AMERICAN JOURNAL OF ECONOMICS AND BUSINESS MANAGEMENT

ISSN: 2576-5973
Vol. 5, No. 3, 2022

The Effect of Oil and Exchange Rates on the Money Supply using ARDL Model and causality test Toda & Yama Moto Standard study in Iraq for the period (2017-2021)

Karrar Hatam Attieh Al-Bidairi [1]

E-mail: *Kerbakarrer.albdire@qu.edu.iq*

[1] *Al-Qadissiyah of University Department of Banking and Finance-Faculty of Administration and Economics, Iraq.*

Zahraa Yousif Abbas Al-Saadi [2]

[2] *Al- Kerbala of University Department of Banking and Finance-Faculty of Administration and Economics, Iraq.*

E-mail: zahraa.y@s.uokerbala.edu.iq

Abstract: This study examines the impact of oil prices and exchange rates on the money supply in the broad sense in Iraq using monthly data from (January 2017 to December 2021) and by (60) views, and this period was chosen as it included new government decisions to reform the structural system of the Iraqi economy, most notably the high price The exchange of the US dollar against the Iraqi dinar (devaluation of the Iraqi dinar), as well as fluctuations in crude oil prices due to the Covid-19 pandemic, The research problem was formulated, which refers to the question (Is there a causal relationship linking crude oil prices and the exchange rate to the money supply in the broad sense? What is the direction of that relationship?) To test the research hypothesis, the ARDL model and the causality of Toda & Yama Moto were adopted. The research concluded that there is a joint integration and a long-term equilibrium relationship between the variables of the research and the existence of a causal relationship between crude oil prices and the exchange rate with M2 during the research period. We recommend that an export base should be formed that does not depend on crude oil revenues alone , which contributes to achieving the goal of devaluing the currency The Central Bank of Iraq fixes the price of the dollar in the local markets in such a way that there is no significant difference between the price of the central bank and the price of the dollar in the local markets.

Keywords: oil prices, exchange rate, money supply, ARDL, causation

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

INTRODUCTION

Crude oil is one of the most important sources of energy in the world, and global oil prices are affected by supply and demand, which in turn is affected by the overlap of economic factors with political factors. Oil prices are characterized by extreme fluctuations and instability, and Iraq is one of the rentier countries. It destabilizes the economy and affects the economic variables, especially the money supply. Likewise, the exchange rate is one of the basic elements that affect all economic and financial aspects of different countries. Some developing countries, including Iraq, face large fluctuations in the exchange rate of their local currency against foreign currencies. This has led to the intervention of some governments to protect their currency from continuous deterioration, restore balance and achieve Stability in the economy by liberalizing the exchange rate and devaluing the local currency against foreign currencies. In December 2020, the Central Bank of Iraq approved the devaluation of the Iraqi dinar, equivalent to 22%. The Central Bank of Iraq attributed the reasons for the devaluation of the dinar at the time to what it described as structural distortions in the Iraqi economy that impoverished public finances and restricted the reform capacity sought by the government and the Ministry of Finance. Iraq's decision to devalue the national currency coincided with the Iraqi government's proposal for an economic reform project. There is no doubt that these measures affected the behavior of economic variables, including the money supply.

1. The Scientific Methodology of research

1.1. The research problem

Fluctuations in oil prices have a very important impact on economic variables such as money supply, especially if the economy is rentier like the Iraqi economy. Accordingly, the research problem is represented in the following

(Is there a causal relationship linking crude oil prices and the exchange rate to the money supply in the broad sense? What is the direction of that relationship?)

1.2. The importance of research

The importance of the research stems from the importance of the research variables (crude oil prices, exchange rate and money supply). In the light of a rentier economy like the Iraqi economy, in which the oil sector dominates the bulk of total exports, and the financing of the public budget depends on the revenues derived from it, in addition to the great importance of the exchange rate policy In achieving economic stability it is important to determine the quantitative and causal relationships between crude oil prices, exchange rate and money supply.

1.3. Research objectives

The research aims to achieve a number of points that can be summarized as follows:

a) Identify the concepts of research variables and clarify the relationship between them.

b) Measuring and analysing the equilibrium relationship between crude oil prices, the exchange rate and the money supply in the broad sense.

c) Measuring and analysing the causal relationship between crude oil prices, exchange rate and money supply in the broad sense.

1.4. Research Hypotheses

The research seeks to test the following hypotheses:

The main hypothesis: the absence of a significant relationship between crude oil prices and the exchange rate and money supply in the broad sense. A set of the following sub-hypotheses is derived from it:

a) The first sub-hypothesis: the absence of co-integration and a long-term relationship between crude oil prices and money supply in the broad sense

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

b) The second sub-hypothesis: the absence of joint integration and a long-term relationship between the exchange rate and the money supply in the broad sense.
c) The third sub-hypothesis: There is no causal relationship between crude oil prices and money supply.
d) Fourth sub-hypothesis: There is no causal relationship between the exchange rate and the money supply.

1.5. Search data

The research used monthly data for the variables of crude oil prices, the Iraqi dinar exchange rate against the US dollar, and the money supply in the broad sense for the period (January/2017-December 2021) with 60 views. The data was obtained from the International Monetary Fund and the bulletins of the Central Bank of Iraq for different years.

1.6. Statistical methods and research method

The research used the descriptive approach to clarify the research variables in theory, in addition to that, the standard approach was used to estimate the relationship between research variables, the statistical significance test for the parameters estimated using the statistical program EViews, and the use of the ARDL co-integration test. The causality tests were also used by Toda-Yamamoto test and Granger causality test.

2. The theoretical side of the research

2.1. The price of crude oil

The price of oil is defined as the monetary value of a barrel of oil measured in US dollars, consisting of (42) gallons. The price of oil was competitive until the beginning of the second half of the nineteenth century. However, due to the change of oil parties and their reduction in the competition market, the price became almost monopolistic. Few of the big companies, so we find that sometimes the price moves away from the influence of economic factors (Hirsch, 2005: 41), The price of oil is determined based on supply and demand in the market during a certain period of time, and the supply includes the oil produced or most of it. The demand is the amount of human need in its quantitative and qualitative aspects for the oil commodity, whether in the form of crude or its derivatives (Abdul Muttalib, 1998: 216), and that oil pricing Crude is not determined by the producing countries only, but the countries that are able to store and market oil and affect the oil market have become the main controller in pricing, and the political factor that plays a major role in pricing cannot be neglected, which leads to the difficulty of predicting the future of oil prices (Al-Laithi, 2005: 360).), With the rise in international oil prices, as the World Bank expects the Iraqi economy to recover gradually by 6.3% on average in the years (2022-2023), as the rise in oil revenues along with the effect of devaluation of the currency reduced the deficit in the state budget to 5.4 % of GDP in 2021 (World Bank, 2021: 1). There are many types of crude oil price, and the most prominent of these prices are: (Al-Hasnawi, 2006: 8)

a) Declared price: It is a fixed price set unilaterally by the major oil monopolies before 1971, and these prices do not reflect the real value.
b) Realized (actual) price: It is the amount of the declared price minus the discounts agreed upon between the seller and the buyer, which are the discounts for geographical location, density and sulfur content.
c) Tax cost price: It is the real cost that major oil companies pay for a barrel of crude oil at less than these prices
d) Reference price: It is the average price of a group of similar oils, such as Brent crude.
e) The spot price and the forward price: the spot price is paid instantaneously with immediate delivery of the crude in question. As for the forward price, it is the price that is paid in the future for the crude that is delivered immediately.

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

2.2. Exchange rates

The exchange rate is defined as the price of one unit of a foreign currency expressed in units of the local currency, or it is the price of one unit of the local currency expressed in units of foreign currency, or it is the value of one currency expressed in another currency (Khalil, 838: 2005), which is The percentage on the basis of which the local currency is exchanged for a foreign currency, and given that a single currency cannot be used in international exchanges, It has become necessary to resort to the process of comparing the currencies in which exchanges are made, and accordingly this comparison process is the basis of the currency exchange process and the exchange rate is a purchase price and a selling price, where the purchase price is the number of units of the local currency that the buyer pays to buy one unit of Foreign currency, and the selling price is the number of units that the seller requires of the local currency to sell one unit of foreign currency (Latrash, 2000,: 95-96)

The exchange rate is a good indicator of competitiveness in global markets, as the exchange rate measures the cost of producing local goods, as any appreciation in the value of the local currency (depreciation of the exchange rate) will be reflected in its higher cost for importers, and assuming that global prices do not change, this will lead to a deterioration in the competitive advantage of the country at the global level, and it is exactly the opposite in the case of a decrease in the local currency (the rise in the exchange rate), this will reflect the increase in the competitive advantage of the country at the international level, Note that the level of international competitiveness does not depend on the exchange rate only, but rather depends on several factors, including, domestic inflation rates, domestic financial policies, the degree of technological progress, growth rate, and other factors (Abbas, 2003:7). The exchange rate takes several types as Come:

a) ***: The nominal exchange rate***: is the exchange rate of foreign currency for local currency or vice versa. The nominal exchange rate represents the process of measuring the value of a country's currency that can be converted into another country's currency (Al Niqash, 136:2006) The nominal exchange rate of a currency is determined according to the supply and demand for it, and the exchange rate can be changed according to the supply and demand relationship or the exchange rate system adopted by the country because this exchange rate is the current currency exchange rate and does not take into account the purchasing power of the currency. (Mishkin & Savastano, 2001:407)

b) ***The Real exchange rate***: The real exchange rate is the rate that gives the real value of the local currency, as it determines the amount of foreign currencies that can be purchased for one unit of local currency (Qadar, 2003,: 105) and the real exchange rate takes into account the effect of inflation. On the nominal exchange rate through the following formula: (Zuhair, 2015:5)

REx = NEx P^*P

So: NEx: nominal exchange rate, REx: real exchange rate, P : the domestic price index , P^* : the foreign price index

c) ***Equilibrium exchange rate:*** The equilibrium exchange rate means the price determined by the strength of supply and demand when the quantity demanded and the quantity supplied of a currency is completely equal, regardless of the effect of speculation and unusual capital movements. (Abdul-Jalil, 2012:34) Several approaches are used to determine the equilibrium exchange rate, the most famous of which is the concept of purchasing power parity, which says that the exchange rate is proportional to the domestic and external relative price, (Khidir, 2012:23)

2.3. Money Supply

The money supply is meant as the amount of payment means available in the society, which is the total amount of money of all kinds that exist in the society in a certain period of time (Kanaan, 2012: 475). The term money supply refers to the total balance of the available local means of payment owned by the public in the state. Business establishments, companies and all categories that keep money other than

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

the central bank and commercial banks. The cash balances held by the central bank are usually excluded from the money supply on the basis that such money results from non-commercial rather than administrative operations (Al-Shammari, 2009: 32) The money supply consists of legal money, both paper and metal, issued by the Central Bank, and bank money (deposit money) created by commercial banks through the exercise of their credit activity (Al-Dulaimi, 1990: 581), as follows:

a) ***Legal money***: It is money that is issued by a law that imposes an obligation to deal with and accept it in general (Khalaf, 2006: 34).

b) ***Bank money (deposits money)***: It is a banking obligation to pay a certain amount of legal money to the depositor or to a person he determines upon request or after a certain period determined by agreement between the depositor or the bank. The bank, whatever the type of deposit, the debt is an amount of legal money, the creditor is the owner of the deposit, and the debtor is the bank (Samhan and Yamen, 2011: 113)

The change in the money supply usually results in changes in many macroeconomic variables such as the level of national product, the level of employment, the general level of prices and the exchange rate of the local currency in foreign markets (Al-Shinawy, Ghazlan, and Al-Sayed, 2006:69).

- **The Monetary Base (M0):** It is called the first standard monetary base, which is the easiest to measure and the most widespread. It is represented by the amount of currencies (paper and metal) circulating in the economy, as well as the available ones in the form of reserves for commercial banks with the Central Bank, which is a narrow measure of money supply (Shalhoub, 2007: 124).
- **Narrow Money Supply(M1):** It includes the total means of payment circulating in a society during a certain period of time, and M1 here includes current deposits and currency in circulation (Haddad, and Hathloul, 2010: 89), and it is expressed in the following formula:

$$M1=DD + CC$$

Since: DD = current deposits, CC = is the currency in circulation.

- **Broad Money Supply (M2):** It is sometimes known by the term local or internal liquidity and consists of demand deposits (current) and currency in circulation in the hands of the public in addition to time deposits in commercial banks, and it is expressed in the following formula: (Haddad, Hathloul, 2010:89)

$$M2=M1+TD$$
$$M2=DD+CC+TD$$

So: M2 = money supply in the broad sense, M1 = money supply in the narrow sense,
DD = demand deposits, CC = currency in circulation, TD = time deposits.

- **Money supply in the broadest sense M3**: This concept refers to determining the money supply on the basis of local liquidity (M2) in addition to savings deposited outside commercial banks, i.e. with saving institutions such as joint savings banks and savings and lending associations. The components of the broader money supply can be clarified as follows: (Shendi, 2010:103-104)

M3= M2 + Liabilities of non-cash intermediary financial institutions

3. The practical side

3.1. Description of the standard models

To test the equilibrium relationship between the research variables, we use the ARDL co-integration test and the Granger causality test (Toda & Yama Moto).

3.1.1. The ARDL model for co-integration testing

The ARDL test was developed by Pesaran to overcome the shortcomings of the (Engle-Granger and Johansen) co-integration approaches. The ARDL does not require that the time series be integrated of the same degree, that is, the time series are stable at level I (0) or in the first difference I (1), but if they are in the second difference I(2), the ARDL model is ineffective. The model is tested according to the

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

Unconstrained error correction (UECM) methodology, and the expression for the equation is as follows: (Pesaran et al. 2001: 289–326).

$$\Delta y_t = c + \sum_{i=0}^{r} z_1 \, \Delta y_{t-i} + \sum_{i=0}^{m1} z_2 \, \Delta x_{1\,t-1} + \cdots + \sum_{i=0}^{m2} z_3 \, \Delta x_{1t-1} + \sum_{i=0}^{mn} z_n \, \Delta x_{nt-1}$$

$$+\beta_1 y_{t-1} + \beta_2 x_{1\,t-1} + \beta_3 x_{2\,t-1} + \beta_n x_{n\,t-1} + \varepsilon \ldots\ldots (1)$$

That: y the dependent variable and x the independent variable, C the constant, Δ first-degree differences r The period of slowing down of the dependent variable, m1, m2, m3,..mn The period of slowing down of the explanatory variables x1,x2,x3,….xn , Z : Represents short-term information: β indicates long-term transactions. : ε limit of random error.

After that, the existence of a long-term relationship between the variables is verified using the Bond Test.The ARDL for short-run coefficients is estimated by Error Correction Model (ECM), (Allawi and Rahi, 2013: 223).

Before applying the ARDL model, the stability of the time series is first tested by conducting a unit root test, which takes the following form: Enders, 1995: 256).

$$y_{t=}\, \omega y_{t-1} + \epsilon_t \ldots..$$

Since: (yt variable in duration (t), (ϵ_t) perturbation term and its arithmetic mean equal to zero (u=0) and its variance is constant (□2=1) and (0=ϵ_t) Cov when (ω = 1) The time series suffers from a unit root, so the first differences should be taken for it using several tests, the most famous of which is the (ADF- Dickey Fuller) test because it does not leave the correlation error between the residuals (Dickey &Fuller, 1989: 1057-1072)

3.1.2. Causality tests

The causality test is used to identify the nature and direction of the relationship between variables, since these variables do not move in the same direction to achieve the state of equilibrium, (Davidson & MacKinnon, 1999: 588). If the values of (Yt) and (Xt) represent two stable time series that express the development of two economic phenomena different over time (t), the simple causation model can be formulated according to the following relationship: (Gujarati, 2004:697)

$$y_t = \sum_{i=1}^{k} \varphi_i X_{t-1} + \sum_{i=1}^{k} \omega_j y_{t-\mathrm{j}} + \mu_{1_t} \ldots.$$

$$X_t = \sum_{i=1}^{k} \lambda_i X_{t-1} + \sum_{i=1}^{k} \delta_j y_{t-\mathrm{j}} + \mu_{2_t}$$

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

Since: δj , λi , φ 〖, ω〗_j are parameters to be estimated, μ1t μ2t: uncorrelated random variables whose arithmetic mean is zero and their variance is constant

In order to estimate the model, it is necessary first to determine the optimal slowdown period for the search variables in the (VAR) model, and it will be based on the AIC (AIC) and Squares (SC) criteria, as well as the Hanan Quinn (HQ) criterion as basic indicators in determining the slowdown periods.

As for the Toda-Yamamoto causal test, it depends on Granger causal steps using the VAR model, where the degrees of integration and lag between variables are first determined. (Tawakkol, 2018: 38)

$$y_t = \alpha_0 + \sum_{i=1}^{K+d\,max} \alpha_{1i} y_{t-1} + \sum_{i=1}^{K+d\,max} \alpha_{2i} x_{t-i} + \varepsilon_t$$

$$X_t = \beta_0 + \sum_{i=1}^{K+d\,max} \beta_{1i} X_{t-1} + \sum_{i=1}^{K+d\,max} \beta_{2i} y_{t-i} + \varepsilon_t$$

That : y,x variables, k maximum lags, d order of integration of the study variables

3.2. Analyse the standard results

This section describes the results obtained from testing the ARDL model of co-integration and causality tests, and for testing the relationship of crude oil prices and the exchange rate on the money supply.

3.2.1. The results of the time-series stability test

Table (1) Unit root test for search variables -(ADF)

Null hypothesis: Contains unit root							
OIL							
level	**none**	**Trend & intercept**	**intercept**	**1st difference**	**none**	**Trend & intercept**	**intercept**
	-2.913549	-3.490662	-1.946654		-1.946654	-3.490662	-2.913549
t-Statistic	-1.298423	-1.448196	0.467678	**t-Statistic**	-5.975669	-5.959057	-6.007502
Prop	0.6245	0.8356	0.8127	**Prop**	0.000000	0.00000	0.000000
EX							
level	**none**	**Trend & intercept**	**intercept**	**1st difference**	**none**	**Trend & intercept**	**intercept**
	-1.946549	-3.489228	-2.912631		-1.946549	-3.489228	-2.912631
t-Statistic	0.748478	-1.61832	-0.604212	**t-Statistic**	-4.464506	-4.679287	-4.520035
Prop	0.8732	0.7736	0.8612	**Prop**	0.00000	0.002	0.0005
M2							
level	**none**	**Trend & intercept**	**intercept**	**1st difference**	**none**	**Trend & intercept**	**intercept**
	-1.946447	-3.487845	-1.946447		-1.946654	-3.489228	-2.912631
t-Statistic	4.682518	-1.073904	4.682518	**t-Statistic**	-3.070762	-7.06122	-6.061277
Prop	1.0000	0.9246	1.0000	**Prop**	0.0027	0.00000	0.00000

Source: Prepared by the researchers based on 11 EViews program

Table (1) shows that the time series of the research variables are unstable in their levels, as all the

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

estimated values of the t-Statistic test are less than the tabular values, that is, they are not statistically significant at a significant level (5%), and therefore we do not reject the null hypothesis (H0:B= 0) which states that the time series are instabilized at the level and contain a unit root.

When the first differences were taken, it was found to be significant, with the presence of an intercept at a significant level (5%), as the t-statistic values were greater than the tabular values, that is, the time series are integrated of the first degree I (1), and accordingly we reject the null hypothesis represented in the non-stationarity of the variables In its level and containing the unit root, we accept the alternative hypothesis (H0:B ≠0). Figure (1) shows the time series at the first level and difference.

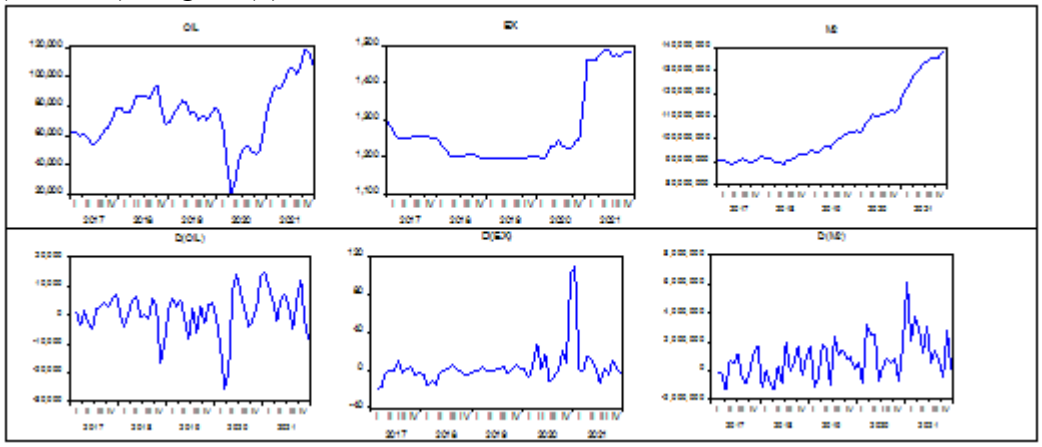

Figure (1) Time series of search variables at the first level and difference
Source: Prepared by the researchers based on 11 Eviews program

3.2.2.: Test results of a model ARDL

After conducting the time series stability test and ensuring the integrity of the first order time series I(1), the ARDL model can be applied to test the co-integration. In the first stage, the optimal slowdown periods for the model are determined according to the Akaike Information Criteria as shown in Table (2) And Figure (2), after that the Bond test is applied and then short and long-term transactions are extracted and the error correction model is estimated.

Table (2) Slowdown periods for the estimated model -ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2(-1)	0.694247	0.133586	5.196987	0.000
M2(-2)	0.309213	0.136343	2.267913	0.0282
OIL	-9.460839	24.90993	-0.379802	0.7059
OIL (-1)	-50.5837	39.74631	-1.272664	0.2097
OIL (-2)	70.02782	25.67454	2.72752	0.0091
EX	21593.41	8609.033	2.508227	0.0158
EX (-1)	11739.78	16088.22	0.729713	0.4693
EX (-2)	-22892.43	16000.31	-1.430749	0.1594
EX (-3)	16154.88	14865.56	1.086732	0.2829
EX(-4)	-25134.29	8615.101	-2.917469	0.0055
R-squared	Adjusted R-squared		F-statistic	Prob(F-statistic)
0.996193	0.995347		1177.545	0.0000

Source: Prepared by the researchers based on 11 Eviews program

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

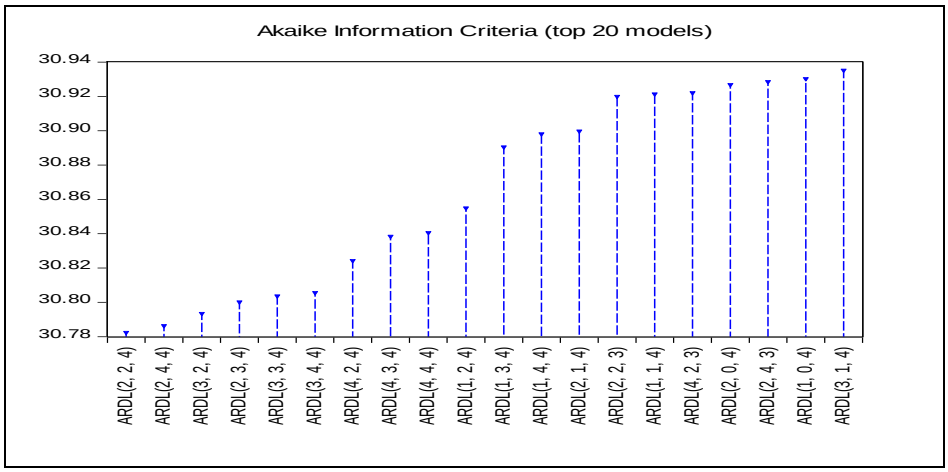

Figure **(2) Determining slowdown periods according to Akaik criterion**

Source: Prepared by the researchers based on 11 Eviews program

Table (2) and Figure (2) show the statistical test results of the regression equation for the ARDL estimated model if the optimal slowdown periods for the variables were determined according to the Akaik Information Standard (AIC), as the variables (money supply, crude oil prices and exchange rate) took slowdown periods 2, 2 and 4 respectively, thus becoming the optimal model ARDL(2, 2,4) out of 20 models.

We also note the quality of the estimated model through the coefficient of determination R-squared (0.995), which means the model explains about 99.5% of the changes in money supply and 1% is due to other factors not included in the model. According to the F-statistic test, the probability value was ((0), which means the significance of the estimated model.

Table (3) Boundary Test - BOND TEST ARDL Form

Test F-statistic				
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	6.768	10%	2.63	3.35
K	2	5%	3.1	3.87
Null Hypothesis	No levels relationship	2.50%	3.55	4.38
		1%	4.13	5

Source: Prepared by the researchers based on 11 EViews program

The results of Table (3) indicate the logical and morale long-term relationship between crude oil prices and the exchange rate of the Iraqi dinar as explanatory (independent) variables and money supply in the broad sense (M2) as a dependent variable as well as the existence of a joint integration relationship between the mentioned variables according to the Bound test, as it reached F-statistic value (6.77) which is greater than the upper limit (5) I(1) for critical values at a significant level of 1%, which means that there is a co-integration and a long-term equilibrium relationship between crude oil prices, exchange rate and money supply, and therefore we reject the null hypothesis $\beta_1=\beta_2 = 0$ H0: (the first and second sub-hypothesis of the research) which states (there is no co-integration and a long-term relationship between the variables)

Table (4) Estimation of short- and long-term parameters and error correction model

Short term parameters and ECM error correction model				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(M2(-1))	0.309213	0.128127	2.413339	0.0199
D(OIL)	-9.460839	22.09071	-	0.6705

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

			0.428272	
D (OIL (-1))	70.02782	23.26349	3.010203	0.0043
D(EX)	21593.41	7870.875	2.743457	0.0087
D (EX (-1))	31871.85	9917.19	3.213798	0.0024
D (EX (-2))	8979.415	9007.754	0.996854	0.3242
D (EX (-3))	25134.29	8037.542	3.127112	0.0031
CointEq (-1)	-0.00346	0.000644	-5.37385	0.0000
Long term parameters				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
OIL	-2885.46	16656.43	-2.07323	0.03632
EX	-0.055977	0.284205	-3.12572	0. 0195
C	5.99E+08	3.96E+09	0.151162	0.0285

Source: Prepared by the researchers based on EViews 11

We can see from Table (4) the significance of the CointEq correction coefficient (-1), as its value was (-0.00346) with probability (0.00000) at a significant level of 1%. This means that there is a short-term response among the search variables, when M2 deviates from the equilibrium value during the short term It corrects its value (0.346%) of this deviation.

The results of estimating the long-term relationship indicate the significance of oil prices, as the value of t-Statistic reached (2.07) with a probability value of (0.036) at the level of significance (5%), which means that there is a long-term response between oil prices and M2 when the price of crude oil rises by one unit. M2 will increase by (28.8%).

As for the relationship between the exchange rate and M2, the results show that the relationship is inverse and significant, as the value of Statistic t reached (-3.12) with a probability value of (0.019) at the level of significance (5%). When the Iraqi dinar exchange rate against the US dollar rises by one unit, the money supply in the broad sense decreases by (0.055%)

3.2.3. Estimated Model Rating:

To ensure the quality of the model used to measure and analyze the relationship of research variables, diagnostic tests must be carried out as follows:

Table (5) The serial correlation test and the variance instability test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.308676	Prob. F(2,43)	0.2807
Obs*R-squared	3.213069	Prob. Chi Square(2)	0.2006
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.384321	Prob. F(10,45)	0.947
Obs*R-squared	4.406337	Prob. Chi-Square(10)	0.9272

Source: Prepared by the researchers based on 11 Eviews program

We note from Table (5) that the F-statistic value amounted to (1.308676) with a probability value of (0.2807) at the significance level (0.05) for the serial correlation test, which means that the estimated model is free of the serial correlation problem between the residuals, and therefore we do not reject the null hypothesis (H0: P = 0). As for the results of the Heteroskedasticity Test, it was found that the F-statistic value (0.384) with a probability value of (0.947) at the significance level (0.05), which means the stability of the variance of the random error limit in the estimated model. Therefore, we do not reject the null hypothesis (H0: P=0). Which states that there is no autocorrelation problem in the model or homogeneous variance of errors.

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

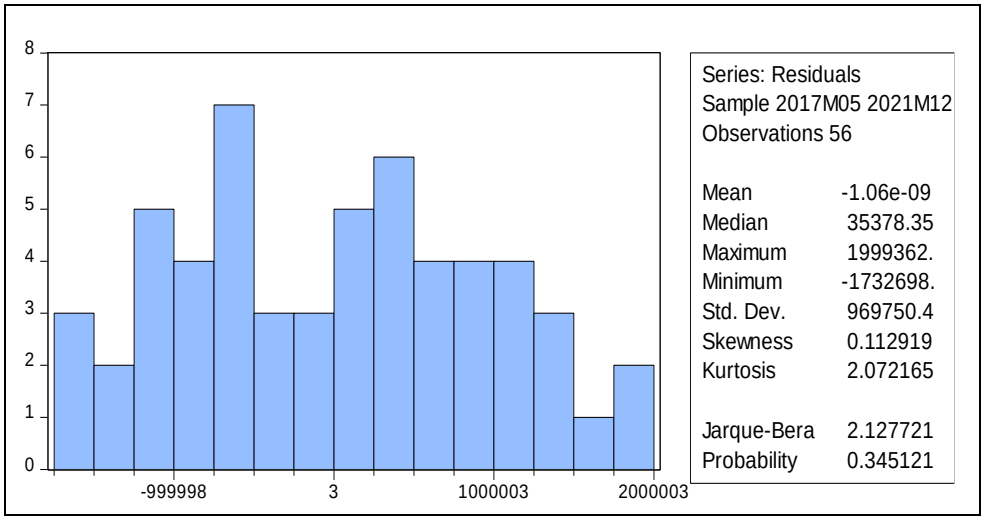

Figure (3) The normal distribution test for random errors

Source: Prepared by the researchers using the 11Eviews program

Figure (3) refers to the Jarque Bera (JB) test for the normal distribution of random errors. It is clear from the figure that the random errors are distributed normally in the estimated model, as the value of JB reached (2.127) with a probability value of (0.345), and therefore we do not reject the null hypothesis (H0:P). =0).

Table (6) Ramsey RESET Test

Test	Value	df	Probability
t-statistic	0.630833	44	0.5314
F-statistic	0.397951	(1, 44)	0.5314

Source: Prepared by the researchers using Eviews software

We note from Table (6) that the model does not suffer from the problem of inappropriateness of the functional form, as the value of F-statistic reached (0.397) with a probability of (0.53). Thus, we do not reject the null hypothesis

a) Structural stability test results of the estimated ARDL model

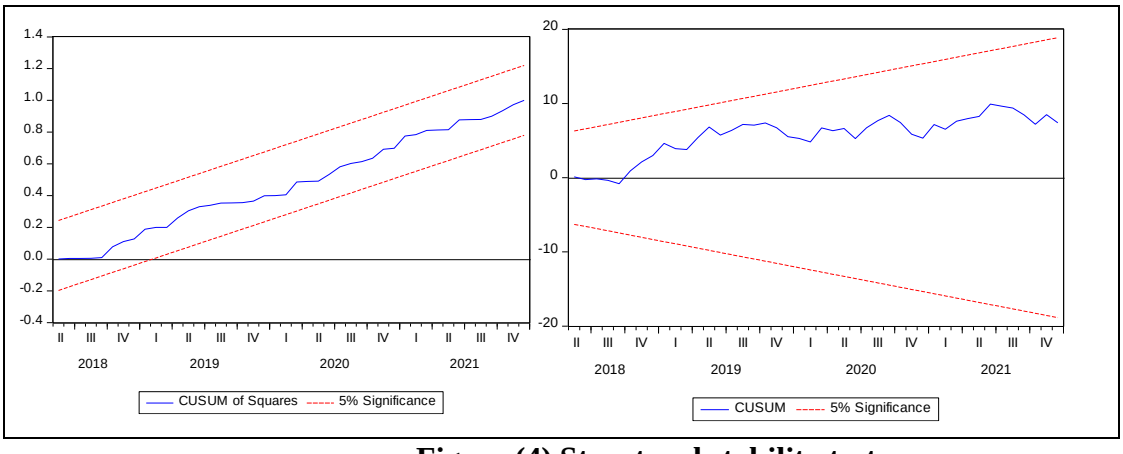

Figure (4) Structural stability test

Source: Prepared by the researchers using the 11Eviews program

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

The above figure shows that the estimated coefficients of the ARDL model are structurally stable over time during the research period, as the graph of the statistics of CUSUM and CUSUMSQ fell within the critical limits at a level of significance of 5%, and this confirms the existence of stability between the search variables and consistency in the model.

3.2.4. the results of the Causality Test

The causal test of Granger and Toda & Yama Moto was used, and before applying the mentioned tests, the optimal number of lag periods was found based on the AIC (AIC) and Seschwartz SC criteria, as shown in Table (7). The results showed that the two criteria achieved the lowest value at deceleration periods. time is equal to (4).

Table (7) the time lags for the research variables

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1930.29	NA	1.94E+26	6 9.04598	69.15449	69.08805
1	-1681.39	462.2398	3.70E+22	60.47819	60.91219	60.64645
2	-1662.8	32.53455	2.64E+22	60.13564	60.89515*	60.53049
3	-1652.16	17.47286	2.51E+22	60.07723	61.16224	60.49788
4	-1640.54	17.84580*	2.31e+22*	59.98364*	61.39415	60.43010*

*** (each test at 5% level)**

Source: Prepared by the researchers based on 11 Eviews program

Table (8) Granger causality test between oil prices, exchange rate and money supply

Causation direction	Null Hypothesis	F. Statistic	Probability
OIL → M2	OIL does not Granger Cause M2	0.90699	0.4676
M2→ OIL	M2 does not Granger Cause OIL	1.29821	0.2844
EX → M2	EX does not Granger Cause M2	5.64625	0.0009
M2→EX	M2 does not Granger Cause EX	1.92619	0.1217

source: was prepared by the two researchers based on the EViews 11 program

We note from Table (8) that there is no causal relationship between crude oil prices and money supply in the broad sense (M2 - OIL), as the value of F. Statistic reached (0.90699) and (1.298), with a probability of (0.4676) (0.2844) at the level of significance of 0.05, which means Oil prices do not cause a change in the quantity of money supply in the broad sense in the short term. Thus, we do not reject the third sub-null hypothesis which states that there is no short-term causal relationship between crude oil prices and money supply in the broad sense. This means that the money supply needs a longer period of time to respond to changes in crude oil prices.

As for the causal relationship between the exchange rate and the money supply, it was in one direction only, from the exchange rate to the money supply, as the (F) statistical value reached (5.64) with a probability of (009.0) at the level of significance (0.05), and thus we reject the null hypothesis that states that there is no The existence of a one-way causal relationship from the exchange rate to the money supply, and that any change that occurs in the exchange rate leads to a response to the change in the money supply in the short term.

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

Table (9) (Toda & Yama Moto) VEC Granger Causality Wald Tests

Excluded	Null Hypothesis	Chi-sq	df	Prob.
OIL → M2	OIL does not Granger Cause M2	15.67894	4	0.0035
M2 → OIL	M2 does not Granger Cause OIL	5.709553	4	0.2219
EX →M2	EX does not Granger Cause M2	37.65056	4	0.0000
M2 → EX	M2 does not Granger Cause EX	9.351327	4	0.0529

Source: Prepared by the researchers based on 11 Eviews program

We notice from Table (9) that there is a long-term one-way causal relationship from crude oil prices to M2, as the value of Prob was (0.0035) at a significant level of 0.05. Therefore, we reject the null hypothesis. As well as the existence of a one-way causal relationship between the exchange rate and the money supply, as the probability value was (0.000) at a significant level (0.05), and we reject the null hypothesis which states that there is no causal relationship between the exchange rate and M2 in the long run.

Conclusions:

The research found that there is a joint integration and a long-term equilibrium relationship between the variables of the research, as the relationship between crude oil prices and money supply was a positive and morale relationship in the long term. Cash in the long term and the absence of a causal relationship in the short term, just as there is a causal relationship in the short term and the drum and in one direction from the exchange rate to the money supply during the research period.

Recommendations:

1. The necessity of working to make the currency sale window in the bank two-way, i.e. buying and selling currency through the formation of an export base that does not depend on revenues from the sale of crude oil, which contributes to achieving the goal of devaluing the local currency, which is to increase the demand for national products.

2. The necessity for the Central Bank of Iraq to work to stabilize the price of the dollar in the local markets through its own tools and in such a way that there is no significant difference between the price of the bank and the price of the dollar in the local markets.

3. The Central Bank of Iraq should prepare the ground when taking a decision to devalue the currency, as this will enter the economy into a state of shock and confusion, which does not lead to the desired results.

4. The Central Bank of Iraq should control the amount of cash that could lead to a high rate of inflation, which does not guarantee the stability of the exchange rate

5. Taking into account the mutual influence between the exchange rate and the money supply of all kinds when formulating monetary policy.

References

1. Abbas, Belkacem, Exchange Rate Policies, (2003) Development Bridge, Arab Planning Institute, Kuwait. Issue 23, second year.

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

2. Abdel Jalil, Hajira, The Impact of Exchange Rate Changes on the Trade Balance A Case Study of Algeria, (2012), Master's Thesis, University of Tlemcen, Faculty of Economics and Management Sciences.
3. Abdel Muttalib, Muhammad Shabana, Fundamentals of Economic Resources, (1998), University House, Alexandria.
4. Al-Dulaimi, Awad Fadel Ismail, Money and Banks, (1990), Dar Al-Hikma for Printing and Publishing, Ministry of Higher Education and Scientific Research, University of Baghdad.
5. Al-Hasnawi, Maytham Rabie, Using Commodity Futures Options in Hedging from the Price Risks of Crude Oil, (2006), unpublished PhD thesis, University of Baghdad.
6. Allawi, Kamil Kazem and Rahi, Muhammad Ghali, Measurement and Analysis of Financial Expansion and its Relationship to Economic Variables in Iraq, (2013) Al Ghari Journal of Economic and Administrative Sciences, Volume (9), Issue (29).
7. Al-Naqqash, Ghazi Abdul Razzaq, International Finance and International Banking Operations, (2006), Wael Publishing House, Amman, Jordan, third edition.
8. Al-Shammari, Farah Ali Jassam, The Role of Monetary Policy in Reducing the Phenomenon of Inflation in the Iraqi Economy, Analytical Study for the Period (1970-2006), (2009), Applied Research to Obtain a Higher Diploma, University of Baghdad, Higher Institute for Accounting and Financial Studies.
9. Dickey, D.A, and fuller, W.A., Likelihood Ratio Statistic For Autor Essivesive, Time Series With A Unit Root (1989), Econometric, vol, 49.
10. El-Shennawy, Ismail Ahmed and Ghazlan, Mohamed Ezzat Mohamed and El-Sayed, Mohamed Gaber Hassan, The Economics of Money, Banks and Financial Markets, (2006), Publisher, Department of Economics - Faculty of Commerce - Alexandria University, Alexandria, Egypt.
11. Enders, Walter, Applied Econometric Time Series (1995), New York: John Wiley and Sons, Inc.
12. Gujarati, Damodar N, Basic Econometrics, (2004), 4th Edition, USA: McGraw-Hill.
13. Haddad, Akram and Hathloul, Mashhour, Money and Banks: An Analytical and Theoretical Introduction, (2010), Wael Publishing House, Amman, Jordan, third edition.
14. Hirsch, L.Robrt, Bezdaek, Windling, Robet, Peaking of world oil production: impacts' mitigation and risk management, (2005).
15. Kadri Abdel Majid, Introduction to Quantitative Economic Policies, an analytical and evaluative study, (2003) Algerian Publications Bureau.
16. Kanaan, Ali, Money, Banking and Monetary Policy, (2012), Dar Al-Manhal Lebanese, Beirut, Lebanon, first edition.
17. Khader, Zaher Abdel Halim, The Effect of the Exchange Rate on the Total Indicators of the Chinese Economy, (2012), Master Thesis, Faculty of Economics and Administrative Sciences, Al-Azhar University, Gaza.
18. Khalaf, Falih Hassan, Money and Banks, (2006), The Modern World of Books for Publishing and Distribution, Irbid, Jordan, first edition, 2006.
19. Khalil, Sami. International economy. (2005), Dar Al-Nahda Al-Arabiya for Printing and Publishing, Cairo, Egypt, second edition.
20. Latrash, Taher, Banking Techniques, (2000), University Publications Office, Algeria,
21. Mishkin, Frederic S. and M. Savastano, Monetary Policy Strategies for Latin America, (2001), Journal of Development Economics, Vol. (66)
22. Pesaran, M H Shin, Y Smith, R J, (2001) Bounds testing approaches to the analysis of level relationships Journal of applied econometrics Vol. 16; Iss. 3
23. Samhan, Hussein Muhammad and Yamen, Ismail Younes, The Economics of Money and Banks, (2011), Dar Safaa for Publishing and Distribution, Amman, Jordan, first edition.

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM

24. Shalhoub, Ali Muhammad, Money and Banking Affairs, (2007), Shuaa Publishing and Science, Aleppo, Syria, first edition

25. Shendi, Adeeb Qassem, Money and Banks, (2010), Dar Al-Diaa for Printing and Publishing, Al-Najaf Al-Ashraf, Iraq, first edition.

26. Tawakkol, Hassan Ahmed Al-Fadl, Study of the long-term causal relationship between exchange rate rates and foreign exchange reserves in Sudan for the period from 1975-2016 using the methodology, Yamamoto and Toda–(2018), International Journal of Economic Studies, Arab Democratic Center, Germany Berlin, No. 02.

27. The World Bank, Quarterly Report, Standing at a Crossroads with Limited Economic Reforms, (2021), Iraq.

28. Zuhair Chaushan, Exchange rate fluctuations and their effects on the trade balance, a standard study of the case of Algeria (1990-2014), (2015), a master's thesis in management sciences, Oum El Bouaghi University, Faculty of Economics, Commercial and Management Sciences.

ISSN 2576-5973 (online), Published by "Global Research Network LLC"
under Volume: Issue: 1 in January-2022
https://www.grnjournals.us/index.php/AJEBM