

DETERMINANTS OF MONEY SUPPLY IN THE LIBYAN ECONOMY DURING THE PERIOD FROM 1980 TO 2016

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ABSTRACT

This research focuses upon the relationship between money supply and its main determinants in the Libyan economy using time series data from 1980 to 2016 by the descriptive analytical approach. The results of this study showed that the role of high-powered money emerges more important in affecting the money supply, in comparison to money multiplier, and the monetary base and the money multiplier together. Moreover, the main driving force behind the expansion in monetary base was foreign assets in the Libyan economy during the period of study. Regarding the appropriate economic policy, aiming to minimize the adverse impact of monetary expansion on the monetary stability in the Libyan economy, the major outcomes of this study suggest that monetary expansion can be cured by a sufficiently tight monetary policy through instituting appropriate mechanisms to sterilize foreign exchange injections into the Libyan economy.

Keywords: The monetary expansion, Money multiplier, monetary base, and Money supply

I. INTRODUCTION

The money supply and its prudent management and control through the monetary policy pursued by the central bank of a country can play a significant role in the managing and controlling the monetary sector to achieve monetary stability and low inflation (Muhammad and Anisul.2010). Money supply is the total stock of assets that are generally acceptable as medium of exchange within an economy at a particular time (Marthinsen, 2008). According to the IMF's manual, there exist three basic measures of money supply in an economy, they are referred to as M0, M1, M2, and they are measured as follows:

The first indicator, M0, includes only currency in the hands of the public; banks' statutory reserve deposits held at the central bank and banks' cash reserves. This aggregate represents the

monetary liabilities of the central bank and is usually referred to as the monetary base or reserve money.

The narrow money supply, M1, comprises currency held outside the banking system and the current account deposit. It may also include some foreign currency deposits that are used for domestic transactions. This definition implies that only assets that are directly used in making payments should be considered as money.

The broad monetary aggregate, M2, comprises M1 plus short-term (usually a year and under) savings and time deposits, certificates of deposit, foreign currency transferable deposits and repurchase agreements.

In general, there is no universally applicable empirical definition of money supply and the choice may vary dependent on what issue is being examined. However, the most common measures for studying the effects of money supply on the economy are narrow money supply and broad money supply (Mankiw, 2010).

II. RESEARCH PROBLEM

The Libyan economy experienced huge increases in money supply during the period from 1980 to 2016. As a result of the developing nature of its economy, and the limited availability of other endogenous resources other than oil and gas, the Libyan economy experienced a drastic increase in almost all macroeconomic variables, particularly, the monetary expansion.

Table 1 identifies development of monetary expansion in the Libyan economy during the period in question. It summaries the actual money supply, the desired level of money supply, and the ratio of monetary expansion. The actual money supply achieved sizeable increase during the period of study. It increased from approximately 2898.9 LD million in 1980 to about 4645.4 LD million in 1990, and it reached its highest level of 86536.9 LD million in 2016 as indicated in Table 1. In contrast, the desired level of money supply varied significantly during the period of study. It ranged between 1564.13 LD million and 2966.90 LD million, reflecting the considerable fluctuation in the real income in the Libyan economy. More specifically, the average of actual money supply and the desired money supply during the period 1980-2016 were 19198.10 LD million, and 2188.14 LD million respectively. Such a situation resulted in an excess money supply in the Libyan economy during the period of study.

The value of monetary expansion was relatively moderate during the 1980s. It ranged between 642.12 LD million and 1878.18 LD million. After that namely during the period from 1990 to 2011, it has increased and peaked in 2016 at about 84521.70 LD million. Furthermore, the ratio

of monetary expansion moved in the range of 7.20 percent to 37.32 percent during the period 1980-1992 (see Table 1). Since then, it gradually increased over the period of study, with the exception of 2000, 2003, and 2010. The upward trend in the ratio of monetary expansion persisted to reach its highest level of 1055.80 in 2016.

Broadly speaking, an analysis of the historical record and graphical evidence of annual data of actual money supply and desired level of money supply indicates that the monetary expansion is still a serious problem in Libyan economy as indicated in Figure 1, and this was due to a substantial increase of money supply on the one hand, which registered positive growth rates during the most period of study, with average of roughly 11 percent during the period from 1980-2016, and a significant fluctuation in real income on the other hand, which achieved negative growth rates during the most period of study, with average of nearly -0.58 percent during the mentioned period. Thus, there is a need to determine the main sources of money supply growth which would assist policy makers, to achieve the monetary equilibrium in the Libyan economy.

Table 1: The coefficient of monetary expansion in the Libyan economy during the period (1980-2016)

Year	Real GDP (Y) (1980 =100)	Money Supply (M_t)	The Desired Level of Money Supply(QY_t)= $0.251728Y_t$	The Value of Monetary Expansion (M_{ex})= $M_t -$ $0.251728Y_t$	The Ratio of Monetary Expansion (%)
1980	11516.000	2898.9	2898.90	0	0
1981	9208.711	3512.2	2318.09	1194.11	12.96
1982	9348.022	3232.3	2353.15	879.15	9.40
1983	8907.569	2884.4	2242.28	642.12	7.20
1984	8167.615	2711.4	2056.01	655.39	8.02
1985	8217.238	3492.3	2068.50	1423.80	17.32
1986	7284.116	3041.5	1833.61	1833.61	25.17
1987	6213.595	3438.6	1564.13	1874.47	30.16
1988	6684.402	3011.6	1682.65	1328.95	19.88
1989	7165.757	3682.0	1803.82	1878.18	26.21
1990	7432.322	4645.4	1870.92	2774.48	37.32
1991	8612.331	4442.7	2167.96	2274.74	26.41
1992	8386.357	5168.2	2111.08	3057.12	36.45
1993	8043.430	5384.9	2024.75	3360.15	41.77
1994	8198.862	6057.4	2063.88	3993.52	48.70
1995	7157.922	6372.4	1801.84	4570.56	63.85
1996	7342.302	6718.0	1848.26	4869.74	66.32
1997	7286.563	7021.6	1834.23	5187.37	71.19

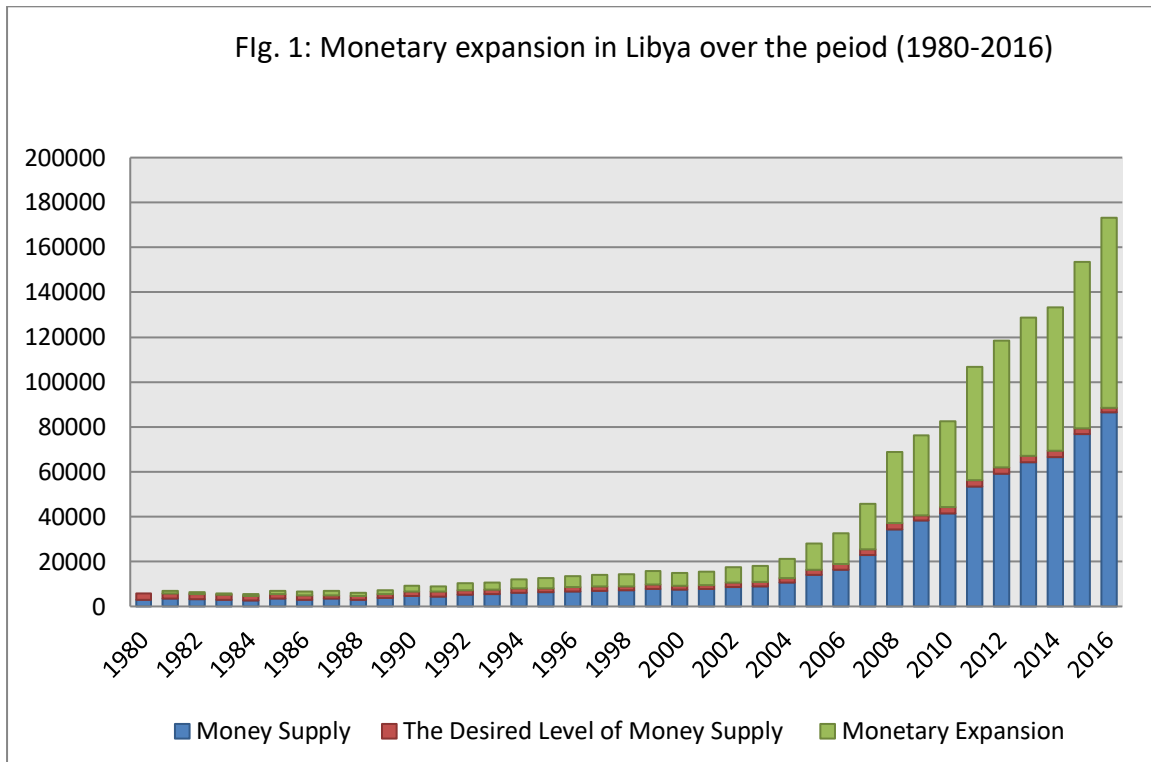
1998	7256.420	7187.7	1826.64	5361.06	73.88
1999	7285.897	7891.1	1834.06	6057.04	83.13
2000	7556.286	7433.0	1902.12	5530.88	73.20
2001	7228.429	7703.8	1819.59	5884.21	81.40
2002	7138.151	8773.8	1796.87	6976.93	97.74
2003	8065.988	9029.2	2030.43	6998.77	86.768
2004	8421.066	10536.6	2119.81	8416.79	99.94
2005	9287.632	14028.1	2337.95	11690.15	125.86
2006	9911.535	16343.0	2495.01	13847.99	139.71
2007	10654.904	22837.5	2682.13	20155.37	189.16
2008	10905.037	34414.6	2745.10	31669.50	290.41
2009	9603.463	38169.4	2417.46	35751.94	372.28
2010	11786.159	41321.2	2966.90	38354.30	325.41
2011	10989.459	53437.1	2766.35	50670.75	461.09
2012	11231.163	59213.7	2827.19	56386.50	502.05
2013	11070.682	64299.4	2786.80	61512.60	555.63
2014	10291.208	66674.9	2590.59	64084.32	622.71
2015	9761.076	76783.0	2457.14	74325.86	761.45
2016	8005.452	86536.9	2015.19	84521.70	1055.80

Source: 1. International Monetary Fund, yearbooks 2005, 2008 and 2014.

2. The Central Bank of Libya, Economic Bulletin, various issues.

Note: The base year used here is 1980.

M_{ex} is volume of monetary expansion which increases from the desired level of money supply in the economy, M_t is quantity of money in the circulation, Q is average of unit share of real income from money supply in the base year at specific level of prices, Y_t is real domestic product, and t is time.



III. RESEARCH OBJECTIVE

This research has a very limited objective, i.e. to study developments of money supply in the Libyan economy over the past thirty-seven years. The aim is to identify the main factors of money supply growth.

IV. LITERATURE REVIEW

Meltzer (1958) investigated the quantitative relationship between the money supply and the central bank monetary liabilities in France for the period 1938-54. He concluded that the banking system operating under fractional reserves would be subject to multiple expansion of money and increase in monetary base will yield multiple expansions in money supply. Empirical evidences prove that a close and stable relationship existed between money supply and monetary base during the period of study.

Brunner and Meltzer (1964) estimated a money supply function. This function is a behavioral relation based on their theoretical model of the money supply process. Factors underlying the monetary behavior of banks and the public are specified and entered directly in the money supply function. They adopted high-powered money as the variable limiting the maximum size

of the money stock, calling it the monetary base (B). They used the source method of computing the base. The Federal Reserve through open market operations and the discount rate directly controls this base. Other factors included in the function are currency held by the public (c), time deposits at commercial banks (T), and bank excess reserves (ER).

Shahi (1978) investigated empirically the relationships between monetary base and the money multiplier and their contribution to the changes in money stock for the period 1949-1976. The results of this study showed that the multiplier value was between 1.3 to 1.6. The mean value of multiplier was 1.4, which was much lower than in developed industrial countries. This was on account of high proportion of currency with the non-bank-public on the average. He has also considered the source side of the monetary base. Given the value of money multiplier any change in source components of the monetary base affects the aggregate value of the base hence the stock of money. The major items on the source side are foreign assets, government securities and discount advances.

Lodha, (1988) aimed to develop an appropriate definition of money stock and its component suitable for Indian context to bring out the determinants that influence the money stock and to compute the relative contributions of these components both on annual and quarterly basis. In this study fundamentally single equation, one-way causation approach has been used. Broadly defined money stock M2 is taken into consideration. The equation considered is as follows:

$$M = \frac{1+c+b+t}{[1(rs+re)(1+t)+(c+b)]} H$$

The ratios considered are currency ratio, time deposit ratio, other deposit ratio, liability ratio, excess reserve ratio and required reserve ratio. The change in money stock has been calculated by following methods:

1. By calculating Money Multiplier on the basis of Ms/H.
2. By inserting the actual values of the ratios in the money multiplier formula.
3. By inserting the estimated value of the ratios in the formula.

The author concluded that on the basis of quarterly data the contributions of high-powered money and money multiplier to money stock comes to 76.27 and 23.73 percent respectively. When interpreted in terms of five yearly bases the contribution of money multiplier emerges highest to 46.63 percent, and high-powered money contributes to the extent of 53.27 percent. Thus in long-term perspective, it is clear that changes in money stock have been caused

predominantly by changes in the high-powered money. But from a short-term perspective, the impact of changes in the high-powered money is apt to be less certain on money stock. High-powered money, as a policy variable would increase the effectiveness of the monetary policy in the long run.

Friedman and Schwartz (1963) examined an influence of three proximate determinants on money supply. These determinants are high-powered money (H), the deposit reserve ratio (D/R), and the deposit to currency ratio (D/C). They presented the following identity of money stock.

$$M = H * \frac{\frac{D}{R} [1 + \frac{D}{C}]}{\frac{D}{R} + \frac{D}{C}}$$

The authors concluded that changes in high-powered money were by far the dominant determinant of long term and major cyclical movements in the broadly defined money stock. Changes in the two ratios exerted an important influence and changes in the deposit to currency ratio made a significant contribution to movements in money during mild cycles.

Cagan (1965) used the same money supply identity as Friedman and Schwartz; however, the author arranged the three proximate determinants in a different form. In Cagan's identity currency is expressed as a ratio to money (C/M) and reserve as a ratio to deposits (R/D).

$$M = \frac{H}{\frac{C}{M} + \frac{R}{D} - \frac{C}{M} + \frac{R}{D}}$$

In this study, the research presented a statistical and descriptive analysis of the economic factors accounting for the relative contribution of each proximate determinant to secular and cyclical change in the money stock from 1875 to 1960. The dominant factor influencing long-term growth in money has been increase in high-powered money.

Lodha, (2004) explained the framework for analysis of money stock determination in a simple equation which expresses money (M) as the product of High Powered Money (H) and Money Multiplier (m) in the identify $M = m H$. Thus, multiplier in this process is a connecting link between high-powered money and money stock. If the components of high-powered money and money stock are put together, the importance of money multiplier emerges:

$$H = C + R \text{ (Currency + Reserves)}$$
$$M = C + D \text{ (Currency + Deposits)}$$

In H and M, R and D are not common and the amount of D would always be some multiple of R which means that it is the reserves of commercial banks upon which deposits are build up. Since the money stock identity is expressed in multiplicative form, the change in money stock can be separated into two components – the change in high powered, money (ΔH) and change in money multiplier (Δm). This contribution is estimated using logarithms (base 10) on the basis of earlier identify $M = m H$ as follows:

$$\log M = \log H + \log m \quad (1)$$

$$\Delta \log M = \Delta \log H + \Delta \log m \quad (2)$$

and their percentage contribution is estimated as

$$\frac{\Delta \log H}{\Delta \log M} * 100 + \frac{\Delta \log m}{\Delta \log M} * 100 \quad (3)$$

The researcher concluded that the role of high-powered money emerges more important in affecting the money supply both in short and money supply both in short and long period, in comparison to money multiplier.

Lodha, S.L. (2012) in his book *Determinants of Money Stock: With Special Reference to India*, published by LAP Lambert Germany, concluded that on the basis of data for the period of 1980-1981 to 2011-2012. The money multiplier emerges less important money comparison to high-powered supply in India. This conclusion increases the role of Reserve Bank of India in controlling the money supply.

Muhammad and Anisul, (2010) tested empirically the money supply function for Bangladesh using annual time series data. Authors observed that high-powered money played a very significant role in the money supply process of Bangladesh, particularly with respect to the narrow money supply M1, thus providing some support for the monetarist model.

V. BASIC RESEARCH METHODOLOGY

In order to achieve the research objective, a descriptive analytical approach will be used to analyze and review developments of monetary indicators related to money supply in the Libyan economy during the period from 1980 to 2016. These include the coefficient of monetary expansion, money multiplier, monetary base, and sources of monetary base.

5.1 Specification of the Model

The theoretical framework of model has its foundation in the contributions of Cagan (1965), Meltzer (1958), Friedman and Schwartz (1963), and more recently Lodha, (2004), Lodha, S.L.(2012).

To bring out the determinants that influences the money supply in the Libyan economy during the mention period, and to compute the relative contributions of these determinants on annual basis. We begin from the theory of money supply determination in a simple equation which expresses money (M) as the product of High Powered Money and Money Multiplier. Thus, the equation considered is as follows:

$$M = m * H \quad (1)$$

Where: m is the money multiplier which is calculated as money supply divided by monetary base in this equation. H is high powered money which is defined and measured as the sum of currency in circulation outside a nation's central bank and its treasury, plus deposits held by deposit-taking financial institutions (hereafter referred to generically as banks) at the central bank.

By differentiation of Equation (1) we can get the equation for money supply such as:

$$dM_s = dm \times H_{t-1} + dH \times m_{t-1} + dm \times dH \quad (2)$$

Where: $dm \times H_{t-1}$ is the contribution of monetary base to money supply, $dH \times m_{t-1}$ is the contribution of monetary multiplier to money supply, and the contribution of both monetary base and monetary multiplier to money supply.

According to the previous equation, changes in money supply in the Libyan economy are a product of impact the monetary base (H), the money multiplier (m), and the monetary base and the money multiplier together.

5.2 Secondary Data

The study covers the period from 1980 to 2016. The secondary data was obtained from different local and international sources such as:

1. Central Bank of Libya, Economic Bulletin, various issues.
2. National Authority for Information and Documentation.
3. International Financial Statistics, IFS, International Monetary Fund.

The data from these different sources for the entire time series from 1980 until 2016, except few of them, is only available in the form of annual data. Consequently, this study has chosen annual data instead of quarterly data. Like many other developing countries, some of data is either not available or may be available but not always in the form of a consistent time series.

VI. RESEARCH SIGNIFICANCE

Knowledge of the major sources of money supply would assist policy makers to come up with appropriate strategies to address the prevalence of excess money supply which in turn results in to achieve monetary stability, and reduce inflation rates in the Libyan economy.

VII. ANALYTICAL RESULTS OF EQUATION OF MONEY SUPPLY IN LIBYA

As discussed earlier, changes in money supply are a product of impact the monetary base (H), the money multiplier (m), and the monetary base and the money multiplier together. Thereby, these impacts will be measured using equation (2), to determine the main sources behind increasing money supply in the Libyan economy.

7.1 The Impact of Monetary Base on Money Supply

An analysis of relationship between monetary base and money supply shows that the absolute contribution of monetary base in money supply was generally not stable as pointed in Table 3. It varied significantly for the period from 1980 to 2016. For instance, the monetary base contribution in money supply rose from about -176 LD million in 1981 to approximately 1265 LD million in 1990, and it reached its highest level of 17915 LD million in 2011, and this was due a substantial increase in annual change rate of monetary base on the one hand, which amounted to -140.3 LD million, 814.9 LD million, and 9800.3 LD million in 1981, 1990 and 2011 respectively, and a significant increase in the value of monetary multiplier on the other hand, which nearly amounted 1.25, 1.55, and 1.82 in 1980, 1989, and 2010 respectively as indicated in Table 2.

In general, the monetary base contributed between -587 percent and 300 percent of total money supply in 2001 and 2003 respectively as pointed in Table 4, with the period average of 63 percent. The relationship between monetary base and money supply was further explored using actual data of Libya from 1980 to 2016 as depicted in Figure 2, which showed a strong positive relationship between the high-powered money with the money supply in Libya as shown by their common upward movement over time. More specifically, the correlation coefficient between monetary base and money supply in the Libyan economy was 0.99. Consequently, it can be said

that money supply, which is the crucial engine of monetary sector in the Libyan economy, was profoundly affected by vast increase in the monetary base.

7.2 The Impact of monetary Multiplier on Money supply

Developments of the money multiplier in the Libyan economy have been presented in Table 2. As can be seen from the Table, during the period from 1980 to 2016, with the exception of 2002, 2003, 2004, and 2007, the value of money multiplier did not exceed 2 during the period in question, and this was mainly due to a huge increase in monetary base, particularly during the recent years. The analysis further showed that the value of money multiplier has generally been relatively lower in the Libyan economy compared to other Arabic countries. The average of money multiplier in Libya was 1.58 compared to 3.21, 2.86, 2.75, and 6.12 in Tunisia, Morocco, Mauritania, and Oman respectively (Central bank of Oman, 2008).

Furthermore, analysis of the impact of monetary multiplier on money supply in the Libyan economy showed that the monetary multiplier contribution in money supply ranged from -180.46 percent in 2003 to 874.65 percent in 2001, with the period average of 48 percent, as indicated in Table 4. This figure clearly reveals that the impact of monetary multiplier on money supply was lower than the monetary base impact (see section 7.1), suggesting that money supply was hugely affected by the changes which happened in the monetary base rather than money multiplier in the Libyan economy during the period in question.

7.3 The Impact of both Monetary Base and Multiplier on Money Supply

Table 3 shows the absolute contribution of both base and multiplier in Libya' money supply during the period from 1980 to 2016. It obviously indicates that the absolute contribution of both base and monetary multiplier in money supply was quite limited during the mentioned period. For instance, it rose from approximately -51.12 LD million in 1980 to roughly 15.34 LD million in 2002, and it reached its highest level of 466.37 LD million in 2007. Moreover, the information in Table 4 reveals that the impact of both base and monetary multiplier on average for the period 1980-2016 amounted -11 percent, varying between a high of 23.20 percent in 1983 and a low of -187.19 percent in 2001. Therefore, it can be concluded that both base and monetary multiplier have had an adverse effect on developments of money supply in the Libyan economy.

Overall, during the period of study, monetary base' contribution ranged between -587 percent and 300 percent of money supply, with the period average of 63 percent, whereas monetary multiplier' contribution remained between -180.46 percent and 874.65 percent, with the period average of 48 percent. On the other hand, the contribution of both base and monetary multiplier to money supply was -11 percent during the same period. Thereby, this clearly indicates that the

contribution of monetary base in money supply has experienced a considerable increase, meaning that an expansion in the monetary base was followed by excess money supply. In other words, the main driving force behind the expansion in money supply was monetary base in the Libyan economy during the period of study.

Table 2: Money Supply and its Determinants in Libya over the period (1980-2016)

Year	Monetary Base	Money Supply	Monetary Multiplier	Annual Change in Money Supply	Annual Change in Monetary Base	Annual Change in Monetary Multiplier
1980	2307.2	2898.9	1.256	-	-	-
1981	2166.9	3512.2	1.620	613.3	-140.3	0.364
1982	2261.1	3232.3	1.429	-279.9	94.2	-0.191
1983	1798.9	2884.4	1.603	-347.9	-462.2	0.174
1984	1717.9	2711.4	1.578	-173.0	-81.0	-0.025
1985	2221.6	3492.3	1.571	780.9	503.7	-0.006
1986	2113.1	3041.5	1.439	-450.8	-108.5	-0.132
1987	2250.7	3438.6	1.527	397.1	137.6	0.088
1988	1912.9	3011.6	1.574	-427.0	-337.8	0.046
1989	2371.1	3682.0	1.552	670.4	458.2	-0.021
1990	3186.0	4645.4	1.458	963.4	814.9	-0.094
1991	3185.4	4442.7	1.394	-202.7	-0.6	-0.063
1992	4092.3	5168.2	1.262	725.5	906.9	-0.131
1993	3992.7	5384.9	1.348	216.7	-99.6	0.085
1994	4627.3	6057.4	1.309	672.5	634.6	-0.039
1995	4985.7	6372.4	1.278	315.0	358.4	-0.030
1996	5434.8	6718.0	1.236	345.6	449.1	-0.042
1997	5772.8	7021.6	1.216	303.6	338.0	-0.019
1998	5861.1	7187.7	1.226	166.1	88.3	0.010
1999	5696.8	7891.1	1.385	703.4	-164.3	0.158
2000	5327.5	7433.0	1.395	-458.1	-369.3	0.010
2001	4187.3	7703.8	1.839	270.8	-1140.2	0.444
2002	4256.6	8773.8	2.061	1070.0	69.3	0.221
2003	4256.3	9029.2	2.121	323.4	-0.3	0.060
2004	5089.3	10536.6	2.070	1507.4	-1693.0	-0.051
2005	7670.8	14028.1	1.828	3491.5	2581.5	-0.241
2006	8730.8	16343.0	1.871	2314.9	1060.0	0.043
2007	10987.1	22837.5	2.078	6494.5	2256.3	0.206
2008	18881.6	34414.6	1.822	11577.1	7894.5	-0.255
2009	20462.8	38169.4	1.865	3754.8	1581.2	0.042
2010	22604.2	41321.2	1.828	3151.8	2141.4	-0.037
2011	32404.5	53437.1	1.649	12115.9	9800.3	-0.178
2012	34300.9	59213.7	1.726	5776.6	1896.4	0.077
2013	36886.5	64299.4	1.743	5085.7	2585.6	0.017

2014	38130.3	66674.9	1.748	2375.5	1243.8	0.005
2015	41926.2	76783.0	1.831	10108.1	3795.9	0.083
2016	49797.4	86536.9	1.737	9753.9	7871.2	-0.094

Source: The Central Bank of Libya, economic bulletin, various issues.

Note: The monetary multiplier was calculated as money supply divided by monetary base.

Table 3: The Absolute Change in Libya's money supply over the period (1980-2016)

Year	Due to Monetary Base	Due to Monetary Multiplier	Due to Monetary Base and Monetary Multiplier
1980	-	-	-
1981	-176.279	840.720	-51.123
1982	152.683	-414.571	-18.022
1983	-660.724	394.968	-80.737
1984	-129.877	-45.368	2.042
1985	794.999	-10.908	-3.198
1986	-170.558	-294.628	14.389
1987	198.054	186.882	12.169
1988	-516.087	104.815	-15.731
1989	721.371	-41.127	-9.851
1990	1265.425	-224.780	-77.252
1991	-0.874	-201.864	0.038
1992	1264.853	-419.835	-119.529
1993	-125.784	351.037	-8.543
1994	855.872	-158.230	-25.149
1995	469.163	-143.076	-11.081
1996	574.008	-209.548	-18.875
1997	417.801	-107.500	-6.685
1998	107.401	57.785	0.883
1999	-201.486	931.035	-26.099
2000	-511.546	57.138	-3.704
2001	-1590.818	2368.553	-506.921
2002	127.498	927.151	15.344
2003	-0.618	256.034	-0.018
2004	-2253.857	5012.526	-1251.228
2005	5344.582	-1229.473	-623.638
2006	1938.485	330.688	45.696
2007	4223.500	1804.656	466.377
2008	16409.270	-2811.818	-2020.360
2009	2881.974	805.300	67.438
2010	3994.353	-762.648	-79.809
2011	17915.242	-4045.473	-1753.959
2012	3127.163	2495.146	146.022
2013	4462.745	583.115	43.955
2014	2167.943	184.432	68.409
2015	6635.233	3164.814	315.059

2016	14412.167	-3941.062	-739.892
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Note: This table was calculated from table 2.

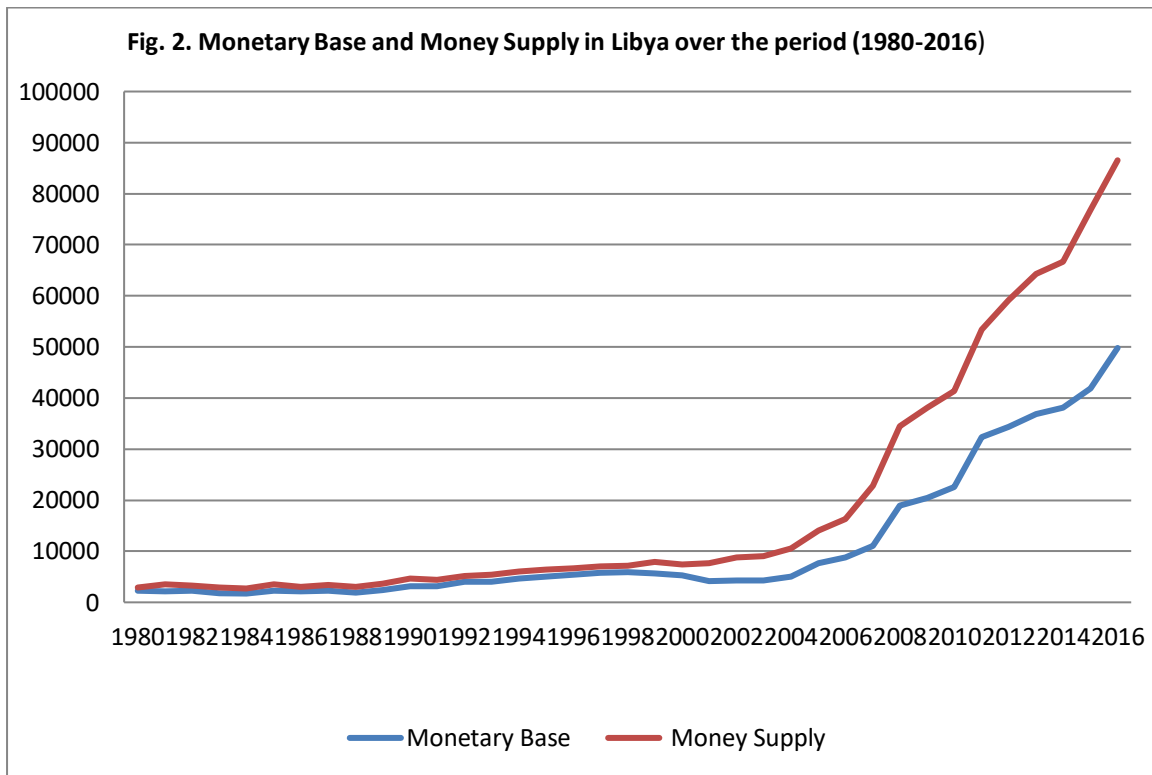
Source: The Central Bank of Libya, economic bulletin, various issues

Table 4: The Relative Change in Libya's money supply over the period (1980-2016)

Year	Due to Monetary Base	Due to Monetary Multiplier	Due to Monetary Base and Monetary Multiplier
1980	-	-	-
1981	-28.742	137.081	-8.335
1982	-54.549	148.114	6.438
1983	189.917	-113.529	23.206
1984	75.073	26.224	-1.180
1985	101.805	-1.396	-0.409
1986	37.834	65.356	-3.191
1987	49.875	47.061	3.064
1988	120.863	-24.546	3.684
1989	107.603	-6.134	-1.469
1990	131.349	-23.331	-8.018
1991	0.431	99.588	-0.018
1992	174.342	-57.868	-16.475
1993	-58.045	161.992	-3.942
1994	127.267	-23.528	-3.739
1995	148.940	-45.420	-3.518
1996	166.090	-60.633	-5.461
1997	137.615	-35.408	-2.202
1998	64.660	34.789	0.532
1999	-28.644	132.362	-3.710
2000	111.667	-12.473	0.808
2001	-587.451	874.650	-187.194
2002	11.915	86.649	1.434
2003	300.610	-180.464	-20.152
2004	-149.519	332.527	-83.005
2005	153.074	-35.213	-17.861
2006	83.739	14.285	1.974
2007	65.031	27.787	7.181
2008	141.739	-24.287	-17.451
2009	76.754	21.447	1.796
2010	126.732	-24.197	-2.532
2011	147.865	-33.389	-14.476
2012	54.135	43.294	2.571
2013	87.973	11.786	0.241
2014	91.263	6.460	2.280
2015	65.643	31.303	3.054
2016	147.978	-40.715	-7.263

Note: This table was calculated from Tables 2 and 3.

Source: The Central Bank of Libya, economic bulletin, various issues.



VIII. Analytical Results of Components of Monetary Base in Libya

The monetary base in monetary economics is defined and measured as the sum of currency in circulation outside a nation’s central bank and its treasury, plus deposits held by deposit-taking financial institutions at the central bank (Anderson, 2006). More generally, the monetary base consists of whatever government liabilities are used by the public to purchase and sell goods and services, plus those assets used by banks to settle inter-bank transactions (Central bank of Oman, 2008).

As shown in Table 5, monetary base witnessed dramatic increase in the Libyan economy over the period of study .It increased from only 2307.2 LD million in 1980, to 497974 LD million at the end of 2016, with growth rate average of 8.70 percent. This rapid increase was in currency outside banks and in commercial banks reserves alike. However, most of this increase in monetary base was mainly due to currency outside banks, as can be seen from figure 3. More

specifically, the share of currency outside in monetary base did not fall below 29.70 percent during the period from 1980 to 2016, with the period average of 45 percent. But commercial banks reserves varied their share in total of monetary base from 24.28 percent in 2003 to 66.81percent in 2008, with the period average of 41 percent.

Better understanding of the factors affecting the monetary base requires analyzing sources of monetary base rather than its uses. The sources side of monetary base is structured to show that monetary base equals the sum of net foreign assets, and net domestic assets with Central Bank of Libya as presented in Table 6. It can be seen that the increase in monetary base during the period of study was mainly driven by the rise in net foreign assets, and to a lesser extent due to the increase in net domestic assets. This is shown by the rise in the ratio of net foreign assets to monetary base which moved between 23.13 percent in 1993 and 894.73 percent in 2007, with average of 259 percent during the period from 1980 to 2016. On the other hand, the ratio of net domestic assets to monetary base ranged from -794.73 percent in 2007 to 76.87 percent in 1993, with average of -159 percent during the same period.

In general, one can conclude that the increase in the monetary base was on account of increase in currency issued by Central Bank of Libya. On the sources side of monetary base, the large increase in net foreign assets of Central Bank created the momentum, resulting from surplus positions in Libya's overall balance of payments. These surplus have mainly reflected oil production and price fluctuations ,where they increase with the increase of oil production and oil price and *vice versa*.

Table 5: Components of Monetary Base in Libya during the Period (1980-2016)

Year	Currency Outside Banks (1)	Commercial Banks Reserves (2)	Public Enterprises Deposits (3)	Monetary Base (4)	1/4%	2/4%	3/4%
1980	685.7	838.4	783.1	2307.2	29.72	36.34	33.94
1981	791.2	542.3	833.4	2166.9	36.51	25.03	38.46
1982	889.9	623.2	748.0	2261.1	39.36	27.56	33.08
1983	838.2	583.1	377.6	1798.9	46.60	32.41	20.99
1984	767.6	642.2	308.1	1717.9	44.68	37.38	17.94
1985	985.1	841.6	394.9	2221.6	44.34	37.88	17.78
1986	1023.8	907.3	182.0	2113.1	48.45	42.94	8.61
1987	1068.2	1020.4	162.1	2250.7	47.46	45.34	7.20
1988	899.6	881.9	131.4	1912.9	47.03	46.10	6.87
1989	1131.7	941.2	298.2	2371.1	47.73	39.69	12.58
1990	1461.1	973.3	751.6	3186.0	45.86	30.55	23.59
1991	1620.8	1171.7	392.9	3185.4	50.88	36.78	12.34

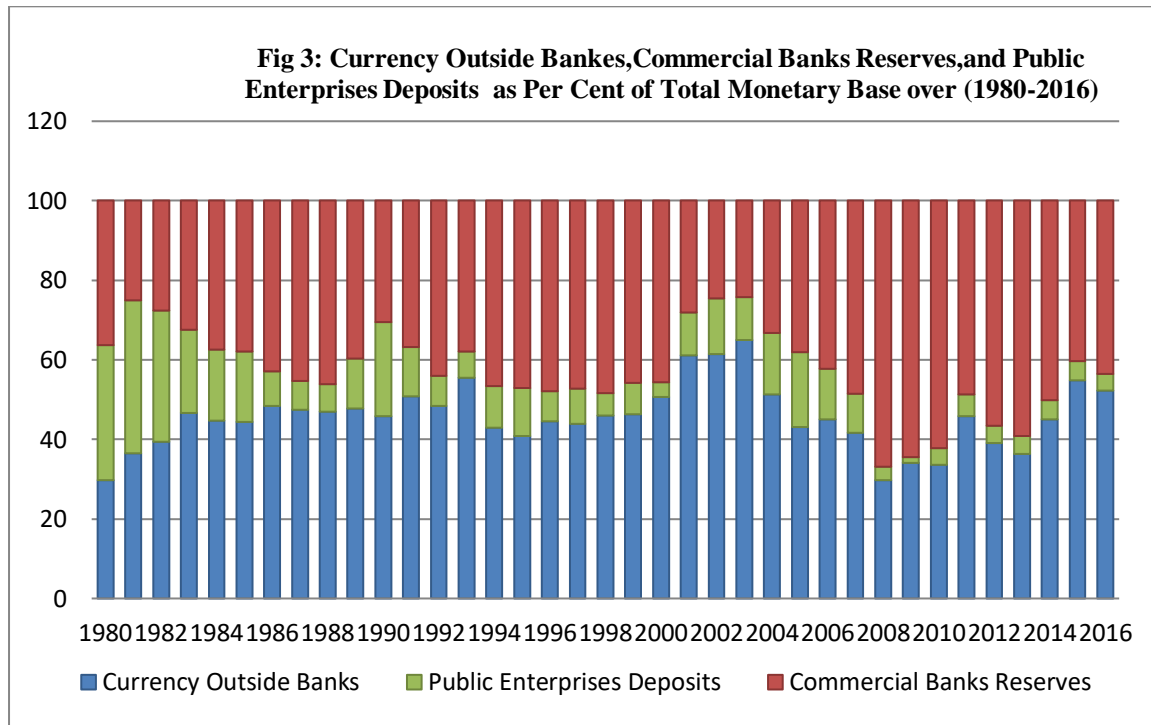
1992	1982.2	1798.1	312.0	4092.3	48.44	43.94	7.62
1993	2217.0	1511.4	264.3	3992.7	55.53	37.85	6.62
1994	1989.8	2158.7	478.8	4627.3	43.00	46.65	10.35
1995	2035.4	2346.4	603.9	4985.7	40.82	47.06	12.12
1996	2419.8	2600.5	414.5	5434.8	44.52	47.85	7.63
1997	2534.2	2723.2	515.4	5772.8	43.90	47.17	8.93
1998	2698.6	2830.0	332.5	5861.1	46.04	48.28	5.68
1999	2634.9	2605.6	456.3	5696.8	46.25	45.74	8.01
2000	2699.2	2429.9	198.4	5327.5	50.66	45.61	3.73
2001	2559.6	1173.5	454.2	4187.3	61.13	28.03	10.84
2002	2613.3	1044.3	599.0	4256.6	61.39	24.53	14.08
2003	2763.5	1033.6	459.2	4256.3	64.93	24.28	10.79
2004	2612.7	1692.0	784.6	5089.3	51.34	33.25	15.41
2005	3308.7	2920.5	1441.6	7670.8	43.13	38.07	18.80
2006	3932.9	3688.5	1109.4	8730.8	45.05	42.25	12.70
2007	4581.2	5334.5	1071.4	109871	41.70	48.55	9.75
2008	5608.3	12614.3	659.0	188816	29.70	66.81	3.49
2009	6962.9	13182.0	317.9	204628	34.03	64.42	1.55
2010	7609.0	14075.5	919.7	226042	33.66	62.27	4.07
2011	14840.1	15755.4	1809.0	324045	45.80	48.62	5.58
2012	13391.1	19423.8	1486.0	343009	39.04	56.63	4.33
2013	13419.9	21788.0	1678.6	368865	36.38	59.07	4.55
2014	17169.7	19127.7	1832.9	381303	45.03	50.16	4.81
2015	23007.3	16928.8	1990.1	419262	54.88	40.38	4.74
2016	26005.0	21706.6	2085.8	497974	52.22	43.59	4.19

Source: The Central Bank of Libya, economic bulletin, various issues.

Table 6: Monetary Base Sources in Libya over the period (1980-2016)

Year	Net Foreign Assets (1)	Net Domestic Assets (2)	Monetary Base (1) + (2= (3)	1/3%	2/3%
1980	4203.0	-1895.8	2307.2	182.17	-82.17
1981	2765.9	-599.0	2166.9	127.64	-27.64
1982	2102.1	159.0	2261.1	92.97	7.03
1983	1591.0	207.9	1798.9	88.44	11.56
1984	1075.0	642.9	1717.9	62.58	37.42
1985	1846.7	374.9	2221.6	83.12	16.88
1986	1910.4	202.7	2113.1	90.41	9.59
1987	1620.7	630.0	2250.7	72.01	27.99
1988	1139.3	773.6	1912.9	59.56	40.44
1989	990.4	1380.7	2371.1	41.77	58.23
1990	1196.2	1989.8	3186.0	37.55	62.45
1991	1236.7	1948.7	3185.4	38.82	61.18
1992	1403.0	2689.3	4092.3	34.28	65.72
1993	923.4	3069.3	3992.7	23.13	76.87
1994	1097.5	3529.8	4627.3	23.72	76.28
1995	1511.8	3473.9	4985.7	30.32	69.68
1996	2290.3	3144.5	5434.8	42.14	57.86
1997	3017.3	2755.5	5772.8	52.27	47.73
1998	3205.2	2655.9	5861.1	54.69	45.31
1999	3213.6	2483.2	5696.8	56.41	43.59
2000	5800.4	-472.9	5327.5	108.88	-8.88
2001	9855.6	-5668.3	4187.3	235.37	-135.37
2002	18552.8	-14296.2	4256.6	435.86	-335.86
2003	26573.2	-22316.9	4256.3	624.33	-524.33
2004	33065.9	-27976.6	5089.3	649.71	-549.71
2005	54447.9	-46777.1	7670.8	709.81	-609.81
2006	77240.8	-68510.0	8730.8	884.69	-784.69
2007	98305.4	-87318.3	10987.1	894.73	-794.73
2008	121257.2	-102375.6	18881.6	642.20	-542.20
2009	128191.6	-107728.8	20462.8	626.46	-526.46
2010	134163.0	-111558.8	22604.2	593.53	-493.53
2011	139448.2	-107043.7	32404.5	430.34	-330.34
2012	155781.6	-121480.7	34300.9	454.16	-354.16
2013	150927.5	-114041.0	36886.5	409.17	-309.17
2014	125598.6	-87468.3	38130.3	329.39	-229.39
2015	109413.8	-67487.6	41926.2	260.97	-160.97
2016	104306.3	-54508.9	49797.4	209.46	-109.46

Source: The Central Bank of Libya, economic bulletin, various issues.



Source: The Central Bank of Libya, economic bulletin, various issues

IX. CONCLUSION

This research has reviewed main macroeconomic indicators of the Libyan economy, especially those related to money supply over the period from 1980-2016. These being as follow; firstly, excess money supply in Libya measured by the coefficient of monetary expansion has been positively affected by the expansionary monetary policy that was formulated by the central bank of Libya, and it has also been affected by real income fluctuations in the domestic economy. Despite main objective of the Central Bank is to maintain monetary stability in Libya, and to promote the sustained growth of the economy in accordance with the general economic policy of the state, the monetary authority in Libya has not yet achieved these objectives. Growth rate of money supply still dominates real income growth rate, and high growth of real income is not yet tangible.

Secondly, monetary expansion has been positively affected by both changes in monetary base and money multiplier. But the impact of monetary multiplier on money supply was lower than the monetary base impact. On the contrast, it has been adversely affected by the mutual effect of monetary base and monetary multiplier together. This implies that the monetary base exerts a

major influence upon money supply in Libya. Moreover, monetary expansion is derived from net foreign assets of Central Bank. This is because the surplus positions in Libya's overall balance of payments, arising from the boom in the oil sector.

X. ACKNOWLEDGMENTS

Alhamdulillah, I thank Allah who has helped me during all the difficult time in the completion of this study. My appreciation also goes to Central Bank of Libya, especially Research and Statistics Department, and National Authority of Information and Documentation for their support in data gathering. I would also like to thank my sweet daughter, Libya for its lovely smile, which supported me during the time of writing this research.

REFERENCES

- [1] Muhammad Mahboob and Anisull Islam. Money Supply Function for Bangladesh: An Empirical Analysis, AIUB Business and Economics, Working Paper Series, no. 2010-01, pp. 63-70, 2010.
- [2] Marthinsen, J. (2008). *Managing in a Global Economy, Demystifying International Macroeconomics* (1rd ed.). United States: South-West.
- [3] Mankiw, N. (2010). *Macroeconomics* (7rd ed.). United States: Catherine Woods and Craig Bleyer.
- [4] Meltzer, Allan H. (1958) "The Behavior of the French Money Supply: 1938-1954" JPE, June.
- [5] Brunner, Karl and Meltzer, Allan. H. (1964) "Some Further Investigations of Demand and Supply Functions for Money", The Journal of Finance, Vol. XIX, May.
- [6] Shahi, M.A. (1978) an Empirical Approach to the Determination of Money Stock in India, 1949-1976. The Asian Eco Review, Vol. XX August-Dec.
- [7] Lodha, S.L. (1988)-Determinants of Money Stock in India 1950-51 – 1977-78, Raj Books and Subscription Agency, Jaipur.
- [8] Friedman, Milton and Anna J. Schwartz (1963a) -"A Monetary History of the United States: 1867-1960, Princeton University Press, Princeton.
- [9] Cagan. Phillip. (1965) Determinants and Effects of Changes in the Stock of Money: 1875-1960, National Bureau of Economic Research, New York.

[10] Lodha, S.L. (2004)-Determinants of Money Stock in India (1980-81 to 1999-2000), Indian Council of Social Science Research, New Delhi.

[11] Lodha, S.L. (2012)-Determinants of Money Stock : With Special Reference to India, LAP Lam

[12] Central bank of Oman (2008). Annual Report.