



Determinants of Money Supply in Light of Price Changes in Iraqi Economy: (1990 – 2014)

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Introduction

Money demand (MD) is one of the key economic variables in creating economic policies aiming at achieving money equilibrium in the economy to attain sustainable growth. Therefore, tracking the determinants of money demand functions is one of the crucial factors in ensuring the stability of the economy and increasing the efficiency in economic policies adoption.

The current study addresses the main factors determining money supply in Iraq for the period of 1990 – 2014. Actual money demand (MD) based on price level changes has been used as a suitable approach to formulate an effective monetary policy. However, this has resulted in irregular developments accompanied with changes occurring in real gross national product, non-oil product, and inflation rates. The effectiveness of the monetary policy has also been further reduced due to the dominance of inefficient economic activities by the public sector (especially before 2003), and the marginalization of the private sector.

Despite all this, the public sector could play an important role in developing the necessary infrastructure, and setting an industrial base for economic development. The main source of government income is in custom fees from oil and non-oil revenues. However, the price of oil has been in a continued decline, which results in reducing oil revenues. Furthermore, due to the minimal presence of the private sector where there is little commercial, industrial, and service activities, there is also a great reduction in non-oil revenues. Although the public sector has been attempting to rejuvenate the private sector by facilitating national loans for housing development, handcraft economic activities etc., as the main driver of the economy, the public sector could contribute further in formulating an economic policy that includes allowing the private sector to have an active role in economic activities.

The purpose of this research is to study if a function of MD in the Iraqi economy during the period of 1990 – 2014 can be determined using known economic theories. The hypothesis is presented as such: price changes are among factors determining the

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Money Supply (MS) in the Iraqi economy during the period of 1990 – 2014. This research also presents the most influential factors in determining Iraqi MS throughout the 25-year period of 1990 – 2014 in which the Iraqi economy has witnessed exceptional conditions such as war, political and economic crisis, and fluctuations in oil.

Theoretical Framework

Monetary Policy

Monetary policy plays an important role in achieving sustainable economic growth. As economic stability is the desired goal of any nation, the target of any monetary policy should be to support both local and foreign investments to drive economic activities. A monetary policy is a collection of rules or guidelines, and procedures and arrangements regulated by monetary authorities to control MS in accordance with economic activity and desired economic goals. (Labonte 2013) Typical targeted economic goals include economic growth, high employment rate, and stable prices in goods and services. A properly developed monetary policy should control money supply even under varying market conditions, or is able to fix proper interest rates to ensure that the MS matches the MD of the market (Chery 1997).

To achieve the above, the monetary policy should achieve the following goals: (i) stability in prices for goods and services, which is a crucial goal which all nations strive to achieve to curb inflation, (ii) prevent or enable a speedy recovery from a market depression by proper price control to prevent deflation. The goals are logical due to the relationship between money supply and prices of goods and services which was confirmed by American economist Thomas L. Friedman which emphasized that it is difficult to control prices of goods and services without control MS (Tobin).

Furthermore, monetary and economic stability can also be achieved through the consistency between the quantity of money supplied and economic activity expressed by the gross domestic product, that is to say that controlling money supply in a way that avoids the occurrence of money instability, and what it would produce of economic instability and impairment, to mention that the stability of local currency value is one of the objectives of monetary policy through controlling money supply while maintaining a suitable level of international reserves and supporting the expansion of public lending.

The volumes of money supplied is the tool used by monetary authorities when the economy suffers of both depression and unemployment (Economic depression) due to increasing effective demand leading to increased investment and employment level in the economy. It should also be stressed that monetary policy, through controlling credit and its costs, can contribute to attainment of economic growth, as the central bank can induce changes in commercial bank total volume of reserves and their ability to create credit and affecting its volume. As an expansive monetary policy can maintain a low interest rate that encourages an increase in credit and in investment, achieving thereby an economic growth, however some of policy objective might conflict, it remain

possible to design this policy by a mechanism that enables it to attain its goals (Abdul Hamid 2003).

Main Monetary policy tools or instruments that the central bank has, to influence money supply and credit volumes in the economy, which are derived from determinates of money supply and divided into indirect tools, (Ireland) represented by open market operations and discount window facility as well as reserve requirements, and direct tools used to influence credit quality, cost and volume, where this policy differentiates between various used of credit given to national economic sectors and activities according to their significance in achieving economic stability, which means directing credit towards sectors and activates, rather than other, according to their importance. (Al-Janabi et al. 2009)

Determinants of money demand

Money demand is one of the important tools that can be adopted by the central bank when formulating monetary policies, where the appropriate estimation of the quantity demanded of money, either by individuals or by institutions, contributes largely in determining quantities of money that should be supplied without the occurrence of impairment in the national economy; and given the great importance of this variable. several theories have emerged and numerous studies were conducted to prove its importance and knowing its determinants and behavior, in order to use it when formulating monetary policy to attain economic goals, Moreover, several money demand, have emerged, among which classical quantity theory of money (Ireland 2005) which provided a logical interpretation of increases occurred in the general prices level, when money quantity increased by rates greater than increases in the production of goods and services. This theory stated that there is a strong association between money quantity and prices level, the increasing money quantity by a given rate, will increase prices with the same rate, and from which came the exchange equation (Fisher) as follows.

$$M.V = P.T \dots\dots\dots (1)$$

Where M = Money quantity, v = velocity of money circulation, p = general prices level, T = volume of transactions.

Assuming that money are used only to settle exchanges (buying and selling),

$$\frac{P.T}{V}$$

and MS = MD, So equation 1 becomes $M = \frac{P.T}{V}$.

The important point that makes ideas of this theory supports the research idea, it is notion that money demand depends primarily on general price level where it changes with it in the same direction, i.e. prices increase leads to increase in money demand to cover expenditure on goods and services that increased with the increase of prices. Another formula (theory) monetary balances or Cambridge equation (Alfred Marshall) at Cambridge university and completed by pigou at the same university, and it is the link point between classical and modern quantity theories (Stephen et al. 1989) where:

$M = k \cdot pT$ the inverse of Money circulation velocity $k = \frac{1}{v}$, and for the difficulty in measuring transactions (T), it was replaced by (Y), real national incomes and (P) become an expression of deflator, so Cambridge equation became $M = KY$.

Then the Keynesian theory of money demand, emerged, and it was crystalized in determining the three motives for money demand (transactions, precautionary, and speculation (Khaleel 1994).

The main focus of this research is modern theory of money quantity, which ideas appeared under the name of contemporary monetary theory or Chicago school pioneered by the economist Milton Friedman, who explained the relationship of income with money demand, where (P) = Price and (Y) = real income. Taking the correlation as positive and consistent between money demand and price level. He also indicated that real incomes change in a certain rate might lead to a change in money demand with higher rate and in the same direction, he also showed that there are two types of money keeping cost (Khaleel 1994).

Opportunity cost of money keeping (Revenue that could be attained if money were invested rather than saving it, represented by market interest rate, where higher interest rates leads to higher opportunity cost and the lower the quantity demanded).

The other type of cost is represented by the loss resulting from reduced purchasing power of saved money in case of price increase (continuous and successive Increases in general price level in which money demand decreases: that the relationship is an inversed one), so Friedman believed that factors affecting money demand are: The spent of monetary savings (accounts), general price level, real income level and market prevailing interest rate, as well as prices change rate. So money demand functions became: $MD = F(U, P, Y, I, P^*)$, where U the amount spent of monetary account is (Saving)).

P^* change in general price level

Assuming that U is fixed and stable, and given that the demand is the reasons of demand change, U was dropped from the equation, and Friedman also pointed out that change rate will be large and remains for long period of time, so to influence in money demand, he also dropped the variable P^* from the equation, and it became.

$MD = F(P, Y, i, \dots)$ (3) And the exponential formula was used to express the equation in the following form: $MD = a \cdot Y^b \cdot i^c$.

Where a, b, c are constants. Dividing the equation parts by $\frac{M}{P}$ real money supply then $\frac{Md}{P} = a \cdot Y^b \cdot i^c$ and the equation became;

$$\text{Log } \frac{Md}{P} = \text{Log } a + b \text{ Log } Y + c \text{ Log } i \dots (4).$$

Equation 4 the exponential formula used in field studies concerning money demand.

Price Stability and its Relationship

With money demand price stability, conceptually, expresses the state in which economic authorities can make decision on economic activities level, consumption and investment in particular, without feeling worried regarding fluctuations in prices. It was also defend as a state in which general prices level remains constant or(Khaleel 1994) change in a limit size that have marginal effect on the economy (Bank of Japan 2013). It should also be noted that the presence of price stability makes changes in individual prices an natural phenomenon in the market mechanism. So said that what is meant by price stability is a relative stability in prices level but not individual prices stability. So it refers to economic stability because it leads to stability of aggregate demand variables (consumption, Investment, Exports) that means general equilibrium, whereas, economic social and political effects of inflation and deflation are negatively reflected on economy, meanwhile modern Macro – analysis depended on aggregate equilibrium models (AD, AS), (IS- LM) to analyze macro- equilibrium through inflation and product gaps, which emphasizes that macro equilibrium approach to achieved occurs through price fluctuation and fluctuation of aggregate activity level. (Central Bank of Sri Lanka 2005)

It is also important to note that general prices level is influenced by aggregate demand, where price school agree that increasing aggregate demand corresponds with price increase when achieving full employment, while controlling for other variables, however the status is different in the point prior to achieving full employment of available productive energies. Some schools see that prices are adhesive and slow in change and has weak sensitivity to total expenditure changes with the presence of idle production energies, other se that production and price change simultaneously and in the same direction with change of aggregate demand (Mishkin).

Factors Determining Money Demand in Iraqi Economy for the Period (1990 – 2014)

The efficiency of monetary policy in economy depends on monetary authority in deducing the effect of these policy procedures on monetary position in economy, particularly on money demand. So identifying determinant of this variable and the degree to which it is influenced by changing occurring in one of these determinants is one of the basic requirements for monetary policy, success in achieving its goals, for the purpose of knowing the development of money demand movement which characterized Iraqi economy during the studied period, data specific to that period were adopted, and the following were the most important determinant of money demand.

Money Supply

Economic slowing down growth of any country can be measured in part by money supply structure for advanced credit practices and banking savings and withdrawal facilities is a good indicator of the extent to which the country is economically

advanced, therefore when studying the structure (combination) of local money supply, it became clear that Iraq is not different from other developing countries with respect to money supply structure and factors affecting local currency volume, where local currency supply grows very large, due to wide money issuance resulting from banking and financial factors, where the large expansion of governmental credit provided by banking system to finance governmental financial deficit (Financing by deficit policy), has a great role in the growth of money supply, its increase and enlarging monetary base as a results of continuous money Issuance (Khazraji 2003). Table (2) displays the analysis of money supply components (growth of monetary liquidity for the period 1990 – 2014).

This can be tracked through available data for this period, where money supply increased in compound annual growth rate (32.2%), while gross national product in fixed prices grew only with (0.89%), meaning sot inflation pressure for the studied period was about (31.3%) which is a very large percentage. Therefore it is natural that this situation must grow sadly, after 1990, due to economic sanctions and government debt (issuing money in high rates to cover its budget deficits), which led to huge increases in aggregate demand surpluses, as compared to goods supplied, and at this stage the Iraqi economy entered hyperinflation, breaking down of Iraqi Dinar purchasing power, after prices continued their increases in a mad manner, accompanied with increased money circulation, so Iraqi dinar function as value store was paralyzed and was used as an agent for exchange only.

So money supply increased continued with annual growth rate (11.0%) due to money issuance and money printing policy, which resulted in an expansive effect on money supply, in general, and money in exchange in particular, However this was accompanied with the crash (break down) of Iraqi dinar purchasing power as well as other catastrophic problems, such as the spread of corruption aspects, both administrative and financial environment damage, expansion of natural resources, destroying the educational system, health, food and the spread of the crime.

We can also see the increase of money supplied volume in 2009, with mean annual growth reached (11.9%), where new money issuance which was put for exchanges in (2003), has a role in that, because the process of changing old currency and placing the new one, gave central bank and Iraqi population a high quality national currency, that contributed to maximizing public trust in Iraqi dinar and its resources indicated that crude oil export became equal to printing new paper currency where there was a form of spontaneous link between current and investment expenditure and the creation of national currency that has a petroleum basis that led to the reduction of inflationary pressure to about (9.53%) during the (2003 – 2009).

The same change can be seen during the period (2010 – 2014), where money supply attained rate (3.68%) to finance the budget large deficit, in addition to foreign borrowing or state borrowing from the central bank, the rejoin for this series expansion is the government tendency towards achieving continuous increase in money supply, to face continuous increases in its expenditure rate without and serious interest in reforming the

impairment in the production structure and achieving tangible increase in non-petroleum goods product.

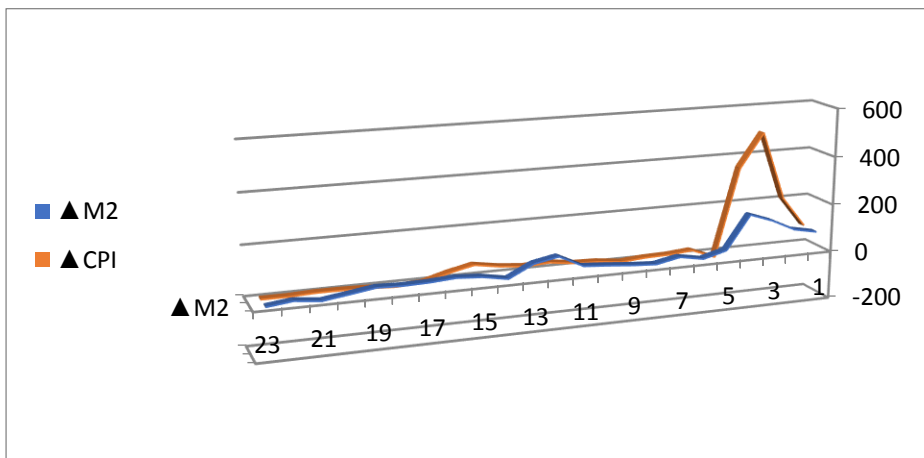
In order to give the economic theory its practical application in the manner that brings it close to reality, to be more logical, statistical data for the period 1990 – 2014 were adapted, and through the use of regression analysis, the best regression equation which represent the change function in money supply in the broad sense, was reached. Model results were as follows.

$$\Delta M2 = 27.1307 + 0.3164 (\Delta CPI)$$

$$T = (5.218) (8.269)$$

$$R^2 = (0.80), F: (68.38) r: (0.88) DW: (1.710).$$

Results of estimation suggested the agreement of estimated model parameters with economic theory logic and statistical significance and metric of its tests, where the model explained (80%) of changes in money supply change, meanwhile (t) test showed the significance of estimated parameters at (5%) level while calculated (f) value expressed the model total significance at (0.05) level, which confirms that independent variable have a significant effect on dependent variable. Also, in light of estimation results, it can be noticed that the estimated model was free from measurement problems, where Durbin – watts on statistic test confirmed the non-existence of inter conditional problem between successive values of random variable at 1% level.



Gross Nonpetroleum Domestic Product

Gross domestic product is an indicator expressing the state economic performance level, and it is the most comprehensive indicator of economic activity, however Iraqi Gross domestic products witnessed cheer fluctuation due to conditions of war and economic sanctions posed by invasion of Kuwait and later after the change in April,

2003, The Image of this fluctuation became appear ant In Iraqi domestic product value in current and fixed prices in table (1). This fluctuation was (55926.5) Million dinars in current price and (29711.1) million dinars in fixed prices on 1990, but it went down to its minimum level in 1991, to became (42451.6) million dinars in current prices and (10682) million dinars in fixed prices. But as for gross domestic product without petrol. It was (777109) as compared to (13353.8) in 1990, and this can be attributed to economic sanctions posed by the UN which resulted in stopping petrol exports and the reduction of industrial and agricultural production as well as the breakdown of other service and production sectors, which, in its turn, led to the deterioration of Iraqi Gross product value to this level, on the other hand, as a results of the second golf war which started after the evasion of Kuwait. As the Iraqi economy is still suffering its consequences, where the united Arab economic report 1992 reported that the sum of direct financial losses, for 1990 and 1991, that affected Iraqi economic were estimated of about (232) billion dollars, which is the destruction of economic institution and facilities, as well as in basic and infrastructure costs in Iraq.

However, during the period 1997 – 2003, Gross domestic product witnessed an increase, but in decreasing rates, with compound annual growth rate of (0.56%), where GDP was (26990.4) million dinars with fixed prices with a change rate of (-33.1) in 2003, as compared with (26342.7) million dinars with annual growth rate of (21.1%), in 1997. Whereas GDP, without petrol, witnessed a decrease, where it was (13686.3) million dinars in 1997 as compared to (13073.3) million dinars, and a change rate of (-28.3%) in 2003, as a result of sanctions and economic irregularity and the semi complete neglect of economic development and reform processes, accompanied with other catastrophic problem that faced Iraq during that black era of its history, where those policies result was a continuous increase in inflation rates.

However, Iraqi economy, represented by GDP, attained real growth with an estimated rate of (4.67%) for the period (2010 – 2014), but it remained retarded on delayed in fixed prices, where domestic product in 2010, and in fixed prices was (53495.9) million dinars with annual growth rate of (6.89%) as compared to (72700.0) million dinars, and annual growth rate of (1.53%) in 2014, and this was the result of increased oil revenues and its contribution rate to GDP (as compared to DGP without petrol). This means that the growth was a result of increased oil revenues as well as commercial sector contribution.

So, when speaking about Iraqi percept income of GDP, which is an important indication of population living level the great disaster seems greater which means that Iraqi economy must realize a faster pace growth if it is to compensate what it lost during the last thirty years and keep pace of come never, at least, of Asian economic growth levels.

Growth and development is a controversial process, in respect to getting numbers related to Macroeconomic since the microeconomic is still softening obstacles since the microeconomic is still setting obstacles in addition to problem facing service and production problem, specially the role of industry, agriculture and service sectors in

building GDP, given that the basic problem does not lie in GDP growth rate resulting from increased petroleum revenues, but in the development process and the contribution of remaining production sectors, therefore the growth came as an unavoidable result of increased petroleum production in Iraqi exports as well as the international petroleum prices increase.

General Prices Level

By referring to statistics shown in table (3) we notice the increase of standard number with an annual compound growth rate of (44.6%) for the period (1989 – 1996), and this might be attributed to international sanction posed on Iraq due to mistaken policies and wars of the last period, which caused a complete penalization in all economic sectors and as a result of prohibiting Iraq from main sources for getting foreign currency to support the value of local currency and general beget as well as the stopping of oil exports and the breakdown of Iraqi economy infrastructure in addition to Issuing large amount of money without any cover, by Iraqi government in 1991, as well as locally printing of Iraqi dinar with a bad quality, and its distribution and exchange in local markets to cover construction and public expenditure cost, which resulted in an increased money supply and the drop of its value to a very low level, and standard number cautioned in increase during the period (1997 – 2003) with a compound annual growth rate of (6.1%) as a result of economic sanctions and conditions surrounding it.

The period after (2003), according to the statistics, witnessed an increase in general price level, with annual growth of (9.27%) as a result of Iraqi economy taking charge of large loads, the breakdown of security situation in the country and theft and rubbing operation that encountered governmental institutions, properties and banks in various Iraqi Cities as well as Iraqi government apathy of economic policies in finding future solutions and plans for Iraqi economy.

Statistical data showed the continuous increase at prices index rates with a percentage of (1.68%) for the period 2010- 2014, and it's a very low percent as compared to earlier periods, in reference to national five years development plan for the period 2010- 2014, which Iraq launched in May 2010, aiming at reducing differences and barriers between rural and urban areas, as well as setting the infrastructure and providing social services and jobs as well as, to increase by 9.38% as an annual growth rate during the plan period, as well as working on diversifying the economy, which is now depending on petroleum revenues given that Iraqi economy is a revenue based economy depending completely on oil revenues, and that the decrease of oil prices was reflected on petrol revenues for the time being, as well as setting an efficient policy to control inflation and public expenditure, in addition to restricting governmental bank to keep pace with banking work development in the world, accompanied by Iraqi success in cooperation with international society in reducing its datedness that Iraq suffered from during last decades.

Interest Rate

Law 64, 1967, gave Iraqi central bank the right to determine lower and higher limits of interest rates charged by or paid by banks in their banking transactions, so Iraqi monetary policy, during last decades, was characterized by a monetary policy with fixed interest rate, that is to say that interest was inelastic and inability determining its rates by banks, in other words, interest rate were administrative set by the central bank^(Yahya 2001).

It is noticed, on this basis, that during the period (1999- 2003), Iraq central bank was more likely to continue its intervention when specifying these prices for all banks, so he adopted raising interest rates structures policy as a tool to attract savings and containing a part of liquidity surplus from the public. The dependence of monetary policy on interest rate as a direct monetary tool and limiting tool of monetary and financial impairment windows in the economy^(Attu 1999). However during this period interest rates, in general, witnessed no but minimum change. But the central bank, after 2003, made a modification on the interest rate price to become 11% in 2007, as compared to 7% in 2005, and this increase came to stimulate interest rates in performing its role in maximizing saving levels and maintain savings (deposits) returns level in banks, in addition to its effect on surplus banking liquidity rates, in serving policy goals and priorities and economic stability in general. The central bank started the gradual interest rates reduction till it stopped stable at 3.42% in 2014, and this reduction, according to the central bank, came without violating basis and principles of economic stability adopted by monetary policy in excusing it goals of reducing inflation and maintaining a stable level of prices, as the main goal sought by Iraq.

Monetary policy of central bank, through focusing on interest rate sign to fix inflation expectation for public and reducing inflation through lowering money circulation velocity and increasing its demand, as well as reinforcing of keeping Iraqi dinar to provide a strong opportunity for stability that helps for activating growth and achieving development goals^(Saleh 2008).

Measuring the effect of money demand determinant in Iraq (1990- 2014)

The importance of measuring money demand function and understanding the relationship between money demand and factors determining it in the frame of price changes, arises from finding a stable function of money demand that helps monetary authorities in formulating monetary policies for coming periods, and once this function is attained, it can be used in setting future predictions for money demand them, monetary authorities can determine a growth rate that is suitable to money supply in accordance with money demand.

Technique of Measuring Money Demand Function

Description of the Model

Money demand represents and important variable for decision makers concerned economic activity in general, and monetary policy in particular, so the estimation of money demand function and identifying factors influencing it, might help in formulating monetary policy decisions aiming at achieving goals at the macro-economic level,

therefore and from what has been presented in the analytical part of this research, the relationship that specifies money demand in Iraqi economy, can be stated, according to the following assumption:

$$Md_2 = f(y, p, I, D_1, D_2) \dots\dots\dots (1)$$

Where Md_2 = real aggregate demand on money (money in the broad sense).

Y: Non petroleum GDP in fixed prices.

P: inflation rate.

I; interest rate.

D_1 : Dummy variable representing the period before (2003).

D_2 : Dummy variable representing the period after (2005), for what this period reflected of changes in the political system and allowing the private sector to contribute to economic activity embedded in the issuance of many laws and decisions aiming at improving economic performance.

Money supply data, in the broad sense, will be used to express money aggregate demand assuming equilibrium in money market, where economic theories suggested the possibility of automatic return to equilibrium in money through interest rate mechanism, since the increase of interest rate to a level above the equilibrium one, then quantity of money demanded will be less than the supplied one, which drives individuals to use the surplus in buying bonds and money assets, however, with the increase of money supplied above liquidity requirements with increasing interest rates, will increase demand on bonds, which increases their prices, which in turn will move the interest rate down, and this mechanism will be repeated till $MS = MD$ in the money market, and the contrary occurs when interest rate goes down^(Stephen 1997).

Classical theory saw money demand as capital demand for investment and that savings are represented by money supply, and that interest rate in the market is the result equilibrium between the sum of society savings and sum of capital investment, while Keynesian theory suggested that the meaning of money demand is the desire to keep money in the liquid form, while money supply is the willingness to give it up in exchange of less liquid form (such as bonds) and that interest rate is the factor for achieving equilibrium between them^(Shihah 1996).

Fredman sees that when central bank increases money supply, banks will find that they have excess reserves, which leads to bank expanding loans giving and investments, and that individuals will find that they have account in excess of their need at prevailing price level, real incomes and interest rates, which requires achieving them through investment and the process continues until money demand increases due to fitness in prices, real income and interest rate and to turn to equilibrium.

Results of Measuring Money Demand Function

Function (1) was estimated, but it doesn't provide statistically accepted results in terms of estimated parameters significance and the presence of some measurement problems such as self-correlation despite the correspondence of estimated parameter signs with economic logic, therefore the relation representing money demand function was re estimated with the help of what Fredman took as a starting point in analyzing his theory to money demand (Aziz et al. 2002).

(Modern money quantity theory), where he pointed out that nominal aggregate money demand in cement prices is a function in real GDP with fixed costs the general level of prices and nominal interest rate:

$$Md2^* = F(Y, cpi, i) \quad (2)$$

Where Md2/: Nominal aggregate money demand.

Cpi: price index

According to the following

1. Positive relation between (Md2, Y).
2. Positive relation between (Md2, cpi)
3. Positive relation between (Md2, I), and the estimated equation was as follows

Results of estimation results of equation (3) shows that estimated parameters signs were in accordance with model assumption put by freedman about the positivity of the relationship between money supply in nominal brand sense and not petroleum GDP as well as with general price level, and the university of the relationship with price level, and the university of the relationship with nominal interest rate, and the university of the relationship with nominal interest rate, and since estimated parameters cane with high statistical significance of the whole model was high as shown by (F) test.

However, all these significant statistical indicators are not autocorrelation, detected by D.W test, which put under question in the possibility that the estimate regression is spurious, therefore, and in another attempt by the researchers, doubles logarithmic form, was used, as an alternative of the previous formula to get rid of autocorrelation problem, firstly and to get a means explain the model parameters as elasticities showing response degree, secondly, and thirdly to delete or remove deviant observations in the time – series for different variables, so the estimating equation was as follows.

Although estimated parameters signs were consistent with model assumptions, and since they became expressive nominal money demand elasticity to changes in independent variables, ie a 100% change in consumer price index (cpi) will lead to a (93%) change, and in the same direction in money demand; but despite that showed the absence multiple correlation problem when comparing simple sqre correlations of independent variables with each other, and determinant coefficient, the following correlation matrix was obtained:

LnI	LnCpi	LnNogdp	Variables
-0.2438	0.1872	1.000	LnNogdp
-0.4375	1.000	0.1872	LnCpi
1.000	-0.4375	-0.2438	LnI

However, even though estimated models were consistent with economic theory, in terms of parameters signs and the quality of statistical significance, the continued appearance of self-correlation required ascertaining time series stationary extent, the direction of the relationship between variables in the long run, and is there any association or cointegration between studied variables. (Atiah 2004) Therefore, unit root test (D. F.) was used to test time – series stationary level.

Table 1: GDP at current prices and fixed prices without the contribution of the oil sector in Iraq for the period (1990-2014)

Years	GDP Deflator	GDP	Change rate in GDP %	Compound annual growth rate GDP %	GDP 100=1988	Change rate in GDP 100=1988	Compound annual growth rate GDP % 100=1988	NOGDP 100=1988	Change rate in NOGDP %	Compound annual growth rate NOGDP %
1990	188.2	55926.5	-----	42	29711.1	-----	0.89	13353.8	----	3.38
1991	397.4	42451.6	-24.0939		10682.0	-64.04711		7771.9	-41.8001	
1992	812.7	115108.4	171.1521		14163.5	32.592211		13684.3	76.07406	
1993	1743.0	321646.9	179.4296		18453.6	30.289829		15005.2	9.652668	
1994	8652.9	1658325.8	415.5734		19164.9	3.8545324		18728.1	24.81073	
1995	34210.9	6695482.9	303.7495		19571.2	2.1200215		14654.7	-21.7502	
1996	29919.4	6500924.6	-2.90581		21728.1	11.020786		16289	11.15205	
1997	57295.3	15093144.0	132.1692	6.12	26342.7	21.237936	0.56	13686.3	-15.9783	0.59
1998	48207.8	17125847.5	13.46773		35525.0	34.857095		14578.4	6.518197	
1999	82506.8	34464012.6	101.2397		41771.1	17.582266		16460.6	12.91088	
2000	118544.2	50213699.9	45.69894		42358.6	1.4064748		16481.1	0.12454	
2001	95337.4	41314568.5	-17.7225		43335.1	2.305317		17659.4	7.149401	
2002	101680.6	41022927.4	-0.7059		40344.9	-6.90018		18245.9	3.321177	
2003	109615.9	29585788.6	-27.8799		26990.4	-33.10084		13073.3	-28.3494	
2004	127945.6	53235358.7	79.93557	8.59	41607.8	54.157775	2.37	21818.4	66.89283	2.56
2005	169280.9	73533598.6	38.12924		43438.8	4.4006172		25119.2	15.12852	
2006	199759.9	95587954.8	29.99222		47851.4	10.1582		28523.9	13.55417	
2007	229755.6	111455813.4	16.60027		48510.6	1.3775981		27732.1	-2.77592	
2008	303627.9	157026061.6	40.88638		51716.6	6.6088649		28344.9	2.209714	
2009	238765.2	130654218.7	-16.7946		54720.8	5.8089666		30843.1	8.813578	
2010	285649.4	167093204.4	27.88964		58495.9	6.8988392		34396.3	11.52024	
2011	349049.7	223677005.2	33.86362	4.67	64081.7	9.5490453	2.5	36958.3	7.448476	2.33
2012	359092.7	253030755	13.12328		70463.9	9.9594736		39841.6	7.801495	
2013	365215.7	269647864	6.567229		73832.5	4.780604		43159.6	8.327979	
2014	358473.8	260610438	-3.35157		72700.0	-1.533877		41600.0	-3.61356	

Table 2: Money supply in the narrow and broad senses with money preference in Iraq for the period (1990-2014)

Years	Net currency in exchange	Current deposits	Narrow money supply M1	Change rate of money in narrow sense %	compound annual growth rate for money in narrow sense %	Broad money supply M2	Change rate of money in broad sense %	compound annual growth rate for money in broad sense %	Cash preference
1990	13639	1720	15359	----	32.3	-----	-----	32.9	-----
1991	21882	2797	24679	60.681		30883	-----		79.91
1992	36005	7888	43893	77.8557		55781	80.62041		78.69
1993	67156	19296	86452	96.9608		111334	99.59126		77.65
1994	199482	39465	238947	176.393		274012	146.1171		87.2
1995	585203	120666	705869	195.408		767756	180.1906		91.94
1996	881741	78887	960628	36.0915	11.0	1076833	40.25719	11.3	89.21
1997	930134	108269	1038403	8.09627		1231027	14.31921		84.35
1998	1192354	159346	1351700	30.171		1627176	32.18037		83.07
1999	1276098	208616	1484714	9.8405		1827441	12.30752		81.25
2000	1473989	253685	1727674	16.3641		2168143	18.64367		79.68
2001	1783407	376398	2159805	25.0123		2771736	27.83917		77.92
2002	2564574	449908	3014482	39.572		3758617	35.60516		80.2
2003	4624654	1143807	5768461	91.3583		6943725	84.74149		83.07
2004	7162945	2985681	10148626	75.933	11.9	11480812	65.34082	12.1	88.4
2005	9112837	2286288	11399125	12.3219		13228369	15.22155		86.17
2006	10968099	4491961	15460060	35.625		17649646	33.42269		87.59
2007	14231700	7489467	21721167	40.4986		24829268	40.67856		87.48
2008	18492502	9697432	28189934	29.7809		33192317	33.68222		84.93
2009	21775679	15524351	37300030	32.3168		43527047	31.13591		85.69
2010	24342192	27401297	51743489	38.7224	3.68	58584565	34.59347	4.36	88.32
2011	28296000	34186568	62482568	20.7545		69834930	19.20363		89.47
2012	30593647	33142224	63735871	2.00584		73054099	4.609683		87.24
2013	34995453	38835511	73830964	15.839		84755812	16.01787		87.11
2014	36071593	36620855	72692448	-1.5421		87817565	3.61244		82.78

Table 3: Consumer price index with interest rate and monetary stability coefficient in Iraq for the period (1990-2014)

Years	Consumer price index (CPI)	Compound annual growth rate for CPI %	Inflation %	Interest rate %	Change in interest rate %	Change in GDP % 100=1988	Change rate of money in broad sense %	Monetary stability coefficient
1989	106.3	44.6	----	-----	-----	----	-----	----
1990	161.3		51.7404	10	-----	-----	-----	----
1991	461.9		186.361	10	0	-64.04711	-----	----
1992	848.8		83.7627	10	0	32.592211	80.62041	2.473609722
1993	2611.1		207.623	12	20	30.289829	99.59126	3.28794395
1994	15461.6		492.149	12	0	3.8545324	146.1171	37.90786659
1995	69792.1		351.39	12	0	2.1200215	180.1906	84.99470406
1996	59020.8		-15.433	12	0	11.020786	40.25719	3.652842002
1997	72610.3	6.1	23.0249	12	0	21.237936	14.31921	0.674227948
1998	83335.1		14.7704	12	0	34.857095	32.18037	0.923208604
1999	93816.2		12.5771	12	0	17.582266	12.30752	0.699996235
2000	98486.5		4.97814	12	0	1.4064748	18.64367	13.25560188
2001	114612.5		16.3738	12	0	2.305317	27.83917	12.07607023
2002	136752		19.3168	12	0	-6.90018	35.60516	-5.160033506
2003	181301.7		32.577	9	-25	-33.10084	84.74149	-2.560100892
2004	230071.86	9.27	26.9	8	-11.111	54.157775	65.34082	1.206490112
2005	314968.37		36.9	7.1	-11.25	4.4006172	15.22155	3.458957984
2006	482531.54		53.2	7.7	8.4507	10.1582	33.42269	3.290217755
2007	631151.26		30.8	11.30	46.7532	1.3775981	40.67856	29.52861215
2008	648192.34		2.7	11.88	5.13274	6.6088649	33.68222	5.096521189
2009	630042.96		-2.8	8.83	-25.673	5.8089666	31.13591	5.35997401
2010	645794.03		2.5	7.17	-18.8	6.8988392	34.59347	5.014389957
2011	681958.50	1.68	5.6	3.45	-51.883	9.5490453	19.20363	2.011052351
2012	723557.96		6.1	3.66	6.08696	9.9594736	4.609683	0.46284404
2013	737305.57		1.9	3.65	-0.2732	4.780604	16.01787	3.350595448
2014	753526.29		2.2	3.45	-5.4795	-1.533877	3.61244	-2.355104092

Table 4: Results of unit – root by ADF of all variables for 1990 – 2015

First team			level			Type equation *	variable
5%	1%	T-stat	5%	1%	T-stat		
-3.012363	-3.788030	-3.007338	-3.012363	-3.788030	-0.100335	α	CPI
-3.644963	-4.467895	-2.951165	-3.632896	-4.440739	-2.522071	$\alpha\mathcal{E}$	
-3.012363	-3.788030	-3.884978	-3.012363	-3.788030	-0.362304	α	I
-3.644963	-4.467895	-5.047149	-3.632896	-4.440739	-3.117306	$\alpha\mathcal{E}$	
-3.012363	-3.788030	-9.288913	-3.012363	-3.788030	-5.202343	α	nongdp
-3.644963	-4.467895	-9.054985	-3.632896	-4.440739	-5.074037	$\alpha\mathcal{E}$	
-3.012363	-3.788030	-2.448979	-3.012363	-3.788030	-3.109475	α	M2
-3.644963	-4.467895	-2.719330	-3.632896	-4.440739	-3.315224	$\alpha\mathcal{E}$	

Table 5: Unit root test results by pp for all variable during the period (1990-2015)

First team			level			Type equation *	variable
5%	1%	T-stat	5%	1%	T-stat		
-3.004861	-3.769597	-2.457233	-2.998064	-3.752946	0.076249	α	CPI
-3.632896	-4.440739	-2.443415	-3.622033	-4.416345	-1.887722	$\alpha\mathcal{E}$	
-3.004861	-3.769597	-3.408260	-2.998064	-3.752946	-0.639935	α	I
-3.632896	-4.440739	-3.554699	-3.622033	-4.416345	-2.059696	$\alpha\mathcal{E}$	
-3.004861	-3.769597	-23.76573	-2.998064	-3.752946	-5.193237	α	nongdp
-3.632896	-4.440739	-25.47705	-3.622033	-4.416345	-5.068025	$\alpha\mathcal{E}$	
-3.004861	-3.769597	-2.026569	-2.998064	-3.752946	2.803458	α	M2
-3.632896	-4.440739	-3.005599	-3.622033	-4.416345	-0.333786	$\alpha\mathcal{E}$	

Principal component method was used in estimating and showing the influence of each determinant in the level of money demand (Koutsoyiannis 1977) this method is special case of Factor analysis method and it aims at creating new variable from the model independent variables, these new variables are called principal components (P.) ($I = 1, 2, 3, \dots, k$), and being aware that principal components should not be more the independent variables in the equation.

First: The method

A table of partial correlation coefficients between (k) independent variables explanatory (x_i) is built and is called correlation table, where ($r_{x_i x_j} = 1$), and correlation of each row compounds are identical with correlations of each column ($1x_i x_j = 1 x_j x_i$).

Sum squares of are calculated for each (P_i) and is called Latent root of this element or compounds and it will be denoted by (λ), associating P_i to indicate it, for

example latent root for the first (P_1) is E $\lambda_m = \sum_i^k L_{mi}^2 =$ [Latent root of the m th Principal Component]

Where m = the order of principal component structure; and total variance of principal compound is computed in (X_i) set, which is determined by E

$$\frac{\lambda_m}{k} \cdot 100 = \frac{\sum_i^k L_{mi}^2}{k} \cdot 100$$

Where: K = independent variables in the model.

It can be seen from (λ_m) of roots, that there as a gradual decrease, when adding a new principal component suggesting that (P_1) has a higher latent root that is higher from that of the second, and (P_2) latent root is higher than that of P_3 and son on then the second principal component (P_2) is found and as follows

$r * x_i x_j = r x_i x_j - L_i L_j$. ($i = 1, 2, \dots, k$), ($j = 1, 2, \dots, k$), and a new correlations table is constructed, called Residual correlation Table, from original simple correlation table, and based on the previous formula. The process is repeated when finding every principal component until $M P_1 =$ are constructed.

Second: Estimation results

Applying principal components method for estimating the final model of money demand parameters, constructed, and by using partial correlations between explanatory variables at final demand components, the following results were obtained:

1. Estimating money demand model (estimated previously).
 - a) Constructing simple correlations table between md determinants, determining, $\frac{\lambda}{k}$ for determining, thereby, one principal component ($M=1$), given that $\frac{\lambda}{k}$ for the second component was negative so we chose (P_1) to remain in the analysis $P_1 = 0.9513 \text{nogpp} + 0.3780 \text{cpi} + 0.1740i$.
 - b) Second stage Estimating principal components ($M = D$) $YE = rP_1 + u$

To estimate $\textcircled{R}$ in the model, we substitute each of independent variables from final demand components tables and estimated variable for eac year, in the equation (2), to find (P_1) values, by applying OLS method on the equation, we get the post estimation modern $M^{\wedge}_{d2} = (191.123) p_1$.

It is possible, from the previous estimated model (eq.6) for money demand, to know the effect of each determinant of md in aggregate money demand by using beta

method for the modern under study or by using partial derivation of the equation for the component whose effect to be known, so it was found that:

Table (6)

	NOGDP	CPI	I	Σ
NOGDP	1.000	0.1723	-0.0650	1.1073
CPI	0.1723	1.000	-0.7324	0.4399
I	-0.0650	-0.7324	1.000	0.2026
Σ	1.1073	0.4399	0.2026	1.354
LOADINGS FOR P ₁ (L _{i1})	0.9513 L11	0.3780 L12	0.1746 L13	$\sqrt{1.354} = 1.164$
Latant root of p ₁	$\lambda = \sum_i^k L_{mi}^2 = 1.0782$			

$$*Md^2 = 0.0000004 + 21 \text{ GDP} + 88\text{CPI} - 40i$$

Table (7)

	NOGDP	CPI	I	Σ
NOGDP	0.095	-0.1873	0.230	0.322-
CPI	0.1873-	0.86	0.7981-	-0.1254
I	0.230-	0.7981-	0.970-	-0.054
Σ	0.322 -	-0.1254	-0.058	

The result will be negative and it is not possible to attain on other component (P₂). However, after substitution it was found that md equation is $*Md^2 = 0.0000004 + 21 \text{ GDP} + 88\text{CPI} - 40i$. Suggesting that cpi parameter has the highest correlation which affect the role of price stability on money demanded (positive relationship between prices and money demand).

Final Findings

The following findings, for analysis, were reached.

- 1) MD is among the important variable to be taken into account theirs, have emphasized, and Iraqi situation is not an exception.
- 2) However quantity and credit volumes. To expand liquidity and stimulate economic activity (productive and investment), where, the main problem lies in that money is contingent on expectations and economic and political stability degree.

- 3) The absence of a developed stock market and a modern banking system, Makes interest rate relationship poor in influencing money demanded or prevent inflation in Iraq.
- 4) Depression of which Iraqi economy is suffering, pushed monetary authority to use some channels to influence the volume of economic activity, and this was noticed at the end of 2014 till the beginnings of 2016, in terms of quantitative and credit facilities (easing), where central bank provided commercial banks, with loans, to give loans to individuals to expand liquidity in bank and business sectors as well as, to reduce interest price with increased money demand.
- 5) Financial crisis of which Iraqi economy started suffering since the drop of petroleum prices, since oil revenues constitute the large proportion of public revenues, caused many financial breaks and failure of society and business sectors to turn back their loans, also and as a result of liquidity decrease, in banking sector in particular, lending policy because restrictive, and there was exaggeration in conservative and caution.
- 6) Descriptive analysis, supported by quantitative one, showed that, when estimating a simple relationship between ΔMD and Δcpi , developments were consistent and in the same direction, which confirmed the correlation between price stability and quantity of money demanded in Iraqi economy.
- 7) It was found using econometric techniques, that estimated equations that express Fredman assumptions, are the most appropriate for the research variables and more consistent with the situation of Iraqi economy, since these equations were highly statistical significant, and special explanation power, where logarithmic price changes, was 93% to each 100% change in money aggregate demand.
- 8) Stationary tests showing variance in stationary levels which does not allow the presence of cointegration which pushed researchers to use principal components method to identify the strongest effect in which price stationary state excelled in its effect.

Second:

Identifying money demand determinant in Iraqi economy is very crucial for making right decision to attain macro economic goals, therefore conducting research and studies related to money demand, specifying its determinants, periodically, to identify advances that might happen on this variable its determinants and utilizing them in formulating and applying monetary policy. But before making decisions related to economic activity, it is important to study potential (expected) effects of these decisions on economic variables and their effects on economic structure, in order to avoid expected problem and obstacles that might face the national economy development.

References:

- Abdul Hamid, H. (2003), Economic Study Series: Economic policies on a National level (Macro analysis), al Neel Al – Arabia, Group, Cairo.
- Al-Janabi, H., and Arsalan, R. (2009), Money, Banks, and Monetary Theory, Amman, Dar wael publishers.
- Atiah, A., (2004) Advanced in Econometrics: Between the Theory and Practice, Al Iskandara, Addar Al – Jamieah, 4th edition.
- Attu, S. (1999), The Role of Monetary Policy During Economic Sanctions, and Financial Reform after it, Journal of Economic Studies, Baitul Hikmah Baghdad, pp 57.
- Aziz, M., Abu Sneineh, M. (2002), Economic Principles, Benghazi, Garyounis University.
- Bank of Japan, (2003) The Price Stability Target Under the Frame Work for the Conduct of Monetary, p1-3.
- Central Bank of Iraq (2003-2014) Annual Report, Baghdad, General Department of Statistics and Researches.
- Central Bank of Iraq, Basic Financial Indicators 2015, Baghdad, General Department of Statistics and Researches.
- Central Bank of Sri Lanka, Price Stability, Pamphlet Series No. 1, p2.
- Cheryl, E. (1997), "Open Market Operations in the 1990s" Federal Reserve Bulletin, November 1997.
- Ireland, P. (2005), "The Monetary Transmission Mechanism" Federal Reserve Bank of Boston, working papers no.06-1 November 2005 p 1.
- Ireland, P., N. Lecture Notes on Money Banking and Financial Market: The Tools of Monetary Policy, chapter 17, p1.
- Khaleel, S. (1994), Modern Macroeconomic Theory, 2nd edition, Kuwait.
- Khazraji, T., and Mendlawi, A. (2005) "The Ability of Monetary Policy to Encourage Local Investment in Iraq for the Period (1980 – 2003)," Journal of Administrative and Economics studies, 40(11), 12.
- Koutsoyiannis, A. (1977), Theory of Econometrics, Hong Kong, 2nd edition.
- labonte, M. (2013), "Monetary Policy and the Federal Reserve: Current Policy and Conditions," Congressional Research Services 12.
- Mishkin, F. "Macroeconomics: Policy & Practice", USA Pearson, University Columbia, p309.
- Saleh, M. (2008), "Monetary Policy of the Central Bank of Iraq and the Requirements of Economics Stability and Growth," Iraqi Journal of Economic Sciences, al – Mustansiryah University, (18) 12.
- Shihah, M., (1996), Economics of Money and Banks, Al – Marifah Al – Jameiah Publisher, 6th edition.
- Stephen, G. (1997), "The Evolution of Monetary Policy: From Money Targets to Inflation Targets" Bank of Australia, p.128.
- Stephen, H. and Wilcox, J. (1989) "The Long-Run Determination of the UK. Monetary Aggregates" .Bank of England Discussion (London).

- Tobin, J., Monetary Policy, The Concise Encyclopedia of Economics.
- Yahya, W (2001), Monetary Theory: Theories, Institutions and policies, Dar Alkutob Publishers, Mosel University.
- Yamane, T. "Statistics, an Introduction Analysis," Harper and Row, New York, and John Wetherill, INC., Tokyo 3rd edition.