



An analytical study of the effect of money supply on the exchange rate in the Yemeni economy during the period (1995-2018)

Mohammed Qasem Al-maflehi¹, Prof. Dileep Arjune², Dr. Mohammed Hadi Nasser³

¹Research Scholar, Dept. of Economics, J.E.S, College, JALNA.

Dr. Babasaheb Ambedkar Marathwada University, (M.S.), India.

²Department of Financial and Banking Sciences, Aden University - Yemen.

²(M.A., M.Phil. SET, Ph.D. Economics), Professor and Head, Dept. of Economics, J.E.S. College, JALNA. Dr. Babasaheb Ambedkar Marathwada University, (M.S.), India.

³Department of Financial and Banking Sciences, Faculty of Economics and Political Science, Aden University – Yemen.

Corresponding Author – Mohammed Qasem Al-maflehi

Email: m.almaflehi77@gmail.com

DOI- 10.5281/zenodo.10043246

Abstract:

This study aimed to measure the effect of money supply on the exchange rate in the Yemeni economy during the period 1995-2018, using Vector Auto Regression (VAR) to estimate the long-term relationship between the study variables and the error correction vector (VECM) to find the short-term relationship. The study found a positive and significant effect of money supply on the exchange rate in the Yemeni economy during the research period, as the coefficient reached (25.3). This means that if the money supply increases by one unit, the foreign exchange rate will increase by 25.3%. Thus, the purchasing value of the national currency decreases, meaning that the money supply (the independent variable) is directly related to the exchange rate (the dependent variable) in the Yemeni economy. The study also found a positive and moral effect of inflation rates towards the exchange rate in the Yemeni economy during the study period.

Keywords: money supply, exchange rate, inflation rate, Yemen, VAR model.

Introduction:

The study of the subject of money is considered one of the basic economic studies due to its connection and its impact on many economic problems. Money is also a reflection of the most important economic activities and social aspects, as it plays an essential role in economic life. This is also a result of its important role in the contemporary economy as it is the main driver of all transactions in the economies of different countries and an effective tool in revitalizing the economy through its direct effects on macroeconomic variables (Mpofu 2021). The money supply affects the overall elements of the internal stability of the economies of any country. Therefore, the monetary authorities represented in the Central Bank undertake the process of monetary issuance and the regulation of the money supply as a result of its utmost importance and the greatest impact it has on most economic variables, including the exchange rate, which plays an important role in the economic activities carried out by the state, whether commercial or investment-related. Monetary is a highly sensitive variable, especially after the expansion and development of international trade, as the exchange rate has become a pivotal center in monetary policy. The phenomenon of exchange

rates arose from the phenomenon of money and exchange rates came to solve the problems raised by various economic transactions, not only in calculating the value of transactions, but also in settling this value. Thus, we note the correlation between money, the size of its supply and exchange rates (TURNA & ÖZCAN 2021). Through this study, the researcher will clarify the relationship in light of the evolution of the two variables in the Yemeni economy.

The problem of the study:

The problem of the study is to answer the following main question: What are the effects of the money supply on the exchange rate in the Yemeni economy?

The importance of the study:

The importance of the study lies in the importance of the study variables and their greater impact on the country's economy, as changes in the volume of the money supply, by increase or decrease, have a positive or negative impact on a number of macroeconomic variables. This includes exchange rates which is one of the most important contemporary economic variables that affect the internal and external economic transactions.

Study hypotheses:

The hypotheses of the study are as follows:

- There is no effect of the money supply on the exchange rate in the Yemeni economy during the period (1995-2018).
- There is no effect of inflation rates on the exchange rate in the Yemeni economy during the period (1995-2018).

Objectives of the study:

The objectives of the study are the following:

- 1- Analysis of the development of money supply and exchange rate in the Yemeni economy during the period (1995-2018)
- 2- Knowing the effect of money supply on the exchange rate in the Yemeni economy during the period (1995-2018).

Study Methodology:

The study relied on the descriptive analysis methodology as well as the standard analysis method to study the relationship between the money supply and the exchange rate in the Yemeni economy in light of the available data to clarify the relationship and determine the impact.

Previous Studies:

There are many Arab and foreign studies that discuss the effect of money supply on the exchange rate. These studies differ from one country to another according to the economic conditions that the country is going through. In this part of the research, we will review the most important studies that examined money supply and the exchange rate, and know the most important findings of these studies.

Samia Mansour (2015): This study carried the title "Standard for some determinants of the exchange rate in Algeria for the period (1975-2013)". The study aimed to find out the most important factors that affect the exchange rate in the long run. Thus, the study used the descriptive analytical method to examine the concepts of price and some of its determinants. The necessary standard and statistical methods were also used to study the relationship between the independent variables: (inflation, interest rate, exports) and the dependent variable (exchange rate). The study concluded that the exchange rate in Algeria is determined by the mechanism of supply and demand in the financial market. The results of the study also showed an inverse relationship between exports and the exchange rate in Algeria, which means that exports have no effect on the exchange rate. It also showed the existence of a direct relationship between the interest rate and the exchange rate in Algeria, as the interest rate significantly affects the exchange rate. The study proved the existence of a direct relationship between inflation rates and the exchange rate in Algeria, as a change in the inflation rate by 1% will lead to a change in the exchange rate by 0.253 alone.

Shanbesh Muhammad (2013): This study is titled "The Relationship Between Inflation, Money Supply

and Exchange Rate in the Libyan Economy during the period 1992-2008". It aimed to determine the relationship between inflation, money supply and exchange rate. It relied on the descriptive analytical approach in addition to the use of standard and statistical methods and methods to achieve the study's goal. The results of the study showed a direct relationship between inflation rates and the exchange rates of the Libyan dinar, as the value of the elasticity coefficient was (0.447). This means that a 100% devaluation of the Libyan dinar against the dollar will lead to an increase in inflation rates by 44%. Here, it should be noted that the effect of money supply on inflation is greater than the effect of changing the Libyan dinar exchange rate.

BabakrSuhad (2014): This study is titled "Determinants of the Exchange Rate in Sudan Using the Cointegration and Error Correction Model (1978_2010)". It aimed to know the most important factors affecting the exchange rate in Sudan. The inductive approach was used to list general concepts about the exchange rate and the factors affecting it in addition to the quantitative econometric approach using co-integration and the error correction model by applying to the determinants of the exchange rate during the period (1978_2010) using the econometric analysis program (Eviews). The results of the study showed the existence of a co-integration relationship between the independent variables represented in the money supply, the inflation rate, the gross domestic product, the balance of payments and the government budget and the exchange rate as a dependent variable.

The study concluded that there is a long-term equilibrium relationship between the independent variables and the dependent variable. The causality test based on the error correction model showed that there is a causal relationship between the dependent variable and the independent variables in the short term. The study also proved that inflation, balance of payments and money supply are the most important determinants of the exchange rate in Sudan.

Al-Ghalbi Abdul-Hussein and Al-JubouriSawsan (2008): This study is entitled "The Impact of Money Supply Measures on Some Macroeconomic Variables in a Sample of Developed Countries". The study aimed to determine the impact of the money supply, according to its various aggregates, on the macroeconomic variables in a sample of developed countries. The research relied on the descriptive analysis of the studied macro variables (GDP, interest rate, general level of prices, trade balance, unemployment, government spending and foreign exchange rate) in Canada, Japan and Spain. The study focused on knowing the effect of money supply on the foreign exchange rate. Thus, the results of the study showed that the net currency in circulation (M0) affects the exchange rate of the

Canadian dollar, while its effect appears on the exchange rate of the Japanese yen. The study also showed that the money supply in the narrow sense (M1) showed an impact on the exchange rate in Canada and Japan more than its effect on the exchange rate of the Canadian dollar. Spain The study also showed the effect of money supply in the broadest sense (M3) on the general level of prices in Japan and Canada without any effect on the Spanish variables.

Nazem Abdullah and Al-Issawi Majid (2017): This study was titled “Measuring and analyzing the factors affecting the exchange rate of the dinar in the Iraqi economy using the Autoregressive Distributed Time Gaps (ARDL) model for the period 1990-2015”. The study aimed to measure and analyze the short and long-term relationship between the Iraqi dinar exchange rate, the money supply, the budget deficit and some macroeconomic variables, using the quantitative approach by building a model to measure and analyze the impact of the money supply, the budget deficit and some macroeconomic variables on the Iraqi dinar exchange rate based on programs Statistics (Eviews9, spss17). Thus, the study revealed the following most important results:

- 1- The results of the estimation of the standard model proved the existence of a negative and significant effect for each of the variables of the money supply, the budget deficit, the gross domestic product and the degree of economic openness in the exchange rate of the Iraqi dinar against the dollar in the parallel market, in addition to the presence of a positive and moral effect of the consumer price index and oil revenues on the exchange rate in long term.
- 2- The degree of influence of the money supply on the changes that occur in the exchange rate of the dinar against the dollar in the parallel market in the short term is 34% of the total impact (the long term), which is higher than the degree of impact of the budget deficit of 26%.

Kitan Hussein (2017): This study was entitled "Measuring and analyzing the effect of money supply on inflation and the foreign exchange rate in the Iraqi economy for the period (1991_2014)". It aimed to clarify the relationship between money supply and the foreign exchange rate, and then measure and analyze the impact of the net currency in circulation and money supply in the narrow sense and money supply in the broad sense on the foreign exchange rate in the Iraqi economy. The research adopted the descriptive analytical method and the quantitative standard method. Thus, the results of the study showed that the net currency in circulation had a higher effect than money supply in the narrow and broad sense on the exchange rate. The standard analysis also proved that there is a direct relationship between the money supply (M2, M1,

M0) and the foreign exchange rate in the Iraqi economy.

Nour Al-Huda Mushfak (2018): This study is entitled "The Impact of Money Supply on Some Macroeconomic Variables –A Case Study of Algeria's Economy for the Period 2001-2016". It aimed to know the impact of the money supply on some macroeconomic variables, including the exchange rate, and therefore the study results were summarized in that the money supply showed an adverse effect on the exchange rate. This means that an increase in the money supply does not lead to a rise in exchange rates. This does not agree with the views of economists. The reason for this is due to the increasing global demand for the national currency through the increase in demand for oil and the increase in imports needed for the economic recovery program and the economic growth support program.

Said Maysa (2016): This study is entitled: "The effect of time gaps in determining the causal relationship between money supply and the exchange rate in Sudan using the Granger test in the period 1980-2014". It aimed to know the causal relationship between money supply and the exchange rate using the Granger method, as well as to identify the developments in money supply and exchange rate in Sudan. The study adopted the descriptive analytical method in addition to the standard method. Thus, the study showed the existence of a two-way co-integration relationship between the study variables. It also showed the existence of a reciprocal causal relationship between the money supply and the exchange rate that explains the changes that occur in each of them.

Abdelkader Murad (2011): This study was entitled "Studying the impact of monetary variables on the exchange rate of the Algerian dinar against the US dollar during the period 1974-2003". The study aims to research and estimate the most important monetary variables on the exchange rate of the Algerian dinar against the US dollar. The research relied on the descriptive analytical method in addition to the historical method and the case study method to measure the impact of the most important monetary variables on the Algerian dinar exchange rate. The results of the study summarized that the exchange rate is affected by several economic factors, the most important of which are: money supply, interest rates, inflation rates, the state of the balance of payments and the state of the general budget, and there are other factors such as political instability and rumors.

The path of development of money supply and exchange rate in the Yemeni economy for the period (1995-2018):

The development of the money supply in the Yemeni economy for the period (1995-2018):

The money supply is one of the most influential economic variables because of its impact on a number of economic factors and variables represented in the general budget, inflation and the

currency exchange rate. The following table shows the development of the money supply in the Yemeni economy during the period (1995-2018).

Table (1): The development of the size of the money supply in the Yemeni economy in millions of riyals during the period (1995-2018):

Year	(M1)	(quasi cash)	(M2)money supply
1995	164135	84130	248265
1996	156698	112853	269551
1997	166384	132004	298388
1998	179927	153422	333349
1999	207197	172098	379295
2000	247248	227277	474525
2001	282683	280366	563049
2002	306450	358215	664665
2003	347465	449906	797371
2004	390541	526734	917275
2005	442464	607045	1049509
2006	558461	792969	1351430
2007	613748	1037589	1651337
2008	680159	1197318	1877477
2009	758331	1317467	2075798
2010	786133	1480589	2266722
2011	992999	1275233	2268232
2012	1104820	1652943	2757763
2013	1116583	1984980	3101563
2014	1129542	1976673	3106215
2015	1502395	1736464	3238859
2016	1789618	1907836	3697454
2017	2316479	1965869	4282348
2018	3177713	2051719	5229432
Average 2018_1995	809090.5	978404.1	1787495

Source: - Central Bank of Yemen, General Authority for Statistics and Research, Sana'a, annual reports for the years (2000, 2007, 2013, 2015).

- The Central Bank of Yemen, General Administration of Research, Statistics and Research, Aden, the annual report on monetary and banking performance for the years (2016, 2017, 2018).

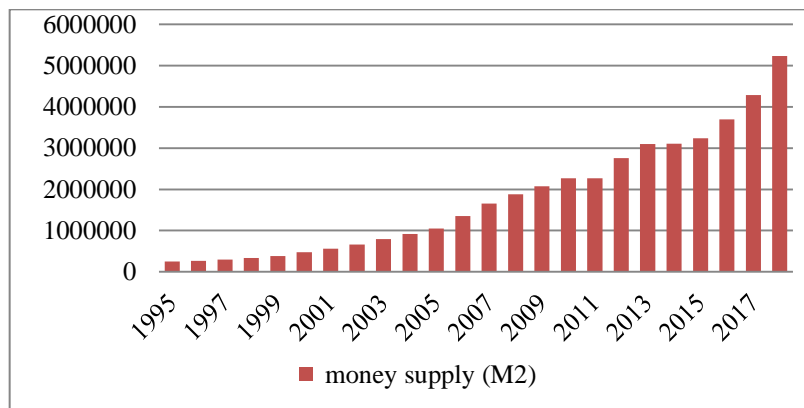
Table (1) shows the development of the money supply in the Yemeni economy during the period (1995-2018). We note during the period (1995-1999) a continuous increase in the money supply during these years, as the money supply in 1995 amounted to (248265 million riyals) and in 1999 amounted to (379295 million riyals), an increase in the size of the money supply by an amount of 131030 million riyals compared to what it was in 1995. This is the result of the increase in the components of the money supply represented in cash and cash equivalents during these years. We note that this period is the period in which the economic reform policy was adopted and a number of monetary measures were implemented within the reform program to correct the structural imbalances that the Yemeni economy suffers from, especially after the civil war and the political turmoil that the country witnessed in 1994, which resulted in a

number of imbalances and deterioration in economic indicators. Most notably, the deterioration of the national currency exchange rate and the rise in inflation rates (the rise in the general level of prices). During the period (2000-2007) we also note the continuous increase and growth in money supply in the narrow sense as well as money supply in the broad sense (M2). The data indicate an increase in the size of the money supply in the narrow sense (M1), which consists of the currency circulating outside the banking system in addition to demand deposits (current deposits). The increase in the currency circulating outside the banking system reflects the public's lack of confidence in the banking system, and in return there is also an increase in quasi-money as a result of the increase in deposits of various kinds, whether in foreign currency or term and savings deposits and social security deposits, which in total constitute the volume of quasi-cash. Thus, the size of the money supply amounted to (1651337 million riyals) in 2007 compared to what it was in 2000, which amounted to (474525 million riyals), with an

increase of (1176812 million riyals), which is several times what it was in 2000. This confirms the weak performance of monetary policy in controlling the size of the money supply, which is growing very dramatically and at a rate that exceeds the rate of growth in the size of real GDP. This increase is reflected in the increase in the volume of domestic demand for goods and services in light of the limited supply of them, which leads to a rise in the general level of prices and a deterioration in the exchange rate (a decrease in the purchasing value of the national currency).

Moreover, during the period (2008-2014) we note the continuous increase and growth in all components of the money supply in the Yemeni economy, which suffers from a number of chronic structural imbalances. The money supply in 2014 amounted to (3106215 million riyals), as despite the decrease in the quasi-cash component during the year 2011 and 2014, the money supply continued to increase as a result of an increase in the currency in

The following figure shows the path of development of money supply in the Yemeni economy during the period 1995-2018:



Source: Prepared by the researcher based on the data in Table (1) and Excel

The development of the exchange rate in the Yemeni economy during the period (1995_2018):

The exchange rate is one of the most important economic variables included in the market economy and on which a number of decisions are built for dealers in economic activities, as the

circulation. As for quasi-money, it declined in 2014. The decline in quasi-money is due to the decline in deposits, especially deposits in foreign currencies, as a result of the decrease in the government's share of foreign exchange as a result of sabotage operations and a decline in oil exports. (It is worth noting here that in 2014 the Central Bank provided 2187.7 million dollars of foreign exchange required to import oil derivatives, as a result of the decrease in the government's share destined for domestic consumption, which was affected very significantly as a result of acts of sabotage). As for the period (2015-2018), which is considered an exceptional period because the country is going through a civil war during this period, most of the state's revenues stopped and the state relied heavily on the cash issuance process to cover its expenses. The size of the money supply increased from 3238859 million riyals in 2015 to 5229432 million riyals in 2018. This reflects an increase of 1990,573 million riyals.

Yemeni riyal is linked to the dollar, and this relationship is determined according to the exchange system followed, whether it is fixed or free. Through the following table, the development of exchange rates in the Yemeni economy will be explained.

Table (2): The evolution of the exchange rate in the Yemeni economy for the period (1995_2018) (riyals / dollars):

Year	Exchange Rate	Rate of change in exchange rate %
1995	50.04	0
1996	128.19	156.38
1997	129.28	0.85
1998	135.88	5.11
1999	155.75	14.62
2000	161.73	3.84
2001	168.69	4.30
2002	175.60	4.10
2003	183.5	4.50
2004	184.78	0.70
2005	191.42	3.59

2006	197.05	2.94
2007	198.95	0.96
2008	199.78	0.42
2009	202.85	1.54
2010	219.59	8.25
2011	213.80	(-2.64)
2012	214.35	0.26
2013	214.89	0.25
2014	214.89	0.00
2015	245	14.01
2016	313	27.76
2017	436	39.30
2018	500	14.68
Average 2018_1995	209.79	13.75

Source: Central Bank of Yemen, General Authority for Statistics and Research, annual reports for the years (2000, 2002, 2007, 2011, 2013, 2014, 2015)

-Bulletins, periodicals and reports of the Central Statistical Organization, Yemen, for the years from 2002 to 2011.

-Ministry of Planning and International Cooperation, Economic Studies and Outlook Sector, Economic and Social Developments in Yemen, Macroeconomic Developments, Issue (44), August, 2019.

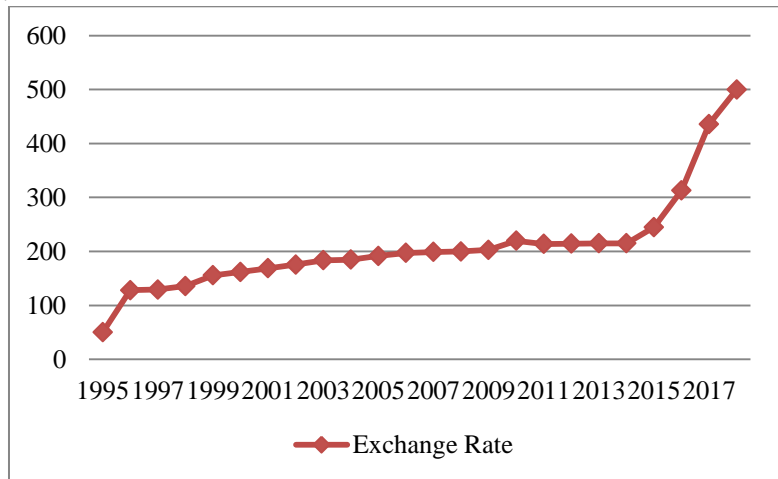
Table (2) shows the exchange rate index in the Yemeni economy, which is one of the most important economic indicators at the present time in reflecting a picture of the Yemeni economic situation for investors, as the exchange rate in the Yemeni economy has gone through a number of stages and transformations in its systems from fixed to floating managed by the Central Bank During the school years. Through the table, we note that the exchange rate during the period (1995-1999) witnessed a number of changes, especially in 1996, as it amounted to (126.91 riyals / dollar) while it was in the previous year (50 riyals / dollar), as a result of the economic reform program that made the exchange rate system floating but managed by the monetary authority represented by the central bank. The change rate amounted to 156.38 percent, more than double what it was in the previous year, and the rise in exchange rates (decrease in the purchasing value of the national currency) continued. The exchange rate of the Yemeni riyal against the US dollar at the end of the studied period in 2014 was about (214.89 riyals / dollar), compared to what it was at the beginning of the studied period in 1995, which amounted to 50 riyals / dollar. This means the failure of the monetary authorities represented in the Central Bank of Yemen to limit the deterioration of the national currency exchange rate. Through what was previously reviewed for data related to the development of the money supply and the exchange rate in the Yemeni economy during the period (1995-2018), the mutually

influential relationship between the changes that occurred in the size of the money supply and the changes that occurred in the exchange rate, which was characterized by the continuous increase during the study period, appears. We note from tables (1) and (2) that the size of the money supply in the Yemeni economy has been characterized by continuous growth throughout the years of the study period. This growth in money supply was accompanied by a sharp deterioration in the exchange rate of the Yemeni riyal against the US dollar. In 1995, the government adopted an economic reform program to address structural imbalances, reduce public spending and the public debt burden, and reduce inflation rates. This did not limit the exacerbation of the exchange rate crisis, as the monetary authorities tended to increase the money supply to finance the deficit in the state's general budget through cash issuance. This inflationary financing led to the depreciation of the national currency. We note from the previous data of the Yemeni riyal exchange rate against the US dollar that the largest rate of change of the exchange rate was in 1996 due to reforms in the field of monetary policy, which is the unification and reduction of the official customs exchange rate to 126 riyals / dollar, while it was 50 riyals in the previous year. The transition was made during this year to the managed floating exchange system, which means that the monetary authority intervenes from time to time to reduce fluctuations in the exchange rate. And the exchange rates that were clarified are the indicative rate issued in the publications of the Central Bank of Yemen, which commercial banks deal with in the field of their foreign operations. As for the exchange rate of the Yemeni riyal against the US dollar in the parallel market, it is more deteriorating, as the decline in the value of the currency led to an increase in prices and an increase in the rate of inflation. The period 2015-

2018 also witnessed a sharp and very significant deterioration in the exchange rate of the national currency against the US dollar, as a result of the significant increase in the size of the money supply during that period. Thus, the increase in the money supply did not lead to a solution to the problem, and the economic situation worsened and complicated. This increase was accompanied by an increase in the general level of prices (high inflation rates) and then a decrease in the purchasing value of the national

currency, as well as a decrease in the average real income per capita. This means that the continuous increase in the size of the money supply represents an inflationary increase in light of an economy that suffers from a stagnation in the productive system and a decrease and halt in exports of goods and services and an inability to cover aggregate demand and a decrease in foreign exchange reserves in value, which in turn leads to the exchange rate depreciation.

The following figure shows the course of the development of the exchange rate in the Yemeni economy during the period 1995-2018:



Source: Prepared by the researcher based on the data in Table (2) and Excel.

Research Methodology:

To find out the impact of money supply and inflation on exchange rate in the Yemeni economy represented by the exchange rate of the national currency against the US dollar during (1995-2018), this research will consist of a dependent variable is exchange rate and two independent variables are money supply and inflation rate. The model can be formulated with the following equation:

$$EXCH = f(M2, INF)$$

$$EXCH_t = \beta_0 + \beta_1 M2 + \beta_2 INF + \mu_t$$

Where:

EXCH: Exchange rate.

M2: Money supply.

INF: Inflation rate.

μ_t : Random error.

The (VAR) model will be estimated according to the following equation:

$$EXCh_t = \alpha_0 + \sum_{i=1}^p \beta_i M2_{(t-p)} + \sum_{i=1}^p \gamma_i Inf_{t-p} + E_t$$

Results and Discussion:

Unit Root Test:

To illustrate the stability of the series and its absence from the unit root, we use the Augmented Dickey Fuller test, which shows that the variables are static at the level and with a significant level 5%. Thus the Vector Auto-Regression model (VAR) can be applied.

Table 1: Results of stability tests using ADF

Variable	At Level			At 1 st Deference		
	Trend and intercept	intercept	Non	Trend and intercept	intercept	Non
EXCH	-8.066					
LM2	-4.477					
INF	-6.354					
			%10	%5	%1	
		1	-1.61	-1.95	-2.58	
		2	-2.57	-2.86	-3.43	
		3	-3.12	-3.41	-3.96	

Critical values to test of ADF

Source: MacKinnon (1996)

We note from the previous table that all the variables of the study are static at the level and

integrated in degree I(0), and therefore the (VAR) method can be applied to estimate the model and

then estimate the Vector Error Correction Model (VECM) to determine the short-run relationship. Determining the ideal number of lags for the model estimated using multiple test criteria, such as:

Akaike info criterion, Hannan-Quinn criter, Schwarz criterion as in Table (2), which shows that the number of ideal lags for the model is (4) according to the previous criteria.

Table2: Optimal Lags Length

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-120.3659	NA	2144.327	16.17074	16.60532	16.19300
2	-115.6195	5.933116	4040.697	16.70243	17.57159	16.74694
3	-98.54440	14.94067	2045.333	15.69305	16.99679	15.75981
4	-47.24076	25.65182*	25.25930*	10.40509*	12.14342*	10.49411*

After confirming the stability of the variables and determining the number Optimal Lags Length of for the model, the (VAR) model is estimated according to the following equation:

$$\Delta EXCh_t = \prod_1 M_{2(t-1)} + \prod_2 Inf_{(t-1)} + \sum_{i=1}^p \alpha_i \Delta M_{2(t-p)} + \sum_{i=1}^p \beta_i \Delta Inf_{(t-p)} + \theta_t$$

Results of a Long-Run Relationship:

The following table shows the results of the long-term relationship between the variables, as we notice a positive and significant effect of the money supply on the exchange rate in the Yemeni economy

during the research period, as the parameter reached (25.3) and this means that if money supply increases by one unit, it leads to an increase in the exchange rate (decrease the purchasing value of the national currency) by 25.3%. We also note from the data of Table (3) that there is a positive and significant effect from inflation rates towards the exchange rate, as the coefficient reached (3.8), which means that an increase in the inflation rate by 1% leads to a rise in the exchange rate (a decrease in the purchasing value of the national currency) by a rate of 3.8 %.These results are consistent with the theories and literature that investigated the same topic from different places such as (Shneibesh, 2013), (Kaitan, 2017), (Nur al-Huda, 2018), and the study (Abdul Qadir, 2011).

Table 3: Results of long-run relationship

Cointegrating Eq:	CointEq1
EXCH(-1)	1.000000
M2(-1)	25.36662 (2.37721) [10.6707]
INF(-1)	3.854452 (0.90691) [4.25010]
C	-566.6153

Results of VECM Model:

Table (4) shows the short-run relationship shows that the exchange rate in the Yemeni economy is affected by its previous values as well as the previous values of the money supply. We note

that the value of the error correction parameter is equal to (-1.11), which is a negative and significant value, and this indicates that the relationship in the long run is correct and the relationship is corrected at 11% annually to reach the long-run relationship.

Table 4: Results of short-run relationship

Error Correction:	D(EXCH)	D(M2)	D(INF)
CointEq1	-0.111087 (0.02574) [-4.31546]	-0.009556 (0.02796) [-0.34180]	-0.103057 (0.02675) [-3.85274]
D(EXCH(-1))	-0.419637 (0.21002) [-1.99809]	0.021032 (0.22810) [0.09221]	-0.510458 (0.21824) [-2.33900]
	-0.127661	-0.016235	-0.216490

D(EXCH(-2))	(0.06161) [-2.07219]	(0.06691) [-0.24263]	(0.06402) [-3.38172]
D(M2(-1))	2.653039 (0.70716) [3.75170]	-0.529631 (0.76804) [-0.68959]	2.858817 (0.73483) [3.89046]
D(M2(-2))	0.311001 (0.63399) [0.49054]	-0.280626 (0.68857) [-0.40755]	2.593048 (0.65880) [3.93602]
D(INF(-1))	0.201625 (0.11733) [1.71846]	-0.011905 (0.12743) [-0.09342]	-0.317033 (0.12192) [-2.60033]
D(INF(-2))	-0.087695 (0.09161) [-0.95730]	0.022490 (0.09949) [0.22604]	0.144273 (0.09519) [1.51560]
C	7.985710 (1.49986) [5.32430]	0.349345 (1.62899) [0.21445]	4.281020 (1.55855) [2.74679]

Model Examination Tests:

The model examination tests indicate that the model is free of standard problems, the most

important of which are: the Autocorrelation problem, Heteroskedasticity problem, and the normal distribution of the estimated residuals.

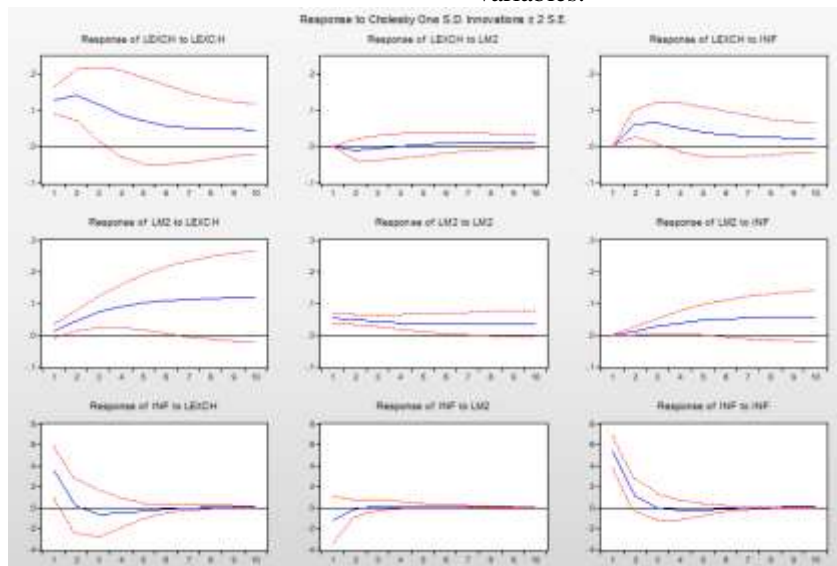
Table 5: tests of model examination

Test	value
R^2	0.857
Autocorrelation LM-sta	10.437 (0.3162)
Heteroskedasticity χ^2	82.654 (0.5211)
Normality	1.420 (0.2334)

The coefficient R^2 indicates the high explanatory ability of the independent variables in explaining the changes in the exchange rate in the Yemeni economy, as its value reached 0.857.

Impulse and Response Functions:

The following figures indicate the presence of a rapid and symmetric response with a different signal of the exchange rate towards the explanatory variables.



Findings and Recommendations:

The study reached the following most important results and recommendations:

The results:

1. The study showed the development of the money supply in the Yemeni economy and the continuous increase from year to another, especially in the currency in circulation as a result of the lack of public confidence and the turmoil the country is going through, in addition to the inflationary

increase in the money supply, which is a negative indicator of the overall economic activity.

2. The study showed the development of the exchange rate in the Yemeni economy, which witnessed a sharp deterioration and a decline in the value of the national currency in its exchanges with the dollar in the foreign exchange market since the start of the economic reform program and the change in the exchange system followed, and thus a negative impact on the overall economic activity.

Mohammed Qasem Al-maflehi , Prof. Dileep Arjune, Dr. Mohammed Hadi Nasser

3. The study showed a positive and significant effect of money supply on the exchange rate in the Yemeni economy during the research period. It also showed through standard and statistical analysis that an increase in the money supply by one unit leads to an increase in the foreign exchange rate by 25.3% and thus a decrease in the purchasing value of the national currency, that is, the money supply (the independent variable) is directly related to the exchange rate (the dependent variable) in Yemeni economy. The study also showed a positive and significant effect of inflation rates towards the exchange rate in the Yemeni economy.

Recommendations:

1- The monetary authority represented by the Central Bank undertakes a set of measures that restore the public's confidence in the banking system in light of the exceptional circumstances that the Yemeni economy is going through, with the aim of limiting and controlling the inflationary increase in the money supply.

2- Reconsidering the exchange system followed in the Yemeni economy and controlling the continuous changes in the exchange rate and taking into consideration the different conditions of the Yemeni economy from other countries.

3- The monetary authority should conduct a comprehensive study and find radical solutions to a number of macroeconomic variables that suffer from chronic imbalances, including the inflationary increase in the money supply, the continuous changes in the exchange rate and the devaluation of the national currency that negatively affect the Yemeni economy.

References:

- AHMED, N., DINGCHOU, M., & QAYYUM, A. (2020). Regulation of Exchange Rate and Economic Growth and Its Effect on Chinese Economy. *Journal of Applied Economic Sciences*, 15(3).
- Ajredi, M. A. S., Ayedh, A. M. A., & Haron, M. S. (2017). The Relationship between Real Exchange Rate and Components of the Broader Measure of Money Supply: An Analytical Study on the Libyan Economy for the Period of 1970–2014. *Journal of Insurance and Financial Management*, 3(3).
- Akinbobola, T. O. (2012). The dynamics of money supply, exchange rate and inflation in Nigeria. *Journal of Applied Finance and Banking*, 2(4), 117.
- Al Rasasi, M. H. (2020). Assessing the stability of money demand function in Saudi Arabia. *International Journal of Economics and Financial Research*, 6(2), 22-28.
- Al-Galbi, Abdul-Hussein Jalil, & Al-Jubouri, Sawsan Karim (2008). The impact of money supply measures on some macroeconomic variables in a sample of developed countries, Al-Ghari *Journal of Economic and Administrative Sciences*, 2 (10), p. 7-36.
- Al-Haithi, Ahmed Hussein, Hammadi Khaled, and Rafah Adnan (2010), The Impact of Exchange Rate Fluctuations on Inflation Rates in the Jordanian and Turkish Economy, *Anbar University Journal of Economic and Administrative Sciences*, Vol. 2, No. 3, pp. 1-29.
- Babaker, Suhad Ahmed Dafa Allah (2014). Determinants of the exchange rate in Sudan using the two models of cointegration and error correction 1978-2010, Master's thesis, Sudan, College of Graduate Studies, Sudan University of Science and Technology.
- Bhat, S. A., & Bhat, J. A. (2021). Impact of Exchange Rate Changes on the Trade Balance of India: An Asymmetric Nonlinear Cointegration Approach. *Foreign Trade Review*, 56(1), 71-88.
- Briliant, D., Aditya, I. D. M. D., & Buana, A. P. (2020). Determinants of Indonesian Real Effective Exchange Rate. *Journal of Research in Business, Economics, and Education*, 2(5), 947-957.
- Bulletins, periodicals and reports of the Central Statistical Organization, Yemen, for the years 2002 to 2011.
- Damani, A., & Vora, V. (2018). An Empirical and Analytical Study of the Factors Affecting the Exchange Rate Fluctuation in India. *International Journal of Innovative Studies in Sociology and Humanities*, 3(3), 1-14.
- Devereux, M. B., & Smith, G. W. (2021). Testing the Present-Value Model of the Exchange Rate with Commodity Currencies. *Journal of Money, Credit and Banking*, 53(2-3), 589-596.
- Funashima, Y. (2020). Money stock versus monetary base in time–frequency exchange rate determination. *Journal of International Money and Finance*, 104, 102-150.
- Gidey, H. T., & Nuru, N. Y. (2021). The effects of government spending shocks on real exchange rate in Ethiopia. *Journal of Economic and Administrative Sciences*.
- Hoang, T., Thi, V., & Minh, H. (2020). The impact of exchange rate on inflation and economic growth in Vietnam. *Management Science Letters*, 10(5), 1051-1060.
- Kitan, Hussein Ali (2017), measuring and analyzing the impact of money supply on inflation and the foreign exchange rate in the Iraqi economy for the period (1991-2014). *Al Kut Journal of Economics Administrative Sciences*, 1(26).
- Mansouri Samia (2015). A standard study of some determinants of the exchange rate in Algeria for the period 1975-2013, Master's

- thesis, Algeria, Faculty of Economics, Management and Commercial Sciences, Kasdi Merbah University - Ouargla.
18. Mashkaq, Nour Al-Huda & Kassimeh, Scheherazade (2018), The Impact of Monetary Supply on Some Macroeconomic Variables - The State of Algeria's Economy for the Period-2001-2016, Master's Thesis, Algeria, Department of Economic Sciences, Faculty of Economic, Commercial and Management Sciences, Mohamed Boudiaf University in Msila .
 19. Ministry of Planning and International Cooperation, Economic Studies and Forecasts Sector, Economic and Social Developments in Yemen, Macroeconomic Developments, Issue (44), August, 2019.
 20. Mourad Abdelkader (2011), studying the impact of monetary variables on the exchange rate of the Algerian dinar against the US dollar during the period 1974-2003, Master's thesis, Algeria, Faculty of Economics, Commercial and Management Sciences, Kasdi Merbah University - Ouargla.
 21. Mpofu, T. R. (2021). The determinants of real exchange rate volatility in South Africa. *The World Economy*, 44(5), 1380-1401.
 22. Musa, N. (2021). Impact of exchange rate volatility on inflation in Nigeria. *Journal of Contemporary Research in Business, Economics and Finance*, 3(1), 26-38.
 23. Nasir, M. A., Huynh, T. L. D., & Vo, X. V. (2020). Exchange rate pass-through & management of inflation expectations in a small open inflation targeting economy. *International Review of Economics & Finance*, 69, 178-188.
 24. QAMRUZZAMAN, M., MEHTA, A. M., KHALID, R., SERFRAZ, A., & SALEEM, H. (2021). Symmetric and asymmetric effects of financial innovation and FDI on exchange rate volatility: Evidence from South Asian Countries. *The Journal of Asian Finance, Economics, and Business*, 8(1), 23-36.
 25. QAMRUZZAMAN, M., MEHTA, A. M., KHALID, R., SERFRAZ, A., & SALEEM, H. (2021). Symmetric and asymmetric effects of financial innovation and FDI on exchange rate volatility: Evidence from South Asian Countries. *The Journal of Asian Finance, Economics, and Business*, 8(1), 23-36.
 26. Said, Maysa Saeed Ahmed, Tariq Muhammad Al-Rasheed, (2016), The effect of time gaps in determining the causal relationship between money supply and the exchange rate in Sudan (Doctoral dissertation, Sudan University of Science and Technology).
 27. Shanbeesh, Muhammad Ramadan (2013). A study of the relationship between inflation, money supply and the exchange rate in the Libyan economy during the period 1992-2008, *The University Journal*, issue fifteen - Volume One, pp. 237-264.
 28. Teh, K. P., & Shanmugaratnam, T. (2021). Exchange rate policy: Philosophy and conduct over the past decade. *World Scientific Book Chapters*, 82-113.
 29. The Central Bank of Yemen, General Administration of Research, Statistics and Research, Aden, the annual report on monetary and banking performance for the years (2016, 2017, 2018).
 30. The Central Bank of Yemen, Sana'a, General Authority for Statistics and Research, annual reports for the years (2000, 2002, 2007, 2011, 2013, 2014, 2015).
 31. TURNA, Y., & ÖZCAN, A. (2021). The relationship between foreign exchange rate, interest rate and inflation in Turkey: ARDL approach. *Journal of Ekonomi*, 3(1), 19-23.