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Measuring the Impact of Some Monetary Policy Variables on the Stability of the Iraqi Dinar Exchange Rate For 2004-2023

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Abstract:
The paper investigates how monetary policy variables affect the stability of real exchange rate of Iraqi dinar covering the period between 2004 and 2023. The research aims to assess the articulation between significant monetary policy instruments particularly the money supply, which is M2, and governmental sales of foreign currency windows together with their impacts on changes on the exchange rates. Using an econometric quantitative approach and EViews-12, the model for this research will estimate and test underlying hypotheses along with analyzing data using the autoregressive distributed lag (ARDL) model.
Statistical inference pointed out a causal relationship for real exchange rate stability due to the monetary policy mechanisms. Actual pricing actions concerning the tendencies toward money supply M2 at the time witnessing the depreciation against the Iraqi dinar from the parallel market would add further fact that sales of foreign currency would improve stability for the exchange rate. The outcome designs go to a minus point that monetary policy became an important point in the equation of taming the exchange rate; external economic factors would also work short on where monetary policy proves to be inbound-constrained against structural challenges in Iraq as well.
It will further enlighten policymakers simply to prove that to further optimize monetary policy tools and to stabilize the foreign currency reserves contribute to the stability of exchange rates and to further economic growth.
Keywords: Monetary Policy, Money Supply, Exchange Rate Stability, Central Banks, Exchange Rate.

1. Introduction:

Monetary policy is one of the most important pillars of macroeconomic policy. It plays an active role in economic activity by controlling monetary supply, local liquidity, and credit to achieve economic stability and growth (Mankiw, 2007). In Iraq, after gaining independence, the Central Bank of Iraq approved its Law No. 56 of 2004, which gave monetary policy freedom to define and define the objectives to be achieved, namely, to stabilize the overall price level and to place inflation among the target levels. (Malath & Majeed,2019). Expansionary monetary policy increases the supply of cash. It decreases the interest rate provided that the increase in the cash supply is below the GDP level, as moneymen say, and) Friedman (highlights them (Bernanke, 2020). Monetary policy affects economic activity through a change in the supply of cash and interest rates. The central bank lowers the amount of cash on hand and boosts interest rates in response to a glut that exceeds the goal rate. This lowers aggregate demand and brings inflation down to target levels. (2003) Miskin et al. The influence of monetary policy is transmitted to domestic economic variables via the exchange rate, which also affects aggregate demand and the general pricing level (Mutlaq et al., 2021). According to Leitemo and Söderström (2005), the real exchange rate influences the relative cost of local and imported commodities, influencing the aggregate demand channel. The impact of the exchange rate channel is included since a decrease in the domestic interest rate would make local deposits denominated in foreign currencies less appealing. By pursuing a deflationary monetary policy through the sale of securities through open market operations, the central bank will decrease the amount of cash in circulation and increase domestic interest rates, attracting foreign equity assets and raising the demand for local currency. As a result, output and aggregate demand will decline (Akingbola, 2012). The degree of economic openness determines how well the exchange rate channel performs. Since the floating exchange rate system makes the exchange rate channel more effective, changes in monetary policy choices would affect the price of imported commodities. (Al-Daghir et al., 2020). While the fixed exchange rate system is suitable for stimulating stable and low inflation rates, Iraq's macroeconomic balance is balanced by a rent pattern (Al-Shaibani, 2018). Empirical work and careful analysis of the effectiveness of monetary policy in stabilizing the exchange rate need to be distinguished between exchange rates declared through official documents) de Jure) and countries' de facto (exchange rates (Reinhart et al., 2004). Reinhart & Calvo. noted that many countries resorted to an exchange rate system that differed from that advertised through official documents and attributed this to the fear of floating. (Fear Floating), with many countries declaring their general exchange rate system while effectively applying the fixed exchange rate system by intervening significantly in the foreign exchange market to reduce their domestic currency volatility(Frankel & Wei, 2008).Researchers (Levy-Yeyatie and Sturzenegger) used a statistical method to classify exchange systems in a sample of 183 countries during the period 1974 to 2000 using annual data; in 2002, they adjusted the sample collected to improve the classification method, and each country annually allocated an exchange rate system through cluster analysis (cluster) which uses in classification a set of changes of change (variation) The official exchange rate, the change in the actual exchange rate, and the change in foreign reserves are allocated at each viewing the exchange rate system of the four systems, namely fixed systems, Crawling peg, managed float systems and free-floating systems system (Levy-Yeyati & Sturzenegger,2005). While the two researchers used (Reinhart & Rogoff) are a different classification from the previous classifications (Lys) because it takes into account multiple exchange rates or in the parallel market. The researchers justified that the parallel market exchange rate reflects the direction of monetary policy on the exchange rate, as it decreases when there is a conflict between monetary policy and the exchange rate system (Reinhart et al., 2004). The relationship between monetary policy and the exchange rate occurs through capital movements because cross-border capital flows are the countries' intermediaries. After all, they strengthen the relationship between domestic economic policy and the strengthening of the balance of payments (Brunner & Meltzer, 1990).

The increase in the money supply leads to a decrease in the real value of the local currency against foreign currencies due to the increase in demand for foreign currency, as the latter, like any commodity, increases in price as a result of the increase in demand for it due to the scarcity of foreign currency, The opposite happens when the money supply decreases, which leads to an increase in the real value of the currency against foreign currencies.(Romer, 2018). When monetary authorities follow the fixed exchange rate system, the Central Bank must maintain the constant exchange rate through participation in the foreign exchange market, the Central Bank's sale and purchase of foreign assets and therefore, this process is involved in net foreign capital flows (CF) Generally speaking, since CF expresses residents' purchases of foreign assets less non-residents' sales, moreover, net foreign reserves (R) is the Central Bank's foreign exchange purchases subtracting its sales. This shows that R forms part of the net foreign capital flows, where net inflows are divided into two parts: The first is net private capital flows (PCF), which is a negative function of the interest rate, and the second is net foreign reserves R (Mundell, 2000). The research studied and analyzed the relationship between monetary policy variables (Money supply and foreign currency sales) and monetary policy variables (presentation of cash and foreign currency sales) and exchange rate stability in the parallel market. So, the search problem can be as follows: Thus, policy variables (Money Supply, currency window sales) significantly impact real exchange rate stability.

2. Literature Review and Hypothesis Development:

The study (Adeoye & Saibu, 2014) aims to measure the relationship between exchange rate fluctuations and monetary policy shocks in Nigeria. The study finds that both real and nominal exchange rates in Nigeria were unstable during the study and explains that self-correction is a process with or without intervention by the central bank. There was a causal link between the monetary policy variables and the rate of interest on the rate**.** The study (Dilmaghani & Tehranchian, 2015) aims to see the impact of monetary policy on the exchange rate of selected developing countries (2001-2010); the study concluded that the period of exchange rate variable slowdown has a positive impact on the exchange rate and this result reflects the dynamics of the exchange rate over time. In addition, the results indicate that the liquidity factor is a monetary policy indicator that positively impacts the exchange rate. The study (Kearns & Manners, 2018) aims to verify the impact of monetary policy on the exchange rate [using daily data in four countries (Australia et al. and the United Kingdom). The study found that a 2 % rate change results in an exchange rate of 4**. %** (Pham, 2019). The study aimed to analyze the impact of the monetary policy curve (MP) (Money supply, interest rate) on the parallel exchange rate in Vietnam ،was applied and the study concluded that the lower money supply leads to an improvement in the exchange rate in the parallel market. Vice versa, the higher interest rate, because of contraction monetary policy, leads to an improvement in the exchange rate in the parallel market, i.e., a positive relationship between the presentation of cash and the interest rate on the exchange rate. (Kim et al., 2020) The study analyzed the impact of monetary policy shocks on the exchange rates of Asian countries and produced the study. Deflationary monetary policy shocks lead to higher real exchange rates in the sample countries. Study (Yang & Zhang, 2021) The study found a negative impact of non-traditional monetary policy on the stability of the United States exchange rate from 2008-2012. The study (Eichenbaum et al., 2021) sought to exaggerate the impact of monetary policy variables (money supply, foreign currency sales) on the exchange rate and inflation in countries that target inflation policy. Study (Banerjee & Mohanty, 2021) The study aimed to exaggerate the impact of America's deflationary monetary policy on the net value of companies and domestic credit in India through the exchange rate channel. (Mahood & Muneer, 2023) The study examined the impact of foreign exchange window sales on Iraq's exchange rate stability.

(Okolie et al., 2023) The study analyzed the impact of external remittances on foreign reserves and the exchange rate in Nigeria's economy for 2015-2022. (Prayoga & Purnomo, 2024) the study found no positive relationship between the exchange Rate and Foreign Direct Investment in Indonesia. (Al-Wastey & Al-Atabey, 2023) The study aimed to analyze and measure the impact of exchange rate shocks on some variables of Iraq's economy, especially the supply of cash and agricultural output. Results showed the vulnerability of agricultural output to the exchange rate shock. The study (Farooq, 2023) aims to analyze the impact of the money supply, exchange rate and inflation rate on Pakistan's GDP. It concluded that both the money supply and inflation rate positively impacted the GDP, and Panama's exchange rate negatively impacted the GDP. The study sought (Goestjahjanti,2023) Analysis of the impact of interest rates on savings deposits and exchange rate fluctuations on Indonesia's Money Supply; the study recommended that exchange rate fluctuations should be controlled to limit the increase in the supply of Money and inflation. The Study (Ahamefule & Egbe, 2024) examined the analysis of cash supply, interest rate, exchange rate and external debt on Nigeria's inflation rate. It concluded that the majority of variables had an impact on inflation other than the exchange rate had a weak impact; from this, we propose the following hypothesis: H.1 There is a statistically significant correlation and effect between the independent variable (M2) and the dependent variable (REXR), at a significance level of (0.05). H.2 There is a statistically significant correlation and effect between the independent variable (SFC) and the dependent variable (REXR) at a significance level of (0.05).

3. Methodology:

3.1 The Sample:

The Iraqi economy's study period (2004-2023) was neutralized. Data were collected from the Central Bank of Iraq, the Ministry of Finance, the Ministry of Planning, and the Central Statistical Authority.

3.2 Measurement of variables:

To achieve the research's objective and prove its hypothesis, the researcher relied on the dynamic-based inductive approach and the method of descriptive analysis and quantitative approach by relying on measurement methods through data collection, parameters and measurement tool (Eviews-12) to measure the impact (presentation of cash, foreign exchange window sales as an independent variable) On the Iraqi dinar exchange rate as a dependent variable in Iraq, a set of statistical and financial indicators and methods will be used to ascertain the validity of the hypothesis and measure it using statistical programs (Microsoft Excel, Eviws12) Cash offer, currency window sales and exchange rate selected for 2004-2023.

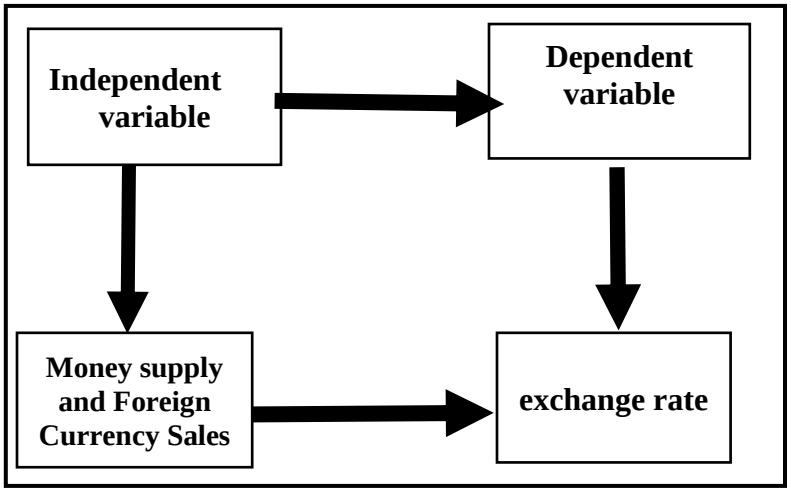

Figure 1: Hypothetical diagram of research.

Source: Prepare by Researchers.

In this part, the standard model used, which is one of the important stages that supports the results of the analytical aspect, is described by conducting tests that support the results of scientific research. In addition, economic measurement determines the relationship between the variables studied according to economic theory. The slotted distribution model (ARDL) was used, and after the stabilization tests showed that all data were Resident at the first difference, annual data for the period (2004-2023) were adopted. The data were divided into two subordinate variables (widespread Supply of Money, foreign currency window sales) and a stable variable (real exchange rate), as shown in the following formula:

$$REXR = f(M2, SFC)$$

$$REXR = B_0 + B_1 X_1 Y_1 - B_2 X_2 Y_2 + u_t$$

Table 1: Variations of the classical model

Variable type	Variable name	Variable symbol
Independent	widespread Supply Money	M2
Independent	foreign currency window sales	SFC
Dependent	real exchange rate	REXR

Source: Prepare by Researchers

4. Results:

Test the stillness of estimated model time series.

To verify the stillness of the estimated standard model time series, the Dickie Fuller Expanded Test (ADF) and Phillips Peron Test (P.P) were conducted, and the results were as follows:

4.1 Expanded Dickey-Fuller test (ADF)

From table number (2) which shows that all-time series of variables were not static at the (original) level, but after taking the first difference we note that all-time series will be at a lower level of morale (5%) and that we reject the null hypothesis H:0 we accept the alternative H:1 the model is free of the problem of the root of the unit .

Table 2: Results of the Augmented Dickey-Fuller test statistics

Variables		At Level			At First Difference		
		With Constant	With Constant & Trend	Without Constant & Trend	With Constant	With Constant & Trend	Without Constant & Trend
Prob 5%	M2	**0.9836**	**0.0512**	**0.9890**	**0.0288***	**0.0747**	**0.0138***
	SFC	**0.2028**	**0.9149**	**0.6837**	**0.0355***	**0.0378**	**0.0026**
	REXR	**0.1434**	**0.2522**	**0.7397**	**0.1768**	**0.0138***	**0.0203**

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Table No. 3 shows the results of the Flips Peron test (P.P) We note that time chains are not dormant at the level, but after taking the first difference the time chains are stillborn at a lower level of morale (5%) so we reject the hypothesis of nowhere (H:0) accept the alternative (H:1) there is no unit root problem.

Table 3: Results of the Phillips-Perron test statistics

Variables		At Level			At First Difference		
		With Constant	With Constant & Trend	Without. Constant & Trend	With Constant	With Constant & Trend	Without. Constant & Trend
Prob 5%	M2	**0.9941**	**0.8317**	**0.9993**	**0.0309***	**0.0762**	**0.0490**
	SFC	**0.1977**	**0.9750**	**0.6837**	**0.0351**	**0.0110**	**0.0026***
	REXR	**0.6686**	**0.9616**	**0.7129**	**0.1618**	**0.1105**	**0.0178***

Source: prepared by the investigator. according to the statistical program's results (Eviews12).

4.2 Testing the autoregressive distributed lag (ARDL) model .

Table 4: Results of testing the ARDL model for the widespread Supply Money model and its relationship to parallel exchange rate in Iraq.

Variable	Coefficient	Std. Error	t-Statistic	Prob	
REX (-1)	0.791624	0.173231	4.569802	0.0005	
REX (-2)	-0.514036	0.170730	-3.010810	0.0100	
SFC	1.756606	3.513307	4..441418	0.0003	
M2	-0.005226	0.001474	-3.5454556	0.0036	
C	974.518	207.4407	4.697794	0.0004	
Adjusted R-squared	0.908407	Durbin-Watson stat	2.13	Prob (F-statistic)	0.0000

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Table No. (4) which shows the model (ARDL) which automatically identifies the slowing periods and test results are shown (Adjusted R. Squared) is (0.90), which indicates that (90%) of changes in the dependent variable are due to changes in the independent variable and (10%) is due to other factors not included in the model, in addition, the adjusted interpretive power value was lower than Derby Watson's value of (2.13464), indicating that the model was free of the self-correlation problem, while the statistical value f (43.15092) indicated that the model was statistically significant.

4.3 Results of the Bounds Test for Cointegration

To ascertain if there is a long-term equilibrium connection between the dependent variable (real exchange rate) and the independent variable (widespread supply money), one might use the limits test. The process of doing this is as follows: comparing the F statistics with the lower and higher critical values:

Table 5: Results of the bounds test between the independent variables M2, SFC and REXR as a dependent variable in Iraq.

Test Statistic	Value	K
F-statistic	9.867946	2
(Critical Value Bounds)		
Significance	I0 Bound	I1 Bound
% 10	2.63	3.35
% 5	3.1	3.87
% 2.5	3.55	4.38
% 1	4.13	5

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Table (5) shows that the statistical value of F is (9.867946) which is greater than the minimum and upper limits at a moral level (5%) and therefore we reject the hypothesis of non-H:0 and accept the alternative H:1 which provides for a long-term balance between (M2, SFC) and (REXR) which means a common integration.

4.4 Test estimated (short-run) parameters and unconstrained error correction factor

To ascertain the nature of the short-term connection and the extent to which the independent variable influences the dependent variable, this test estimates short-term parameters. Furthermore, as the accompanying table illustrates, the error correction term represents the rate at which the model eventually reaches equilibrium:

Table 6: The estimation of the error's results. SFC debt model and its link to REXR, as well as the correction model and M2's short-term relationship.

Variable	Coefficient	Std. Error	t-Statistic	Prob
REXR (-1)	-0.722407	0..138964	-5.198530	0.0002
M2	1.75E-06	3.53E-07	4.941418	0.0003
GR	-0.005226	0.001474	-3.545456	0.0036
REXR (-1)	0.514036	0.170730	3.010810	0.0100
Coint Eq (-1) *	-0.722407	0.103645	-6.969982	0.0000

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Table (6) provides evidence of a short-term causal relationship between the monetary policy variables (M2, SFC) as independent variables and the dependent variable (REXR). Specifically, an increase of one unit in the cash supply causes the value of the Iraqi dinar (1.75006) to decrease at a probability level of 0.0002, with an error correction factor of 72% (0.722407). Long-term monetary policy can be used to rectify the exchange rate balance.

4.5 Testing of long-term estimated parameters

To ascertain the nature of the long-term connection between the two variables and the extent to which the independent variable influences the dependent variable, this test estimates long-term parameters.:

Table 7: The estimating the error correction model and the long-run relationship between M2, SFC and REXR

Variable	Coefficient	Std. Error	t-Statistic	Prob
M2	2.42E-06	4.59E-07	-5.266027	0.0002
SFC	-0.007235	0.001303	5.551131	0.0001

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Through table No. 7, which shows the relationship between (M2,SFC) as an increase of (SFC) by one unit leads to an improvement in the exchange rate of Iraqi dinars in the parallel market (REXR) by (5.266027) at a probability level (0.0001) while an increase Money supply of one unit leads to a decrease in the exchange rate in the parallel market by (-5.55131) at a probability level (0.0002)This means an inverse relationship between the Money Supply and the exchange rate.

4.6 Conduct diagnostic tests for estimated residuals

To demonstrate this, we will perform the following crucial diagnostic tests to confirm the reliability and correctness of the earlier test results:

4.7 Autocorrelation Problem Test (LM Test)

The purpose of this test is to confirm how much the estimated model is free of the residual autocorrelation issue:

Table 8 : Results of the Autocorrelation Problem (LM) Test for the M2,SFC Model and its Relationship to REXR

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.579658	Prob. F.	0.5849
Obs-R-squared	2.557528	Prob. Chi-Square.	0.2784

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Through table (4) it is clear that the model does not have a self-correlation problem, as the results of the Breusch-Godfrey test have reached the probable value (Prop.f) (0.5844) and probability value prop chi .squer (0.2784) while Obs * R-squared (2.557528) It therefore accepts the H0 null hypothesis that there is no self-correlation problem and rejects the H1 alternative hypothesis that there is a self-correlation problem at a 5% morale level which enhances the validity of the estimated model.

4.8 Testing the heterogeneity of variance problem (ARCH Test)

This test is intended to confirm how much the estimated model is free of the residual variance variation issue, as shown in the accompanying table:

Table 9: Results of the consistency of variance tests. Error limits (homogeneity of variance) for M2, SFC the model for sin the REXR.

Heteroskedasticity Test: ARCH			
F-statistic	1.443182	Prob. F.	0.2716
Obs*R-squared	2.907011	Prob. Chi-Square.	0.2337

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Through Table (6) that the model does not have the problem of counting the consistency of homogeneity, as the probability value has reached (prop. f) (0.2716) and chi-squared (0.2337) (Obs. squared) (2.907011) Therefore accepts the null hypothesis H:0 which states that homogeneity is not established and rejects the alternative hypothesis H:1 which states that there is a problem of consistency of variability at a 5% morale level which enhances confidence in the estimated model.

4.9 Testing the problem of normal distribution of the model

This test is used to ensure that the estimated model is free from the problem of normal distribution of residuals, as follows:

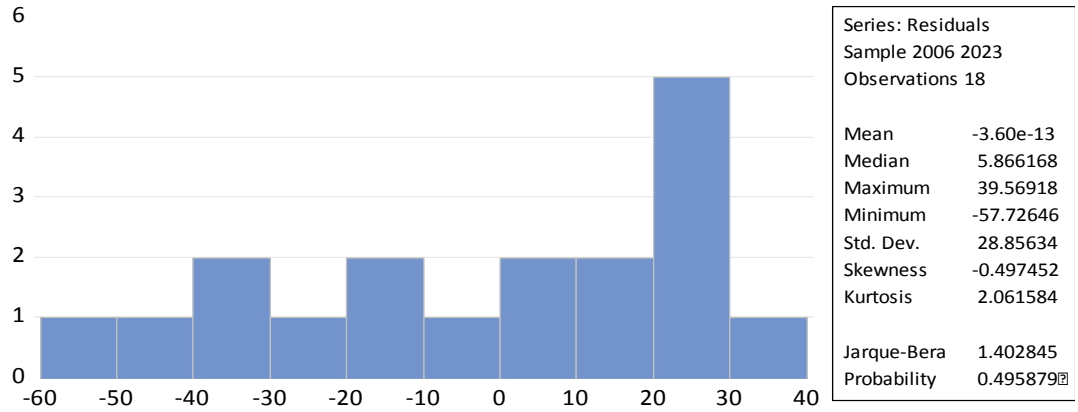

Figure 2: Results of testing the normal distribution problem of the M2, SFC model and its relationship REXR

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

Results on natural distribution of parcels by test (Jarque - bera) This means accepting the hypothesis of non-distribution is not distributed naturally, as the probability value (0.495879) is greater than the moral level of (5%) This means accepting the hypothesis of non-rejection of the alternative hypothesis, i.e. that the remains are distributed naturally, thereby enhancing the validity of the estimated model.

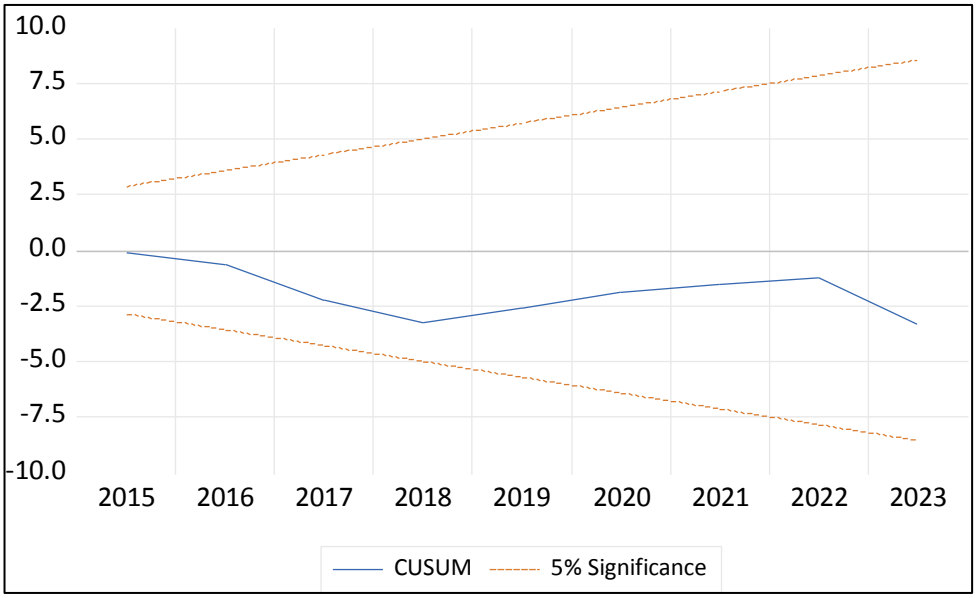

Figure 3: Cumulative sum of residuals test

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

4.10 Model Stability Tests

This test shows the stability of the estimated parameters in the model by testing the cumulative total of the protectors, as the estimated decline occurred between the maximum and the minimum as shown in Figure below, which shows the stability of the model's structural parameters.

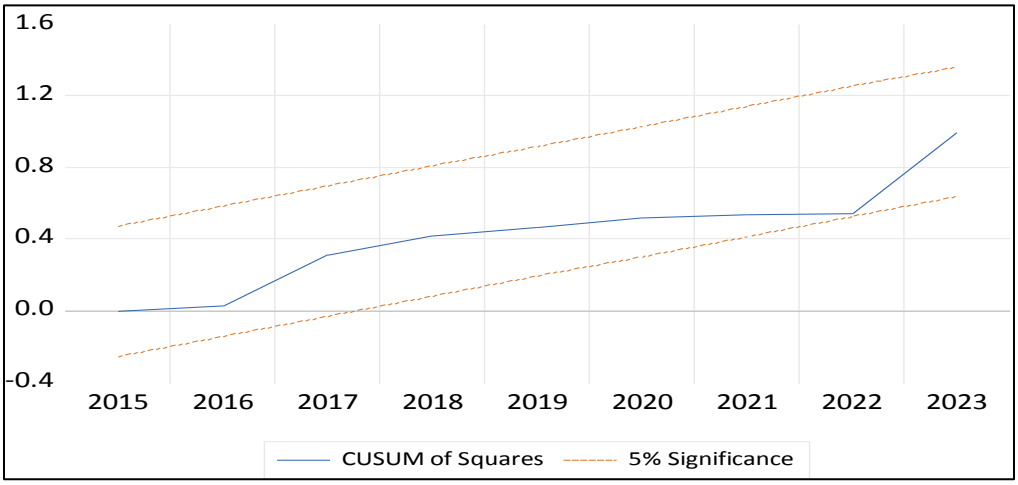

Figure 4: Cumulative sum of squares test

Source: Prepare by Researchers according to the statistical program's results (Eviews12).

5. Discussion of Results:

Results indicate an inverse correlation between the cash offer and the parallel exchange rate if an increase in the cash offer results in a lower exchange rate as a result of increased demand for foreign currency, and this corresponds to Iraq's economic reality; there are reverse links between the sales of the currency sale window and the parallel exchange rate as the increase in foreign exchange sales leads to an improvement in the exchange rate in the parallel market, and this corresponds to Iraq's economic reality.

6. Conclusion:

Through the standard analysis results, the study's hypothesis confirmed a statistically significant relationship between monetary policy variables (M2, SFC) as independent variables and real exchange rate (REXR) as a dependent variable in the Iraqi economy. The results showed that (90%) of changes in the (REXR) dependent variable resulted from changes in autonomous variables (m2, SFC). The results of the joint integration test showed a long-term correlation between the study variables, as an increase of one unit in the cash supply leads to a reduction in the real exchange rate by (-5.55131). This applies to the reality of the Iraqi economy. Increasing the supply of cash increases the demand for foreign currency and, thus, the depreciation of the local currency. This corresponds to the reality of the Iraqi economy as monetary policy defends the value of the local currency through the currency sale window because of monetary sterilization.

Authors Declaration:

Conflicts of Interest: None

-We Hereby Confirm That All The Figures and Tables In The Manuscript Are Mine and Ours. Besides, The Figures and Images, which are Not Mine, Have Been Permitted Republication and Attached to The Manuscript.

- Ethical Clearance: The Research Was Approved by The Local Ethical Committee in The University.

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