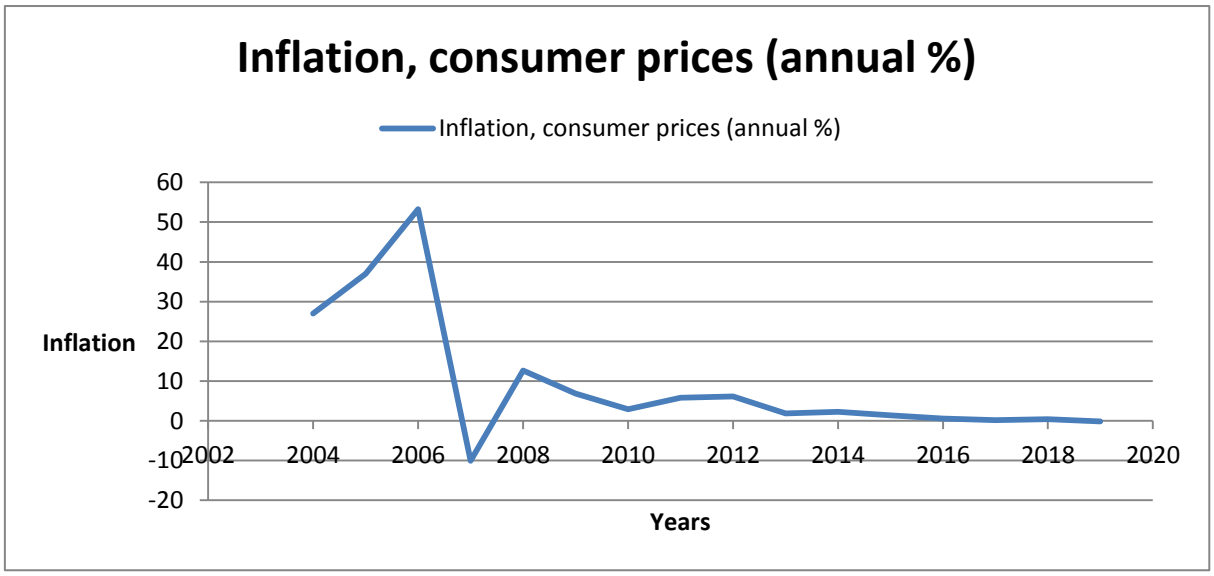
The oil industry has always dominated the Iraqi economy. It accounts for more than 90% of the government's income and 80% foreign exchange earnings (World Bank, 2018 Cited in Al-Jafari & Altaee, 2019).

1. The Trend of Inflation Rate in Iraq.

As evaluated by the CPI, inflation demonstrates the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or modified at particular intervals, including yearly.[2]

[1] - https://cbi.iq/static/uploads/up/file-158245052997641.pdf
[2] https://data.worldbank.org. International Monetary Fund, International Financial Statistics and data files.

Figure 1: The trend of inflation rate in Iraq for the period (2004-2019).[3]



The line chart above demonstrates the inflation, consumer price (annual %) in Iraq in 2004 – 2019. It can be seen that the lowest rate of inflation rate is -10.07% was recorded in 2007 in Iraq. However, the highest inflation rate of 53.23 percent was experienced, which is very high for any measure (2006). Inflation rates reached 9.24 percent in 2009, 2011, and 2012, close to this inflation rate average. After 2012, there was a fall in inflation and a period of prosperity until 2019.

Monetary policy an important policy among other economic policies due to its essential role in dealing with economic imbalances, and including reducing the inflation problem; it is obvious this policy is created and implemented by the central bank for the purpose of controlling the money supply and financing to stabilize the flow cash and then use it in a proper manner consistent with the state of the economy and its position.

The essence of monetary policy concerning the determination and maintenance of the price level constantly remains in the central objective of social and economic planners. Moreover, monetarists also evaluate and argue that the amount of money available and the inflation rate are inextricably linked. Furthermore, it's also noticed that the substantial quantity of money supply increases can positively or negatively impact the overall economic progress. (Chaudhry et al., 2015).

Monetary theory provides insight on how to design optimal monetary policy. It may be either expansionary or contractionary, with an expansionary policy increasing the overall supply of currency in the economy more rapidly than average. In contrast, a contractionary policy extends the money supply more slowly or even shrinks it. In the past, expansionary strategy has been used to combat unemployment in a recession by lowering interest rates hoping that easy credit will bring companies into expanding. Contractionary policy is intended to slow inflation, avoiding the resultant distortions, and decrease asset prices. The Central Bank monetary policy instruments are determined by the economic growth stage, especially the financial sector.

1.1. The Generally Used Monetary Instruments Are Discussed Below.

1.1.1. Expansionary Monetary policy

Expansionary monetary policy is when the Central Bank is utilizing its tools to stimulate the economy. That demands reducing the prime rate to raise the supply of money. This may reason mortgage rates to decrease, consumers to borrow, and businesses to develop, thereby

[3] https://data.worldbank.org.

hiring more workers who will consume even more (Amadeo, 2012). Furthermore, an expansionary monetary policy (also identified as monetary policy relaxation) attempts to utilize monetary policy to increase or decrease aggregate demand, output, and employment. Typically, this entails a reduction in the central bank's official policy interest rate. It might also imply a relaxation of credit controls in some places. A fall in the exchange rate (depreciation) is also an expansionary monetary policy.

1.1.2. Contractionary Monetary Policy

Contractionary monetary policy is a type of monetary policy in contrast to expansionary policy. The purpose is to minimize the amount of money available. That can be accomplished by interest rate increases, which are often used to fix the inflationary issues that arise during a business cycle expansion. Contractionary fiscal policy also supports the contractionary monetary policy. It is a decrease in the amount of money in circulation, correlating increases in interest rates, for the expressed goal of placing the brakes on an overheated business-cycle expansion and fixing the issue of inflation. In the past, a monetary strategy was implemented by reducing the volume of paper money in circulation. Monetary policy is implemented in modern economies by regulating the money creation process, carried out by fractional-reserve banking (Ahiabor, 2013).

This topic has been selected to identify the role of monetary policy and its influences to decrease the inflation rates in Iraq, and it can be achieved by examining the role of money supply in controlling inflation rates. In addition, the most prominent effects of the exchange rate and interest rate on inflation will be tested.

The most important applied and previous theoretical studies on monetary policy and inflation have been presented and attempted to construct a standard model that determines the effect of monetary policy on inflation. Thus, it was attempted to know the impact of monetary policy and its role in reducing or controlling the inflation rate by clarifying the role of the money supply to determine the inflation rate and the most prominent effect of the exchange rate on inflation in Iraq has been detected.

One of the study's key findings is a significant and constructive relationship between the money supply and the inflation rate in Iraq. This result is in line with the finding of Priscilla (2016), Fabian & Charles (2014), and Hossain (2013), who discovered that the money supply has a favorable effect on Iraq's inflation rate. The second main finding is that the interest rate in Iraq harms inflation. The third main finding is that the exchange rate has a beneficial effect on Iraqi inflation, maybe due to many analyses and econometric methods used in those researches. The fourth finding is that the Iraqi financial crisis harmed inflation. The fifth discovery is that Granger causality has been found between the money supply (M1) and the exchange rate granger induces inflation rate. Unidirectional granger causality among inflation, money supply (M2), and the interest rate in Iraq. As a result, this result agrees with the findings of Iya & Aminu (2014).

Here are other significant findings from the current study. First, the money supply in Iraq has a crucial and positive correlation with the inflation rate. Second, the exchange rate has a major and beneficial impact on Iraq's inflation rate. These outcomes are similar to Priscilla's (2016) and Fabian & Charles's (2014) findings, possibly, because they utilized Autoregressive Distributed Lagged (ARDL) models in the study. Third, interest rates have a major and detrimental effect on Iraq's inflation rate. Fourth, the financial crisis has had a huge and damaging effect on the inflation rate. Fifth, the connections among both inflation rate and all variables in the long term according to Cointegration Test. finally, there is two-direction causality between money supply (M1), exchange rate granger causes inflation rate. Unidirectional granger causality between inflation granger reasons (money supply (M2), interest rate) and this outcome is in line with the observations of Iya & Aminu (2014).

The below are the four chapters that form this dissertation. The first chapter contains the study's introduction, including theoretical monetary policy and inflation, monetary instruments, The Three Instruments of Monetary Policy, Monetary Policy Tools, and the Study's Organization. The second chapter is the lecture reviews and contains a review of the

theoretical and empirical literature on the connection between inflation and monetary policy. Model definition, data summary, theory, methodology, and the study's checking problem are discussed in the third chapter. Finally, the fourth chapter includes a conclusion as well as suggestions.

2. Literature Review

Several theoretical and empirical studies from various countries have confirmed the effect of monetary policy inflation in developing and developed countries. On the other hand, the outcomes are diverse due to various analyses, methods, and information.

Priscilla (2016) examined the impact of monetary policy on inflation in Ghana using a modeling approach of the ARDL version from 1980 to 2014. The research analyzed trends in inflation and monetary indicators. Moreover, it examined the long and short-run impacts of monetary variables on inflation; the short and long-run outcomes collected from the predicted models revealed that the supply of money (M1, M2, and M+) is positively associated with inflation. The connection is that a rise in the supply of money results in high inflation in Ghana. The outcomes further showed a statistically substantial negative correlation between the monetary policy rate and inflation. Therefore, confirming the conventional banking practice of increasing the monetary policy rate, a contractionary monetary policy reduces inflation. Although the Bank of Ghana has adopted a contractionary monetary policy, high inflation persists because other non-monetary factors such as extended government expenditure and utility bills have rendered the monetary policy ineffectual, leading to high inflation. However, a positive short-run connection between the monetary policy rate and inflation was exhibited in this study.

Further, there was a long-run positive correlation between the exchange rate and inflation in Ghana. The short-run consequences, therefore, showed a negative and positive relationship between exchange rate and inflation. The outcome also reported a statistically significant positive relationship between inflation and interest rates in Ghana's long and short term. Economic growth was found to harm inflation in the long-run and short-run. A positive relationship between government expenditure and inflation in both the short-run and long-run becomes identified. Trade openness negatively affects inflation in the long-run and short-run.

Another study is performed by Chaudhry et al. (2015); in Pakistan, increasing the money supply at the inflation rate was investigated. The annual time series data for the duration 1973-2013 was used in the study's model, which was integrated using the ARDL technique. Diagnostic and stability checks ensure that models are safe and reliable from an econometric standpoint. The result showed that the interest rate and money supply are significant policy variables for regulating inflation in the long-run. At the same time, the national output level puts downward pressure on the inflation rate in the short run. Ahiabor (2013) conducts another study that examined the influence of monetary policy on inflation in Ghana from 1985 to 2009. Selected variables are inflation as a dependent variable, while money supply, interest rate, and exchange rate were independent variables. The results proved a positive long-run connection between the supply of money and inflation, a negative correlation between the rate of interest and inflation, but a positive relationship between exchange rate and inflation. Another study is conducted by Iya & Aminu (2014), who found the determinants of inflation in Nigeria from 1980 to 2012. Applying the ordinary least square (OLS) estimation method and Augmented Dickey-Fuller Method examines the unit root test property of the series. Granger causality test of causation among inflation and money supply government expenditure, exchange rate, interest rate, cointegration, and vector error correction techniques were also utilized. The results of the unit root proposed that each one of the variables in the model is stable. Inflation is stationary at a level while money supply.

Government expenditure, interest rate, and exchange rate at first difference are stationary. The results of causality proposed causation between inflation and some of the included variables. The Johansen cointegration results demonstrate that there is a long-run relationship between inflation and the included variables. The VEC error correction results

also revealed the long-run relationship between the model's variables with only money supply and exchange rate causing interest rate. The OLS results found that money supply and interest rate impacted inflation positively, even as government expenditure and exchange rate negatively impacted inflation. As a result, strong economic efficiency in terms of price stability can be accomplished by decreasing the money supply and interest rate, increasing government spending, and the country's exchange rate. A major policy implication of this study is that policymakers might make a concerted attempt to stabilize prices (inflation) by reducing the money supply and interest rate in addition to rising government expenditure and exchange rate; most importantly, raising the Exchange rate and reducing interest rate. Another study is conducted by Onodugo et al. (2018) conducted another study to look at determinants of the success and failure of monetary policy in solving inflation to reach optimal economic targets by using the econometric technique to evaluate the correlation between different variables. The method of data analysis is the ordinary least square (OLS) multiple regression. Our analyses verified that the instruments of the policy of money would have had more influence on inflation if inflation were not structural. Hossain and Islam perform another study (2013) studied the determinants of inflation in Bangladesh for 1990 to 2010.

The ordinary least square method was applied to explain relationships. The empirical findings suggest that the money supply and the one-year lagged value of the interest rate have a strong and important impact on inflation. The result also showed that the one-year lagged price of money supply and one-year lagged value of fiscal deficit has a vital and adverse influence on the inflation rate. There was an irrelevant relationship between interest, fiscal deficit, and nominal exchange rate. The explanatory variables accounted for 87 percent of the variation of inflation during the period. This study implies that the money supply is to be regulated to reduce inflation. In addition to this reduction of last year's interest rate will reduce inflation.

Another study by Fabian & Charles (2014) studied the determinants of inflation in Nigeria using monthly data between January 2007 and August 2014. The OLS method was used. Planned inflation, money supply, and the exchange rate all affected inflation, according to the findings. However, despite being accurately signed, the bill rate and the monetary policy rate had no effect on inflation in Nigeria during the research period. The estimated model demonstrated that every one of the explanatory variables used for the analysis accounted for a 90% variation in describing the path of the inflation regarding increase or decrease. The cointegration check verified that a long-term connection existed in most of the variables, and they were stable at order one. Another study is conducted by Philip et al. (2014). The study concentrates on the effort of monetary policy in decreasing inflation in Nigeria from 1970 – 2012, using the cointegration and Error Correction Technique of econometric analysis. The test of both the Unit root and cointegration showed a long-term relationship between the variables.

In contrast, the Granger Causality test showed an un-directional relation between Monetary Policy and inflation. However, the VECM test indicated that inflation, Gross Domestic Product (GDP), and exchange rate are negatively correlated and positively linked to the broad money supply (M2) and domestic credit. Another study conducted by Onodugo et al. (2018) looks determined to study the success and failure of monetary policy in solving inflation to reach optimal economic targets using the econometric technique to evaluate the correlation between different variables. The method of data analysis is the OLS multiple regression. Our analyses verified that the monetary policy instruments would have had more influence on inflation if inflation were not structural.

3. Data And Methodology

This chapter explains the techniques employed in conducting the study. The chapter contains model specification, data description, data sources, unit root tests, cointegration test, correlation test, Granger causality, OLS, and ARDL method.

3.1. Data Source

The data for the empirical analysis in this study is derived from the Central Bank of Iraq (1/12/2020). The data applied in this study are time-series data span from 31/12/ 2004 until 1/7/ 2020. Since data were not accessible, the option of the timeframe was inevitable. Data were obtained from the Central Bank database posted by the Central Bank of Iraq, Statistical Reports for 2004–2020, and Ministry of Finance, Accounting Department. This study utilized the Monthly data for consumer price index as a measure of inflation, the supply of money (M1, M2), parallel exchange rate or the market price of the domestic currency against the US dollar, interest rate or policy rate is the cost of borrowing money of the bank in Iraq after 2014, reducing the price of oil and the rise of ISIS war in December 2013, they controlled a big part of Western and Northern Iraq and increase in military spending make oil production difficult in Iraq, all of these due to the financial crisis in Iraq. Also, we put the financial crisis as a dummy variable. We have given it one from 2014 till 2020 and zero before 2014. E-Views 9.0 software was employed for the running of the data.

3.2. Unit Root Test: Augmented Dickey-Fuller test (ADF).

The Augmented Dickey-Fuller Test (ADF) is a unit root test for stationarity. The econometric methodology first evaluates the stationarity properties of each time series of considerations. The present study benefits from the Augmented Dickey-Fuller (ADF) unit root test to analyze the stationarity of the data series evaluation. It involves running a regression of the first difference of the series against the series lagged once, lagged difference terms, and optionally, a consistent and a time trend. That could be expressed in General ADF Model.. (Mishra, 2009).

Table 1: Results of the Augmented Dickey-Fuller (ADF) Unit Root Tests

Variables	ADF Test T-Statistics	Critical Value With constant			Level and first difference	Probability Value	Optimal Lag
		1%	5%	10%			
IN	-9.072053	-3.469691	2.878723	-2.576010	At level	0.0000	20
M1	-11.64157	-3.465585	2.876927	-2.575051	At First Diff.	0.0000	1
M2	-12.69961	-3.465585	2.876927	-2.575051	At First Diff.	0.0000	1
I	-6.694513	3.465780	2.877012	-2.575097	At First Diff.	0.0000	1
ER	-8.502963	-3.465585	2.876927	-2.575051	At First Diff.	0.0000	1
FC	-13.63818	-3.465585	2.876927	-2.575051	At First Diff.	0.0000	1

Source: Prepared by the researcher based on analyzing the study model using the E Views.V9

The unit root/stationary test above is showed in table 3.1. Before using the time series data for estimation, the unit root test was performed. The ADF test was used to determine whether or not the data for the indicated variables had a unit root problem. The results revealed that the inflation rate is stationary at the level. We take the following decision rule: if the absolute value of the ADF test is higher than the critical value either at 1%, 5%, or 10% level of significance, in contrast, all variables are non-stationary at the level, and we thus failed to reject the null hypothesis. However, when the first difference has been taken for other variables, then all series become are stationary when the results of the unit root test reveal that many of the ADF statistical values of the variables money supply (M1, M2), interest rate, exchange rate, and financial crisis are higher than the critical values at the first difference. Thus, we can refuse the null hypothesis after taking the first difference for the indicated variables.

3.3. Johansen Co-integration Test.

After the unit root test for the data, the series has been validated; the next step is to see whether the variables have a long-run equilibrium relationship. To avoid the risk of spurious regression, this requires a thorough cointegration evaluation. Since six stationary variables are cointegrated, cointegration analysis is needed.

Table 2: Johansen Cointegration Test for Long-run Relationship between variables

Hypothesized No. of CE(s)	Trace Statistics	0.05 Critical Value	Prob.**	Max-Eigen statistics	0.05 Critical Value	Prob.**
None *	230.8883	95.75366	0.0000	82.97219	40.07757	0.0000
At most 1 *	147.9161	69.81889	0.0000	56.09623	33.87687	0.0000
At most 2 *	91.81990	47.85613	0.0000	34.71801	27.58434	0.0051
At most 3*	57.10189	29.79707	0.0000	29.21996	21.13162	0.0029
At most 4*	27.88192	15.49471	0.0004	18.32827	14.26460	0.0108
At most 5*	9.553658	3.841466	0.0020	9.553658	3.841466	0.0020
	Trace test indicates 6 cointegration eqn(s) at the 0.05 level.					
	Max-eigenvalue Trace test indicate 6 cointegrating eqn(s) at the 0.05 level.					
	**MacKinnon-Haug-Michelis (1999) p-values					

Source: Prepared by the researcher based on analyzing the study model using the E Views.V9

The findings of the Johansen cointegration test in table 3.2 affirm the presence of a relationship between inflation and the included variables in Iraq. The above finding shows that the Trace test and the Maximum-Eigen test are both statistically significant. The result of Trace tests is higher than in critical value at (5%) significance level. Therefore, Maximum-Eigen tests are higher than in critical value at a 5% significance level. The result reveals that both the Trace test and Maximum-Eigen test are statistically significant to decline the null hypothesis at a 5% significance level. At the 5% level of importance, six cointegrating vectors were indicated. The probability value also verified that variables cointegrate at a 5% significant level, as shown by its probability value of less than 5%. The null hypothesis is rejected at a 5% significant level. It is cointegrating equations existed were accepted at a 5% significant level. And this result is also supported by the empirical outcomes of some previous studies such as Iya & Aminu (2014), Onodugo et al. (2018), and Priscilla (2016).

There is a long-term equilibrium connection between these variables IN, M1, M2, I, ER, and FC from 2004 to 2020.

3.4. Pairwise Granger Causality Tests

Causality can be defined as the connection between cause and effect. The concept "causality" refers to a cause-and-effect interaction between two sets of factors, such as Y and X. Recent improvements in the logic of causation have given upward thrust to a new method in which scientists study cause-effect relationships.

Table 3: Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Conclusion
M1 does not Granger Cause IN	2.78032	0.0971	Rejected in 10% significant level
IN does not Granger Cause M1	3.26197	0.0725	Rejected in 10% significant level
M2 does not Granger Cause IN	2.46276	0.1183	Fail to Reject
IN does not Granger Cause M2	6.39870	0.0123	Reject the null hypothesis
I does not Granger Cause IN	2.27386	0.1333	Fail to Reject
IN does not Granger Cause I	43.8725	4.E-10	Reject the null hypothesis
ER does not Granger Cause IN	27.8148	4.E-07	Reject the null hypothesis
IN does not Granger Cause ER	6.50608	0.0116	Reject the null hypothesis
FC does not Granger Cause IN	0.63058	0.4282	Fail to Reject
IN does not Granger Cause FC	0.65079	0.4209	Fail to Reject
M2 does not Granger Cause M1	0.08901	0.7658	Fail to Reject
M1 does not Granger Cause M2	0.92580	0.3372	Fail to Reject
I does not Granger Cause M1	0.00205	0.9639	Fail to Reject
M1 does not Granger Cause I	4.83312	0.0292	Reject the null hypothesis
ER does not Granger Cause M1	7.85881	0.0056	Reject the null hypothesis
M1 does not Granger Cause ER	1.38260	0.2412	Fail to Reject
FC does not Granger Cause M1	9.44321	0.0024	Reject the null hypothesis
M1 does not Granger Cause FC	5.83998	0.0166	Reject the null hypothesis

I does not Granger Cause M2	0.03486	0.8521	Fail to Reject
M2 does not Granger Cause I	4.55621	0.0341	Reject the null hypothesis
ER does not Granger Cause M2	9.23771	0.0027	Reject the null hypothesis
M2 does not Granger Cause ER	1.23970	0.2670	Fail to Reject
FC does not Granger Cause M2	9.23529	0.0027	Reject the null hypothesis
M2 does not Granger Cause FC	5.82404	0.0168	Reject the null hypothesis
ER does not Granger Cause I	24.6328	2.E-0.6	Reject the null hypothesis
I does not Granger Cause ER	11.7017	0.0008	Reject the null hypothesis
FC does not Granger Cause I	0.66413	0.4162	Fail to Reject
I does not Granger Cause FC	0.80708	0.3702	Fail to Reject
FC does not Granger Cause ER	0.47439	0.4918	Fail to Reject
ER does not Granger Cause FC	0.32968	0.5666	Fail to Reject

Source: Prepared by the researcher based on analyzing the study model using the E Views.V9

A limited number of causalities were detected in this model in table 3.3. The outcome of pairwise Granger causality indicated that the money supply (M1) and inflation had a two-way causality between them. Money supply (M1) does Granger cause inflation rate in 10% significant level. The two-direction causality between exchange rate and inflation shows that the exchange rate causes inflation in Iraq to be significantly lower than 5%. Consequently, unidirectional Granger causality amid inflation and money supply (M2), inflation Granger cause money supply (M2) and hence the null hypothesis is discarded and is significantly less than 5%. In contradiction, Money supply (M2) does no Granger causes inflation is not more than 10%. The null hypothesis is declined to reject. Similarity, Similarity, unidirectional Granger causality of inflation and interest rate, inflation Granger causes interest rate, and hence the null hypothesis is dismissed and is significantly less than 5%. In contradiction, interest rare does no Granger causes inflation is not more than 10%. The null hypothesis is failed to refuse. Nevertheless, the outcomes additionally exposed no causation between the financial crisis and inflation. And this result is also confirmed by the empirical results of some previous studies such as Iya & Aminu (2014) and Philip et al. (2014).

3.5. ARDL (Auto-Regressive Distributed Lag) Model

Econometric evaluation of long-run relations has been the subject of interest in many analytical and experimental research in economics. The ARDL model or bond test of checking cointegration technique is introduced by Pesaran & Shin (1999) and extended by Pesaran et al. (2001). The ARDL model is recognized as standard ordinary least squares regression with lags of independent and dependent variables as regressors, even though the ARDL model had been applied in econometrics for decades (Elnabawy & Abonazel, 2020). When opposed to other econometric models, the ARDL Bound testing approach has several benefits. First, it can be utilized to examine the correlation between variables, regardless if variables are purely I (0), purely I (1), or a mixed order of cointegration. This approach does not demand a pretest for unit roots. However, Pesaran & Shin (1997) have demonstrated that the ARDL method discriminates the variables independent and explanatory, and it is possible to estimate correlations considering all variables as endogenous.

The ARDL cointegration approach is used to determine the long-run relationship between series with separate integration orders. The presence of a long-run connection between the variables under investigation is examined in the first stage by computing the Bound F-statistic (bound test for cointegration) to determine a long-run correlation between the variables. The bound F-statistic is applied to each variable as an endogenous variable, while others are considered exogenous variables (Nkoro & Uko, 2016). ARDL Bound testing approach is utilized to examine cointegration, to analyze the long-run relationship and short-run dynamics among variables. ARDL Bound testing method has several benefits in comparison to other econometric models. It can be utilized to examine the relationship between variables even if the variables are purely I(0), purely I(1), or a mixed order of cointegration (Pesaran & shin (1997), and Hysaj 2019).

In a general form, the ARDL model can be defined as Following Pesaran et al. (2001), the error correction description of the ARDL model is as follows::

$$\Delta INt = \beta_0 + \beta_1 IN_{t-1} + \beta_2 MS1_{t-1} + \beta_3 MS2_{t-1} + \beta_4 I_{t-1} + \beta_5 ER_{t-1} + \beta_6 FC_{t-1} + \sum_{i=1}^{p} \alpha 1_i \Delta IN_{t-i} + \sum_{i=0}^{p} \alpha 2_i \Delta MS1_{t-i}] + \sum_{i=0}^{p} \alpha 3_i \Delta MS2_{t-i} + \sum_{i=0}^{p} \alpha 4_i I_{t-i} + \sum_{i=0}^{p} \alpha 5_i ER_{t-i} + \sum_{i=0}^{p} \alpha 6_i FC_{t-i} + \varepsilon_t$$

Where:

β0 = is a constant

IN = is the inflation rate

M1 = is the narrow money

M2 = is the broader money

I = is the interest rate

ER = is the exchange rate

FC = is the financial crisis

t = is the time (31/12/2004 – 31/7/2020)

p = optimum lag length

εt - is a random "disturbance" term

Table 4: Auto-Regressive Distributed Lag (ARDL) Model

	. Coefficient	Std. Error	t-statistic	Prob.
Constant	-42.40627	13.40478	-3.163519	0.0018
IN(-1)	0.663896	0.052626	12.61525	0.0000
M1	1.34E-06	8.00E-07	1.678724	0.0950
M1(-1)	-3.19E-06	1.16E-06	-2.749695	0.0066
M1(-2)	1.61E-06	8.27E-07	1.943326	0.0536
M2	-1.26E-06	7.66E-07	-1.642160	0.1024
M2(-1)	2.83E-06	1.08E-06	2.631607	0.0093
M2(-2)	-1.40E-06	7.93E-07	-1.770037	0.0785
I	1.893276	0.618887	3.059162	0.0026
I(-1)	0.007331	0.810425	0.009045	0.9928
I(-2)	-1.828684	0.632659	-2.890473	0.0043
ER	0.037784	0.009240	4.089062	0.0001
FC	-1.615897	1.934357	-0.835367	0.4047
R-squared	0.929998	Mean dependent var		9.065054
Adjust R-squared	0.925143	S.D. dependent var		17.01082
S.E. of regression	4.654171	Akaike info criterion		5.980734
F-statistic	191.5308	Durbin-Watson stat		2.143907
Prob.(F-statistic)	0.000000			

Source: Prepared by the researcher based on analyzing the study model using the E Views.V9

According to the ARDL Model in table 3.4, the money supply (M1) coefficient is 1.34, indicating that a 1% rise in the money supply will result in a 1.34% increase Iraq's inflation rate. The p-value of the money supply is 0.0950, and, significantly, it is consequently lower

than % 10. Hence, the coefficient of money supply (M1-1) is -3.19, which shows a 1% increase in money supply a year ago, drops inflation rate by -3.19 of Iraq, and a negative correlation. This outcome further reveals that the p-value of the money supply is 0.0066. It is significant and is consequently lower than 5%.

Moreover, the coefficient of money supply (M1-2) is 1.61, which means a 1% rise in money supply two years ago increases to 1.61 inflation and the positive relationship between them. This result further indicates that the p-value of money supply (M1-2) is 0.0536 and is significant that is consequently lower than 10%. In contrast, the coefficient of money supply (M2) is -1.26. The p-value of the money supply is 0.1024, which is not significant and is consequently higher than 5% which implies that independently as a variable, there is no correlation between the money supply and inflation within the stated period. Nevertheless, the coefficient of money supply (M2-1) is 2.83, which means that a 1% improvement in money supply one year ago would increase the inflation rate by 2.83%. The p-value of money supply (M2-1) 0.0093 is significant that is consequently lower than 5%. This outcome is supported by the empirical outcomes of some earlier studies, such as Priscilla (2016). Then, the coefficient of money supply (M2-2) is -1.40, which means that a 1% increase in money supply two years ago resulted in a -1.40 fall in the inflation rate, indicating a negative association between the two. The p-value of the money supply is 0.0785 significant, which is consequently lower than 10%. In other words, the coefficient of interest rate (I) is 1.89, which shows a 1% increase in an interest rate (I) would lead to an increase of 1.89 of inflation in Iraq and a positive relationship. Also, the p-value of the interest rate is 0.0026 significant that is consequently lower than % 5. Then, the coefficient of interest rate (I2-2) is -1.83, which shows that the increasing interest rate two years ago leads to a decrease inflation rate by -1.83, which signifies a negative relationship between them. The p-value of interest rate (I2-2) is 0.0043 and consequently lower than 5% similarities. The coefficient of the exchange rate is 0.038, which signify a 1% increase in an exchange rate create an increase of 0.038 of inflation of Iraq, and the positive relationship between them, the p-value of the exchange rate (i) 0.0001 is significant that is consequently lower than 5%. Finally, the financial crisis (FC) coefficient is -1.61, which means a 1% increase in the financial crisis (FC) would result from a decrease inflation rate by -1.61 and a negative correlation between them. The p-value of the financial crisis (FC) 0.4047 is not significant, consequently higher than 5%.

The R-squared of 0.929998, which signifies 93% of the total variation in the dependent variable, can be explained by the explanatory variables. Adjust R- Square to 0.925143 or 92.5% to account for the impact of independent variables (M1, M2, I, ER, and FC) and their contribution to defining and describing improvements in the inflation rate (IN) in Iraq from 2004 to 2020. In other words, this model can explain 92.5%, which is produced by the independent variables. Other parameters or variables not used in the model and the random variable (U) account for the remaining 7.5%. Therefore, the outcome of (S.E. of regression) is that the error percentage in the model analysis is 4.7. Nevertheless, the F-statistic has a value of 191.5308 with a probability value of (0.000000), which indicates that it is statistically significant at 5%, and the model is a good fit. In addition, the explanatory variables have a combined significant impact in assessing the change of Iraq's inflation rate (IN) over the interest period.

CONCLUSION

This paper strived to investigate the role of monetary policy in regulating Iraq's inflation rate. The monthly time series data have been used for the period 31/12/2004 – 31/7/2020. And data were obtained from the central bank of Iraq database. The current paper was selected to recognize and examine the current and potential effects of monetary policy on inflation in Iraq. However, the outcomes of former empirical studies present mixed findings of the influence of monetary policy to control the inflation rate in Iraq. Using econometric prediction techniques such as ARDL, this research aims to provide empirical evidence and provide a better explanation of the effect of monetary policy on decreasing inflation rates.

Before using the time series data for estimation, the unit root test was performed first. The ADF test was utilized to determine whether or not the data from the indicated variables

have a unit root problem or not. The outcomes reveal that the inflation rate is stationary at the level; nevertheless, all variables are non-stationary. Therefore, we failed to refute the null hypothesis. However, when the first difference for other variables is taken, all series become stationary. Consequently, we can reject the null hypothesis after taking the first difference for the identified variables at the 5% confidence level.

The outcome of the Johansen Cointegration test for a long-run relationship between variables explains that the connections between inflation rate and other variables (money supply (M1, M2), interest rate, exchange rate, and financial crisis) in the long-run, indicated (6) cointegrating vectors, and the null hypothesis is refuted at the 5% level of significance. Moreover, this result is also confirmed by the empirical outcomes of some earlier studies such as Iya & Aminu (2014), Onodugo et al. (2018), and Priscilla (2016).

The outcome of pairwise granger causality showed two-direction causality between money supply (M1) and inflation. Money supply (M1) does Granger cause the inflation rate in 10% significant level. Two-direction causality between exchange rate and inflation shows that the exchange rate does Granger cause; the inflation rate is significantly less than 5% in Iraq. Hence, unidirectional Granger causality between inflation and money supply (M2), inflation

Granger causes money supply (M2), and thus the null hypothesis is refuted, and it is significantly lower than 5%. In contrast, Money supply (M2) does no granger causes inflation is not significantly more than 10%. The null hypothesis is failed to refute. Similarly, unidirectional Granger causality between inflation and interest rate, inflation granger causes interest rate, and thus the null hypothesis is refuted, and it is significantly less than 5%. In contradiction, the interest rate does no granger causes inflation is not significantly more than 10%. The null hypothesis is failed to refute. Nevertheless, the outcomes also showed no causation between the financial crisis and inflation. And this result is also backed by the empirical outcomes of some former studies such as Iya & Aminu (2014) and Philip et al. (2014).

The result of the ARDL estimation shows that the money supply is significant and positively related to inflation in general. The relationship is that an increase in the money supply leads to high inflation in Iraq. This conclusion is also confirmed by the empirical outcomes of some former studies, such as Priscilla (2016). However, the exchange rate coefficient is 0.037, which indicates a positive correlation between the exchange rate and the inflation rate. And the p-value of the exchange rate is 0.0001, which is significant and is consequently lower than 5%. It implies that an increase in the exchange rate leads to high inflation in Iraq. After that, the coefficient of interest rate is -1.828684, which signifies a negative correlation between interest rate and inflation rate. And the p-value of the exchange rate is 0.0043, which is significant and is consequently lower than 5%. It implies that an increase in the interest rate leads to a decrease inflation rate in Iraq. Finally, the monetary policy rate has the role of a tool to control the inflation rate in Iraq during the period.

The study suggests that the central bank should implement adequate policies to manage the money supply and direct the state's attention to the reduce money supply to decrease inflation. The necessity of monetary policy tools is to manage the money supply, stabilize exchange rates primarily against the foreign currency in domestic and decreasing inflation rates, in line with the economic situation (recession, boom), decreasing the volume of cash traded by increasing interest rates on loans and deposits to decrease the inflation rate in Iraq. Hence. Monetary policy solely is inadequate for managing the inflation rate. It must consequently be completed by fiscal measures, non-monetary and non-fiscal measures. Fiscal and other measures are applied to control inflation. To control inflation, there needs to be control of the money supply by way of reducing government expenditure. Government should also stimulate the productive capability of the economy, particularly the agricultural sector, since by increasing the aggregate production of food products, prices would fall, consequently, reduce the rate of inflation.

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