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Money Stock Determinants : High Powered Money and Money Multiplier

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Abstract
The idea that variations in money stock affect the economy's income, output, employment and price level has been around in one form or another for at least a couple of hundred years. However, there has been less universal agreement on precisely what in the economy money affects, how effects are transmitted and the stability of relationships. The broad objectives of monetary policy in India have been to regulate monetary expansion so as to maintain a reasonable degree of price stability and to ensure adequate economic growth. One proposal that has received consideration is that the rate of growth in the money supply should be the only guide to monetary policy. Granted the assumption of a direct link between changes in the money supply and the level of economic activity, the proper policy prescription would seem to be to control changes in money supply. A convenient and customary analytical device of creation of money stock is summarised in form of money multiplier, which shows the relationship between money stock and high powered money. The choice of money stock as a target of monetary policy is more reliable measure and an indicator is free from ambiguities and is simple to operate. This approach indicates the role of high powered money and money multiplier in determination of money supply. In this article an effort has been made to calculate the value of money multiplier and high powered money in affecting the money supply in India for the period 1980-81 to 2011-12.
Keywords : Money multiplier, High powered money, Broadly defined money stock, relative contributions.

1. Introduction

Policy formulation in terms of money stock requires, among others, the appropriate concept of money, and the process of money stock determination. It is with the latter problem that this paper is concerned. Hence, it is related with (i) discussion of the framework for money stock analysis, (ii) examination of concepts of high-powered money and money multiplier and (iii) estimation of relative contribution of high-powered money and money multiplier to the changes in money stock.

2. Review of Literature

Although supply of money occupied great importance in monetary theory, its analysis in economic theory found a second place in comparison to money demand analysis. Its analysis was neglected not purposely, but in fact, there was no need for such analysis because of wide prevalent practice of treating money as given. It was not until the growth of demand deposits, fractional reserve system and the development of Central Banks that theories concerning the analysis of money supply were forthcoming. The money supply studies started in late 1950s can be divided into two groups. Representing the quantity money traditions are Friedman and Schwartz, Cagan, Brunner and Meltzer, David Fand and Research Staff of Federal Reserve Bank of St. Louis under the guidance of Leonall Andersen, Jerry Jordan and Keith Carlson. The model developed by them is based on Multiplier approach of money stock determination. The other approach of money stock determination is represented by James Tobin, Samuelson, Ronald Tiegan, Ackley, Walter Heller, Arthur Okun and Lawrence Klien. Recently included in this approach are Gramley, Chase, Karekan, Cacy and Davis. These two types of studies on money supply in the 1950s has given rise to several model of money stock determinations which could conveniently be divided into (i) multiplier models, (ii) structural models and (iii) Reduced from model.
Studies regarding money supply in India received serious consideration only after the Indo-China (1962) and Indo-Pak (1965) wars and four bad crops in 1970s. The recession of 1967-69 was again conducive to this programme. All these factors led to the production of some studies about money supply after 1960. Some studies were conducted by Raman. First working Group on Money Supply, G.S. Gupta, Pathak and Swamy. These are all non-econometric studies of money supply after 1960. Econometric study on Money Supply was conducted by Lodha, S.L. (1988) which aimed to develop appropriate definition of money stock and its components 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. This study on money supply in India is rated as an excellent piece of research.

3. The Framework

The framework for analysis of money stock determination is presented here in a simple equation which expresses money stock (M) as the product of fundamental two variables; high-powered money (H) and money multiplier (m) in the identity M = mH. 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 (Currency + Reserves)

M = C + D (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 and which further shows why the money stock is larger than '**productivity'** or '**magnification'** factor by which the banking system transforms high-powered money into actual money, the bulk of which consists of book-keeping entries called deposits. This procedure of expressing money stock as a product of high-powered money and multiplier is useful in understanding the sources of change and their relative contribution in determining the size of money stock, towards which we aims at.

4. Money Multiplier is Not a Mechanical Apparatus

However, money multiplier should not be regarded as a purely mechanical apparatus as is evident by the identity M = mH and argued by Majumdar (1976), Shetty et. at. (1976) and by the Second Working Group of the Reserve Bank of India (RBI Bulletin, 1977). Instead, it grows out of the interactions of banks, non-bank-public and decisions of monetary authorities. Essentially, it summarises the influences of all those factors other than changes in the high-powered money on the money stock process. Specifically, it reflects portfolio decisions of the non-bank-public when it decides on its currency and time deposit ratios; the behaviour of banks regarding the distribution of assets between excess reserves and earning assets and the behaviour of central bank when it sets reserve requirements on time and demand deposits and impose additional reserves under the statutory provisions. Fand (1970:12) explicitly noted that "The money stock at any moment in time is the result of portfolio decisions by the central bank, by the commercial banks, and by the public. The central bank determines the amount of high-powered money or monetary base, that is, currency plus bank reserves that it will supply, the commercial banks determine the volume of loans and other assets that they will acquire and the quantity of reserves they will hold as excess or free reserves; and the public determines how to allocate their holdings of monetary wealth among currency, demand, time and savings deposits, intermediary claims, and other financial assets. The money stock that emerges reflects all these decisions. In sum, money stock is clearly the function of three interacting components."

5. Money Multiplier Model in Indian Context

Now we define the money multiplier model of money stock determination in context of India and estimate the contribution of money multiplier and high-powered money to the changes in money stock. In our study the following identities define high-powered money, money stock and money multiplier:

$$M = C + DD + OD + TD \quad \ldots\ldots (1)$$

$$H = C + R + OD \quad \ldots\ldots (2)$$

Where

M	=	Broadly defined Money Stock or M_2
C	=	Currency with the public or non-bank-public
DD	=	Demand Deposits of banks.
TD	=	Time Deposits of banks.
OD	=	Other Deposits with the RBI.
R	=	Reserves with the banks.
H	=	High Powered Money.

We Further Define

L = Total Liabilities of Banks.

D = Total Deposits i.e. DD + TD.

r_s = Statutory Reserve Ratio.

r_e = Excess Reserve Ratio.

$$R = r_e + r_s$$

Also we define some basic ratios

$$\text{Currency ratio} = \frac{C}{DD} \text{ or c, therefore, } C = cDD$$

$$\text{Time Deposits ratio} = \frac{TD}{DD} \text{ or t, therefore, } TD = tDD$$

$$\text{Other Deposits ratio} = \frac{OD}{DD} \text{ or b, therefore, } OD = bDD$$

$$\text{Reserve Ratio} = \frac{R}{L} \text{ or r, therefore, } R = rL$$

$$\text{Liability ratio} = \frac{L}{D} \text{ or } l, \text{ therefore, } L = lD$$

Now we derive the Money Multiplier

$$M = cDD + DD + tDD + bDD$$

or

$$M = (c + 1 + t + b)\, DD$$

$$and\ H = cDD + r_s + r_e + bDD$$

$$or\ H = cDD + r_sL + r_eL + bDD$$

$$or\ H = cDD + r_slD + r_elD + bDD$$

$$or\ H = cDD + r_sl(DD + TD) + r_el(DD + TD) + bDD$$

$$or\ H = cDD + r_slDD + r_sltDD + r_elDD + r_eltDD + bDD$$

$$or\ H = (c + r_sl + r_slt + r_el + r_elt + b)\, DD$$

$$or\ H = [l\,(r_s + r_e) + lt\,(r_s + r_e) + c + b]\, DD$$

$$or\ H = [(r_s + r_e)\,(l + lt) + c + b]\, DD$$

$$or\ H = [l(r_s + r_e)\,(1 + t) + c + b]\, DD$$

$$\text{and Money Multiplier} = \frac{M}{H} \text{ therefore} =$$

$$\frac{M}{H} = \frac{1 + c + b + t}{[l(r_s + r_e)\,(1 + t) + c + b]} \qquad \ldots\ldots(3)$$

In view of these considerations, the basic equation that will be examined for calculation of money supply would be the following,

$$M = \left[\frac{1 + c + b + t}{[l(r_s + r_e)\,(1 + t) + c + b]}\right] H \qquad \ldots\ldots(4)$$

The quantity in the brackets is the value of money multiplier. Thus the equation (4) is the familiar money stock equation, which means that total money stock at any given time is a certain multiple of high-powered money.
The above general form of the money multiplier can be expressed in functional terms as:

$$m = f(c, b, t, l, r_s, r_e)$$

$$or\ m = f(v_1, v_2, v_3) \qquad \ldots..(5)$$

where $v_1 = \begin{pmatrix} c \\ b \\ t \\ l \end{pmatrix}$ *vector* of parameters determined by action of non - bank public.

$v_2 = (r_e)$ Vector of parameters determined by actions of commercial banks.
$v_3 = (r_s)$ Vector of parameters determined by actions of central bank.
Here money multiplier (m) in identity (5) is expressed in terms of six ratios, of these *b* and *l* are peculiar to our monetary system. Since money stock is expressed as the product of high-powered money and money multiplier, our task now is to explain the meaning and importance of high-powered money.

6. High Powered Money

Any kind of money issued by a monetary authority in a country is termed as high-powered money. Specially, this power lies with a central bank and this fact designates a central bank as a "Bank of Note-Issue". Indeed in the good olden days the need of a central bank arose out of issuing notes. The one well-known example is the origin of the Bank of England in 1694 by a decree against a loan sanctioned to the King in lieu of which it got the power of issuing notes. Besides central bank the high-powered money to some extents is issued by Treasury, which in fact, has been the sole incharge in every country till the establishment of a central bank. At present there are many nomenclatures for this term. Friedman, Schwartz and Cagan use the term high-powered money. Andersen and Jordan refer to be as 'sources-base' while Brunner and Meltzer as 'extended base'. A large number of other monetary economists affectionately termed it as 'base-money' or 'monetary-base'. The Reserve Bank of India (RBI Bulletin, 1971 describes it as 'reserve money'. Whatever may be the nomenclature, this money is very significant as it helps to build the pyramid of total money stock in an economy.

7. Importance of High-Powered Money

There are a few major reasons for singling out high-powered money. First, a large number of monetary economists support the view that monetary aggregates such as M_1 or M_2 exert important causal effect upon the level of economic activity, and one of the theoretical merits of high-powered money is that it can easily be structured to control considerably the movement of any single aggregate. Second, in assessing the amount of high-powered money there is no information-lag problem. Third, even if the central bank may not decide explicitly which monetary aggregate is to control, yet all of their actions can be subsumed into the changes in the high-powered money. The high-powered money therefore, serves well as a summary measure of the monetary actions of the central bank. Fourth, it constrains the size of money stock by its total quantity, which is fully absorbed by banks and non-bank-public's demand for monetary funds. The high-powered money held by banks is known as 'reserves' and serves as the base while high-powered money held by non-bank public is termed as 'currency', which also is a potential source of becoming reserves. Therefore, increases or decreases in the high-powered money tend to add to or subtract from the reserves of banks. With higher or lower reserves, banks acquire larger or smaller portfolios of loans and investments thereby causing fluctuations in the money stock. Finally, "control of base money and the money stock through manipulation of interest rates by the authorities influencing the demand for money in the desired direction is, in any case, ultimately dependent upon control of the supply of base money. Through lender of last resort facilities, the authorities can raise the rate at which they would supply funds to the market but the rates will not hold for long unless the quantity of money is curbed correspondingly. The extent to which it is curbed would presumably be the target level for the monetary base that was the object of the change in interest rates in the first place" (Fair, 1981: 17-34). Thus, high-powered money target as a policy variable is based on operational rather than ideological grounds. This would provide a superior decision making framework to formulate policy and increase the effectiveness of monetary policy in economic stabilisation programme.

8. Derivation of High-Powered Money

The size of high-powered-money may conveniently be calculated by either of the two methods based on the 'sources' and 'uses' of high-powered money. The sources of high-powered money are the asset holding of a central bank mostly in the form of government securities; stock of gold and foreign securities. Viewed from another side it is the sum of central bank's credit, the gold stock and treasury currency outstanding less treasury deposits at central bank, treasury cash-balances and other deposits at central bank. The 'uses' of the high-powered money is the currency holdings by banks and non-bank public, which constitute the liability of a central bank. Viewed in terms of demand and supply, the 'uses' is the demand for high-powered money and

'sources' is the supply. The 'sources-base' is always identical to 'use-base' because banks and non-bank-public always compete for use of high-powered money and hence the entire pool is always claimed.

9. 'Uses' and 'Sources' of HPM

The high-powered money by the uses to which it is put consists of currency in circulation and bankers' deposit with the RBI. These are held by non-bank-public in the form of 'currency', by banks in the form of 'reserves' and by the RBI in the form of 'other deposits'. In fact, the uses of the high-powered money are primarily the monetary assets of commercial banks and the non-bank-public. Further, the monetary authorities determine the size of high-powered money. Commercial banks and the non-bank public determine the allocation of its uses.

The most important sources of high-powered money are Reserve Bank's claim on government. When the Reserve Bank of India buys government securities, it pays for them by creating a bank reserve or currency, either item representing a net increase in the high-powered money. The other important sources of high-powered money are 'net foreign exchange assets' and claims on commercial and co-operative banks and the third sources are government's currency liabilities.

10. The Choice of Data

The focus of the study is to investigate the short-term relationships among fundamental determinants of money stock; hence quarterly data are taken into consideration. The period of study is 1980 II through 2012 I; a period which covers 31 years. The period covered is fairly long enough.

A large amount of statistical information is obtained for the study from yearly issues of Report on Currency and Finance, monthly issues of Reserve Bank of India Bulletin and from Handbook of Statistics on the Indian Economy 2010-11. The study is conducted is terms of rates of changes of the variables rather that in terms of their absolute level, as there is strong upward trend of all time series data in our economy, like in other economies. The year is divided into four quarters and monthly data are averaged for finding out the quarterly data. The quarterly averages of money stock and high-powered money are the last-friday-of the-month figures. The year considered is financial year, that is, from April to March. The broadly defined money stock, popularly known as M_2 is chosen for the purpose of this study.

11. Calculation of Contribution of H and M

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 = mH as follows:

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

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

and their percentage contribution is estimated as

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

This identity requires that the algebraic sum of column 2 and 3 should be equal to column 1. Columns 4 and 5 give the relative contribution of high-powered money and money multiplier to the change in money stock. Columns 6, 7 and 8 have been calculated from the original series of money stock, high-powered money and money multiplier respectively. Since these values are calculated from the discrete series and the denominators are different, the sum of column 7 and 8 is not necessarily are equal to the column 6. The last row of table 1 gives the sum of the quarterly changes in the logs of the respective variables.

The comparison of the percentage growth in money stock, high-powered money and money multiplier and the relative contribution of high-powered money and money multiplier to the change in money stock as reveals by tables 1 and 2, gives very interesting results, which are produced below.

12. Empirical Results

The results of rates of changes in high powered money and money multiplier and their relative contribution in changes of money stock are given in tables 1 and 2. Table 1 presents the quarterly results and table 2 presents the yearly results. Column 0 of table 1 presents the quarters and the year begins with quarter II and ends with quarter I, as the quarters are formed on the basis of financial year. Financial year in India begins from April and ends in March. Quarters are formed on the basis of calendar year i.e. the first quarter starts from January and ends in March. Similarly the second quarter begins from April and ends in June. Hence financial year begins with quarter second. Column 1 and 2 are concerned with money supply (M) and high powered money (H). Column 3

depicts the calculated values of money multipliers (m). Columns 4, 5 and 6 are concerned with the log values of M, H and m. Δlog M, Δlog H and Δlog m is given in columns 7, 8 and 9. The percentages contribution in changes of money supply because of high powered money and money multiplier is given in columns 10 and 11. These are calculated on the basis of log differences of respective value of M, H and m. Columns 12, 13 and 14 shows the percentage changes in money stock because of percentage changes in H and m. Columns 3 and 14 have been calculated independently and not from the identity. Column 15 and 16 are concerned with the average value of money multiplier m_1 and m_2 and columns 17 and 18 are concerned with marginal values of money multiplier Δm_1 and Δm_2.

13. Relative contribution of high powered money (H) and money multiplier (m) (Quarterly estimates)

The relative contribution of high powered money and money multiplier to the changes in money stock as revealed in table 1 through columns 10, 11 and 13, 14 shows different variations in different quarters. Whereas high powered money record a decline or a very insignificantly increases in quarter III money multiplier shows an increase during the same quarters except in 1994-95 and 2007-08. The net effect of operation of these two factors (high powered money and money multiplier) in different directions has been the slow increase in money supply during quarter third. For example in the third quarter of 1980-81 high powered money declined by 2.69 per cent while money multiplier increased by 4.67 per cent; their combined effect is increase in money stock by 1.85 per cent. In other words, whereas money multiplier contributed to 248.68 per cent towards the increase in money supply, the contribution of high powered money declined by 148.68 per cent i.e. high powered money pulled down the changes in money supply by 148.68 per cent.

Similarly during 1982-83, the money multiplier contributed 4.99 per cent in the third Quarter towards the increase in money supply; the high powered money contributed towards decline in money supply by 2.08 per cent and their combined effect is the increase in money supply by 2.8 per cent. In other words, the contribution of high powered money was (-) 76.28 per cent and of money multiplier was 176.28 per cent. This contradictory pattern of contribution of high powered money and money multiplier remained all these years except in the years 1985-86, 1988-89, 1993-95 and 2008-09. During 2008-09 the contribution of high powered money was 4.55 per cent in increasing the money supply while contribution of money multiplier was reduced the money supply by 1.01 per cent and hence the net result is increase in money supply by 3.50 percent. Similar is the result- for 2009-10 where money multiplier contributed 4.11 percent to money supply while high powered money contributed 1.21 percent negatively to the money supply. The net result is increase in money supply by 2.86 percent. It can be concluded than in affecting the money supply in quarter third the value of money multiplier have been more significant in comparison to high powered money.

In contrast to the positive and high value of money multiplier in quarter third, money multiplier has contributed either negatively or very insignificant positively during the quarters I and II exception being the first quarter of 1982-83 (money multiplier 3.29) 1996-97 (money multiplier 5.58) and 1999-00(money multiplier 1.38) and second quarter of 1985-86 (money multiplier 4.46) and 1998-99 (money multiplier 2.96), 2002-03 (money multiplier 3.68). During second and first quarters the contribution of high powered money in affecting money supply was significant exception being the second quarter of 1985-86.

During the fourth quarter (October-December), the money multiplier has again contributed negatively in affecting the money supply during the first decade, i.e., 1980-81 to 1989-90 exception being the years 1981-82 and 1985-86. However, during the next decade, i.e., from 1990-91 to 1999-00 money multiplier contributed negatively for four years, very insignificantly during two years and significantly only during the years 1992-93 and in 1995-96. During the fourth quarter, the contribution of high-powered money again remained significant. After 2000-01 during fourth quarter the contribution of money multiplier remained insignificant exception being only 2008-09. However in quarter third the contribution of money multiplier in affecting money supply remained significant upto 2005-06 and in 2009-10. Similarly in quarter second the value of money multiplier remained insignificant in affecting the money supply except being the year 2002-03.

During the whole period of study of 31 years or (125 quarters), the contribution of money multiplier remained insignificant (0.47 per cent) in affecting the changes in money supply on the basis of quarterly data. The significant contribution is noted of High Powered Money which affected changes in money supply by 3.66 per cent. The overall changes noticed in the money supply was 4.06 per cent. In other words the contribution of high powered money in affecting money supply was 89.15 per cent and that of money multiplier was 10.85 per cent when quarterly data is considered.

It is significant further to note that even if average data are considered the results is the same. It is clear from the totals of log M, log H and log m (columns 5 and 6) that average money supply is affected 90.08 per cent by high powered money and 9.92 per cent by money multiplier. This again shows that money supply is affected more by high powered money in comparison to money multiplier. In the short period, this clearly indicates the role of Reserve Bank of India in regulation of money supply.

14. Relative Contribution of High Powered Money and Money Multiplier (Yearly Estimates)

During 1980-81 to 2010-11 – a period of 31 years – overall contribution of money multiplier remained only 1.84 per cent while contribution of high powered money remained 15.26 per cent in affecting the money supply (Table 2). In other words the changes in money supply were affected 88.93 per cent by changes in high powered money and 11.07 per cent were affected by changes in money multiplier. Out of 31 years, during 9 years the value of money multiplier in affecting the money supply was even less that 1 per cent. During 1996-97 and 2009-10 the value of money multiplier was 9.30 per cent and 9.42 per cent respectively. During 1989-90 the value of money multiplier remained zero which shows that whole changes in money supply were affected by changes in high powered money. During 11 years-period, the contribution of money multiplier in affecting money supply remained negative. The contribution of high powered money remained highest per cent 27.47 during 2007-08 in affecting the money supply. In other words where as contribution of high powered money was 121.36 per cent, the contribution of money multiplier was (–) 21.36 per cent. The highest contribution of high powered money 130.00 per cent was during the year 2010-11. During 12 years the contribution of high powered money exceeded more than 100 per cent and hence the value of money multiplier in these years remained negative. Even the average value of high powered money and money multiplier was not different than marginal values. On an average money supply was affected 90.08 high per cent by high powered money and 9.92 per cent by money multiplier. On the basis of interpretation of annual data (long period) it can be concluded also that high powered money remained more significant in affecting the changes in money supply. On the basis of these conclusions (quarterly and annual data), the role of Reserve Bank of India emerges significantly in control of money supply.

15. Average Money Multiplier (m_1) (Quarterly)

The average money multiplier based on quarterly data varied during 1980-81 II to 1999-00 I from 1.21 to 1.25 only (Column 15). The lowest average money multiplier has been during the period from 1987-88 to 1995-96. During this period the average money multiplier remained in between 1.06 to 1.13. This variation in quarterly money multiplier indicates a very small size of money multiplier. However, during the period 2000-01 II to 2011-12 II the average money multiplier m_1 varied from 1.18 to 1.42. This highest value of money multiplier remained 1.40 to 1.42 only for the period of 2006-07 II and III and 2004-05 IV quarters. Only during 2005-06 I quarter the value of money multiplier remained 1.42. Otherwise for remaining period the variation in money multiplier is noticed in between 1.22 to 1.39. This shows that during the period of 31 years money multiplier m_1 varied between 1.21 to 1.39 and exception is noticed during 2011-12 II Quarter when value of money multiplier m_1 was 1.18.

16. The Average Money Multiplier m_2 (Quarterly)

The average money multiplier m_2 for the whole period of 31 years varied in between 2.88 to 5.38 (Column 16). However, during the first 19 years the variations in multiplier is noticed to the extent of 2.88 to 3.93. After 1999-00 to 2011-12 I, the variations in money multiplier m_2 were in the range of 4 to 5.38. Again the increase in multiplier is not abruptly but it shows an increasing trend. Since average multiplier has varied in between 2.88 to 5.38 during a period of 31 years it can be concluded that value of m_2 is stable and an increasing trend emerges.

17. Marginal Money Multiplier Δm_1 (Quarterly)

In comparison to average money multiplier, the variations in marginal money multiplier are noticed significantly in some of the quarters of 31 years period. The periods in which significant values noticed is 1981-82 III and IV, 1982-93 I, 1985-86 II, 1987-88 III, 2002-03 III and 2006-07 III (Column 17). The values of marginal money multiplier – other than exceptions – remained very low and fluctuation, for the whole period were very insignificant. Out of 125 quarters, in 107 quarters the fluctuations in marginal money multiplier were less than 2. Even in 84 quarters the variations in marginal money multiplier were less than 1.50. Minimum variation in Δm_1 is noticed in quarter I exception being the quarter I of 1996-97 and 2005-06. Maximum fluctuations in marginal money multiplier m_1 is noticed in quarter III. For remaining quarters no trend emerges of any kind. However, overall fluctuations were very less in marginal money multiplier as is the case in average money multiplier.

18. Marginal Money Multiplier Δm2 (Quarterly)

Variations in marginal money multiplier m_2 are noticed significantly in most of the quarters for the period of 31 years. Much fluctuations are noticed in quarter III for the whole period. Exceptions are the third quarter of 1985-86, 1980-81, 1993-94, 1996-97 and 2003-04 (Column 18). During III quarter of 1986-87, 1988-89, 1995-96, 1998-99, 2002-03 and 2006-07 the fluctuations in marginal money multiplier m_2 was extremely abnormal of all the quarters. The fluctuations were minimum in quarter I. We can conclude that overall fluctuations and for most of the quarters the fluctuations were under control. However where as marginal money

multiplier Δm_1 was stable, the marginal money multiplier Δm_2 was not.

19. Average Money Multiplier m_1 (Annual)

The average money multiplier m_1 annual ranged in between 1.06 to 1.11 for 7 years (1987-88 to 1995-96) and for 19 years it varied in between 1.17 to 1.30 (Column 15). During 2005-06 it varied maximum and its value was 1.39 and for another two years its value remained 1.35 and 1.36 (2007-08 and 2004-05). Since the fluctuations are very scanty, it can be concluded that annual money multiplier m_1 is stable.

20. Average Money Multiplier m_2 (Annual)

The average money multiplier m_2 (annual) varied in between 2.95 in 1980-81 to 5.20 in 2009-10 for the whole period of 31 years (Column 16). Since 1996-97 the increasing trend of money multiplier emerges without any exception. However fluctuation of small quantity is noticed during 1980-81 to 1996-97. In comparison to money multiplier m_1 the fluctuations in money multiplier m_2 is less. Since the value of money multiplier m_2 is stable money stock can easily be forecast.

21. Marginal Money Multiplier Δm_1 (Annual)

The fluctuations in marginal money multiplier have been ranged from 0.66 in 2002-03 to 19.66 in 1996-97 (Column 17). However, these fluctuations can be termed as exceptions as most of the fluctuations varied in between 6.05 (1994-95) to 12.76 (1997-98). For 11 years since 2000-01 to 2010-11, its value remained less than 2.5. For six years the fluctuations noticed were more than 10.

22. Marginal Money Multiplier m_2 (Annual)

For seven years, out of 31 years the marginal money multiplier m_2 fluctuated more than 5 times, otherwise for remaining 26 years its value remained less than 5. The fluctuation in Δm_2 is noticed less than Δm_1. However, the values are such that fluctuations seem to be stable (Column 18).

23. Conclusion

Thus, it is concluded that when viewed from a long run perspective, the changes in money supply have been predominantly affected by changes in high powered money. Even from a short run perspective, the importance of high powered money in first and second quarters remained significant. In quarter third the value of money multiplier has been more significant in comparison to high powered money. During the whole period of study of 31 years the contribution of money multiplier remained insignificant (0.47 per cent) in affecting the changes in money supply on the basis of quarterly data (Table 1). The significant contribution on is noted of high powered money which affected changes in money supply by 3.66 percent. The overall changes noticed in the money supply were 4.06 per cent. In other words 89.15 percent money supply has been affected by high powered money and 10.85 per cent have been affected by money multiplier based of quarterly data. Even average money supply was affected 90.08 per cent by high powered money and only 9.92 per cent by money multiplier. This indicates the role of Reserve Bank of India in controlling the money supply in India because the responsibility of introducing high powered money is with the Bank itself.

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Table 1 : Contribution of High Powered Money and Money Multiplier to Changes in Money Stock and Values of Money Multiplier (Quarterly Estimates)

Period	M_2	HPM	m	log M	log H	log m	Δ log M	Δ log H	Δ log m	Percentage Contribution of		Percentage Changes in			m_1	m_2	Δm_1	Δm_2
										H	m	M	H	m				
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1980-81																		
II	48353	16785	2.88073	4.68442	4.22492	0.45950									1.21	2.88		
III	49249	16333	3.01531	4.69240	4.21307	0.47933	0.00797	-0.01186	0.01983	-148.68	248.68	1.85	-2.69	4.67	1.21	3.02	1.13	-1.98
IV	51775	17523	2.95469	4.71412	4.24361	0.47051	0.02172	0.03054	-0.00882	140.60	-40.60	5.13	7.29	-2.01	1.2	2.95	1.05	2.12
I	54487	18372	2.96576	4.73629	4.26416	0.47214	0.02217	0.02055	0.00162	92.67	7.33	5.24	4.85	0.37	1.22	2.97	1.61	3.19
1981-82																		
II	57465	19358	2.96854	4.75940	4.28686	0.47254	0.02311	0.02270	0.00041	98.24	1.76	5.47	5.37	0.09	1.23	2.97	1.36	3.02
III	58783	19444	3.02319	4.76925	4.28879	0.48047	0.00985	0.00193	0.00792	19.55	80.45	2.29	0.44	1.84	1.2	3.02	-4.52	15.33
IV	60830	19641	3.09709	4.78412	4.29316	0.49095	0.01487	0.00438	0.01049	29.45	70.55	3.48	1.01	2.44	1.23	3.1	3.64	10.39
I	62096	20187	3.07604	4.79306	4.30507	0.48799	0.00895	0.01191	-0.00296	133.11	-33.11	2.08	2.78	-0.68	1.22	3.08	0.86	2.32
1982-83																		
II	64991	21490	3.02424	4.81285	4.33224	0.48062	0.01979	0.02716	-0.00738	137.27	-37.27	4.66	6.45	-1.68	1.21	3.02	1.19	2.22
III	66811	21042	3.17513	4.82485	4.32309	0.50176	0.01199	-0.00915	0.02114	-76.28	176.28	2.80	-2.08	4.99	1.22	3.18	1.06	-4.06
IV	70070	22307	3.14117	4.84553	4.34844	0.49709	0.02068	0.02535	-0.00467	122.58	-22.58	4.88	6.01	-1.07	1.21	3.14	1.09	2.58
I	72187	22250	3.24436	4.85846	4.34733	0.51113	0.01293	-0.00111	0.01404	-8.60	108.60	3.02	-0.26	3.29	1.24	3.24	-8.96	-37.14
1983-84																		
II	75928	23873	3.18050	4.88040	4.37791	0.50249	0.02194	0.03058	-0.00863	139.35	-39.35	5.18	7.29	-1.97	1.24	3.18	1.29	2.3
III	78598	24010	3.27355	4.89541	4.38039	0.51502	0.01501	0.00249	0.01252	16.56	83.44	3.52	0.57	2.93	1.22	3.27	-1.55	19.49
IV	82416	25647	3.21348	4.91601	4.40904	0.50697	0.02060	0.02864	-0.00804	139.05	-39.05	4.86	6.82	-1.84	1.2	3.21	0.87	2.33
I	85367	26987	3.16326	4.93129	4.43115	0.50014	0.01528	0.02212	-0.00684	144.77	-44.77	3.58	5.22	-1.56	1.19	3.16	0.91	2.2
1984-85																		
II	89923	29283	3.07083	4.95387	4.46662	0.48726	0.02258	0.03546	-0.01288	157.04	-57.04	5.34	8.51	-2.92	1.19	3.07	1.19	1.98
III	92569	28897	3.20341	4.96647	4.46085	0.50561	0.01259	-0.00576	0.01836	-45.76	145.76	2.94	-1.32	4.32	1.2	3.2	0.58	-6.85
IV	97301	30268	3.21465	4.98812	4.48098	0.50713	0.02165	0.02013	0.00152	92.98	7.02	5.11	4.74	0.35	1.21	3.21	1.46	3.45
I	101387	32961	3.07597	5.00598	4.51800	0.48798	0.01786	0.03702	-0.01915	207.20	-107.20	4.20	8.90	-4.31	1.16	3.08	0.64	1.52
1985-86																		
II	105105	32712	3.21304	5.02162	4.51471	0.50692	0.01564	-0.00329	0.01893	-21.06	121.06	3.67	-0.76	4.46	1.23	3.21	-7.69	-14.93
III	108588	33612	3.23063	5.03578	4.52649	0.50929	0.01416	0.01179	0.00237	83.25	16.75	3.31	2.75	0.55	1.18	3.23	-0.57	3.87
IV	112574	34397	3.27279	5.05144	4.53652	0.51492	0.01566	0.01003	0.00563	64.04	35.96	3.67	2.34	1.30	1.18	3.27	1.35	5.08
I	118118	36335	3.25081	5.07232	4.56033	0.51199	0.02088	0.02380	-0.00293	114.02	-14.02	4.92	5.63	-0.67	1.18	3.25	1.04	2.86
1986-87																		
II	123142	38858	3.16903	5.09041	4.58948	0.50093	0.01809	0.02916	-0.01107	161.17	-61.17	4.25	6.94	-2.52	1.16	3.17	0.99	1.99
III	127128	38781	3.27810	5.10424	4.58862	0.51562	0.01384	-0.00086	0.01470	-6.23	106.23	3.24	-0.20	3.44	1.17	3.28	-0.58	-51.77
IV	132513	40677	3.25769	5.12226	4.60935	0.51291	0.01802	0.02073	-0.00271	115.06	-15.06	4.24	4.89	-0.62	1.15	3.26	0.82	2.84
I	139827	43765	3.19495	5.14559	4.64113	0.50446	0.02333	0.03178	-0.00845	136.20	-36.20	5.52	7.59	-1.93	1.14	3.19	0.99	2.37
1987-88																		
II	144808	47640	3.03963	5.16079	4.67797	0.48282	0.01520	0.03684	-0.02164	242.38	-142.38	3.56	8.85	-4.86	1.1	3.04	0.63	1.29
III	149814	47805	3.13386	5.17555	4.67947	0.49608	0.01476	0.00150	0.01326	10.17	89.83	3.46	0.35	3.10	1.08	3.13	-3.71	30.34
IV	155751	51015	3.05304	5.19243	4.70770	0.48473	0.01688	0.02822	-0.01135	167.22	-67.22	3.96	6.71	-2.58	1.06	3.05	0.77	1.85
I	162455	52721	3.08141	5.21073	4.72198	0.48875	0.01830	0.01429	0.00402	78.05	21.95	4.30	3.34	0.93	1.08	3.08	1.61	3.93

1988-89																		
II	168054	56405	2.97942	5.22545	4.75132	0.47413	0.01472	0.02933	-0.01462	199.34	-99.34	3.45	6.99	-3.31	1.06	2.98	0.72	1.52
III	175891	56273	3.12567	5.24524	4.75030	0.49494	0.01979	-0.00102	0.02081	-5.14	105.14	4.66	-0.23	4.91	1.06	3.13	-1.46	-59.37
IV	184008	59502	3.09247	5.26484	4.77453	0.49031	0.01959	0.02423	-0.00464	123.67	-23.67	4.61	5.74	-1.06	1.06	3.09	0.92	2.51
I	190797	61104	3.12250	5.28057	4.78607	0.49450	0.01573	0.01154	0.00420	73.33	26.67	3.69	2.69	0.97	1.07	3.12	1.5	4.24
1989-90																		
II	201187	65607	3.06655	5.30360	4.81695	0.48665	0.02303	0.03088	-0.00785	134.10	-34.10	5.45	7.37	-1.79	1.07	3.07	1.06	2.31
III	207753	66258	3.13552	5.31755	4.82124	0.49631	0.01395	0.00429	0.00966	30.75	69.25	3.26	0.99	2.25	1.07	3.14	1.68	10.09
IV	218706	71052	3.07811	5.33986	4.85158	0.48828	0.02231	0.03034	-0.00802	135.96	-35.96	5.27	7.24	-1.83	1.07	3.08	1.09	2.28
I	227777	74737	3.04771	5.35751	4.87354	0.48397	0.01765	0.02196	-0.00431	124.42	-24.42	4.15	5.19	-0.99	1.06	3.05	0.89	2.46
1990-91																		
II	239357	79304	3.01822	5.37905	4.89930	0.47975	0.02154	0.02576	-0.00422	119.61	-19.61	5.08	6.11	-0.97	1.08	3.02	1.3	2.54
III	243178	76590	3.17506	5.38592	4.88417	0.50175	0.00688	-0.01512	0.02200	-219.87	319.87	1.60	-3.42	5.20	1.09	3.18	0.8	-1.41
IV	252983	80917	3.12645	5.40309	4.90804	0.49505	0.01717	0.02387	-0.00670	139.03	-39.03	4.03	5.65	-1.53	1.09	3.13	1.09	2.27
I	262452	84159	3.11853	5.41905	4.92510	0.49395	0.01596	0.01706	-0.00110	106.91	-6.91	3.74	4.01	-0.25	1.09	3.12	1.19	2.92
1991-92																		
II	276089	90512	3.05030	5.44105	4.95671	0.48434	0.02200	0.03161	-0.00961	143.67	-43.67	5.20	7.55	-2.19	1.08	3.05	0.99	2.15
III	281692	89506	3.14719	5.44977	4.95185	0.49792	0.00873	-0.00485	0.01358	-55.63	155.63	2.03	-1.11	3.18	1.09	3.15	1.04	-5.57
IV	299069	95231	3.14046	5.47577	4.97878	0.49699	0.02600	0.02693	-0.00093	103.57	-3.57	6.17	6.40	-0.21	1.13	3.14	1.76	3.04
I	312762	101112	3.09322	5.49521	5.00480	0.49041	0.01944	0.02602	-0.00658	133.85	-33.85	4.58	6.18	-1.50	1.12	3.09	1.05	2.33
1992-93																		
II	330059	107948	3.05757	5.51859	5.03321	0.48538	0.02338	0.02841	-0.00503	121.53	-21.53	5.53	6.76	-1.15	1.13	3.06	1.3	2.53
III	338162	105974	3.19099	5.52912	5.02520	0.50393	0.01053	-0.00802	0.01855	-76.10	176.10	2.46	-1.83	4.36	1.12	3.19	1.72	-4.1
IV	349775	107092	3.26612	5.54379	5.02976	0.51403	0.01466	0.00456	0.01011	31.08	68.92	3.43	1.05	2.35	1.1	3.27	-0.63	10.39
I	358955	109946	3.26483	5.55504	5.04118	0.51386	0.01125	0.01142	-0.00017	101.52	-1.52	2.62	2.66	-0.04	1.1	3.26	1.02	3.22
1993-94																		
II	380784	118472	3.21413	5.58068	5.07362	0.50706	0.02564	0.03244	-0.00680	126.51	-26.51	6.08	7.75	-1.55	1.12	3.21	1.4	2.56
III	388229	122218	3.17653	5.58909	5.08714	0.50195	0.00841	0.01352	-0.00511	160.77	-60.77	1.96	3.16	-1.17	1.07	3.18	-0.71	1.99
IV	403179	125484	3.21299	5.60550	5.09859	0.50691	0.01641	0.01145	0.00496	69.79	30.21	3.85	2.67	1.15	1.08	3.21	1.56	4.58
I	424002	134553	3.15119	5.62737	5.12889	0.49847	0.02187	0.03031	-0.00844	138.57	-38.57	5.16	7.23	-1.92	1.09	3.15	1.27	2.3
1994-95																		
II	450896	144492	3.12056	5.65408	5.15984	0.49423	0.02671	0.03095	-0.00424	115.88	-15.88	6.34	7.39	-0.97	1.11	3.12	1.39	2.71
III	465814	149246	3.12112	5.66821	5.17390	0.49431	0.01414	0.01406	0.00008	99.45	0.55	3.31	3.29	0.02	1.08	3.12	0.26	3.14
IV	488394	154940	3.15215	5.68877	5.19016	0.49861	0.02056	0.01626	0.00430	79.10	20.90	4.85	3.82	0.99	1.11	3.15	1.85	3.97
I	507679	163983	3.09592	5.70559	5.21480	0.49079	0.01682	0.02464	-0.00782	146.47	-46.47	3.95	5.84	-1.78	1.11	3.1	1.04	2.13
1995-96																		
II	529044	176188	3.00272	5.72349	5.24598	0.47752	0.01790	0.03118	-0.01327	174.15	-74.15	4.21	7.44	-3.01	1.11	3	1.09	1.75
III	541053	176405	3.06711	5.73324	5.24651	0.48673	0.00975	0.00053	0.00921	5.48	94.52	2.27	0.12	2.14	1.1	3.07	-5.18	55.34
IV	559545	175915	3.18077	5.74784	5.24530	0.50253	0.01460	-0.00121	0.01580	-8.28	108.28	3.42	-0.28	3.71	1.13	3.18	-9.03	-37.74
I	582170	184474	3.15584	5.76505	5.26594	0.49911	0.01721	0.02063	-0.00342	119.85	-19.85	4.04	4.87	-0.78	1.11	3.16	0.85	2.64
1996-97																		
II	613347	193252	3.17382	5.78771	5.28612	0.50158	0.02266	0.02019	0.00247	89.11	10.89	5.36	4.76	0.57	1.13	3.17	1.43	3.55
III	628767	185352	3.39229	5.79849	5.26800	0.53049	0.01078	-0.01813	0.02891	-168.10	268.10	2.51	-4.09	6.88	1.16	3.39	0.29	-1.95
IV	647814	190212	3.40575	5.81145	5.27924	0.53221	0.01296	0.01124	0.00172	86.73	13.27	3.03	2.62	0.40	1.16	3.41	1.04	3.92
I	680597	189280	3.59572	5.83289	5.27710	0.55579	0.02144	-0.00213	0.02357	-9.95	109.95	5.06	-0.49	5.58	1.23	3.6	-11.86	-35.17

1997-98																		
II	716303	206006	3.47710	5.85510	5.31388	0.54122	0.02221	0.03678	-0.01457	165.60	-65.60	5.25	8.84	-3.30	1.19	3.48	0.81	2.13
III	733129	203704	3.59899	5.86518	5.30900	0.55618	0.01008	-0.00488	0.01496	-48.40	148.40	2.35	-1.12	3.51	1.19	3.6	1.43	-7.31
IV	761570	208545	3.65183	5.88171	5.31920	0.56251	0.01653	0.01020	0.00633	61.71	38.29	3.88	2.38	1.47	1.19	3.65	1.33	5.88
I	797109	217720	3.66117	5.90152	5.33790	0.56362	0.01981	0.01870	0.00111	94.40	5.60	4.67	4.40	0.26	1.18	3.66	0.97	3.87
1998-99																		
II	845773	224364	3.76965	5.92725	5.35095	0.57630	0.02574	0.01305	0.01268	50.73	49.27	6.11	3.05	2.96	1.22	3.77	2.42	7.32
III	881023	224076	3.93180	5.94499	5.35040	0.59459	0.01773	-0.00056	0.01829	-3.15	103.15	4.17	-0.13	4.30	1.21	3.93	11.81	-122.4
IV	919310	239310	3.84150	5.96346	5.37896	0.58450	0.01847	0.02857	-0.01009	154.62	-54.62	4.35	6.80	-2.30	1.17	3.84	0.57	2.51
I	957464	250748	3.81843	5.98112	5.39924	0.58188	0.01766	0.02028	-0.00262	114.81	-14.81	4.15	4.78	-0.60	1.18	3.82	1.46	3.34
1999-00																		
II	1003067	260181	3.85527	6.00133	5.41528	0.58605	0.02021	0.01604	0.00417	79.37	20.63	4.76	3.76	0.96	1.2	3.86	1.81	4.83
III	1036193	255044	4.06280	6.01544	5.40662	0.60883	0.01411	-0.00866	0.02277	-61.38	161.38	3.30	-1.97	5.38	1.21	4.06	0.59	-6.45
IV	1074594	264646	4.06050	6.03124	5.42267	0.60858	0.01580	0.01605	-0.00025	101.56	-1.56	3.71	3.76	-0.06	1.22	4.06	1.42	4
I	1108852	269356	4.11668	6.04487	5.43033	0.61455	0.01363	0.00766	0.00597	56.21	43.79	3.19	1.78	1.38	1.25	4.12	2.85	7.27
2000-01																		
II	1157878	277346	4.17485	6.06366	5.44302	0.62064	0.01879	0.01270	0.00609	67.57	32.43	4.42	2.97	1.41	1.27	4.17	1.94	6.14
III	1180611	271286	4.35190	6.07211	5.43343	0.63868	0.00844	-0.00959	0.01804	-113.62	213.62	1.96	-2.18	4.24	1.27	4.35	1.45	-3.75
IV	1241161	286143	4.33755	6.09383	5.45658	0.63724	0.02172	0.02316	-0.00143	106.60	-6.60	5.13	5.48	-0.33	1.26	4.34	1.10	4.08
I	1289715	295598	4.36306	6.11049	5.47070	0.63979	0.01667	0.01412	0.00255	84.72	15.28	3.91	3.30	0.59	1.25	4.36	0.98	5.14
2001-02																		
II	1363905	311111	4.38398	6.13478	5.49292	0.64187	0.02429	0.02221	0.00208	91.45	8.55	5.75	5.25	0.48	1.27	4.38	1.66	4.78
III	1394065	305681	4.56052	6.14428	5.48527	0.65901	0.00950	-0.00765	0.01715	-80.50	180.50	2.21	-1.75	4.03	1.27	4.56	1.45	-5.55
IV	1437896	314586	4.57076	6.15773	5.49774	0.65999	0.01344	0.01247	0.00097	92.76	7.24	3.14	2.91	0.22	1.26	4.57	1.16	4.92
I	1478046	325213	4.54486	6.16969	5.51217	0.65752	0.01196	0.01443	-0.00247	120.63	-20.63	2.79	3.38	-0.57	1.26	4.54	1.22	3.78
2002-03																		
II	1589105	337248	4.71198	6.20115	5.52795	0.67320	0.03146	0.01578	0.01568	50.16	49.84	7.51	3.70	3.68	1.30	4.71	2.34	9.23
III	1628842	338003	4.81902	6.21188	5.52892	0.68296	0.01073	0.00097	0.00975	9.06	90.94	2.50	0.22	2.27	1.28	4.82	-8.37	52.61
IV	1673305	340720	4.91109	6.22358	5.53240	0.69118	0.01170	0.00348	0.00822	29.72	70.28	2.73	0.80	1.91	1.31	4.91	5.47	16.37
I	1712162	356192	4.80685	6.23354	5.55168	0.68186	0.00997	0.01929	-0.00932	193.45	-93.45	2.32	4.54	-2.12	1.30	4.81	1.09	2.51
2003-04																		
II	1791762	385308	4.65020	6.25328	5.58581	0.66747	0.01974	0.03412	-0.01439	172.91	-72.91	4.65	8.17	-3.26	1.29	4.65	1.15	2.73
III	1823533	374225	4.87283	6.26091	5.57313	0.68778	0.00763	-0.01268	0.02031	-166.06	266.06	1.77	-2.88	4.79	1.31	4.87	0.59	-2.87
IV	1881149	389930	4.82433	6.27442	5.59099	0.68344	0.01351	0.01785	-0.00434	132.16	-32.16	3.16	4.20	-1.00	1.33	4.82	1.89	3.67
I	1963811	414839	4.73391	6.29310	5.61788	0.67522	0.01868	0.02689	-0.00822	143.99	-43.99	4.39	6.39	-1.87	1.33	4.73	1.22	3.32
2004-05																		
II	2066371	430429	4.80072	6.31521	5.63390	0.68131	0.02211	0.01602	0.00609	72.47	27.53	5.22	3.76	1.41	1.35	4.80	1.86	6.58
III	2094839	425885	4.91879	6.32115	5.62929	0.69186	0.00594	-0.00461	0.01055	-77.57	177.57	1.38	-1.06	2.46	1.36	4.92	0.32	-6.26
IV	2160799	451000	4.79113	6.33461	5.65418	0.68044	0.01346	0.02488	-0.01142	184.82	-84.82	3.15	5.90	-2.60	1.40	4.79	2.05	2.63
I	2216507	472224	4.69377	6.34567	5.67415	0.67152	0.01105	0.01997	-0.00892	180.66	-80.66	2.58	4.71	-2.03	1.33	4.69	-0.08	2.62
2005-06																		
II	2335992	495898	4.71063	6.36847	5.69539	0.67308	0.02280	0.02124	0.00156	93.17	6.83	5.39	5.01	0.36	1.36	4.71	1.97	5.05
III	2404563	499831	4.81075	6.38104	5.69882	0.68221	0.01256	0.00343	0.00913	27.30	72.70	2.94	0.79	2.13	1.38	4.81	3.55	17.43
IV	2491808	519112	4.80013	6.39651	5.71526	0.68125	0.01548	0.01644	-0.00096	106.20	-6.20	3.63	3.86	-0.22	1.39	4.80	1.67	4.52
I	2603431	549046	4.74174	6.41555	5.73961	0.67594	0.01903	0.02435	-0.00532	127.93	-27.93	4.48	5.77	-1.22	1.42	4.74	2.01	3.73

2006-07																		
II	2769473	590107	4.69317	6.44240	5.77093	0.67147	0.02685	0.03132	-0.00447	116.65	-16.65	6.38	7.48	-1.02	1.23	4.69	-1.38	4.04
III	2884618	592789	4.86618	6.46009	5.77290	0.68719	0.01769	0.00197	0.01572	11.13	88.87	4.16	0.45	3.69	1.40	4.87	38.21	42.93
IV	2975029	613414	4.84996	6.47349	5.78775	0.68574	0.01340	0.01485	-0.00145	110.82	-10.82	3.13	3.48	-0.33	1.40	4.85	1.58	4.38
I	3172080	673290	4.71131	6.50134	5.82820	0.67314	0.02785	0.04045	-0.01260	145.22	-45.22	6.62	9.76	-2.86	1.37	4.71	1.06	3.29
2007-08																		
II	3336562	725653	4.59801	6.52330	5.86073	0.66257	0.02196	0.03253	-0.01057	148.15	-48.15	5.19	7.78	-2.40	1.28	4.60	0.17	3.14
III	3508922	759813	4.61814	6.54517	5.88071	0.66447	0.02187	0.01998	0.00190	91.33	8.67	5.17	4.71	0.44	1.24	4.62	0.34	5.05
IV	3667051	790163	4.64088	6.56432	5.89772	0.66660	0.01914	0.01701	0.00213	88.86	11.14	4.51	3.99	0.49	1.27	4.64	1.90	5.21
I	3901382	872352	4.47226	6.59122	5.94069	0.65053	0.02690	0.04297	-0.01607	159.75	-59.75	6.39	10.40	-3.63	1.25	4.47	1.10	2.85
2008-09																		
II	4080166	910655	4.48047	6.61068	5.95935	0.65132	0.01946	0.01866	0.00080	95.91	4.09	4.58	4.39	0.18	1.22	4.48	0.47	4.67
III	4222925	952101	4.43537	6.62561	5.97868	0.64693	0.01494	0.01933	-0.00439	129.42	-29.42	3.50	4.55	-1.01	1.18	4.44	0.25	3.44
IV	4396957	876367	5.01726	6.64315	5.94269	0.70047	0.01754	-0.03600	0.05354	-205.24	305.24	4.12	-7.95	13.12	1.29	5.02	-0.07	-2.30
I	4660738	916733	5.08408	6.66845	5.96224	0.70621	0.02530	0.01956	0.00575	77.29	22.71	6.00	4.61	1.33	1.31	5.08	1.78	6.53
2009-10																		
II	4937368	955745	5.16599	6.69350	5.98034	0.71315	0.02504	0.01810	0.00694	72.28	27.72	5.94	4.26	1.61	1.31	5.17	1.49	7.09
III	5078332	944225	5.37831	6.70572	5.97508	0.73065	0.01223	-0.00527	0.01749	-43.08	143.08	2.86	-1.21	4.11	1.36	5.38	-2.59	-12.24
IV	5219608	996926	5.23570	6.71764	5.99866	0.71897	0.01192	0.02359	-0.01167	197.93	-97.93	2.78	5.58	-2.65	1.32	5.24	0.60	2.68
I	5476310	1089282	5.02745	6.73849	6.03714	0.70135	0.02085	0.03848	-0.01763	184.54	-84.54	4.92	9.26	-3.98	1.30	5.03	1.11	2.78
2010-11																		
II	5687638	1152565	4.93477	6.75493	6.06167	0.69327	0.01644	0.02452	-0.00808	149.14	-49.14	3.86	5.81	-1.84	1.28	4.93	0.83	3.34
III	5865393	1173696	4.99737	6.76830	6.06956	0.69874	0.01337	0.00789	0.00547	59.04	40.96	3.13	1.83	1.27	1.29	5.00	1.91	8.41
IV	6132103	1215796	5.04369	6.78761	6.08486	0.70275	0.01931	0.01531	0.00401	79.25	20.75	4.55	3.59	0.93	1.30	5.04	1.70	6.34
I	6374103	1301269	4.89837	6.80442	6.11437	0.69005	0.01681	0.02951	-0.01270	175.53	-75.53	3.95	7.03	-2.88	1.23	4.90	0.15	2.83
2011-12																		
II	6664222	1355729	4.91560	6.82375	6.13217	0.69158	0.01933	0.01781	0.00152	92.11	7.89	4.55	4.19	0.35	1.18	4.92	0.09	5.33
Total	165237052	36627898	473.44771	718.07845	646.86620	71.21224	2.13933	1.90725	0.23207	89.15	10.85	4.06	3.66	0.47				

Table 2 : Contribution of High Powered Money and Money Multiplier to Changes in Money Stock and Values of Money Multiplier (Quarterly Estimates)

Period	M_2	HPM	m	log M	log H	log m	Δ log M	Δ log H	Δ log m	Percentage Contribution of		Percentage Changes in			m_1	m_2	Δm_1	Δm_2
										H	m	M	H	m				
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1979-80	43792	15202	2.88067	4.64139	4.18190	0.45949												
1980-81	50966	17253	2.95399	4.70728	4.23687	0.47041	0.06589	0.05497	0.01092	83.43	16.57	16.38	13.49	2.55	1.21	2.95		
1981-82	59794	19658	3.04177	4.77665	4.29353	0.48313	0.06937	0.05666	0.01272	81.67	18.33	17.32	13.94	2.97	1.22	3.04	9.96	3.67
1982-83	68515	21772	3.14688	4.83578	4.33790	0.49788	0.05913	0.04438	0.01476	75.05	24.95	14.59	10.76	3.46	1.22	3.15	12.56	4.12
1983-84	80577	25129	3.20651	4.90621	4.40018	0.50603	0.07043	0.06228	0.00815	88.42	11.58	17.61	15.42	1.89	1.21	3.21	9.08	3.59
1984-85	95295	30352	3.13964	4.97907	4.48219	0.49688	0.07286	0.08201	-0.00915	112.56	-12.56	18.27	20.78	-2.09	1.19	3.14	6.90	2.82
1985-86	111096	34264	3.24236	5.04570	4.53484	0.51086	0.06663	0.05265	0.01398	79.02	20.98	16.58	12.89	3.27	1.19	3.24	10.44	4.04
1986-87	130653	40520	3.22438	5.11612	4.60767	0.50845	0.07042	0.07283	-0.00242	103.43	-3.43	17.60	18.26	-0.55	1.16	3.22	7.49	3.13
1987-88	153207	49795	3.07674	5.18528	4.69719	0.48809	0.06916	0.08952	-0.02035	129.43	-29.43	17.26	22.89	-4.58	1.08	3.08	5.80	2.43
1988-89	179688	58321	3.08101	5.25452	4.76582	0.48869	0.06924	0.06864	0.00060	99.13	0.87	17.28	17.12	0.14	1.06	3.08	7.25	3.11
1989-90	213856	69414	3.08090	5.33012	4.84144	0.48868	0.07560	0.07562	-0.00002	100.02	-0.02	19.02	19.02	0.00	1.07	3.08	6.69	3.08
1990-91	249493	80243	3.10923	5.39706	4.90440	0.49265	0.06694	0.06296	0.00398	94.06	5.94	16.66	15.60	0.92	1.09	3.11	8.05	3.29
1991-92	292403	94090	3.10769	5.46598	4.97354	0.49244	0.06892	0.06914	-0.00022	100.31	-0.31	17.20	17.26	-0.05	1.10	3.11	7.51	3.10
1992-93	344238	107740	3.19508	5.53686	5.03238	0.50448	0.07088	0.05883	0.01204	83.01	16.99	17.73	14.51	2.81	1.11	3.19	8.80	3.80
1993-94	399049	125182	3.18775	5.60103	5.09754	0.50348	0.06417	0.06516	-0.00100	101.55	-1.55	15.92	16.19	-0.23	1.09	3.19	7.82	3.14
1994-95	478196	153165	3.12209	5.67961	5.18516	0.49445	0.07858	0.08762	-0.00904	111.50	-11.50	19.83	22.35	-2.06	1.10	3.12	6.05	2.83
1995-96	552953	178246	3.10220	5.74269	5.25102	0.49167	0.06308	0.06586	-0.00278	104.40	-4.40	15.63	16.37	-0.64	1.11	3.10	7.91	2.98
1996-97	642631	189524	3.39076	5.80796	5.27766	0.53030	0.06527	0.02665	0.03863	40.82	59.18	16.22	6.33	9.30	1.17	3.39	19.66	7.95
1997-98	752028	208994	3.59833	5.87623	5.32013	0.55610	0.06827	0.04247	0.02580	62.21	37.79	17.02	10.27	6.12	1.19	3.60	12.76	5.62
1998-99	900893	234625	3.83972	5.95467	5.37037	0.58430	0.07844	0.05024	0.02820	64.05	35.95	19.80	12.26	6.71	1.19	3.84	10.91	5.81
1999-00	1055677	262307	4.02459	6.02353	5.41881	0.60472	0.06886	0.04844	0.02042	70.34	29.66	17.18	11.80	4.81	1.22	4.02	11.59	5.59
2000-01	1217341	282594	4.30775	6.08541	5.45116	0.63425	0.06188	0.03235	0.02953	52.28	47.72	15.31	7.73	7.04	1.26	4.31	1.75	7.97
2001-02	1418478	314148	4.51532	6.15182	5.49713	0.65469	0.06641	0.04597	0.02044	69.22	30.78	16.52	11.17	4.82	1.27	4.52	1.30	6.37
2002-03	1650854	343041	4.81241	6.21771	5.53535	0.68236	0.06589	0.03821	0.02767	58.00	42.00	16.38	9.20	6.58	1.30	4.81	1.66	8.04
2003-04	1865064	391076	4.76906	6.27069	5.59226	0.67843	0.05299	0.05692	-0.00393	107.42	-7.42	12.98	14.00	-0.90	1.22	4.77	0.66	4.46
2004-05	2134629	444885	4.79817	6.32932	5.64825	0.68108	0.05863	0.05599	0.00264	95.49	4.51	14.45	13.76	0.61	1.36	4.80	2.36	5.01
2005-06	2458949	515972	4.76566	6.39075	5.71263	0.67812	0.06143	0.06438	-0.00295	104.81	-4.81	15.19	15.98	-0.68	1.39	4.77	1.58	4.56
2006-07	2950300	617400	4.77859	6.46987	5.79057	0.67930	0.07912	0.07794	0.00118	98.51	1.49	19.98	19.66	0.27	1.35	4.78	1.16	4.84
2007-08	3603479	786995	4.57878	6.55672	5.89597	0.66075	0.08686	0.10541	-0.01855	121.36	-21.36	22.14	27.47	-4.18	1.26	4.58	0.94	3.85
2008-09	4340196	913964	4.74876	6.63751	5.96093	0.67658	0.08079	0.06496	0.01583	80.41	19.59	20.44	16.13	3.71	1.25	4.75	1.15	5.80
2009-10	5177904	996545	5.19586	6.71415	5.99850	0.71566	0.07664	0.03757	0.03908	49.02	50.98	19.30	9.04	9.42	1.32	5.20	2.19	10.14
2010-11	6014809	1210832	4.96750	6.77922	6.08308	0.69614	0.06507	0.08459	-0.01952	130.00	-30.00	16.16	21.50	-4.39	1.27	4.97	1.03	3.91
Total	39687000	8833244	119.99015	182.46693	164.37639	18.09054	2.13783	1.90118	0.23664	88.93	11.07	17.22	15.26	1.84