



MEASURING AND ANALYZING THE IMPACT OF THE INFLATIONARY GAP OF THE MONETARY STABILITY COEFFICIENT ON THE EXCHANGE RATE IN IRAQ FOR THE PERIOD (2003-2020)

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Abstract- *That the Iraqi economy suffers in most years of the study from a widening problem of the inflationary gap according to the monetary stability measure, as the main reason for the emergence of the inflation gap according to the monetary stability standard is due to the lack of a proportional relationship between the growth rate of the money supply and the growth rate of the gross domestic product, as well as the character of Iraq With economic openness to global markets after 2003, through which Iraq's oil exports rose as a result of lifting economic sanctions, the exchange rate policy is an important tool in linking the local economy with the global economy, as well as the exchange rate affects macroeconomic variables, and there is a reciprocal relationship between the gap inflation and the exchange rate.*

Keywords: *inflationary gap, economic openness, exchange rate, monetary stability, money supply.*

1. INTRODUCTION

The phenomenon of inflation has constituted one of the most important contemporary economic crises and problems that have preoccupied the minds of economists and thinkers for the past decades and has become facing most of the economies of countries in the world despite the difference in economic systems. One of the positions that occupied and still dominate the bulk of economic studies is of great importance to the specialists, and it represents a difficult test for economic policies because of the impediment to the wheel of growth and development. Therefore, the goal of dealing with inflation and maintaining price stability is one of the basic indicators that countries seek to achieve For the safety of the overall economy, and Iraq is one of the countries in the world whose economy has been linked to the phenomenon of inflation and the general rise in prices that accompanied the local markets. Also, the exchange rate is one of the most important economic indicators because it links the internal economy with the external economy and reflects the economic stability of the state as well, and that the issue of the exchange rate is an important element in international economic relations, and is an essential part of the daily work of economic units, and this confirms the strategic importance of the exchange rate development and growth In international commercial and financial relations, each country has its currency that is used in internal payment operations, and the need to use foreign currencies appears when there are commercial or financial relations between countries of the world. The importance of the research lies in identifying the causes of inflation and focusing on one of these causes, which is the fluctuations in the exchange rate, and using that in an attempt to address the rises in inflation rates by measuring and analyzing the inflationary gap according to the criterion of monetary stability on the exchange rate in the Iraqi economy. The problem of the Iraqi economy is like that of many developed and developing economies, in the course of its development a set of fluctuations (rise and fall) resulting from inflation cycles and the instability of the exchange rate, generated many economic problems, and thus the research problem can be formulated through the following question:

What is the relationship between the inflationary gap in the exchange rate in the Iraqi economy?

The research aims to measure and analyze the impact of the inflationary gap of the monetary stability criterion on the exchange rate in Iraq for the period (2003-2020).



2. THEORETICAL AND CONCEPTUAL FRAMEWORK OF THE INFLATIONARY GAP AND THE EXCHANGE RATE

2.1. The Inflationary Gap

The economist (Keynes) is the first to address the concept of the inflationary gap in his book entitled "How Are the Expenses of war paid", where this concept is taken to analyze the surplus of aggregate demand ($C + I + G$) over aggregate supply (YF at the level of full use) (1), and the inflationary gap begins to appear in the economy when the level of equilibrium national income achieved from the equality of aggregate demand with aggregate supply is at a level greater than the value of the full employment product, meaning that the potential national income is smaller than the actual national income, and this leads to the economy suffering from The emergence of a negative income gap, and consequently, a rise in the rate of inflation in society (2), and the inflationary gap is in a state of reflection with the deflationary gap. Verifies the gross domestic product and the level that can be achieved when employment is for all existing or available resources (3).

Bennett Hansen defines it in the commodity markets as the discrepancy between purchases of goods and services and the quantity supplied or available (4) and also is the difference between the current level of production estimated at current market prices and the amount of production estimated at limit prices that buyers are willing to pay (5).

Some reasons led to the emergence of the inflationary gap, sometimes on the aggregate supply side and at other times on the aggregate demand side, as follows:

1- The occurrence of shocks affecting the supply side leads to lower levels of production, even though the aggregate demand is constant, thus creating an inflationary gap on the aggregate supply side.

2- Lack of flexibility in the field of production, as the increase in aggregate demand does not lead to a change in supply as a result of the decrease in the elasticity of production due to the economy's exposure to structural transformations that affect the productive system and the lack of advancement in the productive sectors, and other reasons that lead to insufficiency in the supply side.

3- Fluctuations in energy prices, wars, conflicts, political disasters, transformations that occur in the industrial field, in addition to transformations that occur in the agricultural field, and other reasons that weaken the aggregate supply and push economic activity into an inflationary gap (6).

4- An increase in the money supply, which causes a force in purchasing within the economy, and then a trend towards spending with a lack of commodities, thus leading to an increase in the level of aggregate demand.

5- Increasing government spending and not increasing taxes and economic policies that are not planned are sufficient to raise the level of aggregate demand. Likewise, deficits occur in the country's budget through financing by printing new money or by borrowing, whether from commercial banks, the central bank, or the People, which leads to the upward push of aggregate demand, thus causing the emergence of the inflationary gap.

6- The existence of expectations that lead to a new increase in the price level, which leads to an increase in the level of individual demand, especially for durable goods, and also in light of economic welfare and the ability of individuals to spend, which raises the levels of aggregate demand (7).

7- The increase in export prices constitutes an external demand for internal commodities, so this increase represents a high level of demand, and also the money that is obtained as a result of export operations is considered an additional income, and therefore the increase in exports leads to an increase in aggregate demand and then an inflationary gap in the economy (8).

To measure the inflationary gap, there is a basic measure used to measure the inflationary gap for the monetary stability criterion, as follows:

- **Monetary stability** criterion: This criterion is used to measure the relationship between GDP and the size of the means of payment according to fixed prices, and this criterion depends on



measuring the inflationary gap in the theory of the amount of money, especially on the ideas of the economist (Milton Friedman), and the inflationary gap is calculated according to this criterion through the following equation:

$$B = \frac{\Delta M}{M} - \frac{\Delta Y}{Y}$$

Whereas:

B: represents the monetary stability rate.

$\frac{\Delta M}{M}$: represents the rate of change in the size of the means of payment.

$\frac{\Delta Y}{Y}$: represents the rate of change in real GDP.

2.2. The Exchange Rate

The exchange process exists when there is a different exchange between currencies and each country has its own currency used in activities paid internally, and the use of foreign currencies appears necessary when the establishment of financial or commercial relations or links between institutions or companies operating locally with institutions or companies operating abroad, and importing institutions are in need of the currency of the country exporting the goods to pay, and these institutions resort to buying the currency of the exporting country from the exchange market in order to be able to complete this process ⁽⁹⁾ There are several definitions of the exchange rate, including that it is the price of a country's currency denominated in the form of a currency for another country or countries, meaning that the exchange rate is important from the existence of relations between monetary units in different countries and since the external exchange relations are continuous, the different currencies between countries are evaluable towards each other, and this leads to the difference in the price of each currency according to the price of its exchange against other currencies ⁽¹⁰⁾.

There are several indicators and forms of the exchange rate, the most important of which are:

Nominal exchange rate: It is the rate that refers to the value of the monetary currency of one country that can be exchanged for the value of a cash currency of another country, and the nominal exchange rate is determined according to the demand and supply in the exchange market at a specific time (11).

B- Real exchange rate: It is the exchange rate that expresses two currencies as it takes into account the relative prices between the two countries, i.e. the exchange rate that reflects the rate at which nationally produced goods can be exchanged with foreign-produced goods.

C- Nominal effective exchange rate: It is an indicator that measures the average change in the value of a currency against a group of currencies during a certain period, and then the nominal effective exchange rate index is equal to an average of bilateral nominal exchange rates, and this is an indication of the development and improvement of the country's currency against other currencies.

D- Real effective exchange rate: The real effective exchange rate refers to the average rate of many bilateral exchange rates, and to become an indicator of the development of the country's competitiveness against external transactions, the nominal rate must be subject to adjustment or correction to eliminate the impact of relative price fluctuations.

3. THE EVOLUTION OF THE INFLATIONARY GAP UNDER THE CRITERIA OF MONETARY STABILITY AND EXCHANGE RATE

3.1. The evolution of the inflationary gap under the monetary stability criterion

The measurement of the inflationary gap according to the criterion of monetary stability is calculated through the difference between the annual rate of change in GDP at constant prices and the rate of annual change in the money supply, if the rate is positive, this indicates the existence of inflationary pressures that increase in weakness or severity depending on the proximity of the amount of the monetary stability standard rate or its distance from zero, and when the rate is

negative, this indicates the existence of sharp deflationary gaps, and in the event that the rate is equal to zero We note through the data in Table (1) that the Iraqi economy suffers from an inflationary gap according to the criterion of monetary stability throughout the studied period except for the years (2012, 2014, 2015, 2016), where economic activities in Iraq suffered from a deflationary gap, the inflationary gap according to the criterion of monetary stability in 2004 was about (0.0834), then that gap rose in (2005, 2006) to the amount of (0.0925, 0.2096) respectively, and with annual growth rates of about (10.91%, 126.60%) respectively, then the inflationary gap according to the criterion of monetary stability rose and decreased in the years (2007, 2008, 2009), as it reached about (0.2695, 0.1598, 0.2049) respectively, and annual growth rates of about (28.56%, -40.71%, 28.24%) respectively, and the reason for this is the occurrence of the global financial crisis and the decline in oil prices, and this represents a reflection of the low level of economic activity ⁽¹³⁾. The inflationary gap according to the criterion of monetary stability in 2014 witnessed a clear decrease of (-0.0176) and a the negative annual growth rate of (-126.77%), and this decline continued to record a negative amount also to reach about (-0.1560, -0.0463) respectively, with growth rates of (784.82%, -70.34%) in 2015 and 2016, and these declines occurred due to the deterioration of the security situation and the war against terrorist groups and their control of oil wells, in addition to the decline in oil prices in the global market, which has a prominent role in The emergence of the deflationary gap in the Iraqi economy ⁽¹⁴⁾.

Then the subsequent years witnessed fluctuating levels of the inflationary gap according to the monetary stability criterion, so the year 2020 witnessed a significant increase, as the amount of the inflationary gap of the monetary stability criterion reached (0.2881) and an annual growth rate of (467.26%), due to the spread of the Corona pandemic and the collapse of oil prices and thus the occurrence of an economic recession, which led to paralysis of economic movement between the countries of the world ⁽¹⁵⁾.

We conclude from the above that the criterion of monetary stability shows that the Iraqi economy often suffers from inflationary pressures of different intensity during the study period, except in a few years in which the economy in Iraq suffered from deflationary pressures, and that growth in GDP may reduce the value of these pressures, but this decline may not affect fundamentally because the growth of output requires balance in basic economic activities in Iraq, and this is linked to the oil revenue on which it depends. The Iraqi economy to a large degree, which makes it vulnerable to global fluctuations, as well as the current conditions that afflict the country, which leads to the emergence of the inflationary gap in Iraq, and the purpose of knowing the development that has occurred in the inflationary gap of the criterion of monetary stability, it can be clarified through the data of Table (1) below:

Table (1) Evolution of the Inflationary Gap by Monetary Stability Criterion in Iraq for the Period (2003-2020) (Million Dinars)

Years	GDP at constant prices (2007=100)	Money supply M1	Change in GDP ΔY	Change in the supply of $\Delta M1$ Cash	Amount of inflationary gap in monetary stability criterion B*	Inflationary gap growth % rate
2003	66,398,900	5,773,601	—	—	—	—
2004	101,788,449	10,148,626	35,389,549	43,75025.0	0.0834	—
2005	103,568,449	11,399,125	1,780,000	12,50499.0	0.0925	10.91
2006	109,368,369	15,460,060	5,799,920	40,60935.0	0.2096	126.60
2007	111,455,813	21,721,167	2,087,444	62,61107.0	0.2695	28.56
2008	119,802,041	28,189,934	8,346,228	64,68767.0	0.1598	-40.71

2009	124,702,847.90	37,300,030	4,900,807	91,10096.0	0.2049	28.24
2010	132,687,028.60	51,743,489	7,984,181	14,443,459.0	0.2190	6.84
2011	142,700,217.00	62,475,821	10,013,188	10,732332.0	0.1016	-53.59
2012	162,587,533.10	63,735,871	19,887,316	12,60050.0	-0.1025	-200.92
2013	174,990,175.00	73,830,964	12,402,642	10,095093.0	0.0659	-164.22
2014	175,335,399.60	72,692,448	34,5225	-11,38516.0	-0.0176	-126.77
2015	183,616,252.10	65,435,425	8,280,853	-72,57023.0	-0.1560	784.82
2016	208,932,109.70	70,733,027	25,315,858	52,97602.0	-0.0463	-70.34
2017	205,130,066.90	71,161,557	-3,802,043	42,8530.0	0.0246	-153.07
2018	210,532,887.20	77,828,984	5,402,820	66,67427.0	0.0600	144.35
2019	222,141,229.70	86,771,000	11,608,343	89,42016.0	0.0508	-15.35
2020	196,985,514.20	103,353,556	25,155,716-	16582556.0	0.2881	467.26

Source/ prepared by the researcher based on:

- Central Bank of Iraq, Annual Statistical Bulletin, for the years (2003-2020), Baghdad, various years.
- Iraqi Ministry of Planning, Central Bureau of Statistics, Annual Statistical Bulletin, for the years (2003-2020), Baghdad, various pages.
- The mathematical formula for the growth rate of the inflationary gap was adopted according to the following formula: $Gr = \left\{ \frac{pt}{po} \right\} - 1 * 100$

Column -s.and (6) of the researcher's work ,(5) ,(4) ,(3)

$$*B = \frac{\Delta M}{M} - \frac{\Delta Y}{Y}$$

3.2. The evolution of the exchange rate in Iraq

Through the data contained in Table (2) the course of development of the official and parallel exchange rate of the Iraqi dinar for the period (2003-2020), as we note a gradual rise and improvement in the value of the Iraqi dinar during the study period, except in 2003, the exchange rate of the Iraqi dinar witnessed a significant deterioration towards the foreign currency, due to the war on Iraq and the overthrow of the former regime and the start of military operations in it, as the official exchange rate was about (1896) dinars per dollar, and the parallel exchange rate was about (1936)) dinars per dollar ⁽¹⁶⁾.

In 2004, after the Central Bank of Iraq obtained independence and freedom through the issuance of the Central Bank Law No. 56 of 2004, monetary policy was modified to achieve the objectives of maintaining the stability of local prices, keeping pace with increasing inflation in addition to increasing the purchasing power of the Iraqi dinar through the measures taken, specifically in the field of the exchange rate of the Iraqi dinar, it was able to control and manage sufficient liquidity, and based on the rules and mechanisms of economic stability, it achieves an increase in the reserves of the Central Bank. of foreign exchange that helps stability, through the adoption of new and more effective tools and methods to maintain the stability of the exchange rate of local currencies ⁽¹⁷⁾, which led to the decline of the official and parallel exchange rate in 2004 to reach the official exchange rate about (1453) dinars per dollar and a negative annual growth rate of (-23.36%), and the parallel exchange rate recorded an amount of (1453) dinars per dollar and a negative annual growth rate of (-24.95 %), and it should be noted that the two prices are equal in the mentioned year, but in 2005 the exchange rate returned to deteriorate slightly, recording a rise in the official exchange rate of (1469) dinars per dollar and an annual growth rate of (1.10%), and the parallel exchange rate is the other rose by (1472) dinars per dollar and an annual growth rate of (1.31%), and the reason for these rises is due to the deterioration of security stability and the spread of rumors among individuals, as well as the decrease in the amount of foreign currency represented In dollars in the Central Bank of Iraq due to the increasing demand for them by commercial banks and also by the



undersecretaries of the Ministry of Commerce to carry out import operations, in addition to increasing the retention of foreign currencies by individuals because they are a stable store of value and to secure their wealth as well ⁽¹⁸⁾.

Then the improvement in the value of the dinar returned during the years (2006, 2007, 2008), as the official exchange rate decreased to (1467, 1255, 1193) dinars per dollar respectively, and with negative growth rates of about (-0.14%, -14.45%, -4.94%) respectively, while the parallel exchange rate during the mentioned years by (1475, 1267, 1203) dinars per dollar respectively, with annual growth rates of about (0.20%), -14.10% and -5.05% respectively, and the reason for this improvement is due to the gradual appreciation of the Iraqi dinar against the US dollar by the monetary policies applied by the Central Bank by providing support to the Iraqi dinar as well as reducing the phenomenon of dollarization ⁽¹⁹⁾.

During the years (2009, 2010, 2011), the official exchange rate witnessed a decline to record a remarkable stability of about (1170) dinars per dollar during those years, and a negative annual growth rate in 2009 amounted to about (-1.93%), and on the other hand, the parallel exchange rate also decreased in (2009, 2010) to (1182, 1186) dinars per dollar respectively, with annual growth rates that reached (-1.75%, 0.34%) respectively, but the parallel exchange rate rose in 2011 to reach (1196) dinars per dollar and an annual growth rate of (0.84%), and the reason for the rise in the parallel exchange rate is due to the collapse of the economic conditions of regional countries ⁽²⁰⁾, as the difference between the two prices gradually decays and is very slight due to the Central Bank organizing the currency window markets better, because the buying and selling operations are one-way and then the economic situation stabilizes as well as the stability of the exchange rate in response to the intervention Inflation target by exchange rate stabilizers.²¹

After that, the official exchange rate fell in (2012, 2013) to reach (1166) dinars per dollar, while the parallel exchange rate witnessed an increase of about (1233, 1232) dinars per dollar during the two mentioned years and with annual growth rates that reached (3.09%, -0.08%) respectively, then the official exchange rate rose again in 2014 as it reached (1188) dinars per dollar with an annual growth rate of (1.89%), while the parallel exchange rate decreased during the mentioned year to (1214) dinars per dollar with a negative annual growth rate of about (-1.46%), then the official exchange rate continued to rise slightly to reach (1190) dinars per dollar during the years (2015-2020), to witness the official exchange rate stability during this period of study, and the reason is due to the monetary policy pursued by the Central Bank and the stability of the exchange rate achieved by this policy, as confidence in the value of the Iraqi dinar and its ability as a store of value began to recover ⁽²²⁾ While the parallel exchange rate began to fluctuate between high and low during that period, as it reached (1247, 1275, 1258, 1209, 1196, 1234) dinars per dollar respectively and with growth rates that reached (2.72%, 2.25%, -1.33%, -3.90%, -1.08%, 3.18%) respectively, and the reason for the increases that occurred during the period mentioned in the parallel market prices are the fees and profits charged by banks and stock exchanges that buy dollars from Central Bank auctions and resell them, in addition to the amount of foreign currency sold by the Central Bank. In daily auctions, which is a high demand in the market ⁽²³⁾, the term devaluation is often confused with the term currency depreciation, the devaluation of the currency relates to cases in which the country fixes the exchange rate of its currency against other foreign currencies or in front of the gold, but the decline in the value of the currency, the exchange rate of the local currency of a country falls or falls against the value of foreign currencies of other countries according to the forces of supply and demand.

We conclude from the above analysis and study of the exchange rate of the Iraqi dinar during the study period (2003-2020), that the official and parallel exchange rates witnessed fluctuations between high and low levels, and that the exchange rate in the parallel market has moved in a range close to the official exchange rate due to the monetary policy applied by the Central Bank of Iraq, which contributed significantly to achieving stability in exchange rates as well as achieving economic stability, as a result of the independence enjoyed by the Central Bank after 2003. Thus, raising the value of the Iraqi dinar against the US dollar, and identifying the evolution of the



official and parallel exchange rate in Iraq for the period (2003-2020), their data have been organized in Table (2) as follows:

Table (2) Evolution of the Official and Parallel Exchange Rate of the Iraqi Dinar for the Period (2003-2020) (JD/USD)

growth rate % Annual	Exchange rate Parallel	growth rate Annual %	Exchange rate Official	Years
—	1936	—	1896	2003
-24.95	1453	-23.36	1453	2004
1.31	1472	1.10	1469	2005
0.20	1475	-0.14	1467	2006
-14.10	1267	-14.45	1255	2007
-5.05	1203	-4.94	1193	2008
-1.75	1182	-1.93	1170	2009
0.34	1186	0	1170	2010
0.84	1196	0	1170	2011
3.09	1233	-0.34	1166	2012
-0.08	1232	0	1166	2013
-1.46	1214	1.89	1188	2014
2.72	1247	0.17	1190	2015
2.25	1275	0	1190	2016
-1.33	1258	0	1190	2017
-3.90	1209	0	1190	2018
-1.08	1196	0	1190	2019
3.18	1234	0	1190	2020

Source/ prepared by the researcher based on:

- Central Bank of Iraq, Directorate General of Statistics and Research, Annual Statistical Bulletin for the years (2003-2020).
- The mathematical formula for the annual growth rate has been adopted according to the following formula: $Gr = \left\{ \frac{pt}{po} \right\} - 1 * 100$
- Columns (2) and (4) of the researcher's work.

4. RESULTS

4.1. Testing the stability of the variables (The Stationary):

Before starting the test by least squares, we test the stability of the time series through the unit root test, the Dickey-Fuller extended test (Augmented Dickey-Fuller), and after performing the test, the results appeared as follows:

Table (3) Extended Dickie-Fuller Test for Unit Root

Variables	Appreciation		Regression shape	Level of spreads	Morale level
	calculated t	Probabilities			
EX	-12.52348	0.0000	Cross	Level	%1
INFSM	-7.431490	0.0000	Cross	Level	1%

Source: Prepared by the researcher based on the outputs of the Eviews12 program.



Table (3) shows the results of the unit root test according to the Dickey-Fuller ADF test according to the level of existence of a segment, where the calculated value of (t) is tested and compared with (t) tabular based on the tables (t) Dickey-Fuller at a significant level (1%), and when a stability test is performed (Skun) variables We find that the time series for estimating the relationship between the inflationary gap and the exchange rate in Iraq extending from (2003-2020) is stable and the degree of stability of the dependent and independent variables has varied, so the variables represented by (INFSM, EX) stabilized at the level and at a significant level (0.01%) and this means that the series is integrated from the zero degree (I ~ 0, ie that all dependent and independent variables are free of the unit root and do not contain pseudo-regression, which means rejecting the null hypothesis ($=0\lambda H_0:$) that states the existence of the unit root problem, and accepting the alternative hypothesis ($0\neq\lambda:H_i$) that states that the unit root problem does not exist, i.e. the stillness of the variables, and therefore the variables will be integrated at the first level and difference.

4.2. The results of estimating the inflationary gap of the monetary stability criterion on the exchange rate:

After testing the stillness of the time series of economic variables, the results are now estimated by the least squares method of the official exchange rate index and as shown in Table (4), considering that (EX) is a dependent variable and (INFSM) is an independent variable, the statistical tests show the quality of the model through the value of the coefficient of determination ($0.609294 = 2R$), while the value of the corrected coefficient of determination (2 (Adjusted R-squared \bar{R} It reached (0.584875), meaning that the independent variables included in the model explain the value of (58%) of the changes that occur in the dependent variable and that the remaining value (42%) is due to other variables that are not included in the model, and the significance of the model as a whole is evident through the test of the value of (F-statistic), which was significant at the level of (1%) Thus, the model is significant, i.e. we reject the null hypothesis ($H_0: B=0$) and accept the alternative hypothesis ($H_0: B\neq 0$), as shown in the following table:

on the Exchange Rate

Dependent Variable: EX			
Method: Least Squares			
Date: 05/19/23 Time: 23:22			
Sample: 2003 2020			
Included observations: 18			
Prob.	t-Statistic	Std. Error	Coefficient Variable
0.0000	36.15763	32.95038	1191.408 C
0.0001	4.995152	113.6796	567.8466 INFSM
1272.389	Mean dependent var	0.609294	R-squared
188.8950	S.D. dependent var	0.584875	Adjusted R-squared
12.54552	Akaike info criterion	121.7054	S.E. of regression
12.64445	Schwarz criterion	236995.2	Sum squared resid
	Hannan-Quinn		
12.55916	criteria.	-110.9097	Log-likelihood
0.597815	Durbin-Watson stat	24.95154	F-statistic
		0.000132	Prob(F-statistic)

Source: Prepared by the researcher based on the outputs of the Eviews12 program.

4.3. The Bound Test Approach to Counteraction:

The joint integration shows the long-term equilibrium relationship between the variables, and the joint integration test will be conducted, and the results were as shown in the following table:

Table (5) Boundary Test for Cointegration

Date: 05/19/23 Time: 23:35					
Sample (adjusted): 2003 2020					
Included observations: 16 after adjustments					
Trend assumption: Linear deterministic trend					
Series: INFSM EX					
Lags interval (in first differences): 1 to 1					
Unrestricted Cointegration Rank Test (Trace)					
	0.05	Trace		Hypothesized	
Prob.**	Critical Value	Statistic	Eigenvalue	No. of	CE(s)
0.1140	15.49471	13.02190	0.433689	None	
0.0476	3.841465	3.924107	0.217496	At most 1 *	
The trace test indicates no cointegration 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)					
	0.05	Max-Own		Hypothesized	
Prob.**	Critical Value	Statistic	Eigenvalue	No. of	CE(s)
0.2781	14.26460	9.097789	0.433689	None	
0.0476	3.841465	3.924107	0.217496	At most 1 *	

Source: Prepared by the researcher based on the outputs of the Eviews12 program.

In Table (5), we note that the test of the results shows that there is more than one vector for joint integration, according to the Trace effect test, and then rejecting the alternative hypothesis and accepting the null hypothesis, which states that there is no joint integration at the level of significance (5%), while the maximum value test shows the existence of a vector also at the level of significance (5%). This confirms the existence of a long-term equilibrium relationship between the variables studied.

4.4. Granger Causality Test

It is a test used to determine the direction of causality between the variables of the study, as this test shows the direction of causality whether it is one-way or two reciprocal directions or that the two variables are both independent of each other, and after we conducted the test we got the results shown in Table (6): -



Table (6). Granger Causality Test

Pairwise Granger Causality Tests			
Date: 05/20/23 Time: 00:30			
Sample: 2003 2020			
Lags: 1			
F-Prob.	Statistic	Obs	Null Hypothesis:
0.0084	9.38517	17	INFSM does not Granger Cause EX
0.7638	0.09390		EX does not Granger Cause INFSM

Source: Prepared by the researcher based on the outputs of the Eviews12 program.

We can see from the causality test of Kranger in Table (6) that there is a one-way causal relationship from INFSM towards EX, i.e. previous changes in INFSM explain the current changes in EX, and there is no causal relationship from EX towards INFSM.

Fifth: Analysis of the results of the autoregression model (VAR):

Before analyzing the VAR model of the model variables, it is necessary to know the optimal number of slowdown periods for these variables, and after conducting the test, the results were as in Table (7), as the optimal deceleration periods are determined based on the AIC standard, the Squarz standard (SC), the Hanan-Coin standard (HQ), the FPE and LR standards. The slowdown period that carries the lowest value for these criteria is chosen:-

Table (7). VAR Vector Autoregression

VAR Lag Order Selection Criteria						
Endogenous variables: EX INFSM						
Exogenous variables: C						
Date: 05/19/23 Time: 23:56						
Sample: 2003 2020						
Included observations: 16						
HQ	SC	AIC	FPE	LR	LogL	Was
10.84323	10.93486	10.83829	174.6633	ON	-84.70630	0
9.341599*	9.616483*	9.326763*	38.86087*	26.14983*	-68.61410	1

Source: Prepared by the researcher based on the outputs of the Eviews12 program.

From Table (7), we conclude that the number of slowdown periods is one duration based on the mentioned criteria AIC, SC, HQ, LR, and FPE standards, which carry the lowest value at the first slowdown period, which will be the optimal slowdown period.

After we have completed the treatment of time series stability and cointegration and causality testing, we will estimate and analyze the VAR model, and after the model has been estimated, we obtained the results shown in Table (8) as follows:-

Table (8) Results of VAR Model Analysis

Vector Autoregression Estimates
Date: 05/20/23 Time: 00:00
Sample (adjusted): 2004 2020
Included observations: 17 after adjustments
Standard errors in () & t-statistics in []



INFSM	EX	
8.82E-05 (0.00029) [0.30643]	0.747171 (0.10727) [6.96547]	EX(-1)
0.056941 (0.21017) [0.27092]	-239.9981 (78.3406) [-3.06352]	INFSM(-1)
-0.031601 (0.34664) [-0.09116]	313.5650 (129.209) [2.42680]	C
0.058549 -0.075944 0.240691 0.131119 0.435330 12.06641 -1.066637 -0.919599 0.088665 0.126407	0.828346 0.803824 33440.90 48.87367 33.77966 -88.58869 10.77514 10.92218 1235.706 110.3448	R-squared Adj. R-squared Sum sq. resides S.E. equation F-statistic Log-likelihood Akaike AIC Black SC Mean dependent S.D. dependent
40.81695	Determinant resid covariance (dof adj.)	

Source: Prepared by the researcher based on the outputs of the Eviews12 program.

Through the results of Table (8), there were models of autoregression of the variables studied in the research:

1- When assuming that the exchange rate (EX) is a dependent variable and the other variable lagging in time is an independent variable (EX-1, INFSM-1), we note that the significance of the same variable is proven by one-time lag EX-1 at a significant level (1%) while the significance of the other variable INFSM-1 was at the level of 5%, and the modified multiple determination coefficient (Adj. R-squared) It is equal to (80%) meaning that this amount remains in the dependent variable attributed to the time-lagging independent variables, and (20%) is attributed to other variables.

2- When the inflationary gap according to the monetary stability criterion (INFSM) is a dependent variable and the other time-behind variable is an independent variable (EX-1, INFSM-1), the significance of either of them will not be proven at statistically acceptable levels.

5. CONCLUSIONS AND DISCUSSION

The Iraqi economy suffers in most years of the study from a widening problem of inflationary gap according to the measure of monetary stability, which reflects the inability of the productive system in Iraq to contain the surplus demand resulting from pumping additional levels of money into the economy. The main reason for the emergence of the inflation gap according to the monetary stability criterion is the lack of a proportional relationship between the growth rate of the money supply and the growth rate of the gross domestic product, as the growth rate of the money supply has exceeded the output growth rate in most years of the study, as a result of the



dependence of inflationary pressures on politics Finance significantly in the high rates of inflationary gap according to the monetary stability criterion. During the study period (2003-2020), which was characterized by the economic openness of Iraq to global markets, through which Iraq's oil exports increased as a result of the lifting of economic sanctions on it, and after the independence of the Central Bank of Iraq in drawing monetary policy under Law No. 56 of 2004, the Central Bank released the dinar From the restrictions of the dual exchange rate and the unification of the Iraqi dinar exchange levels to a unified exchange rate approved in light of the currency auctions adopted by the Central Bank. The results of the causal test indicated that there is a one-way causal relationship from INFSM towards EX, that is, previous changes in INFSM explain the current changes in EX, and there is no causal relationship from EX towards INFSM. The results of the analysis of the relationship and the mutual effect between the inflationary gap of the monetary stability standard and the exchange rate in Iraq for the period (2003-2020) indicated the significance of the independent variable in affecting the dependent variable, as the results of estimating the impact of the inflationary gap according to the monetary stability standard on the exchange rate were significant and positive and consistent with Economic logic, because the change in the amount of money is greater than the real national product, and this shows the existence of a balancing relationship between the studied variables. The need to work on developing a policy of economic diversification in the Iraqi economy, and not relying on the rentier output resulting from an unstable source, in addition to the lack of the ability of the Iraqi economy to control its prices, and to provide support for the import of productive goods to meet internal demand by carrying out local production through Establishing large factories whose production is characterized by abundant volume, and then working to increase the export of manufactured goods because they provide revenues from foreign exchange, which results in the stability of exchange rates and the strength of the Iraqi dinar against the foreign currency. Work to determine monetary growth rates commensurate with the growth rates of the gross domestic product, to determine the amount of money needed by the Iraqi economy while not increasing it widely and introducing the Iraqi economy into an inflation gap or neglecting it and thus pushing the economy towards stagnation. Rationalizing public expenditures, especially consumer expenditures, and adopting the principle of spending for necessary reasons, to avoid signs of inflationary gaps. Increasing the proportion of investment expenditures from financial allocations, because investment expenditures lead to an increase in the proportion of state revenues in the long term, as well as working to multiply the sources of funding for the general budget, by directing them towards more efficient sectors such as the agricultural and industrial sectors, which play an important role in increasing the proportion of production in the Iraqi economy.

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