REPUBLIC OF TURKEY
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DEPARTMENT OF ECONOMICS

THE ROLE OF MONETARY POLICY IN CONTROLLING THE RATE OF INFLATION IN IRAQ (2004 - 2020)

Edrıs Ahmed SALIH

MASTER'S THESIS

Thesis Advisor: Prof. Dr. Ali KABASAKAL

AUGUST - 2021

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"The examination was held online on 24/08/2021 and approved unanimously By the following committee members."

JURY MEMBER	CONVICTIONS
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Edrıs Ahmed SALIH

02/08/2021

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Edris Ahmed SALIH

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ABBREVIATIONS

ADF **:** Augmented Dickey-Fuller

ARCH **:** Autoregressive Conditional Heteroskedasticity

ARDL **:** Auto-regressive Distributed Lag

CBI **:** Central Bank of Iraq

CPI **:** Consumer Price Index

EX **:** Exchange Rate

FC **:** Financial Crisis

I **:** Interest Rate

IN **:** Inflation Rate

M1 **:** (Money Supply) Narrow Money

M2 **:** (Money Supply) Board Money

PPI **:** Producer Price Index

VIF **:** Multicollinearity/ Variance Inflation Factors

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ABSTRACT

Title of Thesis: The Role of Monetary Policy in Controlling the Rate of Inflation in Iraq (2004 - 2020)

Author of Thesis: Edris Ahmed SALIH

Supervisor: Prof. Dr. Ali KABASAKAL

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This dissertation demonstrated the part of monetary policy in regulating the inflation rate in Iraq. To attain this purpose, a modeling technique of the Autoregressive Distributed Lagged (ARDL) approach has been used, and Monthly information has been collected for the period (31/12/2004 to 31/7/2020). Hence, the outcome of the unit root test for stationary implies that the inflation rate is stable at the level, and other variables are stable at the initial alteration. However, the Johansen Co-integration Test result reveals the relationships between the inflation rate and all changes for the far future. Moreover, the Granger causality outcome shows two-direction causality among narrow money supply and exchange rate granger causes inflation rate. Unidirectional granger connection between inflation rate granger causes board money supply as well as the interest rate. Finally, the outcome of the (ARDL) model reveals that the money supply, as well as exchange rate, is significant and favorably linked to inflation. The conclusion is that a rise in the money supply and exchange rate causes Iraq to experience severe inflation. The interest rate has an essential and contradictory association with the interest rate as well as the inflation rate in Iraq. It specifies that a rise in the interest rate causes a reduced inflation rate in Iraq.

Keywords: Money Supply (M1, M2), Interest Rate, Exchange Rate, Financial Crisis

ÖZET

Başlık: Irak'ta Enflasyon Oranının Kontrol Edilmesinde Para Politikasının Rolü (2004 - 2020)

Yazar: Edris Ahmed SALIH

Danışman: Prof. Dr. Ali KABASAKAL

Kabul Tarihi: 24/08/2021 **Sayfa Sayısı:** vi (ön kısım) + 40 (tez) + 12 (ek)

Bu tez, para politikasının Irak'taki enflasyon oranını düzenlemedeki rolünü göstermiştir. Bu amaca ulaşmak için Otoregresif Dağıtılmış Gecikmeli (ARDL) yaklaşımının bir modelleme tekniği kullanılmış ve (31/12/2004 - 31/7/2020) dönemi için Aylık bilgiler toplanmıştır. Bu nedenle, durağanlık için birim kök testinin sonucu, enflasyon oranının düzeyde sabit olduğunu ve diğer değişkenlerin ilk değişiklikte sabit olduğunu gösterir. Ancak Johansen Eşbütünleşme Testi sonucu, uzak gelecek için enflasyon oranı ile tüm değişimler arasındaki ilişkileri ortaya koymaktadır. Ayrıca, Granger nedensellik sonucu, dar para arzı ve döviz kuru grangerinin enflasyon oranına neden olması arasında iki yönlü nedensellik olduğunu göstermektedir. Enflasyon oranı artırıcı arasındaki tek yönlü granger bağlantısı, faiz oranı kadar yönetim kurulu para arzına da neden olmaktadır. Son olarak, (ARDL) modelinin sonucu, para arzının yanı sıra döviz kurunun da önemli olduğunu ve enflasyonla olumlu bir şekilde bağlantılı olduğunu ortaya koymaktadır. Sonuç, para arzı ve döviz kurundaki artışın Irak'ın şiddetli enflasyon yaşamasına neden olduğudur. Faiz oranı, Irak'ta faiz oranı ve enflasyon oranı ile önemli ve çelişkili bir ilişkiye sahiptir. Faiz oranındaki bir artışın Irak'ta enflasyon oranının düşmesine neden olduğunu belirtir.

Anahtar Kelimeler: Para Arzı (M1. M2), FaizOranı, Döviz Kuru, Finansal Kriz.

INTRODUCTION

Inflation is expounded like a constant upsurge in the total price of an economy over time. 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, government income, etc. (Bashir et al., 2011). Otherwise, price management is one of the most significant aspects of economic planning and is typically administered by Iraq's Central Bank (CBI). Furthermore, the consumer price index (CPI) like a calculation of inflation, is primarily measured through the money supply, interest rate, exchange rate, and other factors (random parameters such as the financial crisis) that impact the rate of inflation.

A vital goal of the Central Bank of Iraq is for attaining price stationery in general. As explained in Article (3) of Law No. (56), the Central Bank implemented a stability policy. The dinar's exchange rate is a fundamental mechanism for achieving market stability in Iraq through a sale window of foreign currency, and this is the factor that allows the central bank to keep official reserves covering or equal to (100%) of the value of dinars that he issues and pours out of his treasury to keep prices stable (CBI)[1]. Many economists have described inflation in different aspects, and all of them share the same idea. Economists concede that inflation is growing for a total value over the period (Mankiw, 2010). As a result, one of the most despised economic expressions is inflation, which central bank officials strive to reduce continuously. It is described as a sustained rise in the overall cost amount of the decided products and facility as time passed (Altaee& Al-Jafari, 2019**).** However, the value at which the total price for products and facilities in an economy through time may be defined or described as inflation. Because of its effects on economic sectors, inflation has typically remained an issue in every country. That may be attributed to the fact that the price of money decreases with the increase of the general price level. 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 exceeding supply, an increase in manufacturing costs, and some economic structural

[1] https://cbi.iq/static/uploads/up/file-158245052997641.pdf

issues in calculating inflation; two crucial indexes were used. They are Producer Price Index (PPI) plus Consumer Price Index (CPI). The CPI calculates the shift in a consumer's buying power, while the PPI calculates the change in the buying capacity of the products' producers (Fabian & Charles, 2014).

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 a negative inflation rate of -16.1 percent in 1996, down from 448.5 percent, which was reported in 1994 (Altaee & Al-Jafari,2019). And the other hand, modern number economists of the neo-classical school of thought regard inflation as solely an economic phenomenon that appears to arise primarily due to faster expansion in the amount of money rather than production. Furthermore, he asserted unequivocally that inflation could be controlled if the money stock growth rate was kept continuous concerning the pace of output growth. Despite Friedman's presentation on the constant k principle being contentious, the cash stock/output relation appears to be an effective method of viewing efforts to control an increase in inflation in the economy (Okotori, 2019).

The monetary procedure is through which a nation's financial authority manages the money supply, often by setting interest rates to assist economic development and stability. Its immediate goal is to generally involve reasonably steady costs and a reduced joblessness rate in practice; all kinds of monetary policy confirm modifying the quantity of foundation money in the system. This process of shifting the cash flow of the main currency via the accessible selling and buys of (government-issued) debit and credit tools is called open market operations (Ahiabor, 2013). In other words, the amount of money refers to the amount of money obtainable in a given economy. The

money supply in a commodity money system is the sum of the commodity. The government dominates the money supply in a fiat money system, which is the case in most countries today. Legal limitations allow the administration a monopoly over money printing. The quantity of currency, like the amount of taxes and the amount of administration purchases, is a policy instrument of the government. Monetary legislation refers to the government's influence over the money supply (Mankiw, 2010).

The oil industry has always controlled the Iraqi economy. This one generates over 90% of the government's revenue and 80% of its foreign currency exchange profits (World Bank, 2018 Cited in (Altaee, 2019). Therefore, However, Iraq has experienced a range of political, social, and economical instabilities for the previous few years that resulted in a series of economic conflicts Starting with the eight-year war with Iran from 1980 to 1988, instability and devastation of the oil sector, to the loss of oil reserves amassed at the same time in the year. Then it was accompanied by the incursion of Kuwait in 1990 and the severe international sanctions that followed as a result of that invasion, which lasted for years. These practices resulted in a massive build-up of global debt, undermining the economy of a once-prosperous world. Regardless of past turbulences and events, strengthening security and prosperity increased internal and external investments.

Meanwhile, the Iraqi authority could protect inflation under management after attaining its best great of 76.55% in August 2006 to a bit of registration of -6.37% in October 2009 (Trading Economics, 2018). Overall, numerous indexes like the consumer price index (CPI), extensive price index (WPI), and gross domestic products GDP deflator are used to calculate inflation. The CPI, on the other hand, is widely regarded as the most appropriate index for determining the cost of living **(**Altaee, 2019).

The Iraqi economy grew significantly in the 1970s, but it dropped sharply during the first Gulf War in the 1980s. In 1990, the Iraqi incursion of Kuwait (Second Gulf War) provoked army intervention and financial punishments toward Iraq, which were backed up by global powers. Furthermore, in 2003, U.S. troops and allies invaded Iraq (third Gulf war). The Iraqi economy's infrastructure was altered as a result of these incidents. Inflation was a significant factor in these cases. However, it did not have any powerful connection to the war; inflation was connected to macroeconomic factors. This report

examines the link between inflation (as defined by the CPI), domestic growth product (GDP), narrow money (M1), interest rate (IR), and workforce (WF) within the Iraqi economy from 1990 to 2009. The reasons for inflation in Iraq from 1980 to 1992 and its connection to the political system. According to Sanford, many Iraqis attempted to change their liquid wealth into property investment, and gold purchases have been made while supplies lasted and then bartered for other products. Capital flight is another result of inflation; money left the country to prevent more decline of value. This condition and waning interest in the Iraqi currency depressed the economy even further, triggering a new round of inflation and its consequences. In Iraq, Inflation has emerged as one of the most challenging sectors of financial control (Hasoon, 2015).

The Trend of Inflation Rate in Iraq: The consumer price index (CPI) measures yearly proportion difference in the price to the typical user of attaining an amount of products plus facilities that can get set alternatively updated at specific periods, including annually[2].

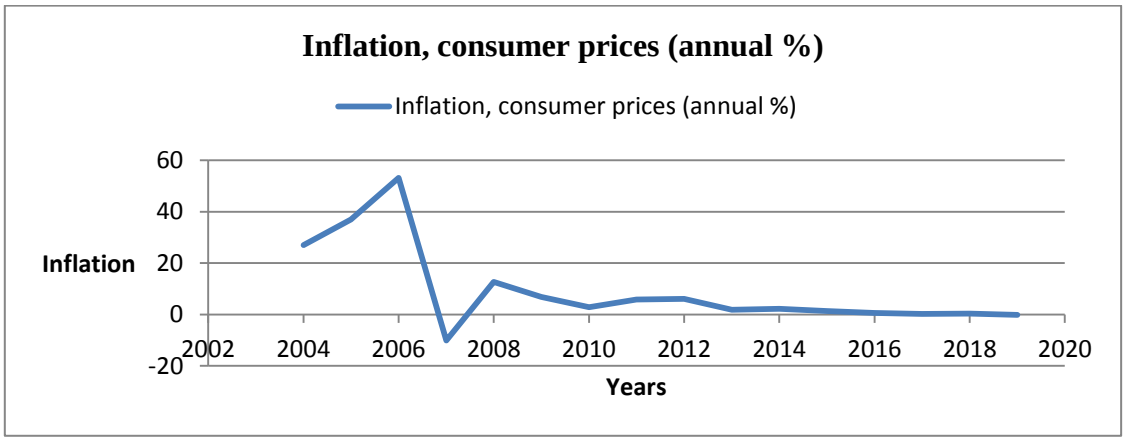

Figure 1: The trend of inflation rate in Iraq for the period (2004-2019).

Even Iraq has faced a sharp fluctuation of inflation rate during (2004-2008), as it was depicted in figure (1) the highest inflation rate (53.23 %) was experienced in (2006). then this ratio significantly decreased, and the smallest percentage of the inflation rate is was recorded in (2007) which was (-10.07%). Still, the proportion of inflation gradually decreased till it reached less than zero in (2019)..

[2]- https://data.worldbank.org. International Monetary Fund, International Financial Statistics and data files.

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 either positively or negatively impact the overall economic progress (Chaudhry et al., 2015).

Monetary theory can help you figure out how to create the best monetary strategy. It can be either expansionary or contractionary, with an expansionary strategy growing the total quantity of currency faster than the average. In contrast, a contractionary strategy slows or reduces the money supply. An expansionary approach was employed to alleviate unemployment during a crisis by decreasing interest costs to lure businesses into expanding. The contractionary policy aims to reduce asset prices while slowing inflation and avoiding the resulting distortions. The instruments of monetary policy used by the Central Bank are dictated by the economy, especially the financial sector.

Expansionary Monetary policy

When the Central Bank uses its instruments to help the economy, expansionary monetary strategy. That demands reducing the prime rate to raise the supply of money. This may cause mortgage prices to fall, customers to loan, and companies to expand, resulting in the employment of additional people who will spend even more (Amadeo, 2012). In addition, expansionary monetary policy (also known as monetary policy relaxation) is an effort to use monetary policy to raise or reduce aggregate need, production, and employment. This usually results in a decrease in the central bank's formal policy interest level. It could also suggest a loosening of credit regulations in some areas. A decline in the exchange rate (depreciation) is also a sign of an expansionary monetary policy.

Contractionary Monetary Policy

Contractionary monetary policy is a kind 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

aids in the implementation of contractionary monetary policy. It is a reduction in the quantity of money in the circulatory system, accompanied by a rise in bill rates with the stated objective of putting the brakes on excessive business development and addressing inflation. Previously, a monetary strategy was achieved by decreasing the amount of paper currency in circulation. In contemporary economies, monetary policy regulates the money generation process carried out by fractional-reserve banks (Ahiabor, 2013).

According to Mankiw (2010), the Federal Reserve explicitly regulates the money supply. The Fed regulates the money supply circuitously via shifting the monetary base or reserve–deposit ratio. To do this, the Fed employs three monetary policy tools: open-market operations, reserve requirements, and the discount rate.

Open-Market Operations

are the buying plus selling of government bonds through using the Fed. While the Fed purchases bonds from the general community, the dollars used to pay for the bonds upsurge the monetary base plus the money supply. While the Fed offers connections to the general public, the dollar gained decreases the monetary base and declines the money supply. The Fed's most prevalent strategic instrument is open-market activities. The Fed conducts accessible activities in the New York bond markets nearly every day.

Reserve Requirements

Reserve requirements are Fed rules which require banks to maintain a minimal reserve–deposit proportion. A rise in reserve necessities boosts the reserve–deposit proportion, lowering the currency multiplier and the money supply. Modifications in spare necessities are the lowest often applied of the Fed's three policy instruments.

The Discount Rate

Is the value rate that the Federal Reserve charges banks while it lends them money. When banks don't have enough funds to satisfy reserve requirements, they loan from the Fed. The lesser the reduction price, the more inexpensive loaned reserves become, also the further banks take through the Fed's discount window. As a result, lowering the reduction price broadens the monetary base also increases the money supply.

Although these three tools open market processes, reserve necessities, and the discount rate provide the Fed significant control to affect the money supply, the Fed cannot do so effectively. According to the Federal Reserve, bank discretion in doing business may make the money supply shift in unexpected means. Banks, for example, may opt to keep surplus reserves or reserves in excess of the reserve requirement. The reserve–deposit ratio rises when the quantity of surplus reserves rises, implying a decline in the money supply. The Fed, for example, has no definite power over the amount of money banks loan from the discount window. The monetary base gets smaller as fewer banks borrow, and the money supply reduces. Consequently, the money supply often shifts in ways that the Fed does not plan (Mankiw, 2010).

The importance of the study

Monetary policy is a crucial 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 to control the money supply and financing for stabilizing the flow cash and then use it in a proper manner consistent with the state of the economy and its position.

The most important applied and previous theoretical studies on monetary policy and inflation have been presented and attempted to construct a standard model that influences how monetary policy affects 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 decide the inflation degree and the most prominent effect of the exchange rate on inflation in Iraq detected

The purpose of the study

This topic has been selected to show the part of the monetary policy plus its influences over the decrease of the inflation rates in Iraq. It could be obtained by examining the role of the money supply in controlling inflation rates. In addition, the most prominent impacts of the exchange degree and interest price on inflation will be tested.

.

The problem Statement

Inflation in Iraq has become one of the most serious problems since 1980. It can be said that many factors cause Iraq's inflation throughout the past few years. One of those reasons is wars, including the Iraq-Iran war between 1980 and 1988, then the Kuwait war in 1991. After that, imposed economic sanctions from 1991 to 2006 by the United States caused inflation in Iraq. Therefore, the US-Allied war and the invasion of Iraq in 2003, and then the ISIS war in 2013. War has often been the cause of inflation and has impacted inflation, as production factors stop, which surplus the demand to supply or increase production costs, all of which cause inflation. So I chose this topic. Consequently, this dissertation will try to model the most important determinants of the inflation rate in Iraq using a set of monthly data from 2004 to 2020.

The method of the study

This research will upload to the literature by exploring the key determinants of inflation in Iraq for a longer period compared with the current literature. In addition, it employs a complete explanatory variable set such as money supply (M1, M2), interest rate, and exchange rate. Furthermore, I used narrow many (M1) and board money (M2) in this study. Narrow money (M1) consists of currency with the public, demand deposits with all banks, and other deposits with the central bank. Then, board money (M2) consists of narrow money and saving deposits, each of which has a different impact on the inflation rate positively or negatively in Iraq. And this outcome is also confirmed by the empirical outcomes of some previous studies, such as Priscilla (2016). It should be mensioned that the Logarithmic form of data has been used because it is closer to reality and the data was stationary. Finally, it uses O ARDL method to investigate the relationship between inflation and the above variables.

The main findings of the Study

One of the study's key findings is a significant and constructive link among the money supply and Iraq's inflation rate. This outcome is in line with the finding of Priscilla (2016), Fabian & Charles (2014), and Hossain (2013), are those that discovered that the money supply has a favorable influence on Iraq's inflation rate. The second main outcome shows that the interest rate in Iraq harms inflation. The third main finding is

that the exchange degree has a beneficial impact 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 amidst the money supply (M1), as well as the exchange rate granger induces inflation rate. Unidirectional granger causality among inflation, money supply (M2), and the interest level in Iraq. Thus, this outcome is in line with the results 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 displays a major and beneficial effect on Iraq's inflation rate. These outcomes are similar to Fabian & Charles's (2014) findings, possibly, because they utilized Autoregressive Distributed Lagged (ARDL) models in the study. Third, interest rates show a major and detrimental influence on Iraq's inflation rate. Fourth, the financial disaster has had a huge also damaging impact 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 organization of the study

The below are the four chapters that form this dissertation. The first chapter contains the study's introduction, which includes theoretical monetary policy plus inflation, monetary instruments, The Three Instruments of Monetary Policy, Monetary Policy Tools, and the Study's Organization. The second chapter is the lecture review and contains a revision of the conceptual and evidential literature on the connection amidst inflation and monetary policy. Model definition, data summary, unit root checks, cointegration test, connection test, Granger causality, Ordinary Least Square (OLS) and Auto-regressive distributed lags (ARDL) techniques, and the study's checking problem are all discussed in the third chapter. Finally, the fourth chapter includes a conclusion as well as suggestions.

CHAPTER 1: LITERATURE REVIEW

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

Priscilla (2016) used the Autoregressive Distributed Lagged model (ARDL) modeling technique to analyze the influence of monetary policy on inflation in Ghana from 1980 to 2014. The investigation examined patterns in inflation and monetary measures. It also looked at the near and far future impacts of monetary factors on inflation; the projected models' short- plus long results indicated that money supply (M1, M2, and M+) is highly related to inflation. The link is that in Ghana, an upsurge in the quantity of money causes excessive inflation. The results also revealed a statistically important adverse correlation between monetary policy and inflation, validating the traditional banking policy of raising the monetary policy rate, a contractionary monetary policy, to lower inflation. Even though the Bank of Ghana has embraced a contractionary monetary policy, elevated inflation continues to exist. This is because non-monetary variables such as increased government spending and electricity costs have made the monetary policy level ineffective, resulting in excessive inflation. However, our analysis found a favorable short-term association between the monetary policy rate plus inflation. Furthermore, in Ghana, there was a long-run favorable connection seen amidst the exchange rate and inflation. As a result, the short-run effects revealed a favorable and unfavorable connection between the exchange rate and inflation. In addition, the results revealed a reasonably substantial favorable connection between inflation plus interest rates in Ghana, both in the near and far future. Economic development was reported to damage inflation in the near and far future. A strong relation among government expenditure and inflation in together the near and far future gets recognized. In together the near and far future, trade openness contains a detrimental influence on inflation. Further research is conducted by Al-Jafari & Altaee (2019). From 1995 to 2015, they discovered the drivers of money supply, exchange rate, and importation on inflation in Iraq. We conducted ADF plus PP unit root exams to investigate the stationary of the factors. To examine the long and short-run relationships amid the influences, the ARDL bounds examining method was applied to co-

integration. The findings show that high inflation is primarily caused by a rise in the money supply in the long run. Moreover, the findings show that increased import openness leads to a rise in the total phase of costs in Iraq throughout the study passé. The results demonstrate that the domestic currency's deflation is essential for curbing inflation in Iraq concerning the exchange degree. In furthermore, we aspire to draw interest in the effect of the shift in worldwide value levels on the occurrence of inflation in Iraq. It is researched that the supply of money, exchange rate, and importation alter inflation to 0.59, -0.85, plus 0.11 proportion points in both via implementing a one percent growth in the longer term. The Error Correction technique with an unfavorable sign remained important in terms of statistics by nearly 34% pace of adaptation to repair the steadiness in the longer term, that become convergent speedy. Another study is performed by Chaudhry et al. (2015). In Pakistan, the influence of expanding the money supply on the inflation rate was evaluated. The annual series of information for 1973-2013 was utilized in the report's framework, integrated using the ARDL technique. Diagnosing and steadiness checks guarantee that models are safe as well as reliable from an econometric standpoint. The outcome demonstrates that the interest rate and money supply are major policy changes for regulating inflation in the far future. In contrast, the national production rate brings inflationary weight to the inflation rate in the near future. Another study performed by Gbadebo& Mohammed (2015) applied a co-integration plus mistake modification techniques approach to study the efficacy of monetary policy as an anti-inflationary factor in Nigeria on quarterly period information gathering facts for the time frame (1980Q1 to 2012Q4). The unit-roots test shows that all the factors were differenced steady. The co-integration test indicates that inflation and the vector of repressors used have a long-term connection. The approximate result indicates that for the period included, interest rate, exchange rate, money supply, plus oil cost are the main reasons for an inflation in Nigeria. It was likewise noted that, while a rise in income in the brief period encourages inflation, better use of the growth will minimize inflation. The Money supply factor demonstrates a significant and optimistic influence on inflation in the near and far future. This suggests that monetary impulses are behind Nigeria's inflationary situation.As a result, anti-inflationary monetary policy measures must be accompanied by some required fiscal policies to achieve structural and economic stability. Keywords: Monetary policy, Inflation, and Co-integration.

Ahiabor (2013) conducts another study analyzing monetary policy's influence on inflation in Ghana between 1985 to 2009. The reliant variable is inflation, whereas the self-governing variables are money supply, interest degree, plus exchange degree. The results confirmed a positive continuous operation connection amidst the supply of money and inflation, an unfavorable relationship amidst the level of interest and inflation, but a favorable connection between exchange level and inflation. Further research is conducted by Iya &Aminu (2014), who found the factors of inflation in Nigeria from 1980 to 2012.

Augmented Dickey-Fuller Method in analyzing the component root test assets of the sequence and Granger connection test of causal relationships amid inflation plus money supply government spendings. Exchange rate, interest rate, cointegration, and vector mistake modification methods were also implemented. The outcomes of component root recommended that each of the variables in the framework is steady. Inflation is constant at a point when money supply. Government spending, interest rate, plus exchange rate at first difference are constant. The outcomes of Connection proposed causation among inflation also several of the provided variables. The Johansen co-integration findings show that inflation and the included variables have a long-term connection. The VEC error correction findings also indicated the attendance of a far-future link seen amid the model's variables, with solely the money supply plus exchange rate affecting interest rates. The OLS findings exposed that money supply plus interest rates had a beneficial influence on inflation, whereas government spending and the currency rate had a detrimental effect.

Consequently, powerful economic productivity in terms of cost security can be achieved by plummeting the money supply plus interest rate, growing government spending, and the country's exchange rate. A key policy inference of this investigation is that concentrated attempt might get caused through policymakers to stable costs (inflation) through decreasing the money supply plus interest rate alongside rising administration spending and exchange rate; most crucially elevating the Exchange rate and lowering interest rate Another research, Loveth et al. (2018), looked at the effectiveness of monetary policy and inflation control in Nigeria. To test the consequence of money supply, interest rate, and currency rate on Nigeria's inflation rate, the research used Augmented Dickey-Fuller (ADF), Johansen Co-integration, and Error Correction Model

(ECM). The unit root test revealed that the Inflation Rate, Money Supply, Exchange Rate, and Interest were all stable at first variance. At the same time, the Johansen Co-integration Exam exposed that several of the variables had a far future equilibrium connection. The Error Correction model findings revealed that the Money Supply plus Interest Rate are statistically important in characterizing variance in the Inflation Rate, whereas the Exchange Rate is negligible. However, monetary policy was shown to have had a major influence in lowering Nigeria's inflation rate.

Further research is performed by Okotori (2019). The characteristics of the monetary policy plus inflation in Nigeria were examined in this research. The model that was developed was evaluated using monthly data between 2009 to 2017.

The result exposed a noteworthy association amid the inflation rate and Nigeria's inflation rate factors, including the broad money supply, exchange rate, monetary policy rate, Treasury bill rates, reserve necessity, and liquidity proportion. Aside from being necessary, the link influenced the inflation rate during the research period. The CBN must conduct regular investigations to assess the shifting dynamics of the mounted link to have a lot of extra forceful policy intervention, which will have suction at the economic system when the inflation range of 6-9 percent is reached. The Augmented Dickey-Fuller (ADF) component root exam, the Johansen Cointegration test, plus the Error Correction Model (ECM) were used. The ADF study results revealed that the supply of money and the exchange rate are linked at order two. Additional variables are stable at demand one. The Johansen Cointegration exam indicates a far future connection amid inflation plus all of the variables used. For the first and second fashions, the ECM outcome for the two calculated copies indicates a self-governing mechanism of 5.2 percent plus 9.4 percent, correspondingly. The results led us to deduce that the money supply, exchange rate, monetary policy rate, treasury bills rate, reserve necessity, and liquidity proportional contain an important influence on the inflation level.

Further research is carried by Islam et al.(2017). Inflation has always been one of the most severe concerns. It can be seen that numerous variables have been connected to Malaysia's inflation in the last certain periods. The purpose of this investigation is to recognize the variables that impact inflation in Malaysia. The quantitative technique is

used in this work, and the econometric model is used to determine the connection among the reliant and uncontrolled variables. In this work, it is divided into two categories: mathematical models and econometric models. Autocorrelation, multicollinearity, and heteroscedasticity are all covered in this work; high inflation may damage a particular country.

Moreover, Philip et al. (2014) emphasize the attempt of monetary policy in reducing inflation in Nigeria from (1970 – 2012), utilizing the co-integration and error correction method of econometric evaluation. The unit root plus co-integration exams revealed a long-term link among the variables, but the Granger Causality test revealed a unidirectional connection amid Monetary Policy plus inflation. However, the VECM exam exposed that inflation, GDP, and exchange rate are adversely plus favorably connected to the broad money supply (M2) plus domestic credit. One more investigation is conducted by Onodugoet al. (2018). This look at determined to study 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 factors. The ordinary least squares (OLS) multiple deterioration approach was used to examine the information. The results of our analyses verified that the monetary policy instruments would have had more influence on inflation if inflation were not structural. Hossain and Islam (2013) conducted another study on the causes of inflation in Bangladesh from 1990 to 2010.

The ordinary least square procedure was implemented to illustrate connections. The experimental data indicate that the money supply and the a-year delay in the interest rate contain an important influence on inflation. The findings also revealed that the one-year delay in the price of money supply and a year delay in the worth of the economic shortfall had a crucial and unfavorable impact on the inflation level. No connection existed between interest rates, budget deficits, and nominal exchange rates. During that time, the descriptive factors explained 87 percent of the variation in inflation. According to this research, the money supply should be controlled to minimize inflation. In addition, the interest rate cut from last year will lower inflation. Fabian and Charles (2014) performed another research that looked at the drivers of inflation in Nigeria, employing monthly information between January 2007 to August 2014. The technique of ordinary least squares (OLS) was used. According to their outcomes, planned

inflation, money supply, and the exchange rate all impacted inflation. Despite being correctly signed, however, the bill rate and the monetary policy rate had no impact on inflation in Nigeria throughout the study time.

According to the calculated model, each of the descriptive variables included in the study explained 90% of the variation in defining the course of inflation in terms of rise or reduction. The cointegration test confirmed that most variables had a continuous operation relationship and were stable at order one. Moreover, Rise (2014) identified the major factors of Influence of Monetary Policy on Inflation Control in Nigeria; this research gives attention to the usage of monetary policy to inspect inflation in Nigeria. It is based on time series analysis spanning the years 1970 to 2010. Employing the technique of Ordinary Least Square (OLS) for evaluating the method outcomes, the research demonstrates that bank rate, deposited with the central bank, liquidity ratio, plus board money supplies are statically important in describing changes in inflation. Though, the exchange rate did not justify an important alter in inflation in Nigeria. Ratnasiri (2009) conducted another study that looked at the key determinants of inflation in Sri Lanka from 1980 to 2005.

The vector autoregressive evaluation method was employed. According to the findings, money supply increases and rice cost rises are the primary long-run drivers of inflation in Sri Lanka. Although, it is clear that the exchange rate decline. Also, the production gap contains no substantial impact on inflation in the near term. As a result, rice cost was the most significant factor since it was completely endogenous. Money supply increase and the exchange rate, on the other hand, were not important factors since they were weakly exogenous in the adjusting phase. In both the far and near future, the output difference had no statistically significant effect on inflation.

Further research was performed by Hassan et al. (2016), who investigates the effect of the monetary policy on inflation, exchange rate, and economic growth. Main and secondary data were employed in the analysis. According to the research, several Central Bank of Nigeria (CBN) policies have been criticized since not every monetary policy instrument benefits every economic agent. The monetary policy includes a trade-off due to its influence over the entire economy. Each economic agent will respond to monetary policy differently about whether it adversely or favorably affects its firm and

activities. Because of the positive effects of development on the economy, policymakers may also opt to improve the economy throughout hyperinflation in the short and medium-term before resorting to inflation. Before deciding whether or not to devalue the currency in the foreign exchange market, monetary officials must consider the basics of exporting and importing and the country's ability to sell abroad. Other obstacles, like the huge difference amid the official market (N197.00k) plus the underground market (N322.00k) that demonstrated no support deflation in the near and between term, will need a coordinated attempt. Odusanya and Atanda (2010) performed further research that evaluated the dynamic and simultaneous inter-connection amid inflation and its causes in Nigeria from 1970 to 2007. For stationery, the period variable and Augment Dickey-Fuller (ADF) unit root test were used.

The outcomes reveal the inflation proportion, the growth proportion of genuine output (GDP), and money supply, plus the actual share of economic shortage is substantial and stable at levels. In contrast, the further variables were used in the empirical analysis—real share of import, exchange rate, and interest rate—are substantial and stable at first variation. The far-future and near-future interaction mechanisms of inflation and its drivers were studied. Accordingly, the Augmented Engle-Granger (AEG) co-integration test and the Error Correction Mechanism (ECM) method were employed. Hussain and Hussain (2020) researched to empirically analyze the influence of different macroeconomic variables on inflation in Pakistan employing the ordinary least square technique and the Granger non-causality test in a time frame from 1973-Q3 to 2017-Q2.

The empirical findings confirm that real GDP, money supply, imports, government spending, and delayed inflation had a favorable and substantial impact on inflation while interest rates were damaged. Furthermore, the data show bidirectional causation amidst money supply and inflation and a unidirectional causal correlation amidst government spending and imports to inflation. These findings indicate that inflation in Pakistan is not entirely determined by currency expansion; imports and fiscal policy are also important contributors to inflation. The analysis finds that key authorities would not attain price stability by monetary policy changes except until the government resolves the budget imbalance. Al-Mukit (2018) performed a further study that looked at the causes of inflation from the viewpoint of an Asian developing country, Bangladesh, over the course between (1977 to 2014). In the study, both demand-side

and supply-side characteristics influencing inflation in Bangladesh were identified. Econometric approaches were utilized to approximate the long and short connection amidst variables employing the Co-integration and Error Correction Model. Utilizing the Granger causality test to examine causative links, the findings demonstrate the presence of a stable long-run critical connection of inflation with real GDP, money supply, imports, interest rate, remittances, and exchange rate. The results indicate that the reasons of inflation in Bangladesh are multifaceted and variable and that the government should employ appropriate methods to reduce inflation in the nation.

Uddin & Chowdhury In an economy like Bangladesh, the rise and fall of the inflation rate (General Price Level) are the same as a two-edged sharpened razor. Both are detrimental to the economy. But, there have been efforts here to comprehend some observed inflationary factors. In addition, a well-known econometric technique of the autoregressive distributed lagged (ARDL) model was used in this regard using information collected from 1972 to 2012. It was demonstrated that the present year's gross domestic product (GDPt), money supply (M2t), and interest rate (IRt), and also the previous year's real exchange rate (RERt-1) and interest rate (IRt-1), have connected with Bangladesh's rising inflation. It has additionally been observed that the present year's real exchange rate (RERt) in the Dollar and the prior year's money supply (M2t) have both caused lower inflation. We highlighted the significance of factors and information accessibility in our analysis, which resulted in several major factors such as unemployment rate (Ut), remittance (REMt), and oil price (PPt) being neglected in the primary model.

CHAPTER 2: DATA AND METHODOLOGY

This part describes methods adopted to undertake the study. The part contains model description, data explanation, data sources, unit root tests, cointegration test, correlation test, Granger causality, Ordinary Least Square (OLS) and Auto-regressive distributed lag (ARDL) method and checking problem (Auto / serial correlation LM Test, Multicollinearity/ variance inflation factor, Heteroscedastic /Heteroskedastic, Identification problem/ Ramsey Reset Test, Histogram and Normality, Stability) of this study.

2.1. Data Source

The information for the empirical examination in this study is derived from the Central Bank of Iraq (1/12/2020). The data used in this research are time sequence information that ranges from the year (31/12/ 2004) through the year (1/7/ 2020). Since data were not accessible, the option of the timeframe was inevitable. Information was obtained from the Central Bank database reported by the Central Bank of Iraq, Statistical Reports, Central Bank of Iraq, between (2004 to 2020), and Ministry of Finance, Accounting Department. This research utilized the Monthly statistics for customer price index as a level of inflation, the supply of money (M1, M2), parallel exchange rate or the market price of the national money against the US money, interest rate or policy rate is the expense of loans 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 (dummy variable). We have given it the number (1) from 2014 till 2020 and (zero) numbers before 2014.

E-Views 9.0 software was used for the evaluation of the data.

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

The Augmented Dickey-Fuller Test (ADF) is a stable unit root test. The econometric technique initially evaluates the stationarity features of every time sequence of evaluation. The Augmented Dickey-Fuller (ADF) unit root test is employed in this

research for assessing the stability of the data sequence evaluation. This entails performing an analysis of the series' initial variance versus the sequence delayed once and the delayed variance period and, freely, the consistency and a temporal tendency. The General ADF Model may be stated as follows: The data was processed using E-Views 9.0 software.

$$\Delta IN_t = \alpha_0 + \alpha_1 t + \alpha_2 IN_{t-1} + \sum_{j-1}^{p} \alpha j \Delta IN_{t-j} + \varepsilon t \quad (1)$$

The added delayed variables are added in this ADF technique to ensure that the mistakes are unrelated; the evaluation for a unit root is performed on the coefficient of (t-1) in the reversion. If the coefficient deviates considerably from zero, the assumption that (INt) has a unit root is refuted. Stationarity is implied by rejecting the null hypothesis. To be more specific, the null hypothesis is that the factor (INt) is a non-stable sequence (H0: 2 = 0) and is refuted if (2) is considerably negative (H: 2 0). If the computed ADF statistic value is greater than McKinnon's crucial principles, the null hypothesis (H0) is not refuted.

Moreover, if the sequence is neither stable nor unified to arrange zero, I (0). Rejecting the null hypothesis, on the other hand, entails stationarity. Failure to decline the null hypothesis results in an analysis on the variance of the sequence; thus, differencing is also performed till stability is attained and the null hypothesis is refuted. When the time sequence (Variables)' initial changes are stable, they may be combined using I(1) (Mishra, 2009).

Table 1: Augmented Dickey-Fuller (ADF) Statistics

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	-2.57601	At level	0.0000	20
M1	-11.64157	-3.465585	-2.876927	-2.575051	At First Difference	0.0000	1
M2	-12.69961	-3.465585	-2.876927	-2.575051	At First Difference	0.0000	1
I	-6.694513	-3.46578	-2.877012	-2.575097	At First Difference	0.0000	1
ER	-8.502963	-3.465585	-2.876927	-2.575051	At First Difference	0.0000	1
FC	-13.63818	-3.465585	-2.876927	-2.575051	At First Difference	0.0000	1

Source: Created by the researcher.

Table 1 above depicts the unit root/stationary analysis. Before using the time series information 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 stable at the stage. We follow the very next policy: if the exact amount of the Augment Dickey-Fuller (ADF) test is higher than the significant rate at (1%), (5%), or (10%) level of significance, in contrast, all variables are non-stable at the level, plus we, therefore, failed to refuse the null hypothesis. However, when the first difference has been taken for other variables, then all sequences become stable when The outcome of the unit root test reveals that many of the variables ADF statistical (money supply (M1, M2), interest rate, exchange rate, and financial crisis are higher than the critical values at the initial difference. Thus, we can refuse the null hypothesis after taking the first difference for the indicated variables.

2.3. Correlations

The link (or correlation) connecting the two variables is symbolized by the letter r and measured with a value ranging from (1) to +1). (0) indicates no connection, while (1) implies the perfect or greatest connection. The letter r indicates the path of the connection. A negative r indicates that the variables are negatively linked. The connection value rises from (0) to (+1) and from (0) to (1). We frequently use perfect, powerful, good (moderate), or poor terms to describe the quality of the connection among variables while writing a paper.

Table 2: Correlations Between Variables

	IN	M1	M2	I	ER	FC
IN	1.000000					
M1	-0.701493	1.000000				
M2	-0.699832	0.998067	1.000000			
I	0.421724	-0.683887	-0.689744	1.000000		
ER	0.824507	-0.543954	-0.538027	0.085603	1.000000	
FC	-0.429917	0.757023	0.784419	-0.521796	-0.224458	1.000000

Source: Created by the researcher.

The test of correlation has been done to show the relationship between these variables. Table 2 shows that inflation (IN) has a strong and negative correlation with money supply (M1, M2). Therefore, the inflation rate and exchange rate strongly correlated with each other but with a positive sign. Moreover, a positive and very weak

relationship can be seen between inflation rate and interest rate. In contrast, the correlation between inflation rate and financial crisis is weak with the negative sign**.**

2.4. Johansen Co-integration Test

The sequence has been verified using the unit root test for the data; the following stage decides whether the variables have a far future equilibrium connection. To avoid the risk of spurious regression, this requires a thorough cointegration evaluation. Since six stationary variables are cointegrated, cointegration analysis is needed.

For cointegration, we used Johannes' test. His test determines if three or more time series are cointegrated and analyzes the stability of the cointegrating connection utilizing the maximum likelihood estimates (MLE) technique. It is as well utilized to compute the amount of connections and as a tool to assess those links.

Any improvement upon the Engle-Granger test is referred to as Johansen's test. It eliminates the difficulty of selecting a reliant variable and also the issues that arise whenever failures are carried over from one phase to another. As a result, the test is able to describe several cointegrating vector kinds of Johansen's tests. Here are two versions of Johannes' analysis: one which uses a trace (from linear algebra) and the other that uses the highest eigenvalue technique (an eigenvalue is a unique scalar; when multiplying a matrix with the aid of a vector and get the same vector as an answer, along with anew scalar the scalar is called as an eigenvalue). Both types of the test will determine the cointegration test.

Table 3: 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 cointegrationeqn(s) at the 0.05 level.					
	Max-eigenvalue Trace test indicate 6 cointegratingeqn(s) at the 0.05 level.					
	**MacKinnon-Haug-Michelis (1999) p-values					

Source: Created by the researcher.

The results of the Johansen cointegration test Table 3 show that the trace and maximum eigenvalue indicate at most six co-integrating equations at the (0.05) significance levels, which denotes a rejection of the null hypothesis co-integration amongst the series at the (0.05). And this outcome is also confirmed by the empirical outcomes of some previous studies such as Iya & Aminu (2014), Onodugo et al. (2018), and Priscilla (2016). In other words, there is a long-run co-integration amongst the IN, M1, M2, I, ER, and FC. Hence, this denotes a rejection of the null hypothesis at the (0.05) level. Thereafter, to investigate the impact of the independent variables on the dependent variable and the model estimation, this study uses the ARDL regressions.

2.5. Pairwise Granger Causality Tests

Causality is described as the link between action and reaction. The term "causality" describes the reason, and consequence relationship among two parts of variables, such as Y plus X. Recent advancements in the logic of causality have resulted in a new technique by which researchers examine cause-and-effect interactions.

Considering two-time sequence variables Xt and Yt, Xt is mentioned to Granger cause Yt if Yt can be stronger anticipated the utilization of the past of Xt as well as Yt than it can by utilizing the past of Yt on its own, we design decided economic identifiers utilizing Pairwise Granger causality assessment as suggested by Granger (1969).

We investigate the lack of Granger Causality by evaluating the following Model:

$$\boldsymbol{y_t = a_0 + a_1 y_{t-1} + \cdots + a_p y_{t-p} + b_1 x_{t-1} + b_p x_{p-1} + u_t} \quad (2)$$

$$\boldsymbol{x_t = c_0 + c_1 x_{t-1} + \cdots + c_p x_{t-p} + d_1 y_{t-1} + d_p y_{p-1} + v_t} \quad (3)$$

Testing

$$\boldsymbol{H_0 = b_1 = b_2 \ldots . = b_p = 0} \quad (4)$$

Against

$$\boldsymbol{H_1 : NOT\ H_0} \quad (5)$$

Is a test that Xt does not Granger-cause Yt.

Similarly, testing

$$\boldsymbol{H_0 = d_1 = d_2 \ldots . = d_p = 0} \quad (6)$$

Against

$$\boldsymbol{H_1 : NOT\ H_0} \quad (7)$$

This is an assessment that Yt does not Granger cause Xt.

In each time, a refute of the null hypothesis shows Granger causality among the variables.

Two variables are normally evaluated together when testing for their relationship while testing for Granger causality.

All the possible outcomes of the analyses are three:

- Rejected in 10% significant level from variable Yt toward Variable Xt.
- Reject the null hypothesis less than 5% significant from variable Yt toward variable Xt.
- Fail to Reject

Hence, we show the main conclusions achieved through the Pairwise Granger-causality assessment conducted in the research. Fifteen pairs of variables (Monetary and prices identifier) were designed as shown in Table 4.

The six price indicators considered are represented as follows:

- Inflation Rate (IN)
- Narrow Money (M1)
- Bored Money (M2)
- Interest Rate (I)
- Exchange Rate (ER)
- Financial Crisis (FC)

Table 4: Pairwise Granger Causality Tests Results

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: Created by the researcher.

According to pairwise Granger causality results in Table 4, a causal relationship runs among these variables. So, there is a bidirectional relationship running from (Narrow money to the inflation rate, Exchange Rate to the inflation rate, Financial crisis to board money, and Exchange rate to interest rate). Hence, a unidirectional relationship is observed between (Inflation rate to board money, Inflation rate to interest rate, Narrow money to interest rate, Exchange rate to narrow money, Board money to interest rate, and Exchange rate to board money). Nevertheless, the outcomes also showed no causation between (Financial crisis to inflation rate, Board money to narrow money, Financial crisis to interest rate, and Financial crisis to exchange rate). And this result is

also confirmed by the empirical results of some previous studies such as Iya & Aminu (2014) and Philip et al. (2014).

2.6. ARDL (Auto-Regressive Distributed Lag) Model

Econometric evaluation of long-run relations has been the subject of interest of lots of analytical and experimental research in economics. The autoregressive distributed lag (ARDL) approach or bond examination of checking cointegration method is introduced by Pesaranas well as Shin (1999) and expanded by Pesaran et al. (2001). The ARDL model is recognized as ordinary least squares regression with lags of independent and reliant factors as regressors, even though the ARDL approach had been applied in econometrics for years. See (Elnabawy, and Abonazel, 2020). When opposed to other econometric models, the ARDL Bound testing approach has several benefits. First, it can be utilized to examine the connection among variables, irrespective of if variables are entirely I (0), purely I (1), or a blended order of cointegration. This approach does not demand a pretest for unit roots. However, Pesaran and 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 indicate the far future correlation among series with separate integration orders. The presence of a far-future correlation amid the variables under research is examined in the first stage by calculating the Bound F-statistic (bound test for cointegration) for determining a far future correlation amid the variables. The bound F-statistic is applied to every variable as they are considered endogenous variables, whereas others are measured as exogenous variables (Nkoro & Uko, 2016). ARDL Bound testing strategy is utilized to evaluate cointegration, examine the far future connection and near-future dynamics among variables. ARDL Bound testing method has several benefits in comparison to other econometric models. It can be utilized to evaluate the connection among variables even if the variables are entirely (0), purely I(1), or a blended order of cointegration (Pesaran and Shin,1997 and Hysaj, 2019).

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

$$\Delta \mathbf{INt} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1 IN_{t-1}} + \boldsymbol{\beta_2 MS1_{t-1}} + \boldsymbol{\beta_3 MS2_{t-1}} + \boldsymbol{\beta_4 I_{t-1}} + \boldsymbol{\beta_5 ER_{t-1}} + \boldsymbol{\beta_6 FC_{t-1}} + \sum_{i=1}^{p} \alpha 1_i \, \Delta \boldsymbol{IN_{t-i}} + \sum_{i=0}^{p} \alpha 2_i \, \Delta \mathbf{MS1_{t-i}}] + \sum_{i=0}^{p} \alpha 3_i \, \Delta \boldsymbol{MS2_{t-i}} + \sum_{i=0}^{p} \alpha 4_i \, I_{t-i} + \sum_{i=0}^{p} \alpha 5_i \, ER_{t-i} + \sum_{i=0}^{p} \alpha 6_i \, FC_{t-i} + \varepsilon_t \quad (8)$$

Where:

β0=is a constant

IN= means the inflation rate

M1 = refers to the narrow money

M2 = refers to the broader money

I= refers to the interest rate

ER= means the exchange rate

FC= means the financial crisis

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

p= optimum lag length

εt- is a random "disturbance" term

Table 5: Auto-Regressive Distributed Lag (ARDL) Model

Independent Variables	**Dependent variable**			
	. 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: Created by the researcher.

Table 5 illustrates that the coefficient of M1 is (1.34), which indicates (1%) increase in M1 would increase (1.34) of inflation in Iraq; this result further shows that the p-value of M1 is significant that is consequently lower than (10%). Hence, The negative result between M1(-1) and inflation, which is not approximately fit with economic theory, (1%) increase in M1(-1) would lead to a decrease (3.19) of inflation; this result shows that P-value of M1(-1) is significant that is consequently lower than (5%). Moreover, The coefficient of M1(-2) is (1.61), which show that a 1% increase in M1 (-2) would increase (1.61) of inflation; this result further shows that the p-value of M1(-2) is significant that is consequently lower than (5%). In contrast, the M2 result also would be line with the economic theory, which indicates that there is a negative relationship between M2 and Inflation, (1%) increase in M2 would result in decrease inflation by (1.26), this result further shows that the p-value of M2 is insignificant that is consequently higher than (5%). Nevertheless, The positive result between M2(-1) and inflation, which is approximately fit with economic theory, (1%) increase in M2(-1) would lead to an increase (2.83) of inflation; this result shows that P-value of M2(-1) 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 M2(-2) is (1.40), which show that (1%) increase in M1 (-2) would result in a decrease (1.40) of inflation; this result further shows that the p-value of M1(-2) is significant that is consequently lower than (10%). In other words, the coefficient of interest rate (I) is (1.89), which indicates (1%) increase in I would increase (1.89) of inflation in Iraq; this result further shows that the p-value of (I) is significant that is consequently lower than (5%). Similarly, The coefficient of I(-1) is (0.007), which indicates (1%) increase in interest rate would increase (0.007) of inflation in Iraq; this result further shows that the p-value of interest rate is not significant that is consequently more than (10%). After that, the coefficient of I (-2) is (1.82), which show that (1%) increase in I (-2) would result in a decrease (1.82) of inflation; this result further shows that the p-value of I(-2) is significant that is consequently lower than (5%). Furthermore, the coefficient of the exchange rate is (0.03), which indicates (1%) increase in the exchange rate of the Iraqi dinar against the dollar (EX) would increase (0.03) of inflation in Iraq; perhaps this is due to the economic openness in Iraq and the high proportion of goods and services imported. Finally, the coefficient of the financial

crisis (FC) is (1.61), which indicates (1%) increase in (FC) would result in a decrease (1.61) of inflation in Iraq; this result further shows that the p-value of the financial crisis (FC) is insignificant that is consequently higher than (5%).

Furthermore, table (6) also illustrates the value of S.E regression, given its minimal value, is small. The R^2 indicates that the model is well fitted. Nevertheless, the F-statistic value is (191.5308), and the probability value is (0.000000) significant that is consequently lower than (5%), and that the model is well fitted.

2.7. Auto / Serial Correlation LM Test

This test is a substitute to the Q-statistics to investigate the sequential connection. In contrast to the Durbin Watson test (AR 1), the LM test may be employed for assessing better-order ARMA mistakes.

The LM test's null hypothesis is that no sequential connection exists to the selected lag order. Eviews publishes two analysis data. The F-statistics are an underutilized variable investigation for determining the combined relevance of all delayed residuals. Excluded variables are not sovereign variables of residuals. The R2 statistic represents the Breusch-Godfrey LM test data.

The Breusch-Godfrey LM-test

Breusch (1978) and Godfrey (1978) formed this autoconnection test. The Breusch-Godfrey test comes from these principles:

Assume the following linear model is computed using OLS.

$$\boldsymbol{Y_t = \beta_1 + \beta_2 x_2 + \beta_3 z_t + u_t} \quad (9)$$

Following residuals are calculated, and the next calculation is calculated using OLS.

$$\cup_t = \boldsymbol{\varphi_1} \cup_{t-1} + \ldots\ldots + \boldsymbol{\varphi_p} \cup_{t-p} + \boldsymbol{\beta_1^*} + \boldsymbol{\beta_2^* x_t} + \boldsymbol{\beta_3^* z_t} + \boldsymbol{\varepsilon_t} \quad (10)$$

The null hypothesis of no autocorrelation is tested.

$$\mathbf{H0:}\ \boldsymbol{\varphi_1 + \varphi_2 + \ldots\ldots + \varphi_2 = 0} \quad (11)$$

In Eviews, the BG test is known as the sequential connection LM test. Eviews calculates as well as F-statistics to ensure that all are zero.

Table 6: Auto / Serial Correlation LM Test

Test statistic	Through	Result	P- value
Auto / serial correlation LM Test	F- statistics	2.259809	0.1075
	Obs*R-squared Chi- square	4.789487	0.0912

Source: Created by the researcher.

The auto/serial correlation LM result indicated that the test does not refute the null hypothesis. Because the P-value of Serial Correlation LM test (F-static) is (0.1075) and (Obs*R-squared Chi-square) is (0.0912) stronger than (F-statistic), which is more than the 5% rate of significance, then we can approve the approach and ensure that the approach has no serial correlation, this shows that the model is statistically suited to be estimated in Table 6.

2.8. Multicollinearity/ Variance Inflation Factors

Multicollinearity/ Variance Inflation Factors (VIFs): This is an approach of examining the degree of collinearity among the regressors in a model. VIFs demonstrate the degree of the variability of a regressor's coefficient computation has been boosted by collinearity with further regressors. All of them could be predicted by separating the variance of a coefficient evaluated via the coefficient's variability where no further regression exists in the model.

The Variance Inflation Factor is classified into two kinds:

1- Uncentered: The uncentered VIF is the proportion of the first equation's coefficient evaluation difference separated by the variance from a coefficient estimation from a solitary-regressor equation (plus no constant).

2- Centered: The centered VIF is the proportion of the difference of the coefficient estimation from the first calculation separated via the variance from a coefficient evaluate and a calculation plus solitary the regressor plus a stable.

Only the centered VIF will be shown in Table 7.

Table 7: Multicollinearity/Variance Inflation Factors

Multicollinearity/ Variance Inflation Factors			
Independent Variables	Dependent variable		
	. Coefficient Variance	Uncentered VIF	Centered VIF
M1	2.80E-15	33.51160	6.465217
M2	2.46E-15	41.40496	7.750348
I	0.034684	8.951313	2.487495
ER	7.76E-05	406.0207	2.128895
FC	3.412693	4.730989	2.742967
C	189.1585	624.0385	NA

Source: Created by the researcher.

Through the results of Table 7, it is obvious that no Multicollinearity obstacle exists between the variables in the recommended approach, the independent influence of monetary policy on inflation rates in Iraq. Because of the value of the centered VIF between the independent variables in the model from (1 - 10) is approved, which indicates that the model is fit to be estimated.

2.9. Identification problem/Ramsey RESET Test

Identification problem / Ramsey RESET test (Ramsey, 1969) can be formed via applying the power of suitable values to the regression method. It is an analysis of linear requirements in opposition to a nonlinear requirement. It investigates the theory asserting that the value of the additional variables is zero, such as:

$$\hat{y}_i = \hat{\boldsymbol{\beta}}_0 + \hat{\boldsymbol{\beta}}_1 \boldsymbol{x_{i1}} + \cdots \hat{\boldsymbol{\beta}}_k \boldsymbol{x_{ik}} + \boldsymbol{y_2} (\hat{\boldsymbol{y}}_i)^3 + \boldsymbol{y_3} (\hat{\boldsymbol{y}}_i)^4 + \boldsymbol{u_i} \quad (12)$$

This contains suitable square values. The null hypothesis of linearity is

$$\boldsymbol{H_0 = y_1 = y_2 = y_2 = 0} \; . \quad (13)$$

F-statistics examine this. If F-statistics is higher compared to its critical value, the conclusion is that sufficient proof for refuting the null hypothesis of linearity exists.

$\boldsymbol{H_0}$**:**The specification of linear

$\boldsymbol{H_1}$**:**The specification of non-linear

F-statistics is created as follows;

$$\boldsymbol{F_{(M,N-K-1)}} = \frac{(\boldsymbol{SSR_{\hat{Y}} - SSR_{\hat{Y}^2}})/\boldsymbol{M}}{\boldsymbol{SSR_{\hat{Y}^2}/(N-K)}} + \frac{(\boldsymbol{SSR_R - SSR_{UR}})/\boldsymbol{M}}{\boldsymbol{SSR_{UR}/(N-K)}} \quad (14)$$

SSR: sum of squared residuals

M: the number of restrictions

N: the number of observations

K: the number of explanatory variables

Table 8: Identification Problem/Ramsey RESET Test

Identification Problem/Ramsey RESET Test			
Test statistic	Value	Df	P- Value
F- statistics	0.515665	172	0.6068
T- statistics	0.26591	(1,172)	0.6068

Source: Created by the researcher.

The reset (F statistic) method is equivalent to (0.515665), and the equivalent p-value is (0.6068.) is significant. Since the p-value is higher than 5% Or The reset (T- statistic) test has a value of (0.295910) as well as a p-value of (0.6068), both of which are significant because the p-value is more than (5%). At the 5% significance level, no proof exists to contradict the null hypothesis of linearity, indicating that the model is statistically suitable for estimation in Table 8.

2.10. Normality (Histogram and Normality Test)

The exam gives a histogram as well as graphic data of the residuals, comprising Jarque-Bera statistics (JB, 1981) concerning examining ordinariness. In case the residuals are typically dispersed, the histogram ought to be bell-formed, and Jarque-Bera test statistics do not have to be significant.

The normalcy test was developed by Fisher (1948). However, the Jarque-Bera (JB, 1980) test is now broadly employed. It is shown as follows in relation of the third and fourth time of the disturbances:

The residuals are usually distributed, and the null hypothesis is H0.

$$\boldsymbol{JB = (n-k)\left\{\frac{s^2}{6} + \frac{(K-3)^2}{24}\right\}} \quad (15)$$

S: measure of skewness

$$\boldsymbol{S = \frac{\mu_3}{\sigma^3} = \frac{\mu_3}{(\mu_2)^{3/2}}} \quad (16)$$

K: measure of Kurtosis

$$\boldsymbol{K = \frac{\mu_4}{\sigma^4} = \frac{\mu_4}{(\mu_2)^2}} \quad (17)$$

Whenever the variable is normally dispersed, the values of K and S are as follows:

K=3 and S=0

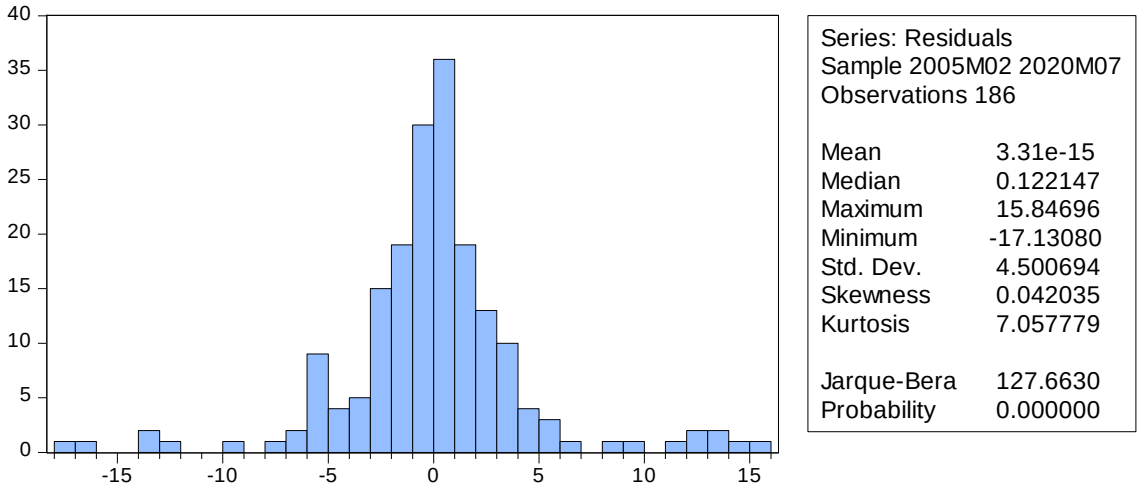

Figure 2: Normality (Histogram and normality Test)

Table 9: Normality (Histogram and Normality Test)

Histogram Normality Test	
Jarque-BeraValue	Jarque-BeraProbability
167.6630	0.000000

Source: Created by the researcher.

Table 9 examines the error normality that is not performed graphically (the distribution histogram) and applies the Jarque-Bera test. It caused that the Jarque-Bera Value is (167.6630) and Jarque-Bera probability is (0.000000) and is lower than (5%). Due to that, this result is not accepted (the series is not normally distributed).

2.11. Stability (Recursive Estimates "OLS only")

2.11.1. Cusum Of Squares Test

The stationary of the far and near future coefficient CUSUM of squares data is a unified total amount of squared residuals. Beneath the null hypothesis of steady coefficients and variance, the CUSUM of squares statistics has standards that vary from zero at the first

analysis to one at the end of the study time. Brown, Durbin, and Evans (1975) developed the CUSUM test data as follows:

$$S_t = \sum_r^t k+1, w_r^2 / \sum_r^t = k+1\, w_r^2 \quad (18)$$

Under the null hypothesis of variable steady or stability, the anticipated value of S is,

$$E[s_t] = (t-k)/(T-k) \quad (19)$$

If t=k, then it goes zero

If t=T, then it goes to unity

Under the null hypothesis of stable variables, the CUSUM statistics have zero predictions.

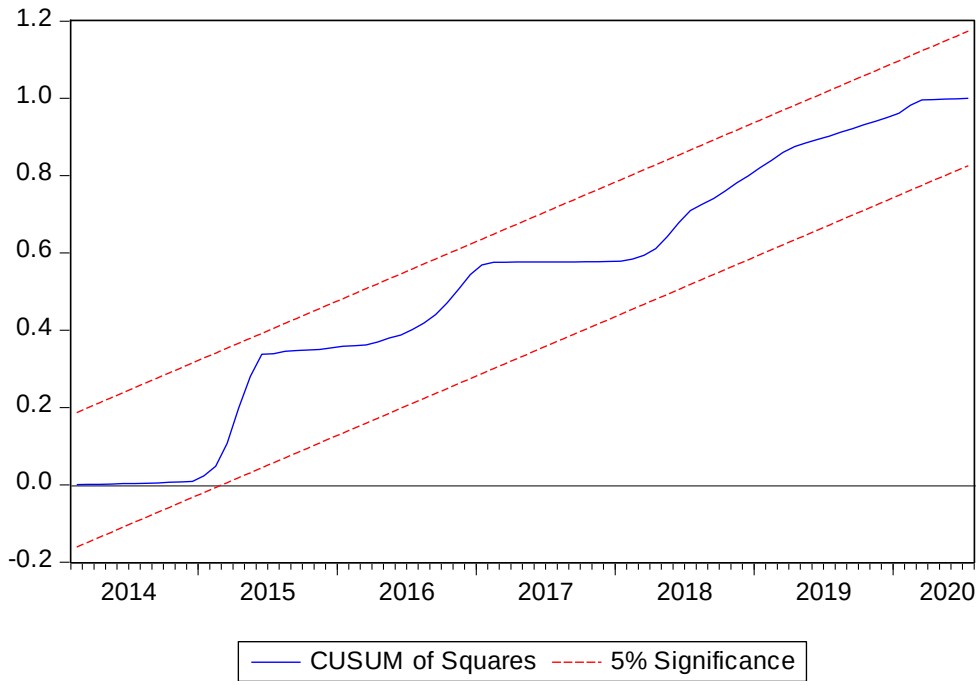

Figure 3: Stability (CUSUM of Squares) test.

2.11.2. Stability (CUSUM) test

The consistency of the long and the short-term coefficient CUSUM test data (Brown, Durbin, and Evans, 1975) relies on continuous totals of scaled recursive residuals. The overall sum is shown against time and the percent crucial lines. The experiment indicates variable unsteadiness if the increasing total exceeds the percent crucial lines. The CUSUM exam comes from the next recursive residual statistical experiment:

$$\boldsymbol{w_r} = \sum_{r}^{t} \boldsymbol{k+1}, \frac{\boldsymbol{w_r}}{\boldsymbol{s_t}} \boldsymbol{t} = \boldsymbol{k+1}, \ldots, \boldsymbol{T} \quad (20)$$

w: recursive residual

s: the typical mistake of the reversion is applied to entirely T observations.

Wr: is displayed against time in conjunction with the 5 percent crucial lines. The shifting of the critical lines demonstrates variable instability.

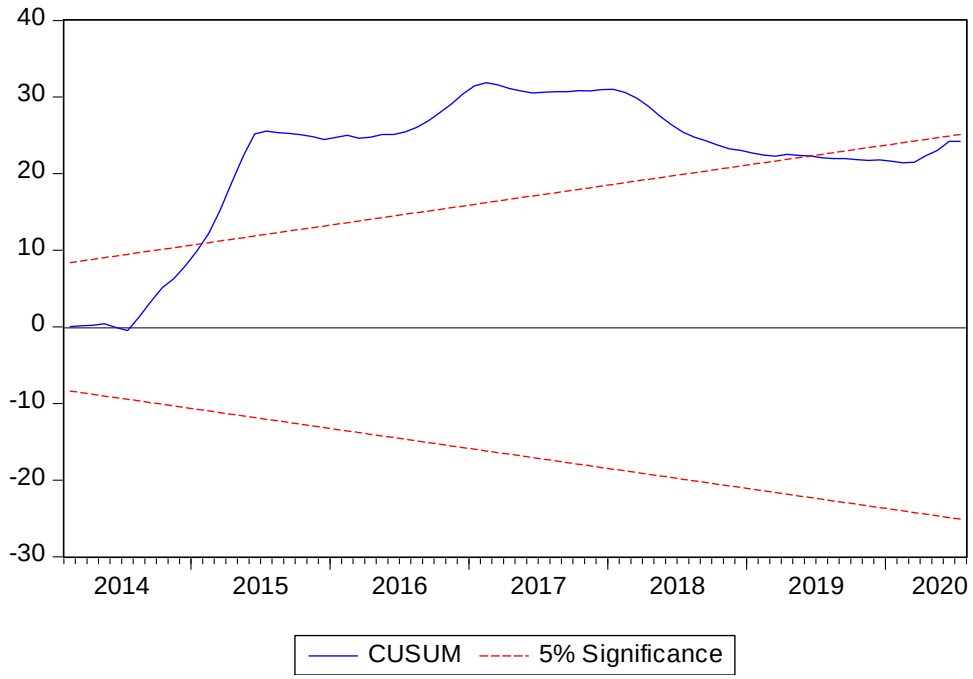

Figure 4: Stability (CUSUM) test

The stationary of the model and the coefficients are examined via the (CUSUM and CUSUM of Squares) Tests. Via the following two figures above, we indicate that the (CUSUM of Square) test fell within the confidence interval (blue line) all through the study period. Since the (CUSUM of Squares) test (blue line) is placed between two red lines, we can see that the (CUSUM) test deviated for a brief period and was outside of the confidence range. Then it returned to the (CUSUM of Squares) test because we can rely on this model and assume its stability in the far future, and the model is statistically applied to be estimated.

CONCLUSION

This dissertation strived to investigate the role of monetary policy in regulating Iraq's inflation rate. The once-a-month period sequence data have been applied for the time (31/12/2004 – 31/7/2020). And the information was achieved 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. Though, 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 Auto-Regressive Distributed Lag (ARDL), this research aims to provide empirical evidence and better explain the influence of monetary policy on decreasing inflation rates.

Before using the timeline information 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 compromise a component root issue. The outcomes reveal that the inflation rate is stationary at the level; nevertheless, all variables are not stable. Therefore, we failed to refute the null hypothesis. However, when the first difference for other variables is taken, all series become stationary. Consequently, at the 5% stage of confidence, we can refute the null hypothesis after obtaining the initial variance for the indicated variables.

The correlation result reveals that the inflation rate has a strong and negative relationship with the money supply (M1, M2). Therefore, the inflation rate and exchange rate strongly correlated with each other but with a positive sign. Moreover, a positive and very weak relationship can be seen between inflation rate and interest rate. In contrast, the correlation between inflation rate and financial crisis is weak with the negative sign**.**

The outcome of the Johansen cointegration test shows that the trace and maximum eigenvalue are statistics indicate (6) co-integrating equations at the (0.05) significance level for Iraq. the null hypothesis of co-integration equations among the variables is rejected in the long term. And this outcome is also confirmed by the empirical outcomes of some previous studies such as Iya & Aminu (2014), Onodugo et al. (2018), and Priscilla (2016).

The outcome of pairwise granger causality showed a bidirectional relationship running from (Narrow money to the inflation rate, Exchange Rate to the inflation rate, financial crisis to board money, and Exchange rate to interest rate). Hence, a unidirectional relationship is observed between (Inflation rate to board money, Inflation rate to interest rate, narrow money to interest rate, Exchange rate to narrow money, Board money to interest rate, and Exchange rate to board money). Nevertheless, the outcomes also showed no causation between (Financial crisis to inflation rate, Board money to narrow money, financial crisis to interest rate, and financial crisis to exchange rate).

The result of the Ordinary Least Square (OLS) estimation reveals that the money supply is insignificant, and the empirical results also approve this result of some earlier studies such as Iya & Aminu, 2014; and Onyeiwu, 2012. Accordingly, the bill rate and exchange rate have a positive statistically significant impact on the inflation rate. Finally, the financial crisis has a negative and significant effect on the inflation rate in Iraq.

The result of the Auto- Regressive Distributed Lag (ARDL) estimation is that the money supply for Iraq has a positive and statically significant impact on the inflation rate in general. However, interest rate (I, I (-1)) has a statically significant and positive influence on the inflation rate. In contrast, Interest rate (I (-2) signifies a negative relationship between interest rate and inflation rate. Therefore, the exchange rate indicates a significant and positive relationship between the exchange rate and inflation. Finally, the financial crisis has a negative and statically insignificant inflation rate.

The research suggests the central bank ought to perform adequate policies for managing the money supply and direct the state's attention to the reduced money supply leading to reduced inflation. The necessity of monetary policy methods is for managing the money supply, reduce exchange rates primarily against the foreign currency in domestic and decreasing inflation rates, decreasing the capacity of cash dealt by increasing interest rates on lends and payments 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 procedures are applied to control inflation. To control inflation, there needs to be control of the money supply by 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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APPENDICES

Appendix 1: Data

Date	(IN) (Inflation Rate)	(M1) (Narrow money)	(M2) (Broad Money)	(I) (Interest Rate) (policy Rate)	(ER) (Exchange Rate) (Market price)	(FC) Financial crisis (Dummy variable)
12/31/2004	31.7	10148626	12254000	6	1462	0
1/31/2005	40.9	10135177	12474000	6	1457	0
2/28/2005	55.1	10463093	12899000	6	1461	0
3/31/2005	33.6	11085035	13650000	6	1469	0
4/30/2005	38.1	10810402	13732000	6	1474	0
5/31/2005	33.9	11131783	13888000	6	1473	0
6/30/2005	37.2	10737379	13792000	6	1468	0
7/31/2005	32.8	10695282	14036000	6	1475	0
8/31/2005	41.7	10758537	13278000	6	1480	0
9/30/2005	36.4	10600940	13138000	7	1481	0
10/31/2005	33.8	10840612	14051000	7	1476	0
11/30/2005	32.8	10701431	13272000	7	1477	0
12/31/2005	31.6	11399125	14684000	7	1478	0
1/31/2006	22.3	11743948	15267000	7	1482	0
2/28/2006	41.9	12079610	15826000	7	1480	0
3/31/2006	53.4	12083684	16701000	7	1480	0
4/30/2006	48.1	12001344	16842000	8	1481	0
5/31/2006	53	11911520	17128000	8	1485	0
6/30/2006	52.5	12008464	17486000	8	1485	0
7/31/2006	69.6	13305673	18820000	12	1486	0
8/31/2006	76.6	13985443	19440000	12	1488	0
9/30/2006	51.6	13225146	19145000	12	1488	0
10/31/2006	52.8	13439071	19538000	12	1485	0
11/30/2006	51.7	13728517	19658000	16	1463	0
12/31/2006	64.8	15460060	21080000	16	1396	0
1/31/2007	66.4	15837550	18329063	20	1318	0
2/28/2007	37.1	15912692	18521249	20	1298	0
3/31/2007	36.6	15966457	18677529	20	1290	0
4/30/2007	40.9	16400693	19144052	20	1284	0
5/31/2007	38.6	15495308	18147866	20	1274	0
6/30/2007	46	16091112	18791275	20	1269	0
7/31/2007	30.5	16691323	19577348	20	1260	0
8/31/2007	20	17358873	20301736	20	1253	0
9/30/2007	34.8	19562284	22524744	20	1249	0
10/31/2007	20.4	20219939	23444731	20	1245	0
11/30/2007	15.5	20414819	23522876	20	1240	0
12/31/2007	4.7	21721167	26956076	20	1214	0
1/31/2008	1.3	22233409	27037186	20	1225	0
2/29/2008	8.1	20318800	25349193	19	1225	0
3/31/2008	5.6	20689975	25910917	17	1222	0

Date	(IN) (Inflation Rate)	(M1) (Narrow money)	(M2) (Broad Money)	(I) (Interest Rate) (policy Rate)	(ER) (Exchange Rate) (Market price)	(FC) Financial crisis (Dummy variable)
4/30/2008	5.5	20982449	26081245	17	1216	0
5/31/2008	4.6	21600247	26580025	17	1212	0
6/30/2008	-6.3	23359947	28481094	17	1205	0
7/31/2008	-1.4	24479090	29825484	16	1202	0
8/31/2008	-5.2	25135940	30879575	16	1196	0
9/30/2008	0.3	26374416	32536077	16	1188	0
10/31/2008	7.6	26068694	31294688	16	1185	0
11/30/2008	6.7	27135473	33579985	15	1183	0
12/31/2008	6.8	28189934	34919675	15	1180	0
1/31/2009	0.6	29047547	36057912	14	1178	0
2/28/2009	0.2	30444207	37659037	14	1178	0
3/31/2009	-3.1	29619659	36973388	11	1178	0
4/30/2009	-5.7	29271550	36720694	9	1179	0
5/31/2009	-5.6	29320418	36957496	9	1187	0
6/30/2009	0.7	30105213	37811325	7	1180	0
7/31/2009	-1.5	31083744	38806875	7	1184	0
8/31/2009	-0.3	31927710	39690346	7	1184	0
9/30/2009	-2.7	35173034	42982641	7	1183	0
10/31/2009	-6.4	35117602	42921266	7	1183	0
11/30/2009	-4.9	35977966	43813715	7	1183	0
12/31/2009	-4.4	37300030	45437918	7	1185	0
1/31/2010	2.2	37822671	46211046	7	1185	0
2/28/2010	2.5	39269192	47666215	7	1185	0
3/31/2010	3.4	41035394	49264741	7	1185	0
4/30/2010	2.9	43004748	51224102	6	1185	0
5/31/2010	1.6	44767560	53050750	6	1185	0
6/30/2010	1.7	47467333	55851298	6	1185	0
7/31/2010	0.6	47665671	55873827	6	1185	0
8/31/2010	1.7	48046807	56388061	6	1185	0
9/30/2010	2.7	47811465	56213464	6	1185	0
10/31/2010	3.6	49041670	57299232	6	1185	0
11/30/2010	3.1	49807671	58201459	6	1185	0
12/31/2010	3.3	51743489	60386086	6	1185	0
1/31/2011	5.8	51837519	60808829	6	1185	0
2/28/2011	5.9	50975178	59739929	6	1185	0
3/31/2011	5	49568411	58452768	6	1185	0
4/30/2011	5.8	50310190	59265111	6	1187	0
5/31/2011	6.6	50494628	59602270	6	1196	0
6/30/2011	6.1	53183620	62321706	6	1197	0
7/31/2011	6.2	55000209	64438666	6	1197	0
8/31/2011	5.2	55477646	65125368	6	1199	0
9/30/2011	5.1	55504559	65110706	6	1200	0
10/31/2011	4.8	58009684	67148300	6	1200	0
11/30/2011	4.8	59624262	68973332	6	1200	0
12/31/2011	6	62473929	72177951	6	1217	0
1/31/2012	5.4	63643370	71626698	6	1205	0

Date	(IN) (Inflation Rate)	(M1) (Narrow money)	(M2) (Broad Money)	(I) (Interest Rate) (policy Rate)	(ER) (Exchange Rate) (Market price)	(FC) Financial crisis (Dummy variable)
2/29/2012	5.7	64242026	72389840	6	1236	0
3/31/2012	8.3	65328642	73592642	6	1240	0
4/30/2012	8.7	66838414	75216016	6	1263	0
5/31/2012	7.2	64741811	73207937	6	1249	0
6/30/2012	5.8	64134152	72682903	6	1240	0
7/31/2012	5.7	64149894	72968245	6	1254	0
8/31/2012	7	64806487	73768559	6	1248	0
9/30/2012	6.4	64442785	73543262	6	1228	0
10/31/2012	4.8	65029424	74254439	6	1200	0
11/30/2012	4.5	65655419	74863727	6	1207	0
12/31/2012	3.6	67622173	77187497	6	1222	0
1/31/2013	2.8	67616036	77336835	6	1226	0
2/28/2013	2.2	68669935	78554690	6	1232	0
3/31/2013	1.3	70113476	80238418	6	1255	0
4/30/2013	1.2	73225274	83367590	6	1268	0
5/31/2013	1.1	74730603	84979975	6	1269	0
6/30/2013	2.3	74783816	85218485	6	1236	0
7/31/2013	2.5	74639315	84998414	6	1217	0
8/31/2013	0.1	73463502	83919472	6	1209	0
9/30/2013	0.3	75289427	85886119	6	1211	0
10/31/2013	3.1	75861653	86592362	6	1220	0
11/30/2013	2.7	76163712	86959526	6	1218	0
12/31/2013	3.1	78318122	89512076	6	1222	0
1/31/2014	4	79174203	90436700	6	1222	1
2/28/2014	3	77659012	88921947	6	1222	1
3/31/2014	2	77934775	89146380	6	1222	1
4/30/2014	1.5	79032176	90306439	6	1218	1
5/31/2014	1.4	77415734	88797216	6	1222	1
6/30/2014	2.3	77864372	88852188	6	1213	1
7/31/2014	2.3	78095327	88970432	6	1215	1
8/31/2014	2.7	74590725	88497577	6	1213	1
9/30/2014	2.1	74762200	89683842	6	1204	1
10/31/2014	0.9	75653062	90633315	6	1207	1
11/30/2014	3	74340981	89370875	6	1200	1
12/31/2014	1.6	77593288	92988876	6	1206	1
1/31/2015	-0.4	73105051	88444238	6	1221	1
2/28/2015	0.3	73257269	88621868	6	1241	1
3/31/2015	0.2	75840568	91248122	6	1270	1
4/30/2015	0.5	76296806	91762010	6	1297	1
5/31/2015	1.7	77528579	92930011	6	1309	1
6/30/2015	2.2	76190432	91422026	6	1306	1
7/31/2015	2.6	74293773	89513378	6	1231	1
8/31/2015	2.6	72462389	87471120	6	1217	1
9/30/2015	2.1	72342635	87179092	6	1222	1
10/31/2015	1.6	72002721	86752666	6	1220	1
11/30/2015	1	70597236	85292706	6	1219	1

Date	(IN) (Inflation Rate)	(M1) (Narrow money)	(M2) (Broad Money)	(I) (Interest Rate) (policy Rate)	(ER) (Exchange Rate) (Market price)	(FC) Financial crisis (Dummy variable)
12/31/2015	2.3	69613150	84527272	6	1216	1
1/31/2016	-0.9	69951239	84418246	6	1235	1
2/29/2016	1.5	72263099	86573324	6	1240	1
3/31/2016	1.8	73800840	87960801	4	1261	1
4/30/2016	2.1	74979511	89080003	4	1277	1
5/31/2016	2.5	75142876	89342320	4	1284	1
6/30/2016	0.1	74639658	88901115	4	1266	1
7/31/2016	-0.4	75657541	89925264	4	1273	1
8/31/2016	0.2	76147991	90540554	4	1281	1
9/30/2016	0.3	76737593	91225709	4	1289	1
10/31/2016	0.2	76128927	90685636	4	1298	1
11/30/2016	-1	75474490	90106348	4	1296	1
12/31/2016	-0.7	75523952	90466370	4	1303	1
1/31/2017	-0.9	75475045	90454105	4	1292	1
2/28/2017	-0.8	75327750	90359096	4	1272	1
3/31/2017	0.3	75354668	90180057	4	1254	1
4/30/2017	1	73968920	88855348	4	1251	1
5/31/2017	0.1	74592298	89550630	4	1250	1
6/30/2017	-0.1	74876608	90045251	4	1248	1
7/31/2017	0.7	75801023	91205230	4	1258	1
8/31/2017	0.2	75293989	90811987	4	1254	1
9/30/2017	0.4	74425046	89870649	4	1255	1
10/31/2017	0.1	74404357	89904869	4	1259	1
11/30/2017	0.7	75598735	91129944	4	1252	1
12/31/2017	0.8	76986584	92857047	4	1251	1
1/31/2018	0.4	75676689	91625221	4	1246	1
2/28/2018	-0.1	74714081	90831209	4	1229	1
3/31/2018	-0.8	73369213	89517337	4	1217	1
4/30/2018	-1.3	73673598	89802803	4	1202	1
5/31/2018	0.7	72694801	88948026	4	1200	1
6/30/2018	1.7	74573555	90973298	4	1200	1
7/31/2018	1.5	74392694	90927911	4	1201	1
8/31/2018	0.2	74883436	91487579	4	1206	1
9/30/2018	0.1	76518872	93170025	4	1206	1
10/31/2018	1.1	76077692	92856914	4	1205	1
11/30/2018	0.8	76622063	93702138	4	1199.776	1
12/31/2018	-0.1	77828984	95390725	4	1195.312	1
1/31/2019	0.6	76669801	94252953	4	1194.805	1
2/28/2019	0.4	75971667	93722387	4	1193.398	1
3/31/2019	1.4	77742103	95606069	4	1196.009	1
4/30/2019	0.7	78626781	97104080	4	1194.831	1
5/31/2019	-0.8	78454098	96043053	4	1193.503	1
6/30/2019	-1	81112597	98387356	4	1193.991	1
7/31/2019	-1.6	82888481	99501960	4	1194.824	1
8/31/2019	-0.3	84199419	1.01E+08	4	1198.972	1
9/30/2019	-0.9	84859680	1.02E+08	4	1194.873	1

Date	(IN) (Inflation Rate)	(M1) (Narrow money)	(M2) (Broad Money)	(I) (Interest Rate) (policy Rate)	(ER) (Exchange Rate) (Market price)	(FC) Financial crisis (Dummy variable)
10/31/2019	-0.8	86159290	1.03E+08	4	1195.625	1
11/30/2019	-0.3	86484250	1.03E+08	4	1201.085	1
12/31/2019	0.1	86771000	1.03E+08	4	1201.707	1
1/31/2020	0.5	86177398	1.03E+08	4	1202.335	1
2/29/2020	1	89230602	1.06E+08	4	1193.838	1
3/31/2020	0.6	91822314	1.08E+08	4	1198.534	1
4/30/2020	0.2	94702482	1.11E+08	4	1226	1
5/31/2020	0.7	94113609	1.1E+08	4	1227.206	1
6/30/2020	0.1	94447347	1.1E+08	4	1243.326	1
7/31/2020	-0.1	97030457	1.11E+08	4	1230.007	1

Appendix 2: Tests of Data

Unit Root Test for Stationary (Inflation Rate) at the level

Null Hypothesis: IN has a unit root
Exogenous: Constant
Lag Length: 20 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.072053	0.0000
Test critical values:	1% level	-3.469691	
	5% level	-2.878723	
	10% level	-2.576010	

*MacKinnon (1996) one-sided p-values.

Unit Root Test for Stationary (Narrow Money) at the first difference

Null Hypothesis: D(M1) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.64157	0.0000
Test critical values:	1% level	-3.465585	
	5% level	-2.876927	
	10% level	-2.575051	

*MacKinnon (1996) one-sided p-values.

Unit Root Test for Stationary (Board Money) at the first difference

Null Hypothesis: D(M2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.69961	0.0000
Test critical values:	1% level	-3.465585	
	5% level	-2.876927	
	10% level	-2.575051	

*MacKinnon (1996) one-sided p-values.

Unit Root Test for Stationary (Interest Rate)at the first difference

Null Hypothesis: D(I) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.694513	0.0000

Test critical values:	1% level	-3.465780
	5% level	-2.877012
	10% level	-2.575097

*MacKinnon (1996) one-sided p-values.

Unit Root Test for Stationary (Exchange Rate) at the first difference

Null Hypothesis: D(ER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.502963	0.0000
Test critical values:	1% level	-3.465585	
	5% level	-2.876927	
	10% level	-2.575051	

*MacKinnon (1996) one-sided p-values.

Unit Root Test for Stationary (Financial Crisis) at the first difference

Null Hypothesis: D(FC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.63818	0.0000
Test critical values:	1% level	-3.465585	
	5% level	-2.876927	
	10% level	-2.575051	

*MacKinnon (1996) one-sided p-values.

Correlation

Correlation						
	IN	M1	M2	I	ER	FC
IN	1.000000	-0.701439	-0.699832	0.421724	0.824507	-0.429917
M1	-0.701493	1.000000	0.998067	-0.683887	-0.543954	0.757023
M2	-0.699832	0.998067	1.000000	-0.689744	-0.538027	0.784419
I	0.421724	-0.683887	-0.689744	1.000000	0.085603	-0.521796
ER	0.824507	-0.543954	-0.538027	0.085603	1.000000	-0.224458
FC	-0.429917	0.757023	0.784419	-0.521796	-0.224458	1.000000

Johnson test/ cointegration test

Date: 12/02/20Time: 19:42
Sample (adjusted): 2006M04 2020M07
Comprised observations: 172 after adjustments
Trend assumption: Linear deterministic trend
Series: IN M1 M2 I ER FC
Lags interval (in first differences): 1 to 15

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.382698	230.8883	95.75366	0.0000
At most 1 *	0.278296	147.9161	69.81889	0.0000
At most 2 *	0.182782	91.81990	47.85613	0.0000
At most 3 *	0.156237	57.10189	29.79707	0.0000
At most 4 *	0.101079	27.88192	15.49471	0.0004
At most 5 *	0.054030	9.553658	3.841466	0.0020

Trace test indicates 6 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.382698	82.97219	40.07757	0.0000
At most 1 *	0.278296	56.09623	33.87687	0.0000
At most 2 *	0.182782	34.71801	27.58434	0.0051
At most 3 *	0.156237	29.21996	21.13162	0.0029
At most 4 *	0.101079	18.32827	14.26460	0.0108
At most 5 *	0.054030	9.553658	3.841466	0.0020

Max-eigenvalue test indicates 6 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Pairwise Granger causality

Pairwise Granger Causality Tests
Date: 12/02/20Time: 20:18
Sample: 2004M12 2020M07
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
M1 does not Granger Cause IN	187	2.78032	0.0971
IN does not Granger Cause M1		3.26197	0.0725
M2 does not Granger Cause IN	187	2.46276	0.1183
IN does not Granger Cause M2		6.39870	0.0123
I does not Granger Cause IN	187	2.27386	0.1333
IN does not Granger Cause I		43.8725	4.E-10
ER does not Granger Cause IN	187	27.8148	4.E-07
IN does not Granger Cause ER		6.50608	0.0116
FC does not Granger Cause IN	187	0.63058	0.4282
IN does not Granger Cause FC		0.65079	0.4209
M2 does not Granger Cause M1	187	0.08901	0.7658
M1 does not Granger Cause M2		0.92580	0.3372
I does not Granger Cause M1	187	0.00205	0.9639
M1 does not Granger Cause I		4.83312	0.0292

ER does not Granger Cause M1	187	7.85881	0.0056
M1 does not Granger Cause ER		1.38260	0.2412
FC does not Granger Cause M1	187	9.44321	0.0024
M1 does not Granger Cause FC		5.83998	0.0166
I does not Granger Cause M2	187	0.03486	0.8521
M2 does not Granger Cause I		4.55621	0.0341
ER does not Granger Cause M2	187	9.23771	0.0027
M2 does not Granger Cause ER		1.23970	0.2670
FC does not Granger Cause M2	187	9.23529	0.0027
M2 does not Granger Cause FC		5.82405	0.0168
ER does not Granger Cause I	187	24.6326	2.E-06
I does not Granger Cause ER		11.7017	0.0008
FC does not Granger Cause I	187	0.66413	0.4162
I does not Granger Cause FC		0.80708	0.3702
FC does not Granger Cause ER	187	0.47439	0.4918
ER does not Granger Cause FC		0.32968	0.5666

Auto-Regressive Distributed Lag (ARDL) method

Dependent Variable: IN
Method: ARDL
Date: 12/02/20Time: 21:16
Sample (adjusted): 2005M02 2020M07
Included observations: 186 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): M1 M2 I ER FC
Fixed regressors: C
Number of models evaluated: 243
Selected Model: ARDL(1, 2, 2, 2, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
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
C	-42.40627	13.40478	-3.163519	0.0018

R-squared	0.929998	Mean dependent var	9.065054
Adjusted R-squared	0.925143	S.D. dependent var	17.01082
S.E. of regression	4.654171	Akaike info criterion	5.980734
Sum squared resid	3747.406	Schwarz criterion	6.206190

Log-likelihood	-543.2083	Hannan-Quinn criter.	6.072098
F-statistic	191.5308	Durbin-Watson stat	2.143907
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Auto / serial correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.259809	Prob. F(2,171)	0.1075
Obs*R-squared	4.789487	Prob. Chi-Square(2)	0.0912

Multicollinearity/ Variance Inflation Factors

Variance Inflation Factors
Date: 12/03/20Time: 00:32
Sample: 2004M12 2020M07
Included observations: 188

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
M1	2.80E-15	33.51160	6.465217
I	0.034684	8.951313	2.487495
ER	7.76E-05	406.0207	2.128895
FC	3.412693	4.730989	2.742967
C	189.1585	624.0385	NA

Variance Inflation Factors
Date: 12/03/20Time: 00:34
Sample: 2004M12 2020M07
Included observations: 188

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
M2	2.46E-15	41.40496	7.750348
I	0.036675	9.469119	2.631389
ER	8.24E-05	431.1914	2.260873
FC	4.064305	5.636783	3.268135
C	206.5434	681.6902	NA

Identification problem/ Ramsey Reset Test

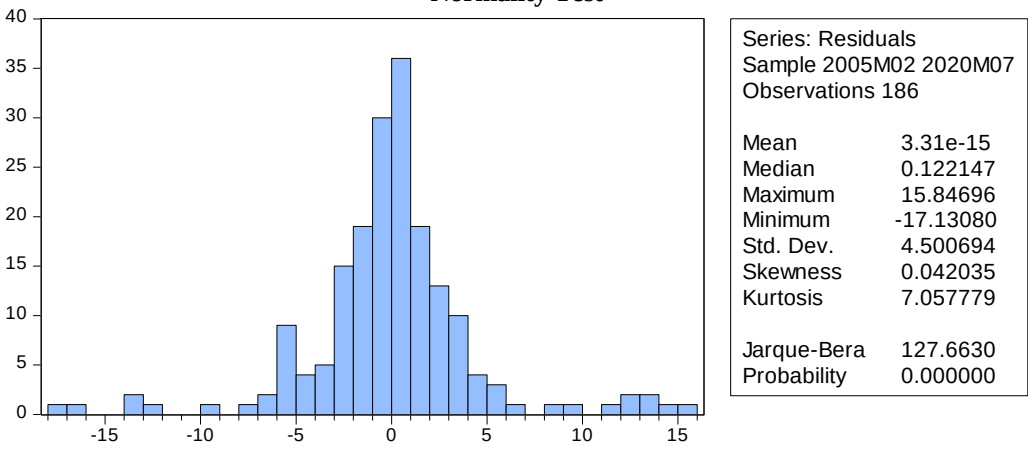
Ramsey RESET Test
Equation: UNTITLED
Specification: ININ(-1) M1 M1(-1) M1(-2) M2 M2(-1) M2(-2) I I(-1) I(
-2) ER FC C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.515665	172	0.6068
F-statistic	0.265910	(1, 172)	0.6068

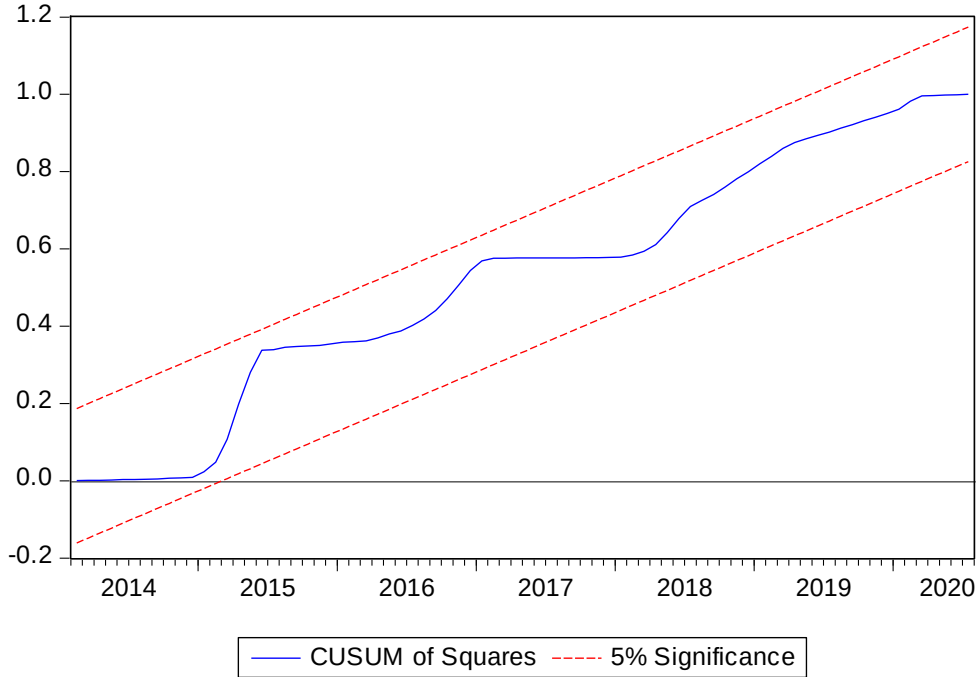
F-test summary:

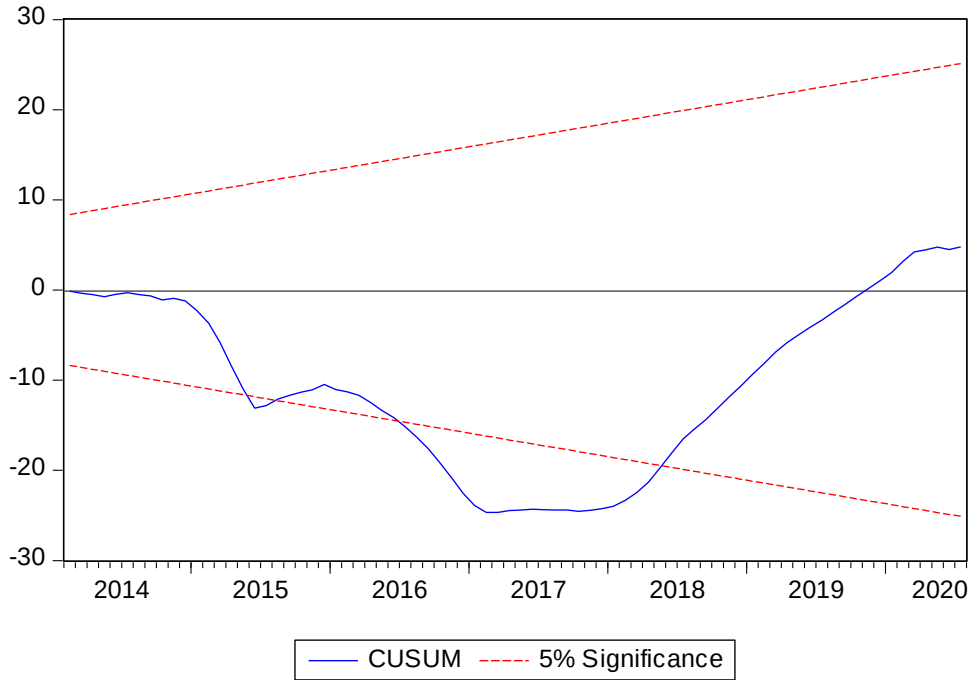
	Sum of Sq.	df	Mean Squares
Test SSR	5.784511	1	5.784511
Restricted SSR	3747.406	173	21.66130
Unrestricted SSR	3741.621	172	21.75361

Normality Test



Stability Test




30
20
10
0
-10
-20
-30
2014
2015
2016
2017
2018
2019
2020
CUSUM
5% Significance

BIOGRAPHY

Name Sur name: Edrıs Ahmed SALIH	
Education Information	
Bachelor	
University	University of Sulaimani
College	College of Administration and Economics
Department	Department of Economics
Articles and Papers	
1- Salıh, E., & Kabasakal, A. The Role Of Monetary Polıcy in Controllıng on Inflatıon Rate in Iraq for the Perıod (2004-2020). *Uluslararası Ekonomik Araştırmalar Dergisi*, *7*(2), 89-102.	