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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

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ABSTRACT

The Libyan economy had achieved a level of growth and stability for its currency exchange rate through the plans of development using fiscal, monetary and trade expansionary policies. However, due to the instability witnessed by Libya in the recent years, as well as the decline in the volume of oil revenues, this has led to a remarkable deterioration in the exchange rates of the Libyan currency. Therefore, the main objective of this study is to determine the effect of monetary expansion on the stability of the real exchange rate in the Libyan economy. By relying on annual data covering the period of 1970 – 2014, which is represented in the variables (Currency in circulation, demand deposits and quasi- money), and using time-series analysis techniques through Johnson's test of the joint integration. The result has shown that a long- term negative equilibrium relationship between variables in line with economic theory. Granger causality test has been applied as well, where the results have shown that there is a causal relationship in one direction between the real exchange rate and both currency in circulation and demand deposits in the short term. Based on the findings, it could conclude that it is possible to control the stability of the real exchange rate of the Libyan dinar through the components of broader measure of money supply. The result of this study gives better understanding about the real exchange rate and its relationship with money supply's components in Libya, which will assist the Libyan monetary authorities and the Libyan central bank in particular in applying the appropriate monetary policy for Libya especially with the current unstable situation in terms of the security and politic.

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1. Introduction

After the collapse of the Bretton Woods System, which is based on the breakeven price Par value, and that since 1973, the industrialized countries had adopted a floating rate for their currency system, major exchange rates suffered serious fluctuations in their value as a result of the circumstances and the economic policies of those countries.

Among the reasons explain the fluctuations in the exchange rates is the interpretation of the monetary theory, which postulates that there is a relationship between exchange rates and money supply, and that the exchange rate is a monetary phenomenon mainly affected by growth rate of the cash balance of the economy, the increase in the expansion of the money supply will lead to increase liquidity, and then to increase aggregate demand, which will result in an increase in the level of prices, However, the impact of money supply growth on the level of prices and the exchange rate depends on the degree of response to the real output developments in aggregate demand in economy; If the increase in aggregate demand were not accompanied by monetary expansion as a result of an increase in real output, this will lead to a general level of prices rising, resulting in a decrease in value of the currency (Obolcin, 2000).

Thus, to achieve a low inflation rate and stable value of the local currency, became the priority for developing countries, including Libya, as Libya sought through the continuing development plans and using expansionary fiscal, monetary and trade policy, With a significant contribution by the private sector alongside the public sector in economic activity to reduce restrictions on foreign trade, which led to an increase in investment and consumer spending (private and public), where domestic credit and the broad money supply through its components (demand deposits and currency in circulation and quasi money) increased significantly during the period in question. (Obolcin, 2000)

At the beginning of the 1980 the Libyan economy suffers from several economic resulting from the decline in oil prices, which led to a decline in oil revenues on the one hand, and the increasing volume of spending on the other hand, in addition to the developments and structural transformations of the Libyan economy during the period 1970-2014, which had a deep impact on the level of the overall performance of the economy. Even though the money supply has achieved an annual growth based on what is stated in the bulletins of the Libyan Central Bank, which can be attributed to growth in demand deposits and currency in circulation and quasi- money. However, the instability that Libya has witnessed in recent years, in addition to the decline in the volume of oil revenues, all these factors led to a marked deterioration in the exchange rates of the Libyan currency.

Consequently, the aim of this study is to determine the effect of monetary expansion on the stability of the real exchange rate in the Libyan economy by variables (demand deposits and currency in circulation and quasi- money).

The significance of the current study lies in identifying the impact of monetary expansion on the stability of the real exchange rate in Libya, the statement of economic effects of the real exchange rate on economic activity, by the standard models of descriptive analyzes to reach the clear numeric results based on which, solutions and recommendations can be put forward for those in charge of monetary policy and exchange rate policy, utilizing the results of this practical study.

To achieve this goal this paper has been organized into four main sections in addition to the introduction. The first section analyzes the concept of the money supply and the exchange rate as well as previous related studies. The second section summarizes the real exchange rate of the Libyan dinar during the period (1970-2014), while the third section shows the method and experimental results, and conclusion comes in the final section.

2. The Concept of Money Supply and the Exchange Rate

2.1 Money Supply

Money supply is meant to refer to the total means of payment in circulation in the community within a specified period of time (Al-Dulaimi, 1990), meaning that it includes all the payment methods available in the circulation and in the possession of individuals, enterprises and institutions. The concept of money supply has taken ample space of debate among economists about giving a specific and agreeable concept as well as the appropriate mechanism for counting it. It should be noted here that the money supply is deemed as a debt on the banking system or the party which holds the issuance process, as it is commitment thereof and a right for its true holders with the absolute disposition of the amounts in their possession (Ali, 1971).

There are several types of money supply, namely, (Al-Dulaimi, 1990):

1. ***The narrow definition of money supply (M1)***

It consists of currency in circulation outside the banking system in addition to the cash deposits or bank money (current deposits). This means that the money supply can be expressed by the following equation: M1= DD + C where:

M1 = The narrow definition of money supply, DD = Demand Deposits, C = Cash money outside the banking system.

Thus, it is clear that there are two parties defining the money supply M1, and these are the Central Bank and commercial banks (Quraishi, 1993).

2. ***Broader measure of money supply (M2)***

The broader concept of money supply consists of the previous definition M1 and includes non-current deposits as well as current deposits and currency in circulation outside the banking system, i.e., It includes the narrow sense of money supply M1 plus non-current deposits (quasi money) such as the saving deposits, and it can be expressed in the broad meaning of the money supply through the following equation (Michael, 1998):

M2= M1 + TD where M2 = Broad measure of money supply, M1 = The narrow definition of money supply, and TD = Time Deposits.

3. ***Broadest measure of money supply (M3)***

Some developed countries applied a broader meaning to the money supply, due to the great development witnessed in those countries in the monetary and financial field and the evolution of financial markets and the emergence of financial institutions and intermediate and the new invented variety of the types of financial derivatives, because there are some other types of deposits that are long-range has been added within the components of the money supply in the broadest sense M3, and it was excluded at the same time of the components of the money supply in the broader sense M2, and these deposits are deposited into intermediate financial institutions of non-commercial banks (such as savings banks and lending) that their range exceeds two years.

4. ***General liquidity for the economy***

It consists of money supply in the broadest sense M3 plus financial assets owned by non-banker economic units such as public finances paper and bonds issued by the specialized investment banks, real estate, government deposits and savings bonds and commercial paper companies that financial assets (Al-Dulaimi, 1990).

2.2 Real Exchange Rate

The nominal exchange rate as the exchange rate has been defined as the exchange rate of one currency in terms of another currency, therefore, the real exchange rate will be equivalent to the nominal exchange rate, which adjusts according to the differences between the relative levels of domestic prices with the relative rates of foreign prices, the real exchange rate is defined as the number of units of foreign commodities necessary to buy one unit of domestic commodities, This means that the real exchange rate RER is a real concept measures the relative prices of the two commodities. There are several factors that affect the exchange rate, namely, (Ghalibi, 2002):

1. Money Supply: Classic view of the quantity theory of money assume that there is a relationship between the amount of money and the general level of prices, which is the same rate and the same direction. Monetary school, led by Milton Friedman has stressed the importance of money to influence the general price level, but it is not as postulated in the Classic (Falcon, 1983).
2. Interest Rates: The transmission of the international capital movement between international economies is only to search for Interest, in the country where real interest rates rise above the rest of the countries the situation will consequently encourage capital to move towards it, which means that an increase in foreign currency supply domestically and therefore the deterioration of its exchange rate.
3. Inflation Rates: Inflation is one of the factors affecting the exchange rate since the rising of its rates domestically leads to lower purchasing power of the local currency and therefore the deterioration of its exchange rate, which shows the significant effect of the general level of prices on the exchange rate (Ali et al., 1986).
4. Balance of Payments: Economic balance and imbalance in the balance of payments is one of the most important factors affecting the exchange rate because it is link that reflects the country's relationship with the outside world. In the case of a deficit in the balance of payments for a certain country, it leads to increased demand for foreign currencies to fill the deficit and in contrast, a decreased foreign demand for the local currency, which means the deterioration of the exchange rate of that country’s currency, while the opposite is true in the case of a surplus in the balance of payments (Zaki, 1987).

5. General Budget: The state budget plays a big role in influencing the exchange rate, if the state followed a deflationary policy by reducing the size of government public spending leading to reduction of demand and low volume in the level of economic activity and a drop in inflation, this will result in rising the exchange rate of the local currency.

3. Literature Review

A study conducted by (Shendi, 2006), to clarify the relationship between the nominal exchange rate of the Iraqi dinar and the US dollar from the period 1974 to 1994, using the money supply (M2) broad concept and the result of the study is that the most important variables that influenced the nominal exchange rate of the Iraqi dinar against the US dollar Money supply is used in the case of multi- linear model.

Study by (Barbour, 2008), entitled: "The factors affecting the transmission of the impact of foreign exchange rates on the price index in Jordan, 1985-2006 " it adopted the standard model of the researcher on the variables, a change in oil prices, the change in the money supply, real exchange rates, compared with the US dollar exchange rate and the researcher using a form Time Series Study that studied time series on the financial statements and the results of a relationship between the demand shock and the speed and volume of transmission the impact of movements in foreign exchange rates.

Study by (Abdullah Ibrahim, 2013), entitled "The causal relationship between money supply and nominal exchange rate in Libya" from the period 1970 to 2010 and was estimated at a record model variables including independent variable which is money supply, and the dependent variable is the nominal exchange rate, and researcher turned to testing co-integration between the variables under study, and the results were a causal relationship between the variables in two directions, and therefore has concluded that the most appropriate model to estimate the relationship between the variables that are characterized by the common feature of integration is correct model.

3.1 The Real Exchange Rate of the Libyan dinar during the period (1970-2014)

There are several metrics to calculate the real exchange rate, but the common index is the consumer account, and another index, which is the relative price of tradable goods to non-tradable goods, and the real exchange rate is calculated as an indicator of prices. Therefore, any reduction in the RER is a real improvement, the real reduction results in a rise in RER, which means a decline in domestic commod’ity prices compared with foreign goods, and

Table 1 shows the value of the RER during the study period from 1970 to 2014. At the beginning of the history of any study in 1970 it achieved the real exchange rate was the smallest decline since (0.9219) dinars, but it has for arrived at the southernmost point to him was that in any study period in 2005, reaching (2.5448) dinars, an increase of 1.7%, where a change in the seventies was a period of his remarkable height varies over a period eighties where it achieved a decline over several years in which, But it has for the high achieved in the year 1981 amounted to 0.8535 dinars In the nineties has had a noticeable decrease during this period, either after the nineties was in 2000, lowest level since reached (0.7563) dinars.

Table 1
Real exchange rate RER Libyan dinars for the period 1970-2014

RER	Years	RER	Yars
0.5981	1992	/	/
0.605	1993	0.9219	1970
0.6136	1994	0.9297	1971
0.5566	1995	0.9259	1972
0.5315	1996	0.7882	1973
0.5193	1997	0.8352	1974
0.5864	1998	0.8261	1975
0.6026	1999	0.8100	1976
0.7563	2000	0.8358	1977
1.0148	2001	0.6636	1978
2.1412	2002	0.8215	1979
2.4075	2003	0.8495	1980
2.3388	2004	0.8535	1981
2.5448	2005	0.8254	1982
2.4616	2006	0.7702	1983
2.2716	2007	0.7145	1984
2.1784	2008	0.6779	1985
2.1000	2009	0.7113	1986
2.1125	2010	0.6671	1987
1.8874	2011	0.6472	1988
1.8120	2012	0.6909	1989
1.7882	2013	0.6435	1990
1.8887	2014	0.6042	1991

But the recent period namely from 2010 to 2014 was in 2010 has reached (2.1125) dinars as a result of economic and political conditions, which caused a decrease in the year 2011, where 1.8874 reached and I have for it seemed to rise in the period i.e., in 2014, reaching its highest point on the rise It reached 1.8887 dinars. All of these changes in the real exchange rate are due to the fluctuations of the local and global exchange rates and monetary policies that Central Bank made in order to encourage to increase domestic exports and reduce imports of foreign goods and service.

The data in the above table been prepared by using the real data and according to the theory of purchasing power and where: RER real exchange rate. NER is nominal exchange rate. Pw index of US consumer prices and which represents the price of foreign goods. Pd local prices record

$$RERppp = \frac{\mathrm{NER} * \mathrm{P_W}}{\mathrm{P}d}$$

3.2 The Evolution of Money Supply in the Libyan Economy

1. Money supply MS in the Libyan Economy

Narrow money supply (M1) and consists of notes and coins circulated by individual in their daily dealings, meaning any money in circulation and in addition to the volume of money thereof which preserved the banks in the form of current accounts or demand deposits and therefore the equation of money supply (M1) is

M1=DD + CR

2. Broader measure of money (M2)

The broader concept of money supply consists of the previous definition M1 and includes non-current deposits as well as current deposits and currency in circulation outside the banking system, i.e., It includes the narrow sense of money supply M1 plus non-current deposits (quasi money) such as the saving deposits, and it can be expressed in the broad meaning of the money supply through the following equation:

M2= M1 + TD where M2 = Broad measure of money supply, M1 = the narrow definition of money supply, and TD = Time Deposits.

Table 2
Total Money supply (M2) in 1970 - 2014[1]

Money supply M2	Quasi-money	Demand deposit	Money in circulation	years	Money supply M2	Quasi-money	Demand deposits	Money in circulation	years
6500.7	1332.5	3186.0	1982.2	1992	/	/	/	/	/
6817.5	1432.6	3168.0	2216.9	1993	296.3	55.3	128.8	112.2	1970
7708.1	1650.7	4067.6	1989.8	1994	430.9	66.4	243.8	120.7	1971
8326.2	1953.8	4337.0	2035.4	1995	518.1	105.1	265.6	147.4	1972
8877.5	2159.5	4298.2	2419.8	1996	672.8	158.8	311.4	202.6	1973
9166.0	2144.4	4487.4	2534.2	1997	1063.8	298.8	502.8	262.2	1974
9697.1	2509.4	4489.1	2698.6	1998	1103.6	236.1	521.5	346.0	1975
10522.2	2631.1	5256.3	2634.8	1999	1433.2	293.8	703.5	435.9	1976
9784.4	2015.2	5070.0	2699.2	2000	1798.7	354.9	858.8	585.0	1977
10809.4	2538.6	5711.2	2559.6	2001	2066.1	378.3	819.3	868.5	1978
10868.6	2162.8	6091.9	2613.9	2002	2809.3	559.9	1193.7	1055.7	1979
11558.1	2528.9	6265.7	2763.5	2003	3554.8	655.9	2213.2	685.7	1980
13135.5	2598.9	7923.9	2612.7	2004	4114.3	602.1	2721.0	791.2	1981
17096.3	3068.2	10719.4	3308.7	2005	3789.6	557.3	2342.4	889.9	1982
19655.9	3,312.9	12410.1	3932.9	2006	3599.0	714.6	2046.2	838.2	1983
26982.2	4,144.6	18256.4	4581.2	2007	3605.7	894.3	1943.8	767.6	1984
39744.5	5,329.9	28806.3	5608.3	2008	4580.4	1088.1	2507.2	985.1	1985
44161.3	5,991.9	31206.5	6962.9	2009	4198.2	1156.7	2017.7	1023.8	1986
46350.7	5,029.5	33712.2	7609.0	2010	4415.9	977.3	2370.4	1068.2	1987
57920.9	4,503.8	38577.0	14840.1	2011	4169.6	1158.0	2112.0	899.6	1988
63731.5	4,517.8	45822.6	13391.1	2012	4645.8	963.8	2550.3	1131.7	1989
69005.9	4,706.5	50879.5	13419.9	2013	5531.2	885.8	3184.3	1461.1	1990
69351.0	2676.1	49505.2	17169.7	2014	5560.9	1118.2	2821.8	1620.9	1991

From table (3), we note that the money supply has achieved an annual average growth of 14.49 percent during the study, due to growth in demand deposits, which achieved an annual average growth of 16.38%, while the currency has grown in circulation rate of 15.62%, and the rate of growth in quasi money of 12.6% during the study period.

[1]Source through actual data:

1. Central Bank of Libya, monetary and banking statistics bulletins from the period 1966 to 2000 and the folder number (54), the first quarter 2014.
2. Central Bank of Libya, the Economic Bulletin, Vol. No. (55), third quarter 2015.
3. The Ministry of Planning, Bureau of Statistics and Census, the preparation of a variety.

Table 3
The annual rate of growth in currencyin circulation and eposits on demand and money supply M1, M2

The annual rate of growth in currency in circulation and deposits on demand & money supply M1, M2					
Growth rate money supply M1	Growth rate of money supply M2	Growth rate of quasi money	Growth rate of demand deposit	Growth rate of money in circulation	years (years 10)
29.01	29.48	31.4	36.41	22.36	1980 – 1971
5.18	6.14	4.4	5.3	8.93	1990 – 1981
5.62	4.81	9.4	4.37	6.72	2000 – 1991
18.26	19.85	10.7	23.32	11.57	2010 – 2001
14.42	16.27	- 0.6	14.77	28.5	2014 – 2011
14.49	15.38	12.6	16.83	15.62	Average annual Rate

The Annual Rate of Growth in Currency in Circulation and Deposits on Demand & Money Supply M1, M2[2]									
Growth rate of deposits	Demand deposits	Growth rate of currency	Money in circulation	years	Growth rate of deposits	Demand deposits	Growth rate of currency	Money in circulation	years
12.9	3,186.0	22.3	1,982.2	1992	/	/	/	/	/
-0.6	3,168.0	11.8	2,216.9	1993	%	128.8	%	112.2	1970
28.4	4,067.6	-10.2	1,989.8	1994	89.3	243.8	7.6	120.7	1971
6.6	4,337.0	2.3	2,035.4	1995	8.9	265.6	22.1	147.4	1972
-0.9	4,298.2	18.9	2,419.8	1996	17.2	311.4	37.5	202.6	1973
4.4	4,487.4	4.7	2,534.2	1997	61.5	502.8	29.4	262.2	1974
0.1	4,489.1	6.5	2,698.6	1998	3.7	521.5	31.9	346.0	1975
17.1	5,256.3	-2.4	2,634.8	1999	34.9	703.5	25.9	435.9	1976
-12.9	5070.0	2.4	2,699.2	2000	22.1	858.8	34.2	585.0	1977
24.7	5,711.2	-5.2	2,559.6	2001	-4.6	819.3	48.5	868.5	1978
6.7	6,091.9	2.1	2,613.9	2002	45.7	1,193.7	21.6	1,055.7	1979
2.9	6,265.7	11.8	2,763.5	2003	85.4	2,213.2	-35.1	685.7	1980
26.5	7,923.9	-5.5	2,612.7	2004	22.9	2,721.0	15.4	791.2	1981
35.3	10,719.4	26.6	3,308.7	2005	-13.9	2,342.4	12.5	889.9	1982
15.8	12,410.1	18.9	3,932.9	2006	-12.7	2,046.2	-5.8	838.2	1983
47.1	18,256.4	16.5	4,581.2	2007	-5.0	1,943.8	-8.4	767.6	1984
57.8	28,806.3	22.4	5,608.3	2008	28.9	2,507.2	28.3	985.1	1985
8.3	31,206.5	24.2	6,962.9	2009	-19.5	2,017.7	3.9	1,023.8	1986
8.1	33,712.2	9.3	7,609.0	2010	17.5	2,370.4	4.3	1,068.2	1987
14.4	38,577.0	95.1	14,840.1	2011	-10.9	2,112.0	-15.8	899.6	1988
18.8	45,822.6	-9.8	13,391.1	2012	20.8	2,550.3	25.8	1,131.7	1989
11.1	50,879.5	0.2	13,419.9	2013	24.9	3,184.3	29.1	1,461.1	1990
-2.70	49505.2	27.94	17169.7	2014	-11.4	2,821.8	10.9	1,620.9	1991

Note: Prepared by using the scale of the money supply and economic bulletin of the Central Bank of Libya

We note from the table (4) below that the demand deposits in some years have recorded negative growth rates and the reason is mistrust between the banking system and individuals, and also because there are restrictions on cash withdrawals from banks, and the decline of institutions and merchants who deal in large amounts on their own to deal with commercial banks, which in turn led to increased liquidity outside the banking system (the National Authority, 2002). This is reflected in the other hand, the positive growth achieved by the currency in circulation during the same period with the exception of the years 1980.1983, 1984.1988 rates, which have had negative growth rates of 35.1%, 5.81%, 8.42%, 15.78%, respectively. It should be noted here, that the lowest rate of growth recorded by the currency in circulation was in 1980, of about 35.05%, The reason for this is the process of replacing the ten categories and five dinars by the Central Bank on 15 - 5-1980, between the first version denominated in dinars, and all the previous versions of the two categories denominated in pounds, and the permanent withdrawal from trading in a blink of one week, this decision came as a solution to address the phenomenon of the increasing currency-in-circulation and monetary preference by large numbers of citizens, as these two categories used to make 97% of all currency in circulation volume on that date (for Central Bank of Libya, 1980).

The decline in this rate of growth of currency in circulation, in 1980, was confronted by a significant increase in the growth rate of deposits on demand; it has grown by about 85.41%. However, the volume of currency in circulation did not record any impairment in value compared to 1980, It had been growing steadily during the period where the highest peak in the year 2011 rate of 95.1% compared with 1980. While demand deposits have grown at a rate of 16.83% during the study period, but it is negative growth rates were recorded in 1978, 1982.1983, 1984.1986, 1988.1991, 1993.1996, 2000.2014 and by 4.6-%, 13.9 -% 12.7-%, -0.5%, 19.5-%, 10.9-%, 11.4-%, -0.6%, 0.9-%, 12.9-%, 2.7-%, which had a negative impact on the growth in the money supply these years.

Table 4
Growth rates (currency in circulation and demand deposits)

Growth rates (currency in circulation and demand deposits) for the period 1970 to 2014									
Money supply M2	Quasi-money	Demand deposit	Money in circulation	years	Money supply M2	Quasi-money	Demand deposits	Money in circulation	years
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19655.9	3,312.9	12410.1	3932.9	2006	3599.0	714.6	2046.2	838.2	1983
26982.2	4,144.6	18256.4	4581.2	2007	3605.7	894.3	1943.8	767.6	1984
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44161.3	5,991.9	31206.5	6962.9	2009	4198.2	1156.7	2017.7	1023.8	1986
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63731.5	4,517.8	45822.6	13391.1	2012	4645.8	963.8	2550.3	1131.7	1989
69005.9	4,706.5	50879.5	13419.9	2013	5531.2	885.8	3184.3	1461.1	1990
69351.0	2676.1	49505.2	17169.7	2014	5560.9	1118.2	2821.8	1620.9	1991

From Table (5) quasi money witnessed the rise and declined during the study period, where at the beginning of the study in 1970 it was about 55.3 million dinars and that is of less value, and then discernible to rise until 1975 decreased approximately 236.1 million representing change 20.9-% and continued negative values over the years (1981.1982, 1987.1989, 1997.2000, 2002.2010, 2011.2014), Quasi money reached the maximum height that was hailed in 2009 amounted to 5991.9 million dinars at change rate of 12.4%.

Table 5
Quasi-money and the rate of change

Quasi-money and the rate of change of the period 1970 to 2014					
Change rate in quasi money	**Quasi- money**	**years**	**Change rate in quasi money**	**Quasi- money**	**years**
19.2	1332.5	1992	/	/	/
7.5	1432.6	1993	%	55.3	1970
15.2	1650.7	1994	20.1	66.4	1971
18.4	1953.8	1995	58.3	105.1	1972
10.5	2159.5	1996	51.1	158.8	1973
-0.7	2144.4	1997	88.2	298.8	1974
17.0	2509.4	1998	-20.9	236.1	1975
4.5	2631.1	1999	24.4	293.8	1976
-23.4	2015.2	2000	20.8	354.9	1977
25.9	2538.6	2001	6.6	378.3	1978
-14.8	2162.8	2002	48.0	559.9	1979
16.9	2528.9	2003	17.1	655.9	1980
2.8	2598.9	2004	-8.2	602.1	1981
18.1	3068.2	2005	-7.4	557.3	1982
7.8	3312.9	2006	28.2	714.6	1983
25.1	4144.6	2007	25.1	894.3	1984
28.6	5329.9	2008	21.7	1088.1	1985
12.4	5991.9	2009	6.3	1156.7	1986
-16.1	5029.5	2010	-15.5	977.3	1987
-10.5	4503.8	2011	18.5	1158.0	1988
0.3	4517.8	2012	-16.8	963.8	1989
4.2	4706.5	2013	-8.1	885.8	1990
-43.1	2676.1	2014	26.2	1118.2	1991

Source schedule using money supply and economic bulletin of the Central Bank of Libya from the period 1966-2000. Volume (54) , the first quarter 2014, and a folder number (55), Aaii quarter 2015, while the change rate is prepared by the researcher

As for the contribution of the money supply (M 2) in gross domestic product, it was effective contribution to GDP, through Table (6), we note that the money supply in 1970, i.e., the beginning of the study, has contributed an average of 22% of the value of gross domestic product and this is the lowest contribution recorded during the study period, and after that this contribution increased until it reached its highest value in 2014 reaching 161% as a result of the political situation during the year, and the following table shows the contribution of the money supply in the GDP.

Table 6

Contribution rate of money supply (M 2) in GDP in the Libyan economy

Contribution rate of money supply (M 2) in GDP in the Libyan economy from the period 1970 to 2014							
Contribution Rate	**GDP**	**Money supply (M2)**	**years**	**Contribution Rate**	**GDP**	**Money supply (M2)**	**years**
0.68	9539.8	6500.7	1992	/	/	/	/
0.73	9331.4	6817.5	1993	0.22	1329.2	296.2	1970
0.77	9967.0	7708.1	1994	0.26	1626.7	430.8	1971
0.78	10679.3	8326.2	1995	0.29	1798.3	518.1	1972
0.73	12180.2	8877.5	1996	0.30	2246.1	672.7	1973
0.65	14148.8	9166.0	1997	0.27	3883.1	1063.7	1974
0.76	12741.3	9697.1	1998	0.29	3780.0	1103.6	1975
0.74	14138.2	10522.2	1999	0.29	4907.0	1433.2	1976
0.53	17394.7	9294.1	2000	0.31	5763.0	1798.7	1977
0.52	20857.8	10809.4	2001	0.36	5687.6	2066.1	1978
0.39	28062.9	10868.6	2002	0.36	7846.3	2809.3	1979
0.34	34164.9	11558.1	2003	0.33	10881.6	3554.8	1980
0.30	44133.9	13135.5	2004	0.44	9401.1	4114.3	1981
0.31	56025.2	17096.3	2005	0.40	9372.8	3789.6	1982
0.27	72841.1	19655.9	2006	0.40	8931.9	3599	1983
0.30	89260.3	26982.2	2007	0.43	8363.9	3605.7	1984
0.44	90342.8	39744.5	2008	0.56	8226.5	4580.4	1985
0.69	63689.1	44161.3	2009	0.57	7324.7	4198.2	1986
0.53	87375.0	46350.7	2010	0.71	6195.7	4415.9	1987
1.48	39171.1	57920.9	2011	0.63	6599.2	4169.6	1988
0.63	100627.3	63731.5	2012	0.63	7404.0	4645.8	1989
1.05	65994.5	69005.9	2013	0.68	8185.3	5531.2	1990
1.61	43030.2	69351.0	2014	0.62	8981.4	5560.9	1991

Source economic bulletin of the Central Bank of Libya from the period 1966-2000 Calendar folder number (54), the first quarter 2014, and the folder number (55), 3rd quarter 2015.

4. Methodology and Findings

As mentioned earlier this study aims to examine the effect of the money on the stability of real exchange rate in Libyan, using demand deposits, currency in circulation and quasi-money as proxies. Data are collected for 45 years (1970 – 2014) in Libya. Annual data applied in this study, which is represented in the variables (Currency in circulation, demand deposits and quasi- money), using time-series analysis techniques through Johnson's test of the joint integration. The relationship between the real exchange rate and the components of the money supply in the broad sense (demand deposits and currency in the public and quasi-money) in Libya will be tested using Johansen methodology (Johansen co-integration test), which requires the need to ascertain the degree of integration of Time Series (Integrated order) using units root test, foremost of which and the most common in modern studies is Dickey- Fuller1986,1981,1979 Augmented)ADF), if it is to prove that the two strings are stable and are of the same rank, we can move to apply the co-integration test to check out the relationship in the long term between the variables, in addition to testing for Granger causality to determine the nature of relations in the short term.

1. *The Unit Root Test*

In the first phase of the measurement will be time-series analysis in order to obtain reliable results that are not subject to false regression to determine whether these chains stable (stationary) or unstable (non-stationary), and to determine the rank of integration (Integrated order, Alhdiy et al, 2015). It should also make sure that it does not include any integrated variant of the second degree, according to the terms of applying Johansen's integration test.

Augmented Dickey- Fuller (ADF) is one of the most important tests, the most common in the recent studies, which can be relied upon to test the unit root, and to study the stability of a string of variables, the (ADF) test is based on the following models:

$$\Delta C_t = \gamma C_{t-1} - \sum_{j=1}^{p} \varphi_{j+1}\ \Delta C_{t-1}\ + \mu_t \dots \dots .. 1$$

$$\Delta C_t = \gamma C_{t-1} - \sum_{j=1}^{p} \varphi_{j+1}\ \Delta C_{t-1}\ + \mathrm{C} + \mu_t \dots \dots 2$$

$$\Delta C_t = \gamma C_{t-1} - \sum_{j=1}^{p} \varphi_{j+1}\ \Delta C_{t-1}\ + \mathrm{C} + b_t + \ \mu_t \dots .. 3$$

Where the following hypotheses are tested:

Null hypothesis: non-stillness C = variable unit root contains H0: $\gamma < 0$

Alternative hypothesis: stillness variable C in the form of an integrated class = zero 0 = Ha: γ

In other words, this study will test the hypothesis that demand deposits and currency in circulation and quasi- money have negative influence on the real exchange rate of the Libyan dinar.

The expanded Dickey Fuller test was conducted in its three models (stable, and the direction and consistent, and null) and based on standard Bayesian Schwarz on all the variables under study to detect the degree of their stabilities.

The results showed lack of stability of these chains variables used for each level, leading to take the test on the first differences. And Table 7 shows the results as follows:

Table 7
Dickey Fuller (ADF) test results

Level						Variables
Critical value %5	Null	Critical value %5	Direction and consistent	Critical value %5	Stable	
-1.949	-1.069	-3.518	-1.907	-2.931	-1.014	LRER1
-1.948	2.124	-3.516	-2.286	-2.929	-3.661	LBD
-4.948	1.016	-3.515	-2.161	-2.929	-0.933	LCC
-4.948	.1311	-3.516	-2.513	-2.929	-1.540	LDD
after taking the first differences						variable
-1.949	-4.452*	-3.518	-4.484*	-2.931	-4.443*	LRER1
-1.949	-4.486*	-3.518	-6.057*	-2.931	-5.006*	LBD
-1.949	-2.088**	-3.518	-5.947*	-2.931	-5.998*	LCC
-1.949	-5.023*	-3.518	-6.403*	-2.931	-6.496*	LDD
* Abstract values at 1%, ** Abstract values at 5%						

All the results that have been obtained through testing ADF to determine the level of stability of the strings confirm that all variables are stable after taking the first difference, and that there was no integrated variant of the second degree, and so we can move to a test of causation for Granger (Granger Causality tests), and then joint integration testing or the simultaneous (Johansen co-integration test) to check for the existence of a relationship in the long run between these variables.

2. *Granger Causality Test*

Determining the causal link between economic variables allows us to determine the relationship type between these variables in the short term, which gives us a good understanding of the economic phenomena. It could be argued that the variable (X) causes the (Y) if the predicted (Y), which relies heavily on the past two variables (Y, X) is better than the predicted Y, which depends only on the past Y (Chippy and Btahir: 2010)

In order to identify the direction of causality between variables Granger Causality test is applied.

• The causality test of (X) to (Y) is conducted according to the following equation (Hadi et al: 2014):

$$Y = \propto_0 + \sum_{i=1}^{m} \propto_{1i} Y_{t-1} + \sum_{i=1}^{n} \propto_{2i} X_{t-1} + \varepsilon_t$$

• While testing the causal direction of the (Y) to (X) is conducted using the following equation:

$$X = \propto_0 + \sum_{i=1}^{h} \propto_{1i} X_{t-1} + \sum_{i=1}^{k} \propto_{2i} Y_{t-1} + \varepsilon_t$$

Where each variable depends on previous values to him, the previous values of the other variables, and determines the number of (P) through the standard AIC where the causal relationship or null are tested using the statistical Fisher estimated (F), and compared with (F) Fisher critical at certain statistical abstract level, where the hypothesis under testing is the lack of a relationship.

Through a table (8) we have reached a number of results that we recorded in the corresponding probability for statistical significance F Fisher at 5%, which rejected the null

Hypothesis, according to the following:

Table 8
Granger causality test results

Calculated Fischer Statistics	Null hypothesis
1.09799	Currency in circulation is not causing RER
4.13033*	RER is not causing Currency in circulation
1.18663	Quasi money is not causing RER
1.10349	RER is not causing Quasi money
0.71281	Demand deposits is not causing RER
3.80872*	RER is not causing Demand deposits
0.13497	Quasi money is not causing Currency in circulation
0.76741	Currency in circulation is not causing Quasi money
4.55486*	Demand deposits is not causing Currency in circulation
1.34938	Currency in circulation is not causing Demand deposits
0.07694	Demand deposits is not causing Quasi money
0.60739	Quasi money is not causing deposits

- The real exchange rate is causing currency in circulation. This means that the change in the real exchange rate is causing the change in currency in circulation and not the opposite, namely that there is a causal relationship in one direction.
- The change in the real exchange rate is causing a change in demand deposits in the short term, which means that there is a causal relationship in one direction.
- The change in demand deposits is causing a change in currency in circulation in the short term.

3. Co-integration Test

After that unit root tests were done on variables under study, where it proved that integrated variables are of the initial class (1) I, we turn to test the joint integration to Johansson. To determine the number of vectors joint integration (Johansen: 1988,1999; Johansen and Juselius: 1990) suggest two tests statisticians, first: Test impact (Trace test- trace) that tests the null hypothesis that the number of vectors unique joint integration or at least equal to the number (q) against the alternative hypothesis (q = 1), and is calculated according to the following formula (Abdullah & Naim, 2011):

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{n} \ln\left(1-\hat{\lambda}_{r+1}\right)$$

Where (λ_ (r + 1), ..., λ_n) represents the lowest potential vectors (eigenvectors) (p-r), and Null hypothesis suggests that the number of vectors joint integration is equal to or less than (r) (Abdali, 2007). The second test is to test the maximum eigenvalue, and it tests the null hypothesis that there is an (r) vector co integration against the alternative hypothesis that there is (r + 1) common vector integration, and the statistics are calculated according to the following equation (Hussain et al, 2010):

$$\lambda_{max}(r, r+1) = -Tln\left(1-\hat{\lambda}_{r+1}\right)$$

Tables (9) and (10) refer to the results of a systematic impact testing of the Johansen (Trace test) and (maximal eigenvalue test) on the real exchange rate and quasi-cash, demand deposits and currency in circulation in Libya. Where both tables refer to the possibility of rejection of the null hypothesis (r = 0) i.e., presence of simultaneous integration in the abstract level of 5% between variables, because the impact values are greater than critical values, and according to this result, there is a long-term equilibrium relationship between real exchange rate and other variables in the long term.

Table 9
Trace Eigenvalue Statistic

Probability	0.5 Critical Value	Trace statistic	π Eigenvalue	Hypothesized No. of CE(S)
0.0089	47.85613	55.14057	0.473672	None
0.0891	29.79707	27.54183	0.358010	At most 1
0.4151	15.49471	8.484945	0.166536	At most 2
0.4194	3.841466	0.651862	0.015045	At most 3

Table 10
Maximum Eigenvalue Statistic

Probability	0.5 Critical Value	Max-Eigen statistic	π Eigenvalue	Hypothesized No. of CE(S)
0.0498	27.58434	27.59874	0.473672	None
0.0952	21.13162	19.05688	0.358010	At most 1
0.3959	14.26460	7.833083	0.166536	At most 2
0.4194	3.841466	0.651862	0.015045	At most 3

The co integration equation of Johansson test was obtained as follows:

LRER1 =1.06 - 0.34 LBD - 0.51 LCC - 0. 89 LDD.

The results co-integration equation of the long-term relationship has come compatible with economic theory for all variables.

The results have shown that demand deposits have a heavier impact on the real exchange rate compared to the other variables which reached its parameter at (0.89), and referring arrest consistent with the theory, and its forcing indicator is consistent with the theory.

And also indicate that the currency in circulation affect the real exchange rate as the value of its parameter is (0.51) and its forcing indicator is consistent with the theory, as well as quasi-money as the value parameter is (0.34).

5. Conclusion and Recommendations

In conclusion, based on the results that have been reached to the possibility of controlling the stability of the real exchange rate of the Libyan dinar through the components of the money supply in a broad sense (demand deposits, currency in circulation and quasi money), which have had a negative Influence of the real exchange rate of the Libyan dinar. The study has shown strong impact for each of (demand deposits, currency in circulation and quasi-money) on the real exchange rate of the Libyan dinar during the study period and a decrease in the value of the Libyan dinar significantly during the study period, especially during the late eighties and nineties as a result of the economic blockade imposed by the United States and the UN Security Council.

Based on that, this study recommends the following:

1. It must raise awareness and culture of banking and gain confidence by individuals and customers so that the banking process can run properly
2. Research must be directed to conduct possible studies for the purpose of developing the banking system
3. The monetary authorities have to take into account the current situation of the Libyan economy and work on a precise standard for determining the bulk of cash money, and when intending to change the money supply, monetary authorities have to take into account the other monetary and economic indicators.
4. The government should not interfere in the work of the Central Bank which should be granted full autonomy in its management of the monetary affairs.

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Appendixes:

1. Dickey Fuller Test Results:

1.1 For variable LRER1 at the level of:

Null Hypothesis: LRER1 has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.7398	-1.014309	Augmented Dickey-Fuller test statistic	
	-3.592462	1% level	Test critical values:
	-2.931404	5% level	
	-2.603944	10% level	

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

Null Hypothesis: LRER1 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.6338	-1.906681	Augmented Dickey-Fuller test statistic	
	-4.186481	1% level	Test critical values:
	-3.518090	5% level	
	-3.189732	10% level	

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

Null Hypothesis: LRER1 has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.2564	-1.060856	Augmented Dickey-Fuller test statistic	
	-2.619851	1% level	Test critical values:
	-1.948686	5% level	
	-1.612036	10% level	

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

After taking the first differences:

Null Hypothesis: D(LRER1) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0046	-4.484398	Augmented Dickey-Fuller test statistic	
	-4.186481	1% level	Test critical values:
	-3.518090	5% level	
	-3.189732	10% level	

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

Null Hypothesis: D(LRER1) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0009	-4.442568	Augmented Dickey-Fuller test statistic	
	-3.592462	1% level	Test critical values:
	-2.931404	5% level	
	-2.603944	10% level	

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

1.2 Variable LBD at the level of:

Null Hypothesis: D(LRER1) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0000	-4.452254	Augmented Dickey-Fuller test statistic	
	-2.619851	1% level	Test critical values:
	-1.612036	10% level	

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

Null Hypothesis: LBD has a unit root
Exogenous: Constant

Prob.*	t-Statistic		
0.082	-3.661268	Augmented Dickey-Fuller test statistic	
	-3.588509	1% level	Test critical values:
	-2.929734	5% level	
	-2.603064	10% level	

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

Null Hypothesis: LBD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.4324	-2.286115	Augmented Dickey-Fuller test statistic	
	-4.180911	1% level	Test critical values:
	-3.515523	5% level	
	-3.188259	10% level	

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

After taking the differences

Null Hypothesis: LBD has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.9909	2.123519	Augmented Dickey-Fuller test statistic	
	-2.618579	1% level	Test critical values:
	-1.948495	5% level	
	-1.612135	10% level	

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

Null Hypothesis: D(LBD) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0000	-6.056572	Augmented Dickey-Fuller test statistic	
	-4.186481	1% level	Test critical values:
	-3.518090	5% level	
	-3.189732	10% level	

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

Null Hypothesis: D(LBD) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0000	-4.486262	Augmented Dickey-Fuller test statistic	
	-2.619851	1% level	Test critical values:
	-1.948686	5% level	
	-1.612036	10% level	

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

1.3 Variable LCC at the level of:

Null Hypothesis: LCC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.7682	-0.933312	Augmented Dickey-Fuller test statistic	
	-3.588509	1% level	Test critical values:
	-2.929734	5% level	
	-2.603064	10% level	

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

Null Hypothesis: LCC has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.4984	-2.161409	Augmented Dickey-Fuller test statistic	
	-4.180911	1% level	Test critical values:
	-3.515523	5% level	
	-3.188259	10% level	

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

Null Hypothesis: LCC has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.8432	1.016	Augmented Dickey-Fuller test statistic	
	-2.618579	1% level	Test critical values:
	-4.948532	5% level	
	-1.612135	10% level	

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

1.4 LD variable at the level of:

Null Hypothesis: LDD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.5040	-1.540476	Augmented Dickey-Fuller test statistic	
	-3.588509	1% level	Test critical values:
	-2.929734	5% level	
	-2.603064	10% level	

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

Null Hypothesis: LDD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.3209	-2.512648	Augmented Dickey-Fuller test statistic	
	-4.180911	1% level	Test critical values:
	-3.515523	5% level	
	-3.188259	10% level	

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

Null Hypothesis: LDD has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.4352	- 1.311324	Augmented Dickey-Fuller test statistic	
	-2.618579	1% level	Test critical values:
	-4.948321	5% level	
	-1.612135	10% level	

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

After taking the differences:

Null Hypothesis: D(LDD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0000	-6.496257	Augmented Dickey-Fuller test statistic	
	-3.592462	1% level	Test critical values:
	-2.931404	5% level	
	-2.603944	10% level	

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

Null Hypothesis: D(LDD) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

Prob.*	t-Statistic		
0.0000	-6.402910	Augmented Dickey-Fuller test statistic	
	-4.186481	1% level	Test critical values:
	-3.518090	5% level	
	-3.189732	10% level	

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

2. Granger Causality Tests results

Pairwise Granger Causality Tests
Date: 07/25/16 Time: 11:07
Sample: 1970 2014
Lags: 2

Prob.	F-Statistic	Obs	Null Hypothesis:
0.3439	1.09799	43	LCC does not Granger Cause LRER1
0.0238	4.13033		LRER1 does not Granger Cause LCC
0.3163	1.18663	43	LBD does not Granger Cause LRER1
0.3421	1.10349		LRER1 does not Granger Cause LBD
0.4967	0.71281	43	LDD does not Granger Cause LRER1
0.0311	3.80872		LRER1 does not Granger Cause LDD
0.8742	0.13497	43	LBD does not Granger Cause LCC
0.4713	0.76741		LCC does not Granger Cause LBD
0.0169	4.55486	43	LDD does not Granger Cause LCC
0.2715	1.34938		LCC does not Granger Cause LDD
0.9261	0.07694	43	LDD does not Granger Cause LBD
0.5500	0.60739		LBD does not Granger Cause LDD

3. Co-integration Tests Results:

Date: 07/24/16 Time: 06:21
Sample (adjusted): 1972 2014
Included observations: 43 after adjustments
Trend assumption: Linear deterministic trend
Series: LRER1 LBD LCC LDD
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Prob.**	0.05 Critical Value	Trace Statistic	Eigenvalue	Hypothesized No. of CE(s)
0.0089	47.85613	55.14057	0.473672	None *
0.0891	29.79707	27.54183	0.358010	At most 1
0.4151	15.49471	8.484945	0.166536	At most 2
0.4194	3.841466	0.651862	0.015045	At most 3

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Prob.**	0.05 Critical Value	Max-Eigen Statistic	Eigenvalue	Hypothesized No. of CE(s)
0.0498	27.58434	27.59874	0.473672	None *
0.0952	21.13162	19.05688	0.358010	At most 1
0.3959	14.26460	7.833083	0.166536	At most 2
0.4194	3.841466	0.651862	0.015045	At most 3

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4. Graph of the variables