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Abstract

A major part of this paper is literature review. The paper compiles in a nutshell all studies on definitions and measures of Money supply in India in a chronological yet logically consistent manner In doing so, alternative measures of money supply have been compared in this paper and it is found that the measure used by RBI is statistically more significant than the other advocated by a number of authors.

I. Introduction

Need for precise definition and measure of money supply arises from delivery of monetary services in an economy by various financial assets like currency, demand deposits, saving deposits, time deposits and the like. Hence it necessary to combine the potential flows of monetary services by each of these into one or more aggregates in order to define money. The definitions of money supply forwarded by the Reserve Bank of India (RBI) from time to time are available in the propositions of First Working Group (1961), the Second Working Group (1977) and Third Working Group (1998). Opinions on these propositions and other developments like attempts to explore the possibility of replacing simple sum measure of money supply by a weighted sum appeared in studies from 1978 onwards till today. The paper compiles in a nutshell all above contentions in a chronological yet logically consistent manner such as to be peals in a single string of thought with a small analysis in the end with latest macroeconomic data.

II. The First Working Group 1961 (FWG)

The First Working Group 1961 (FWG) of RBI for the first time threw light on the concept of money supply in India. The FWG emphasised the role of money as a liquid asset as well as medium of exchange. The FWG defined money supply as consisting of (a) currency notes and coins with the public excluding the balances of central and state governments held at treasuries and cash on hand of scheduled and reporting non-scheduled banks and state co-operative banks, (b) the demand deposits (excluding inter-bank demand deposits) of scheduled and non-reporting non-scheduled banks and state cooperative banks, and (c) the other deposits held with RBI excluding the balance of International Monetary Fund. For scheduled and co-operative banks demand deposits include inter-bank deposits and some other demand liabilities. Public means all holders of money other than government and the banking system.

In defining money supply the FWG used statistical data during a period from 1951-52 to 1961-62 and developed the following concepts - (a) Net bank credit to government sector is the sum of the difference between aggregate variations in the financial assets of RBI including Rupee coins and variations in government deposits with the RBI, bank credit to the government sector and the difference between variations in government currency liabilities and variations in treasury balances; b. Net bank credit to the private sector is the sum of RBI credit to private sector and the difference between variations in financial assets of banks and variations in non-monetary liabilities of banks; and (c) Variations in NFEA (net foreign exchange assets) of the banking sector are those of both of RBI and banks. Variations in NFEA of the RBI are the differences between variations in the foreign exchange (forex hereafter) assets of the RBI and variations in the non-monetary forex liabilities of the RBI. Variations in the NFEA of the banks are the differences between variations in the forex assets of the banks and variations in the forex liabilities of the banks.

As per the FWG money supply comprises government's liability to the public and the monetary liabilities of the banking sector to the public. Variations in the monetary liabilities of the banking sector are reflected in corresponding variations in its financial assets and net-nonmonetary liabilities. Deposits with banks comprised demand liabilities of banks excluding interbank demand deposits, deposits of state governments and other deposits with RBI.

III. The Second Working Group 1977 (SWG)
The SWG mentioned three approaches born out of Radcliffe Committee's almost immeasurable concept of whole structure of liquidity, Gurley-Shaw doctrine on the role of non-monetary financial intermediaries in the main economic process and Friedman-Meiselman doctrine of dual criteria. (i) As per Radcliffe committee's approach the velocity of money is a meaningless number in presence of other financial assets substitutable for money. The spending decisions by households and corporate bodies are not determined by money, i.e. the quantity of means of payment, but by the whole structure of liquidity in the economy. (ii) Gurley-Shaw thesis emphasises on the liabilities of non-monetary financial intermediaries in order to highlight the competition between money created by monetary system and liabilities of other intermediaries. (iii) Friedman and Mieselman have argued that money should be defined as that set of financial assets, which best explains nominal income. The assets defined as money should satisfy the two criteria: (a) Sum of assets should have

the highest correlation among different aggregates of assets with national income, (b) Correlation with income with the sum of assets should be higher than any set of its components. Time deposits in addition to currency and demand deposits satisfy above criteria. So Friedman and Mieselman argue that money should include time deposits. The above recommendation of FWG for compilation of a broader measure of money supply referred to as aggregate monetary resources was first implemented in 1964-65. The SWG renamed this measure 'M$_3$'. The SWG introduced two other sources of money stock called M$_2$ and M$_4$.

The four measures of money supply for annual compilation developed in India by the SWG (1977) are as follows:

M$_1$ = currency with public + demand deposits with the banking system + other deposits with RBI

M$_2$ = M$_1$ + saving deposits with post office savings banks

M$_3$ = M$_1$ + time deposits with the banking system

M$_4$ = M$_1$ + all deposits with post office savings banks excluding National Saving Certificates

IV. Subrahmanyam (1977)

Subrahmanyam (1977) maintained that in early stages of development as people realise the time value of money, their preferences shift from barren currency holding with themselves to time deposit holding with commercial banks. Hence he tried to calculate in line with after Chetty (1969) the substitutability between money and time deposits using constant elasticity of substitution (CES) utility function involving these variables and with help of Indian data during 1948-68. Based on his findings he suggested a measure of current period quantity of money as a linear function of cash values of time deposits in the next period with cash holdings in the current period as constant. He himself criticised this study on the ground that asset holders' preferences change with time and with advent of new assets. However his measure of money stock is justified in the then context because once time deposits mature the sum is transferred to the concerned individuals' savings accounts who can draw it with cheques. These drawings in aggregate give an upward pressure on the quantity of reserve money.

V. Shrivastava (1978)

With reference to the SWG's basic assumption of keeping Term Financing Institutions (TFI) i.e. IDBI, IFCI, ICICI, IRCI etc which are different from non-monetary institutions like UTI, LIC etc,

outside the purview of monetary orbit, Shrivastava (1978) argued that the transactions of TFIs can not be altogether put side because (i) credit flows from banks and TFIs affect real economic variables, (ii) created money is the basis of term loan extension by TFIs as per the Report of the Study Group on Term Loan Participation Arrangements 1971, (iii) term credit creates demand for working capital loan from banks in a time lag, (iv) RBI's loans to IDBI etc is a component of RBI's claim on commercial sector, which is a source of change in reserve money, (v) basis of creation of demand deposits by banks are unborrowed reserves and reserves borrowed from TFIs, (vi) TFIs hold statutory power to enforce financial discipline in the monetary system, (vii) changes in TFI liabilities with respect to government sector, RBI and banking system and rest of the world are accounted for in money supply measure. Based on above points he suggested that SWG measure of total bank credit to commercial sector should also include apex TFI credit and other TFIs' credit in addition to existing RBI credit and other banks' credit to commercial sector.

VI. Kamaiah et al (1983)

Kamaiah et al (1983) criticised the money demand approach where aggregates are constructed from several assets on the assumption that these assets are either perfect substitutes or no substitutes at all. They criticised such assumption on the ground that it is not realistic and should be relaxed by treating each aggregate as a weighted average of all the liquid assets under consideration. They observed that there did not happen any attempt to calculate those weights in the then existing literature. Hence they tried to fill up this gap with help of canonical correlation technique. This is a multivariate method introduced by Harold Hotelling, which assesses the associations between two sets of variables within a data set. They found that currency with public, demand and time deposits with banks and post office savings deposits were not perfect substitutes and further, in the early periods of the sample 1951-71 currency and in the latter period 1958-78 demand deposits received importance in the composition of money holdings. They concluded that components of monetary aggregates cannot be same all the time, which is surely a critique to current RBI practice.

VII. The Third Working Group 1998 (TWG)

The TWG proposed that money as a statistical construct reflects assets with monetary characteristics or specific liquid liabilities of a particular set of financial intermediaries and may not entail interest payments because money holders derive certain benefits, the opportunity cost of which is the

interest. Narrow money perfectly satisfies transactions demand for money. The constituents of narrow money are limited to the central bank and the central government and depository corporations such as commercial and co-operative banks. The banking sector issues money. Banking sector in India comprises RBI, the State Bank of India and its subsidiaries, nationalised banks, regional rural banks, all other banks in private sectors including foreign banks, and Co-operative banks and any financial institution notified by government of India[1]. The TWG defined financial institutions to include banking sector, development financial institutions (DFIs), insurance corporations, mutual funds and non-banking financial companies accepting deposits from public. Primary dealers in financial corporations are treated as non-banks. Households, non-financial commercial sector and non-depository financial corporations hold money. Financial corporations include central bank, other depository corporations, insurance corporations and pension funds, other financial intermediaries and financial auxiliaries.

TWG felt the need for a broader liquidity measure taking explicit cognisance of the importance of nondepository corporations regarding intermediating liabilities from non-bank, non-government sector. As per TWG, the treatment of postal deposits as a part of monetary aggregates may not harmonize with the notion of Depository Corporation like a bank, because postal department is a part of general government though as part of financial innovations financial assets issued by financial institutions are closely similar to bank deposits. So while constructing monetary aggregates the essential guideline should be that only the central bank and depository corporations in the sense of being capable of creating money should be considered. The TWG maintained that compilation of monetary aggregates should be uncomplicated, comprehensive and operationally feasible in terms of frequency of availability of information. Accordingly the group proposed compilation of following four measures of monetary aggregates:

Weekly compilation

M_0 = currency in circulation + bankers' deposits with RBI + other deposits with RBI.

M_0 is essentially the monetary base, i.e. reserve money. It is mainly compiled from RBI's balance sheet.

Fortnightly compilation

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[1] The banking system in India, commonly known as commercial banks includes items ii-v as per Banking Regulation Act, 1949.

M_1 = currency with public + demand deposits with the banking system + other deposits with RBI = currency with public + current deposits with the banking system + demand liability portion of saving deposits with the banking system + other deposits with RBI.

M_1 reflects the banking sector's non-interest bearing monetary liabilities.

M_2 = M_1 + time liability portion of savings deposits with the banking system + certificates of deposit issued by banks + term deposits (excluding non resident foreign currency deposits) with a contractual maturity up to and including one year with the banking system = currency with public + current deposits with the banking system + saving deposit with the banking system + certificates of deposit issued by banks + term deposits (excluding non resident foreign currency deposits) with a contractual maturity up to and including one year with the banking system + other deposit with RBI

M_3 = M_2 + term deposits (excluding non resident foreign currency deposits) with a contractual maturity up to and including one year with the banking system + call borrowings from 'Non-Depository' financial corporations by the banking system[2].

In addition, the TWG proposed two liquidity measures as substitutes of broad money and inclusive of a range of instruments that may be empirically related to overall economic activities:

Monthly compilation

L_1 = M_3 + all deposits with post office savings bank except NSC

L_2 = L_1 + term deposits with Term Lending Institutions and Refinancing Institutions (FIs) + term borrowing by FIs and Certificates of Deposits issued by FIs

Quarterly compilation

L_3 = L_2 + public deposits of non banking financial companies

TWG also noted that research in Monetary Economics has given rise to a number of alternative monetary aggregates like superlative monetary indices, weighted monetary indices, currency equivalent monetary aggregates or divisia indices (DI). The respective weights of components in weighted monetary indices are derived from the interest returns on the components. Currency and non-interest bearing demand deposits have largest weight in the aggregates because they attract no interest. TWG criticised the DI because the weights depend on the choice of benchmark instrument and the indices assume a normal relationship between short term and long term interest rates which may not hold in practice. The TWG observed that except the United Kingdom no other country

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[2] Vasudevan (1980) discussed on the difference between the old series and new series of money stock

publishes the DI figures. As per the TWG in comparison between broader monetary aggregates and liquidity aggregates, the latter seem to perform better.

VIII. Bhole (1987)

On the basis of the literature on definition and concept of money supply given above, Bhole (1987) distinguished between three approaches used for defining and measuring money supply: (a) Monetarist Empirical Approach (MEA) – As per this approach money is best measured as the sum of liquid financial assets which produces adequate demand for money; (b) Substitution Approach (SA) – Under this approach the degree of substitutability between the traditionally defined monetary assets and other assets is ascertained by finding out cross elasticity of substitution, i.e. the percentage change in narrow money per percentage change in each competing asset and (c) Operational Approach – This approach emphasizes on availability of data, frequency of availability of data etc. Bhole derived the following major conceptual differentia of money: general acceptability, perfect means of payment, perfect liquidity and maturity, net store of wealth or value, absence of rate of return and absence of being a part of intended long term savings-investment portfolio. Following general consensus he excluded following ten assets from money supply - National Savings Certificates, Other certificates with post offices, Treasury Bills, Commercial Bills, Government Bonds, Industrial Bonds, FD with non-bank companies, Trade Credit, Unutilised credit limits, Industrial Shares. At the same time he prescribed separate measures of near money assets on the basis of their liquidity, maturity, marketability, risk etc for those financial assets, which he excludes from money supply, because according to him the analysis of economic activity would be meaningless unless the role of the whole complex of other financial assets is considered and here he was in tune with the SWG. Empirically with help of multivariate regression analysis he explained that it was not wise for RBI to depend on narrow money multiplier, which they were doing in practice, for controlling money supply variations in India, because the regulation of government market borrowing, deficit financing, foreign exchange assets etc were important determinants of money supply.

IX. Jadhava (1988 and 1994)

Jadhava (1988) has endorsed Bhole's proposition that conceptualisation of the definition of money should precede the measure of money. Jadhava (1994) did not agree with the FWG's definition of

money supply. He maintained that such definitions were unscientific because of absence of distinction between concept of money and measure of money. As per Jadhava, In the contemporary literature on concept of money supply there is a long-standing debate between two polar approaches for defining money: (i) *a priori* or theoretical approach and (ii) empirical approach. In the theoretical approach money is conceptualised first in terms of particular functional and institutional attributes and then the corresponding measure of money is constructed by aggregating relevant financial assets possessing particular attributes[3]. On the other hand the empirical approach does not rely on any preconceived notion of money. Between the two approaches theoretical approach has a greater analytical and scientific appeal. On the other hand the empirical approach defies this scientific sequence. Empirical approach confuses empirical verification with hypothesisation and therefore forecloses the possibility of generating a testable hypothesis capable of empirical verification as a theory. Empirical approach is the antithesis of scientific procedure because monetary hypotheses, when embedded in definition of money by construction, preclude any empirical invalidation. For example, if money is defined as an aggregate of financial assets, which renders the maximum stability to money demand function, it is futile to test whether money demand function is stable or not. Such a definition of money implies taking stability of money demand for granted.

Bhole blamed RBI for publishing data on multitude of money stock measures ranging from M_1 to M_4. In reply to this, Jadhava answered that empirical substitution approach aims not at deciding which assets could be regarded as money but to determine how much of each asset could be treated as money based on relevant elasticities of substitution. He examined each financial asset so as to include or exclude in totality from money. He criticised Bhole for ignoring the study of Chetty (1969)[4]. He narrated the origin of the concept of weighted monetary aggregates. Chetty (1969) for the first time forcefully argued that each monetary asset has certain degree of moneyness associated with it. The fundamental issue in monetary aggregation is not which assets are to be included in the measure of money stock, but, how much of each monetary asset is to be included. A logical approach to monetary aggregation is therefore to construct monetary aggregates covering all assets weighted by their degree of moneyness. Jadhava detected the shortcomings of the conventional measure.

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[3] There is also a question of the modalities of aggregation, i.e. simple sum of aggregates versus weighted monetary aggregates.

[4] Chetty (1969), using U.S. time series data for 1945-1966 estimated various elasticities of substitution, and aggregation of the liquid assets and constructed the interest rate index taking the assets two at a time.

Thereafter he examined the alternative approaches to weighted monetary aggregates and criticized them in the context of Indian economy. There are three alternative approaches - (a). Substitution Approach, (b). User Cost Approach, (c). Policy Oriented Statistical Approach. (a). The basic premise of the substitution approach pioneered by Chetty is that the degree of moneyness associated with any financial asset depends on the elasticity of substitution between that asset and a reference asset that is designated to be the most liquid asset. (b). In the user cost approach pioneered by Bernett, Offenbacher and Spindt, conceptually all monetary assets are treated as durable goods and therefore, their prices are represented by their corresponding user costs. This approach is useful for a world where interest rates on monetary assets are unregulated. It aims to measure money directly without prior conceptualization. (c). In the policy oriented statistical approach pioneered by Roper-Turnovsky, money stock is best measured as that of aggregate financial assets, which when introduced in quantitative relationships among money, output and prices, gives the best results in terms of certain preconceived and predetermined idea. Jadhava made a critical survey of studies in Indian context on weighted monetary aggregates and noted that the inability of weighted aggregates vis-à-vis simple sum aggregates reflects deficiencies of operationalisation rather than conceptualisation. Jadhava (1994) concluded that economic theory had not provided a clear cut, complete and unequivocal answer to the question of what are definition and measure of money supply and probably could not. Accordingly several measures of money are possible, each successively dropping one notch lower on the liquidity scale in drawing the line between money and other assets.

X. Rath et al (1999)

Rath et al (1999) criticised FWG's (1961) sectorisation where FWG did not distinguish between the domestic economy and the rest of the world sector in money supply accounts. They also criticised SWG's (1977) treatment of all capital inflows as part of money supply through inclusion of non-resident rupee balances under the non-resident (external) rupee accounts, instituted in March 1970 and the non-resident foreign currency balances under the erstwhile foreign currency non-resident accounts instituted in November 1975, even if funds mobilised are parked abroad as is often the case with FCNRB deposits.

Rath et al (1999) took note of TWG's proposal for compilation of monetary aggregates on residency basis by not directly reckoning capital flows in the form of non-resident repatriable foreign currency fixed liabilities with the banking system in India such as the balances under the Foreign Currency Non-Resident Repatriable (Banks) FCNRB Scheme. Rath et al (1999) mentioned a number of central banks like the Bank of England, which compiles money supply on residency basis but excludes bank accounts from channel Islands and the Isle of Man, compile money supply on residency basis.

XI. Jha et al. (1999)

As per Jha et al. (1999) there exists widespread criticism against adopting simple sum methods in monetary aggregation. The most important reason for this is that the simple sum procedure treats all the included monetary assets as alike in their 'moneyness' and implicitly assumes that all the component assets are perfect substitutes. Most economists have placed little faith in broad monetary aggregates, since summation aggregation has long seemed inappropriate at high levels of aggregations over imperfect substitutes. They computed the alternative money stock measures and used them in economic modelling instead of the simple sum measure.

XII. Conclusion

From above studies one can make following general observations:

- Indian economists use the terms 'money', 'money supply' and 'money stock' synonymously. Above literature on definition of money supply reflects intellectual discourses and dialogues among economists, which need concrete shapes in form of measures of money supply, because concrete measures of money supply are more useful than abstract concepts for the purposes of modelling and forecasting. RBI is following the simple sum procedure of measuring money supply in its compilation of monetary aggregates. RBI now publishes data on M_1, M_2, M_3 and M_4 and not on the Divisia index.

- For forecasting purpose one has to work with whatever information is available. The evolution of the components of the monetary aggregates from time to time reflects that regression technique will not be able to serve the purpose of long run forecasting, because explanatory variables are changing over time. In this context the ARIMA model having the quality of temporal stability can be more useful. A careful perusal of the literature on money supply would reveal that the

number of factors affecting money supply is increasing side by side with progress of research in the field. So there may be other factors also, which are so far not discovered or yet to be discovered like simply seasonal cycles in the demand for credit on part of the business community. Existing basic and advanced literatures on time series econometrics like Enders (1995), Patterson (2000), Pindyck et al. (1998) and Gujarati (2003) suggest that if requisite data are not available for the variables affecting money supply or all the variables affecting money supply are not known it is difficult or impossible to explain the movement of money supply using a structural macroeconomic model. Estimation of such a model for money supply may result in so large a standard error that makes most estimated coefficients insignificant and the standard error of forecast unacceptably large. A statistically significant regression equation for money supply may not work out for forecasting purposes, because after running such regression one has to forecast the explanatory variables, which may prove more difficult than forecasting money supply.

- It is mention-worthy that Jha et al. (1999) borrowed DI from Barnett (1980) and Barnett (1982). DI is the weighed average of the stocks of different monetary assets at different points of time, the weights being the differences between the benchmark return and the respective individual asset returns. Acharya et al (1998) and Jha et al (1999) applied it in India. Author applied it to more recent data and found that that the DI has higher standard deviation than the simple sum TWG broad money. Author followed Jha et al (1999) here in computing the returns on currency with public, demand deposits and time deposits. Author found first difference of DI, levels of wholesale price index (WPI), industrial index of production (IIP) and TWG broad money are stationary as per ADF test for the monthly data from April 1996 to March 2003 as are available in RBI source. After March 2003, the data on money stock in RBI source are provisional as on 12 March 2009, the day of completing this analysis. Author regressed first difference of change in DI and change in TWG's broad money separately on first difference of WPI and IIP. The error terms are all found stationary. The results in terms of volatility R^2 and t statistic are not encouraging for replacement of simple sum measure by DI as are evident from equations (1), (2), (3) and (4) and Figures I and 2. Comparison between (1) and (3) shows that 't' values are smaller but R^2 value is higher in (1) than (3) though (2) performs better than (4). Further the weighted sum measure is more volatile than the simple sum measure. Thus can be understood why RBI has not accepted yet the alternative formula.

$\Delta IIP = 15.05 + 0.000286\ \Delta DI \qquad (1)$

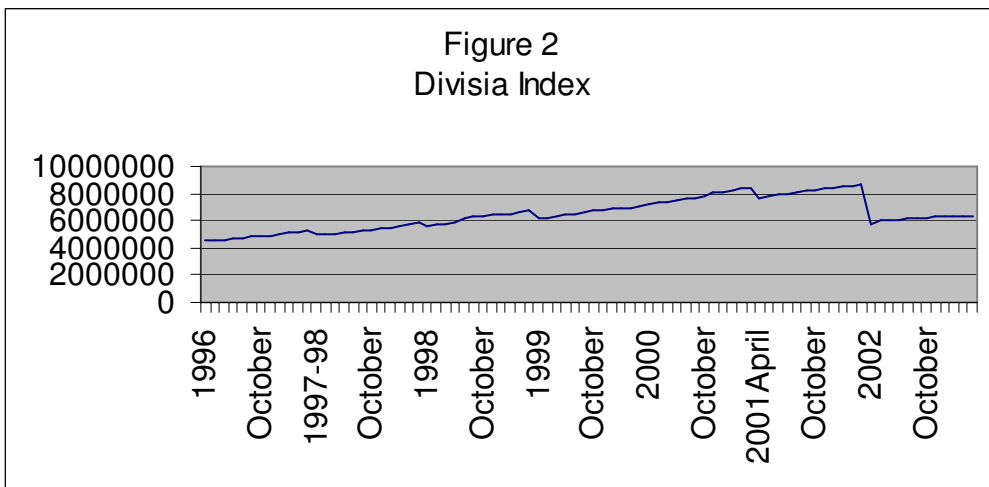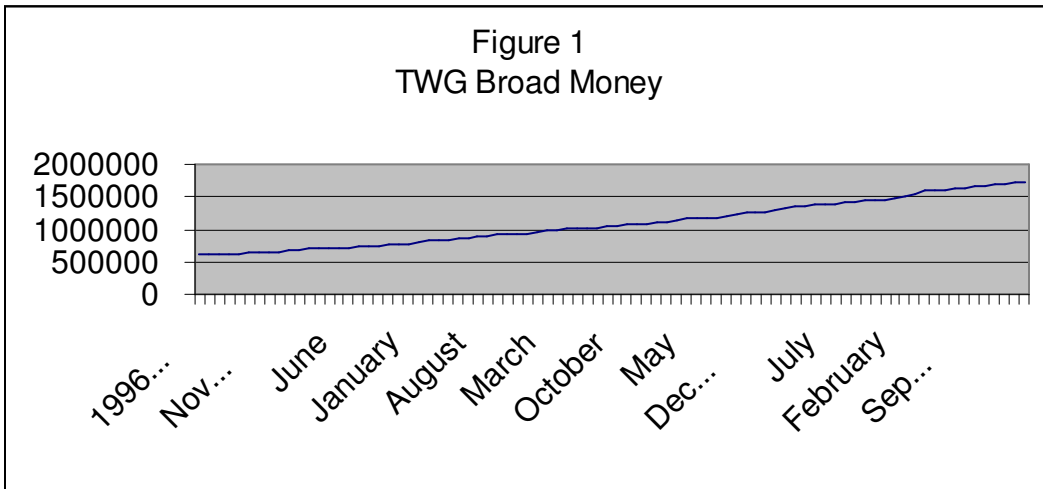$\qquad (0.81) \qquad (5.43) \qquad\qquad R^2 = 0.26$

$\Delta WPI = 0.58 - 1.4E\text{-}07 \Delta DI$

$\qquad (6.32)\quad (-0.52) \qquad\qquad R^2 = 0.0003 \quad (2)$

$\Delta IIP = 79.2 - 0.0004\ \Delta TWG'S\ BROAD\ MONEY\ (3)$

$\qquad (2.4)\quad (-2.26) \qquad\qquad R^2 = 0.06$

$\Delta WPI = 0.85 - 2.8E\text{-}08\ \Delta TWG'S\ BROAD\ MONEY\ (4)$

$\qquad (3.9)\quad (-0.0034) \qquad\qquad R^2 = 1.38E\text{-}07$

Figure 1
TWG Broad Money

Figure 2
Divisia Index

Finally one should not forget the Report of the Working Group on Electronic Money (2002) which used the European Central Bank's 1998 definition of electronic money and made recommendations regarding mode and nature of use of the same, e.g. the multi-purpose e-money may be permitted to be issued only against payment of full value of central bank money or against credit only by the banks. But economic researchers in India are not so far found to show any interest on this since publication of the above report to the best of author's knowledge.

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