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The State Bank of Pakistan

April 2005

Online at <https://mpa.ub.uni-muenchen.de/31430/>
MPRA Paper No. 31430, posted 13 Jun 2011 12:16 UTC

Monetary Aggregates in Pakistan: Theoretical and Empirical Underpinnings

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Abstract

The objective of this study is to analyze theoretical as well as empirical soundness of the current monetary aggregates (M_2) and to propose a broader monetary aggregate (M_3), by exploring the functional characteristics and empirical relevance of financial assets. We used annual time series data from FY76 to FY03 and employed both the functional and empirical (F-M dual criteria) approaches. The results indicate that current monetary aggregates seemed to have been defined more on functional considerations compared to the empirical evidence. The analysis of new set of financial assets suggests that, while the various savings schemes individually as well as in aggregate were able to meet F-M dual criteria, deposits of NBFIs failed to satisfy this criteria. However, the functional considerations suggest that these deposits should, nevertheless, be included in a broader definition of monetary aggregates (M_3).

The authors are thankful to Riaz Riazuddin, Moinuddin and Mohib Kamal Azmi for their comments and useful suggestions. Views expressed in this working paper are those of the authors and do not necessarily represent those of the State Bank of Pakistan. Comments and suggestions are welcome.

The importance of an appropriate monetary aggregate can hardly be over emphasized, particularly for those countries that anchor their monetary policy to monetary aggregates. Under the *monetary aggregates targeting* regime, as is the case in Pakistan, operating targets or monitoring ranges are set for the aggregates. Where the policy is not anchored to monetary aggregates, these are used to indicate the current economic position and future course of economic activities, as the data on monetary indicators is usually available much earlier compared to information on real variables like GDP, employment etc. However, the effective role of monetary aggregates both as policy action variables and leading information variables requires a stable empirical relationship between monetary aggregates vis-à-vis macroeconomic variables of interest like national income and price level.¹

The breakdown of stable relationship between monetary aggregates and macroeconomic variables due to structural change in financial markets and emergence of new financial instruments led to frequent changes in the definition of monetary aggregates in various countries especially in US, UK and EU member countries.² Moreover, the changes in definition of monetary aggregates also stemmed from the economists' perception about the concept of money.

In practice more than one monetary aggregate are usually defined in the hope that multiple aggregates may collectively provide more information for the conduct of monetary policy and developments in the economy. The sum of currency in circulation and highly liquid financial assets (like checkable deposits, travelers checks etc.) generally called M_1 is a narrowly defined monetary aggregate.³ The broader aggregates like M_2 , M_3 and of higher orders also include those financial assets that are relatively less liquid and may involve time delays besides entailing other costs before they are converted into transaction balances. In essence, the higher order monetary aggregates take into account both the medium of exchange and the store of value characteristics of the money.

In Pakistan, three different types of monetary aggregates are in use to measure the stock of money as well as for policy formulation. These include the narrow measures M_0 , M_1 and a broader aggregate M_2 . The M_2 is composed of currency in circulation, other deposits with SBP, demand deposits, time deposits and Resident Foreign Currency Deposits (RFCDs) of the scheduled banks. A review of financial assets indicates that a wide range of financial instruments such as liabilities of non-bank financial institutions, NSS instruments etc., having similar characteristics like time deposits are

¹ For detailed discussion on the importance of monetary aggregates, see [Anderson and Kavajecz \(1994\)](#), [Estrella and Mishkin \(1996\)](#).

² See for example [Lim and Sriram \(2003\)](#), [Anderson and Kavajecz \(1994\)](#), [Walter \(1989\)](#).

³ As this definition of monetary aggregate takes into account only the medium of exchange function of money.

potential candidates to be considered for inclusion in monetary aggregates.⁴ Moreover, financial landscape of the country has undergone significant changes over the past one and a half decade. A number of new financial instruments have emerged that calls for both to reconsider the composition of the existing aggregates and define higher order monetary aggregates.

Keeping in view the need of an appropriate monetary aggregate covering the financial assets having the characteristics of money and/or near money, this paper attempts not only to analyze the components of existing monetary aggregates, but also proposes a broader monetary aggregate (i.e. M_3) for Pakistan.⁵

The organization of this paper is as follow. The following section explains the methodologies employed to define monetary aggregates. Section 3 presents a review of literature and country experiences. In section 4, theoretical and empirical foundations of the existing broad monetary aggregate (M_2) are analyzed. Section 5 discusses the characteristics of a set of financial assets which are potential candidates for inclusion in (higher order) broad monetary aggregate (M_3). The section 6 looks into the empirical justification of these financial assets. The last section concludes the paper.

2. Methodology

Literature on the definition of monetary aggregates and redefinition (in case of a few countries) shows a considerable disagreement on the financial instruments to be included in different monetary aggregates (M_2 , M_3 and of higher orders). Nevertheless, the underlying approaches to classify various financial assets under different monetary aggregates have been more or less the same. The most widely used approaches to define monetary aggregates can be classified into two categories: (1) theoretical or functional approach and, (2) empirical approach.

Theoretical or Functional Approach

The theoretical or functional approach to define monetary aggregates is based on the basic functions of money i.e. its role as medium of exchange, store of value etc.⁶ According to this approach,

⁴ According to **Broaddus (1975)**, unless money was viewed more broadly as liquidity and the liabilities of non-bank intermediaries are considered a part of money stock, monetary policy would be rendered ineffective.

⁵ It may be noted that Ministry of Finance is already publishing a monetary aggregate M_3 in Economic Survey, which includes M_2 , outstanding deposits of National Savings Schemes and deposits of Federal Banks for Cooperatives. The definition of their M_3 is changing from year to year, as initially they were using Deposits of NBFIs, than moved to deposits of Federal Banks for Cooperatives (FBC) (during FY03), and now deposits of Punjab Public Cooperative Banks (PPCB). This definition suffers from a serious problem of double counting as M_2 definition of monetary aggregate includes the deposits of all scheduled banks (including FCB in past and PPCB at present).

⁶ **Broaddus (1975)** notes that the economists who favored this approach started to ask questions like what is money? What are its distinguishing characteristics? Exactly which financial assets possess these characteristics? These questions have resulted in controversies for many years, with economists proposing many different groupings of assets into something money, but no single definition has been universally accepted.

initially the sum of currency in circulation and transferable deposits (i.e. financial instruments of transactional nature) were classified as the money supply.

Later on, **Laidler (1969)** and **Friedman and Schwartz (1970)** argued that money supply should also include those financial assets, which can potentially affect the spending decisions of the economic agents. A possible list of financial instruments should include all those financial instruments that can also be used as *temporary abode of purchasing power*. **Laidler (1969)** argued that money should include all those financial assets, which are easy to store, cheap to realize and relatively less risky i.e. the future value of the asset can be predicted. In this background, there is a wide range of assets such as time deposits, saving deposits, liabilities of non-bank financial institutions, deposits at saving centers etc. that can act as reservoirs of purchasing power in anticipation of payments.⁷

IMF Guidelines on the Subject

Monetary and Financial Statistics Manual (MFSM) 2000 of the IMF also uses the functional approach to provide general guidelines for the construction of broad monetary aggregates, and leaves the choice of specific financial instruments to be included in broad money on the discretion of the national authorities. The manual emphasizes the degree of moneyness of financial instruments: focusing on the extent to which each type of financial instrument performs the liquidity⁸ and store of value functions. Specifically, the manual suggests four characteristics of financial instruments i.e. *transaction cost, divisibility, maturity and yield*, to classify a particular type of financial instrument in broad money and where they should be placed in money hierarchy. These characteristics are briefly discussed below.

- a) *Transaction cost* (cost of converting financial assets into medium of exchange): The manual suggests that the financial instruments should be classified under different monetary aggregates according to explicit (penalties) or implicit transaction cost (in terms of time delays). The financial instruments with higher transaction cost (a relatively less liquid) can be classified under broader monetary aggregates and vice versa.
- b) *Divisibility* (ability of financial instruments to make small transactions): The deposit size i.e. large and small denomination is particularly considered when several monetary aggregates are compiled (M_3 , M_4 , and higher order). The deposits of large denominations are usually covered in M_3 and that of small denomination in M_2 .⁹

⁷ The recent developments in the financial markets reflect that the transaction balances may well be held not only in banks and non-bank deposits but also in a range of money market instruments that has broadened the scope of transaction approach to defining money.

⁸ Liquidity is defined as the extent to which financial assets can be converted into cash at or close to full market value on short notice.

⁹ For example, in the case of US, deposits of less than US\$ 100,000 form the part of M_2 and the rest are part of M_3 .

- c) *Maturity*: The maturity consideration suggests that in the hierarchy of monetary aggregates, very short term components are to be included in lower order aggregates and vice versa.¹⁰
- d) *Yield*: The components added to higher order aggregates usually have higher yields than the interest earning component of the lower order aggregates.

Based on above characteristics of financial instruments, the IMF manual discusses a wide range of financial instruments that are potential candidates for inclusion in broad monetary aggregates. These include “currency in circulation, transferable deposits, term deposits, saving deposits, foreign currency denominated deposits, shares or deposits issued by savings and loans associations, building societies and credit unions, repurchase agreements, money market mutual fund shares, negotiable certificates of deposits, and short term and even medium term securities that are convertible into cash or transferable deposits with reasonably short delays and at close to full value traded before maturity”¹¹

The manual also suggests exclusion of the financial instruments such as “loans, shares and other equity, financial derivatives, and other accounts payable/receivable from the broad money”¹², either due to illiquid nature of these instruments or contracts between borrowers and lenders, time delays and transaction costs (in case of conversion to medium of exchange), potential variability of market prices (as it will not be converted equal or close to the face value of the instruments) etc.

Empirical Approach

Although the functional approach has been the natural theoretical starting point for defining monetary aggregates, it is criticized on account of its subjectivity. **Friedman and Schwartz (1970)** argued that the correct definition of money cannot be separated from the question of the practical uses to which such a definition would be put by policy makers or others as follows: “We conclude that the definition of money is to be sought for not on grounds of principle but on grounds of usefulness in organizing our knowledge of economic relationships. ‘Money’ is that to which we choose to assign a number by specified operation; it is not something in existence to be discovered like the American Continent; it is a tentative financial construct to be invented like length, or temperature or force in physics”.¹³

Moreover, **Broaddus (1975)** argued that it is difficult to precisely differentiate between the financial assets into monetary and non-monetary based on liquidity characteristics. The author further argued

¹⁰ This is particularly practiced in EU member countries, as ECB includes time deposits of up to two years maturity in M2.

¹¹ See Monetary and Financial Statistics Manual (MFSM) 2000, pp 59-63.

¹² Ibid.

¹³ As quoted by **Lim and Sriram (2003)**, p 5.

that functional approach failed to produce any definitive definition of monetary aggregate; it is not surprising that the economists have attempted to settle the issue empirically.

In literature, different techniques have been used to define monetary aggregates empirically. Among these, the most commonly used methodologies are: (1) Cross (interest) elasticity of substitution among financial assets; and (2) statistical correlation of monetary aggregate with nominal income.

According to the elasticity of substitution technique, monetary aggregates are defined as a set of financial assets which are sufficiently close substitutes of each other, i.e. have the highest cross elasticity of substitution (Chetty, 1969; Moroney and Wilbratte, 1976; and Saqib and Khan, 1988).

The correlation approach was proposed by Friedman and Meiselman in 1963. This approach was used to select a set of financial instruments to define monetary aggregate in a study for the Commission on Money and Credit. This approach, also known as *F-M dual criteria*, is a two-step correlation procedure: (1) the sum of financial assets should have the highest correlation with the income; and (2) the aggregate of the financial assets should have a higher correlation with income than any of the components taken separately. In other words, the group of financial instruments whose movements are found empirically to have a strong relationship with the key macroeconomic variables such as national income and prices constitutes the appropriate monetary aggregate. This approach was explained and used by Timberlake and Fortson (1967), Kaufman (1969), Laumas (1969), and Koot (1975) to define appropriate monetary aggregates.

In this study we employed F-M dual criteria for its sheer simplicity. The use of factor analytic approach, before applying F-M dual criteria like Koot (1975) to select financial assets within a set of financial assets, may lead to exclusion of some of financial assets that should be part of monetary aggregates on account of strong theoretical justification. As far as cross interest elasticity of substitution approach is concerned, most of the studies following this approach used constant elasticity of substitution (CES) type utility function to measure the degree of moneyness between two financial assets (e.g. between narrow money and time deposits).¹⁴ This approach may not be feasible in our case given the wide range of financial assets and non-availability of data on rate of returns on some of the financial instruments. Furthermore, interest rate on national savings schemes were totally administrated untill recent past.

3. Review of Literature and Country Experiences

¹⁴ See comments on “On an Empirical Definition of Money of Money for Pakistan” by Muhammad Hussain Malik attached with the Saqib and Khan (1988).

Review of empirical literature suggests that both cross interest elasticity of substitution among various financial assets and F-M dual criteria are widely employed to study appropriate monetary aggregates. **Friedman and Meiselman (1963)** proposed and applied the F-M dual criterion to the annual time series of U.S. monetary data from 1929 to 1952. They found that M2 definition of money was the most appropriate monetary aggregate at that time. The results, when applied to the quarterly data for the period 1946-58, also favored M_2 .

Timberlake and Fortson (1969) analyzed the role of time deposits in the definition of money using the F-M dual criteria and US annual time series data from 1897 to 1965. The results suggested that although moneyness in time deposits increased during the last 12 years of the analysis, predictability gain in terms of higher correlation due to the inclusion of time deposits was insignificant.

In 1969, **Laumas** studied the role of time deposits in the definition of money employing F-M dual criterion using annual and quarterly time series data from 1947 to 1966. The author suggested that a portion of time deposits should be added, instead of total time deposits to construct a monetary aggregate consistent with both theoretical and empirical underpinnings. The author further argued that the findings remained unchanged for both the quarterly and annual time series data.

In 1969, **Chetty** advocated that the monetary aggregates should be the weighted sum of currency, demand deposits and time deposits with the commercial banks, liabilities of savings and loan associations, and deposits in mutual savings banks. He employed constant elasticity of substitution (CES) functional form to measure the degree of moneyness between the financial instruments and these elasticities of substitution were used as weights.

Kaufman (1969) suggested by using F-M dual criteria that the definition of money changes depending on the relationship between financial assets and the income in the concurrent, preceding and later periods. The author used seasonally adjusted quarterly data from 1953 to 1966 and analyzed correlations from the four quarters before the accompanying income through two quarters after. The results indicated that the money comprising of demand and time deposits of the commercial banks was highly correlated with income two or more quarters later. Currency and demand deposits appeared best in explaining income concurrently and one quarter later.

Koot (1975) used a two-step procedure of factor analytic approach and F-M dual criteria to define the money. In first step, relationship among the financial assets was determined within a set of financial assets and then its dimension was reduced by using multivariate statistical technique of factor analysis. In the second stage, F-M dual criteria were applied to the factor analytic results. Procedure

applied on quarterly data from 1953 to 1972 indicated that while the time deposits and savings bonds in US did have some degree of moneyness, the most important determinants of an empirical definition of money were the currency and demand deposits.

Moroney and Wilbratte (1976) employed **Chetty (1969)** type portfolio model of demand to evaluate the degree of moneyness among the various financial instruments. The author used quarterly time series data from 1956 to 1970 of United States and favored a weighted liquidity aggregate as an appropriate monetary aggregate, where elasticities of substitutions are used as liquidity weights or degree of moneyness.

Saqib and Khan (1988) used **Chetty (1969)** type model to derive appropriate monetary aggregates for Pakistan. The authors estimated a constant elasticity of substitution (CES) utility function by using annual time series data from 1971 to 1985. The study found that the time deposits are not a close substitute of M_1 . As a result, the magnitude of derived monetary aggregate was lower as compared to M_2 but greater than the M_1 . The study was confined to estimate the elasticity of substitution between narrow money (M_1) and time deposits only.

*Country experiences*¹⁵

Although the country experiences suggest that both the functional and empirical approaches have been applied to define monetary aggregates in most of the countries, there is not a single definition of any monetary aggregate that is acceptable for all the countries (**Walter, 1989; Lim and Sriram, 2003**). A glance at **Table 1** reveals that the compositions of various monetary aggregates differ from one country to another. However, the differences are prominent in case of higher order monetary aggregates like M_2 , M_3 , M_4 etc. compared to slight variation in the components of narrow monetary aggregate (M_1), which is mostly composed of financial assets that can directly be used as medium of exchange.

Treatment of government deposits: This is one of the major differences observed from the country practices. Most of the selected countries (except India, Jordan and Mauritius) have excluded government deposits from their monetary aggregates. The United States and ECB member countries exclude deposits of central government from the definition of monetary aggregates but include the holdings by state and local governments, social security funds and public corporations. The U.K., however, excludes the whole public sector deposits, as it has been proved empirically that the movements in public sector deposits are not linked with the economic activity (**Thorp and Turnbull,**

¹⁵ Discussion in this section is based on **Lim and Sriram (2003)**.

Table 1: Components of Monetary Aggregates and Monetary Policy Target in Selected Industrial and Developing Countries

Country	M1	M2	M3 and higher order monetary aggregates	Monetary Policy Target
Industrial countries				
Australia	CC+ current deposits of the private non-bank sector	--	M3 = M1+term deposits+ certificates of deposits (CD)+ other deposits Broad Money = M3+borrowing from the private sector by NBFIs less their holdings of currency and bank deposits	Inflation targeting
Canada	CC+DD	M1+SD+nonpersonal deposits	M3 = M2+FCD+nonpersonal TDs	-do-
Japan	CC+DD	M1+SD+TD+FCD+nonresident yen with surveyed financial institutions	M3 = M2+PSD+CD+coperatives, trusts, etc.	M2+CDs
Euro Area	CC+ overnight deposits	M1+deposits with agreed maturity of up to (and including) two years +and deposits redeemable at notice of up to (and including) two years	M2+repurchase agreements, money market fund shares and units+ debt securities with a maturity of up to (and including) two years	Inflation targeting
U.S.	CC+DD a banks and non-banks thrifts+ other checkable deposits including (NOW), ATS accounts, credit union share drafts+ travelers' checks	M1+SD at banks and non-bank thrifts+ TD (small denomination) at banks and non-bank thrifts+ money market deposits+ retail money market mutual funds	M3 = M2+TD (large denomination) at banks and non-bank thrifts+ overnight/term repurchase agreements at banks and non-bank thrifts+ institution-only money market mutual funds+ overnight/ term Eurodollar balances at depository institutions	Interest rate
U.K.	--	M2 (retail M4) = Notes and coins, and retail deposits in M4	M4 = CC+ sterling liabilities of banks and building societies NBNBSPS	Inflation targeting
Developing Countries				
Brazil	CC+DD	M1+SD+Special remunerated finds+ securities issued by depository institutions	M3 = M2+RP+fixed yield funds M4 = M3+highly liquid government securities held by the public	-do-
Chile	CC+DD M1A = M1+DD(OCD)+SD	M2A = M1A+TD	M3 = M2A+time saving deposits including those for housing) M4 = M3+instruments of the central bank held by non-financial private sector M5 = M4+treasury promissory notes held non-financial private sector M6 = M5+credit bills held by non-financial private sector	-do-
India	CC+DD+OD with central bank	NM2= M1+TD (short term)	NM3 = NM2+TD (long term)+call/term funding from financial institutions	Short-term Interest Rate
Korea	CC+DD NM1 = DD+ instant access accounts at banks and non-bank financial institutions (including MMFs at ITMCs)	M1+SD+TD+FCD New M2 = M1+SD+RP+CD+cover bills+ money in trust+ beneficial certificates of investment trust companies and merchant banking corporation+ debentures+ other financial instruments (<2 years) at depository corporations	M3 = M2+RP+CD+OFI deposits+ debentures issued+ commercial bills sold+ cover bills MCT = M2+CD+money in trust (excl. CD & money in trust of development institutions	Inflation targeting
Malaysia	CC+DD	M1+SD+FD+FCD+NIDs+repos	M3 = M2+deposits placed with OBFis (excl. inter-placement of deposits between these institutions)	Overnight (policy) rate
Singapore	CC+DD	M1+SD+TD+OD+RP	M3 = M2+net deposits with NBFIs	Exchange rate targeting
South Africa	M1A = DD+ checks & transmission deposits of the domestic private sector M1 = M1A+DD (other than check & transmission deposits)	M1+SD+TD+PSD	M2+long term deposits held by the domestic private sector with monetary institutions (including national saving s certificates issued by Post bank)	Inflation targeting
Thailand	CC+ DD	M1+SD+TD M2A = M2+promissory notes	M3 = M2A+deposits taken by the six specialized financial institutions from the public	-do-
Pakistan	CC+DD	M1+TD+RFCD		

Source: Lim and Sriram (2003), Websites of the Central Banks

N refers to New; CD: certificate of deposits; DD: demand deposits; TD: time deposits; SD: saving deposits;

2000). Moreover, the public corporations' deposits are too small to relate to their expenditures because these corporations have access to central government funds.¹⁶

Maturity and divisibility considerations: In some countries, maturity of time deposits is the basic consideration for including financial assets in monetary aggregates. The ECB, for instance, includes time deposits of maturity of up to two years with redemption in current account at three months notice in M_2 and they include monetary financial institutions' (MFIs) debt securities of maturity of up to two years in M_3 . The maturity is a consideration even in some of the developing countries such as India, South Africa, and Zimbabwe, where short-term and long-term deposits are separately available. Contrary to this, U.K. does not differentiate on the basis of maturity, as the bulk of deposits is generally of short-term nature and the long-term deposits are redeemable without any penalty.¹⁷

In US, although maturity considerations are not taken into account, time deposits are classified into small and large denominations, and placed under M_2 and M_3 respectively. Similarly, they classify retail and institution related money market mutual funds into M_2 and M_3 respectively.

Treatment of foreign currency deposits: The residents' holding of foreign currency deposits is another point of divergence, mostly among developed countries. In Euro area, these deposits are the part of M_3 because of their close substitution with Euro-denominated financial assets. On the other hand, the US and UK excludes them from their monetary aggregates. UK excludes these deposits on account of the consideration that these assets are mainly held for expenditure abroad, while US excludes on the pretext of being very small compared to deposits in domestic currency.

Another related issue is the treatment of residents' domestic currency deposits in the banks of other countries. The US includes Eurodollar deposits in M_2 and M_3 as these deposits affect the domestic spending while UK and ECB excludes these deposits.

Other financial assets: Few countries treat Money Market Mutual Fund (MMMF) share/units differently. The decision to include or exclude the MMMF shares/units from monetary aggregates is generally based on their size. For UK, the size of MMMF is very small and they exclude them from their monetary aggregates, while size of MMMF is very large in US and ECB member countries, they include them in M_2 and M_3 .

¹⁶ Bank of England Quarterly Bulletin, March 1984, pp. 81

¹⁷ The only maturity criterion UK is observing is for the inclusion of MFI short-term paper and securities of maturity of up to 5 years in M_4 .

It is evident from the above discussion that it is hard to come up with a single definition of monetary aggregate acceptable to all the countries due to differences in their financial structures. The differences also arise because of differing importance of various financial assets in different countries. One specific instrument may be theoretically justified to be included in a certain monetary aggregate, however its inclusion or exclusion will heavily depend on country specific factors like its quantitative significance.

4. Present Compositions of Monetary Aggregates in Pakistan

In case of Pakistan, the existing definition of money supply seems to be based on functional approach and includes those financial assets which are highly liquid. Among other factors, quantitative significance of financial assets and the availability of data appear to be important consideration for inclusion as a component of current monetary aggregates.

The narrow definition of money supply (M_1) includes currency in circulation (CIC),¹⁸ other deposits with SBP and the demand deposits of the scheduled banks. The broad definition (M_2) consists of M_1 , time deposits and resident foreign currency deposits with the scheduled banks. This implies that M_2 takes into account not only those financial assets which can directly be used as a medium of exchange but close substitutes of liquid assets also.

Demand and time deposits of the scheduled banks for the definition of money supply, however, do not take into account the deposits of the government and the foreign constituents (non-residents). The governments' deposits are generally excluded due to non-responsiveness of these deposits to macroeconomic variables like changes in national income, interest rate, exchange rate etc (see IMF Manual 2000). Moreover, monetary and fiscal policy formulation also lends credence to the exclusion of these deposits, as the policy focuses in generally on the net government borrowing from the financial institutions. The non-resident deposits holding are excluded as these deposits are primarily used for international payments, instead of domestic transactions (see IMF Manual 2000).

Empirical Analysis of Current Monetary Aggregates

Empirical analysis of current monetary aggregates indicates that various components of M_1 and M_2 are unable to meet the **Friedman and Meiselman** (F-M) dual criteria. Simple correlation coefficients between changes in each component of the monetary aggregates and income (nominal GDP at current market prices) are reported in **Table 2**. Following **Kaufman (1969)**, correlation coefficients of these financial assets are also analyzed with the income of preceding and later periods. The results indicate

¹⁸ CIC is the amount of currency issued (notes and coins) less currency held by SBP and currency in tills of the scheduled banks.

that changes in currency are best correlated with changes in income in concurrent period. However, a break-up of estimation period into two sub-samples¹⁹ indicates that correlation pattern has witnessed considerable changes over the period of estimation: (1) during FY76-90, currency was correlated best when income preceded currency; and (2) correlation weakened during FY91-03 compared to the correlation coefficients observed during FY75-03 and FY76-90. Similar correlation pattern is also visible in the case of M_0 .

Contrary to the currency correlation patterns, both demand and time deposits are correlated best with the income of the previous period and no visible variation is evident in correlation pattern during the sub-samples. However, demand and time deposits are poorly correlated with income of concurrent periods during FY91-03 compared to FY76-90.

Resident Foreign Currency Deposits (RFCDs) emerged in 1990 and despite the fact that it remained an important financial asset during 1990s, it lacked correlation with income, which is surprising but might be attributable to freezing of foreign currency accounts in 1998 and sharp appreciation of Pak rupee against US dollar since FY01.²⁰

The correlation coefficient for all the three periods (preceding, concurrent and later) witnessed not only substantial changes, but the direction of correlation also changed

Table 2: Correlation Coefficients between the Changes in Financial Assets and Income in the Preceding, Concurrent and Later Periods

	Preceding	Concurrent	Later
A. FY76 to FY03			
CIC	0.459	0.824	0.545
DD	0.166	0.356	0.818
TD	0.651	0.573	0.775
RFCD	0.190	0.015	-0.467
M_0	0.453	0.878	0.526
M_1	0.297	0.563	0.881
$M_2=M_1+TD+RFCD$	0.598	0.658	0.636
B. FY76-90			
CIC	0.723	0.799	0.967
DD	0.679	0.676	0.850
TD	0.230	0.122	0.445
RFCD	n.a	n.a	n.a
M_0	0.599	0.580	0.868
M_1	0.762	0.794	0.948
$M_2=M_1+TD+RFCD$	0.679	0.655	0.913
C. FY91-03			
CIC	0.042	0.680	0.117
DD	-0.109	0.145	0.912
TD	0.267	-0.005	0.455
RFCD	0.154	-0.105	-0.880
M_0	0.018	0.782	0.065
M_1	-0.070	0.323	0.851
$M_2=M_1+TD+RFCD$	0.162	0.215	-0.016

The correlation between monetary aggregates (M_1 and M_2) and income indicates that the second step of F-M approach was violated as the inclusion of demand deposits in M_0 could not improve the correlation of M_1 with income. Similarly, when time deposits and RFCDs were added in M_1 , the correlation witnessed only a slight improvement for concurrent period. Further analysis suggests that

¹⁹ The break-up point of 1990 is selected on two grounds: (1) the business activities of NBFIs got impetus in early 1990s and a number of new NBFIs were established; and (2) following broad-based financial sector reforms initiated in 1989 when national savings schemes were restructured (old schemes were discontinued and new schemes were introduced).

²⁰ However, the correlation coefficient between the RFCDs and changes in income was 0.48 for the estimation period of 1991 to 1998.

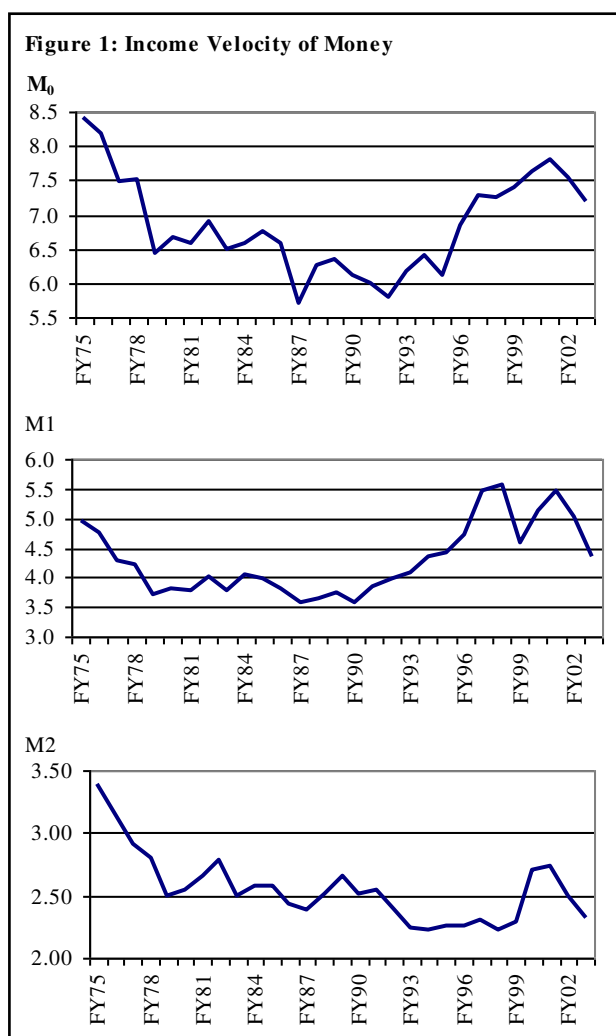
although there was a high degree of correlation between M_2 and income during FY76-90, it declined sharply during FY91-03. This decline seems largely attributable to the inclusion of RFCDs and weakened relationship of demand and time deposits of the scheduled banks with the income in concurrent periods. The later may be due to negative real returns on deposits for most of 1990s. In addition, a strong rise in funds mobilized through national savings schemes during 1990s shifted some of the funds away from banking sector.²¹

The above empirical analysis suggests, while the changes in various components of broad money (M_2) are correlated with the changes in income, none of the component can meet the F-M dual criteria. According to this criterion, the currency in circulation or M_0 turns out to be the best definition of monetary aggregate.

For further analysis, we also analyzed the behavior of income velocity of M_0 , M_1 and M_2 over the period of analysis. Looking at **Figure 1**, it is clearly evident that the velocity of money (with respect to all three monetary aggregates) witnessed substantial variation. The stability of income velocity around mean is also tested by using Chow breakpoint test. The results support the presence of structural breaks in all three series.

The above findings provide more backing to our earlier assertion that the existing definition

of money supply seems to be based on functional approach. Moreover, M_2 exclusively deals with the liquid financial assets of the public with the banking system only. These findings are hardly surprising, given the international experience of defining monetary aggregates on the basis of both the functional considerations and empirical evidence.



²¹ Profit rates on various NSS instruments remained significantly higher as compared to the profits rates on the time deposits of the banking sector (For details, please see Chapter 5 of SBP report titled “Pakistan: Financial Sector Assessment 2001-2002”).

5. Financial Assets Considered for Inclusion in Broad Monetary Aggregate²²

In practice, a certain set of financial assets held with the non-bank financial institutions (NBFIs) and Central Directorate of National Savings (CDNS) seems as liquid as the demand and time deposits of the scheduled banks. Therefore, these financial assets are the potential candidates to be treated as part of broader money supply. The exclusion of these assets from current monetary aggregates may be due to the fact that M₂ covers banking sector only. The other factors could be the quantitative insignificance of non-bank financial institutions and/or lags in availability of data. Another possible reason for classification of various financial assets having almost similar characteristics into different monetary aggregates may be institution specific (Banks, NBFIs, and CDNS), i.e. the deposits of the banking systems might have been considered as money.

In this backdrop, before suggesting the inclusion of these financial assets in broader monetary aggregates, it would be useful to review their characteristics and empirical justification, if any.

Instruments of National Savings Schemes

Central Directorate of National Savings (CDNS) is offering a number of financial instruments with varying characteristics. These instruments can broadly be classified into savings certificates, accounts and bearer instruments.

Table 3: Major Characteristics of Savings Certificates

Characteristic	DSCs	SSCs	RICs	KDCs
Maturity Period	10 Year	3 Year	5 Year	3-year
Minimum holding period	1 Month	1 Month	N/a	N/a
Early encashment facility	Yes	Yes	Yes	Yes
Early encashment penalty	N/a	N/a	4% to 1%	N/a
Profit Payments	Bullet Bond	Bi-annually	Monthly	Bi-annually
Zakat	Compulsory	Compulsory	Voluntary	Voluntary
Bearer / registered	Registered	Registered/bearer	Registered	Registered
Withholding Tax*	@10%	@10%	@10%	@10%

*: Tax treatment has witnessed considerable changes over the period of analysis. For example, DSC were exempted from withholding tax until recent past.

DSCs: Defense Savings Certificates, SSCs: Special Savings Certificates, RICs: Regular Income Certificates, KDCs: Khas Deposits certificates. However, KDCs were discontinued in 1990.

Savings Certificates: CDNS issues medium to long-term maturity certificates through its own centers and agents (banks and post office) network. The major characteristics of selected certificates are summarized in **Table 3**.²³ A closer look on these characteristics reveals that most of the certificates seem to be liquid, as early encashment facility is available (except for RICs) without any explicit cash

²² In this section, we considered a selected set of financial assets that account for the greater portion of non-bank financial institutions' liabilities (see above mentioned SBP report).

²³ List of certificates is not exhaustive, as few unimportant (in terms of volume) certificates are ignored.

penalties and time delays.²⁴ Moreover, although these certificates are not tradable, these can be used as collateral to borrow funds like deposits of the banking system.

Accounts: Although account facilities offered by the CDNS differ from those of banks in certain characteristics such as limits on the amount and number of withdrawals, deposits constituting these accounts seem relatively liquid as cash withdrawals facility is available without any cost and time delay (particularly for small deposits). Major characteristics of savings accounts are summarized in **Table 4**.

Table 4: Major Characteristics of National Savings Accounts

Characteristic	NDA	KDA	SSA	MAA	SA	POSD
Maturity Period	7 year	3 year	3 year	5 to 7 year	Not fixed	Not fixed
Minimum holding Period	N/a	1month	1month	N/a	N/a	N/a
Cash withdrawal	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed
Limit on cash withdrawals	N/a	Partial	N/a	N/a	N/a	N/a
Limit on number of withdrawals	N/a	N/a	N/a	N/a	Twice a week	Twice a week
Maximum Limit on the account	Yes	Partial	Partial	N/a	Nil	Partial
Cheque-able	No	No	No	Yes	Yes	Yes

Note: N/a means not applicable. Partial means there is no limit if account is opened at head office.

NDA: National Deposit Accounts, KDA: Khas Deposits Accounts, SSA: Special Savings Accounts

MAA: Mahana Amdani Accounts, SA: Savings Accounts, POSD: The Post Office Saving Banks Deposits. KDAs were discontinued in 1990.

Bearer Instrument: The most popular bearer instrument offered by the CDNS is the Prize Bond of various denominations. This instrument was actually designed to tap the financial savings of the informal sector. Due to high liquidity content built in this instrument, the anecdotal evidence suggests that these bonds are also acceptable as medium of exchange. In other words, this instrument appears to be a close substitute of the currency.

Deposits of NBFIs:

NBFIs are generally allowed to mobilize fixed deposits, but not less than 7 days maturity for any non-bank financial institution (7 days for DFIs and 30 days for other NBFCs). In particular, development finance institutions (DFIs) have launched a number of schemes to mobilize funds over the past three decades. The characteristics of these schemes were very much similar to the popular financial instruments of CDNS.²⁵ Monthly Income Certificates and Standard Certificates of Deposits launched by National Development Finance Corporation; Munafa certificates of Banker's Equity Limited; Musalsal Munafa Certificate of Regional Development Finance Corporations; and Family Income Certificates of PICIC are worth mentioning.²⁶

²⁴ Although in certain cases like DSCs there is no explicit penalty, implicit early encashment penalty is built in the profit rates of these certificates as the rates are lower for initial years.

²⁵ A detailed comparison of deposits schemes of the banks' and DFIs with financial instruments of CDNS is provided in a report by Khan (1999).

²⁶ Besides these schemes, various commercial and specialized banks mobilized fixed deposits by launching parallel schemes similar to those of the CDNS. Two of those schemes are Allied Mahana Amdani Scheme of Allied Commercial Bank and

As discussed above, the characteristics of both CDNS instruments and NBFIs' deposits suggest that some or all of these instruments can potentially perform the same functions as demand and/or time deposits of the commercial banks. Therefore, these financial instruments can be included at least in broader monetary aggregates. Particularly, instruments like prize bonds and savings accounts of the CDNS seem to be similar to the demand deposits of the banking system; these may qualify for inclusion in narrow money on functional approach. However, substantial time lag in availability of data related to deposits of NBFIs (other than DFIs) and instruments of CDNS is a major challenge for compiling a broader definition of monetary aggregates.

6. Empirical Standing of New Set of Financial Assets

Besides looking at above functional similarities among the financial instruments of various non-bank financial institutions, we applied F-M dual criteria to analyze the empirical justification for including these financial assets in broader definition of money supply. The simple correlation coefficients among the annual changes in selected financial instruments of the NBFIs and CDNS with the annual changes in income are reported in

Table 5.

The changes in most of the national savings schemes have high degree of correlation with

the changes in income during FY76-03. While the DSCs are correlated best with income in concurrent periods, MAAs and Prize bonds witnessed high degree of correlation with the income of the previous period. This correlation pattern changes when the estimation period was bifurcated into two sub-periods. DSCs were highly correlated with the income of the previous period during FY76-90 and with concurrent income for FY91-03.²⁷ Similar to these, changes in correlation pattern are evident for other instruments. In aggregate, annual changes in NSS are correlated best with the income of the previous years over the period of estimation. However, during FY76-90 the correlation was high with the income of concurrent period.

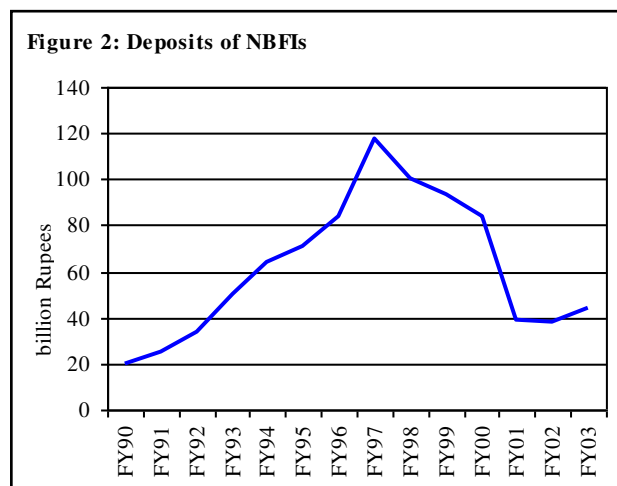
Table 5: Correlation Coefficients between the Changes in Financial Assets and Income in the Preceding ,Concurrent and Later Periods

	Preceding	Concurrent	Later
A. FY76 to FY03			
DSCs	0.589	0.837	0.831
MAAs	0.226	0.249	0.264
PBs	0.523	0.414	0.667
NSS	0.525	0.696	0.875
B. FY76-90			
DSCs	0.822	0.813	0.956
KDCs	0.416	0.644	0.315
NDCs	0.720	0.718	0.585
MAAs	0.849	0.892	0.889
PBs	0.237	0.245	0.379
NSS	0.769	0.867	0.808
C. FY91-03			
DSCs	0.509	0.637	0.613
SSCs	0.380	0.174	0.438
RICs	0.349	0.134	0.688
MAAs	-0.455	-0.547	-0.549
PBs	0.237	-0.017	0.375
NSS	0.147	0.415	0.774
NBFIs	-0.755	-0.143	-0.164

Mahana Munafa Certificate of Industrial Development Bank of Pakistan. These schemes were very much similar to Regular Income Certificates of the CDNS.

²⁷ NSS instruments differ for sub-samples, as some of the old NSS instruments were discontinued in 1990 and new instruments were introduced.

In sharp contrast to the NSS instruments, the correlation between the deposits of NBFIs and income turned out to be negative despite strong functional support. The negative correlation must not be taken on its face value; further investigation suggested that the correlation was 0.38 if we take the estimation period from FY90-00. In fact, negative correlation is the upshot of drastic restructuring of the DFIs and mergers/acquisitions of other NBFIs over the last three years. For example, merger of NDFC alone dampened the deposits of NBFIs by over Rs 25 billion (see **Figure 1**).²⁸



The above discussion suggests that the new set of financial assets fulfill the first condition of the F-M dual criteria. For second condition, correlation coefficients are analyzed by adding CDNS instruments to the present monetary aggregates (M2). The correlation coefficients reported in **Table 6** indicate that the inclusion of NSS instruments resulted in higher correlation of new monetary aggregate (M2+NSS) with income of concurrent and preceding periods. The same was also observed when the overall sample was bifurcated into two sub-samples. These results confirm the second condition of the F-M dual criteria for concurrent income, as the correlation of sum of M2 and NSS with income is higher than the correlations of both these components separately.

Although the inclusion of deposits of NBFIs could not improve the correlation due to reasons stated earlier, these deposit should be included due to strong functional support. In this background, a new set of monetary aggregates may be defined, which includes M₂, instruments of NSS and deposits of the NBFIs. This new monetary aggregate may be titled M₃ keeping the international norms in mind. The annual time series of the proposed broader monetary aggregate is attached in **appendix A**.

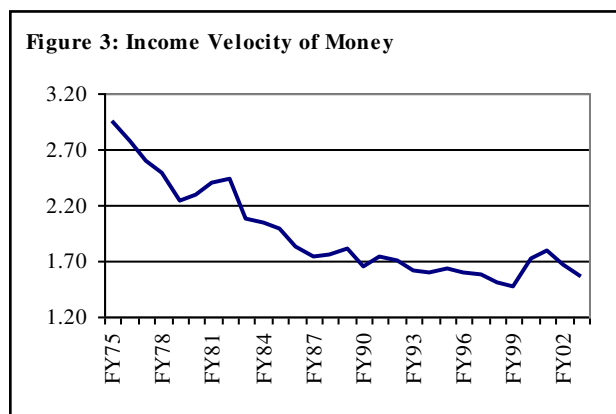
Table 6: Correlation Coefficients between the Changes in Financial Assets and Income in the Preceding, Concurrent and Later Period

	Preceding	Concurrent	Later
A. FY76 to FY03			
M2	0.598	0.658	0.636
M2+NSS	0.606	0.711	0.791
M2+NSS+NBFIs	0.545	0.692	0.787
B. FY76-90			
M2	0.679	0.655	0.913
M2+NSS	0.765	0.792	0.916
C. FY91-03			
M2	0.162	0.215	-0.016
M2+NSS	0.176	0.334	0.461
M2+NBFIs	-0.045	0.134	-0.090
M2+NSS+NBFIs	0.036	0.284	0.438

²⁸ The share of NDFC in total deposits of NBFIs was over 30 percent in 2000.

Besides F-M dual criteria, stability of income velocity of this new monetary aggregate was also analyzed. **Figure 3** indicates that income velocity of money has witnessed visible decline over the period of analysis.

Interestingly, the coefficient of variation for M_3 is high than that of M_2 over the period of analysis.



7. Conclusion

The objective of this study is two fold: (1) to analyze theoretical as well as empirical soundness of the current definition of monetary aggregate (M_2); and (2) to propose a broader definition of monetary aggregate, M_3 , by exploring the functional characteristics and empirical relevance of other financial assets, which are the potential candidates for inclusion. We used annual time series data on various financial assets from FY76 to FY03 and employed both the functional and empirical (F-M dual criteria) approaches.

The results indicate that current monetary aggregates seemed to have been defined more on functional considerations compared to the empirical evidence. The analysis of new set of financial assets suggests that, while the various savings schemes individually as well as in aggregate were able to meet F-M dual criteria, deposits of NBFIs failed to satisfy this criteria. However, almost absence and/or negative correlation between the deposits of NBFIs and the income seems to be the upshot of drastic restructuring and wide ranging mergers/acquisitions of these institutions. Nevertheless, the functional considerations suggest that these deposits should be included in a broader definition of monetary aggregates.

While above analysis takes into account the savings schemes of CDNS and deposits of the NBFIs, which account for the greater portion of non-banking system, a number of other financial instruments like Government Provident Funds, Overnight Repurchase Agreements, the Post Office Savings Bank Deposits, and Money Market Funds etc. can also be considered as potential candidates for inclusion in broader monetary aggregates.

Empirical evidence for the current and newly proposed aggregates highlights the need for a comprehensive research study on the subject not only to redefine the existing monetary aggregates (M_2) but to propose higher order monetary aggregates. For example, instead of adding overall time deposits of the scheduled banks in M_2 , relatively less liquid portion (long-term maturity) of these may

be included in M_3 . Similarly, it can be argued that highly liquid instruments of NSS may be included in current monetary aggregates (M_2). Another point mostly highlighted in literature is Simple-sum and Divisia monetary aggregates. In case of Pakistan, although [Tariq and Matthew \(1997\)](#) found little evidence of the superiority of Divisia monetary aggregates for the period of Q4-1974 to Q4-1992, this may be further explored by using more recent data. Similarly, stability of demand for money function must be also examined.

References

- Anderson, Richard G. and Kenneth A. Kavajecz (1994), "A Historical Perspective on the Federal Reserve's Monetary Aggregates: Definition, Construction and Targeting", in "Money Stock Measurement: History, Theory and Implications" *Review, Federal Reserve Bank of St. Louise*, Vol. 76, pp 1-31.
- Bank of England (1984), "Changes to Monetary Aggregates and the Analysis of Bank Lending" *Bank of England Quarterly Bulletin*, Vol. 24, pp78-83.
- Broadbuss, Alfred (1975), "Aggregating the Monetary Aggregates: Concepts and Issues", *Economic Review*, Federal Reserve Bank of Richmond (November/December) pp 3-12.
- Chetty, V. Karuppan (1969), "On Measuring the Nearness of Near-Money", *The American Economic Review*, Vol. 59 (3), pp 270-281.
- Estrella, Arturo and Mishkin, Frederic S. (1996), "Is There A Role for Monetary Aggregates in the Conduct of Monetary Policy?" *NBER Working Paper 5845*
- Friedman, M. and D. Meiselman (1963), "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United State, 1897-1958" in Commission on *Money and Credit, Stabilization Policies*, Englewood Cliffs 1963.
- Friedman, M. and A. Schwartz (1970), "Monetary Statistics of United States: Estimates, Sources, Methods", National Bureau of Economic Research, Ney York.
- IMF (2000), "Monetary and Financial Statistics Manual"
- Kaufman, G. G. (1969), "More on Empirical Definition of Money", *The American Economic Review*, Vol. 59 (1), pp 78-87.
- Khan, Mushtaq A. (1999), "NSS & Competing Instruments of Financial Saving: The Need for a Level Playing Field", Internal report prepared for the Asian Development Bank.
- Koot, Ronald S. (1975), "A Factor Analytic Approach to an Empirical Definition of Money", *The Journal of Finance*, Vol. 30 (4), pp 1081-1089.
- Laidler, David (1969), "The Definition of Money: Theoretical and Empirical Problems", *Journal of Money, Credit and Banking*, Vol. 1 (4), pp 508-525.
- Laumas, S. Gurcharan (1969), "Savings Deposits in the Definition of Money", *The Journal of Political Economy*, Vol. 77 (6), pp 892-896.
- Lim, Ewe-Ghee and Subramanian S. Sriram (2003), "Factors Underlying the Definition of Broad Money: An Examination of Recent U.S. Monetary Statistics and Practices of Other Countries", *IMF Working Paper WP/03/62*.
- Moroney, John R. and Barry J. Bilbratte (1976), "Money and Money Substitutes: A Time Series Analysis of Household Portfolios", *Journal of Money, Credit and Banking*, Vol. 8(2), pp 181-198.
- Saqib, Najam-us and Aliya H. Khan (1988), "On an Empirical Definition of Money for Pakistan", *Pakistan Development Review*, Vol. 27(4), pp 853-859.

Tariq, Muhammad Syed and Kent Matthews (1997), "The Demand for Simple-Sum and Divisia Monetary Aggregates for Pakistan: A Cointegration Approach", *The Pakistan Development Review*, Vol. 36 (3), pp 275-291.

Timberlake, R. H. (Jr) and J. Fortson (1967), "Time Deposits in the Definition of Money", *The American Economic Review*, Vol. 57 (1), pp 190-194.

Throp, John and Philip Turnbull (2000), "Banking and Monetary Statistics" *Center for Central Banking Studies*, Bank of England, London.

Walter, John R. (1989), "Monetary Aggregates: A User's Guide", *Economic Review, Federal Reserve Bank of Richmond* (January/February) pp 20-28.

Appendix: Component of Monetary Aggregates and Income (GDP at Current market prices)

billion Rupees

	CC	M0	DD	M1	TD	RFCD	M2	NSS	NBFIs	M3	Income
	1	2	3	4:(2+3)	5	6	7:(4+5+6)	8	9	10:(7+8+9)	
FY75	10.3	13.3	12.1	22.7	10.4	0.0	33.1	0.0	4.9	38.0	112.1
FY76	12.6	16.1	14.9	27.7	14.0	0.0	41.7	0.0	5.7	47.4	131.3
FY77	15.5	20.2	19.5	35.3	16.5	0.0	51.8	0.0	6.3	58.1	151.0
FY78	18.3	23.7	23.6	42.2	21.5	0.0	63.7	0.0	7.7	71.4	177.9
FY79	23.7	30.5	28.9	53.0	25.6	0.0	78.6	0.0	9.0	87.6	196.5
FY80	27.6	35.2	33.7	62.0	30.4	0.0	92.4	0.0	10.4	102.8	235.2
FY81	34.8	42.4	38.2	73.6	31.1	0.0	104.6	0.0	11.8	116.4	278.2
FY82	37.7	46.9	42.7	80.9	35.6	0.0	116.5	0.0	17.0	133.5	324.2
FY83	45.8	56.0	50.2	96.5	49.5	0.0	146.0	0.0	30.2	176.2	364.4
FY84	52.0	63.9	50.7	103.4	59.8	0.0	163.3	0.0	42.5	205.7	419.8
FY85	56.4	70.0	61.8	119.0	64.9	0.0	183.9	0.0	53.1	237.0	472.2
FY86	63.3	78.1	70.7	134.8	76.3	0.0	211.1	0.0	69.7	280.8	514.5
FY87	74.7	100.2	83.8	159.6	80.4	0.0	240.0	0.0	90.5	330.5	572.5
FY88	87.8	108.1	96.1	185.1	84.4	0.0	269.5	0.0	115.0	384.5	675.4
FY89	97.5	121.5	105.7	206.4	84.1	0.0	290.5	0.0	136.6	427.1	769.7
FY90	115.1	140.2	122.9	240.2	101.1	0.0	341.3	19.6	156.8	517.7	855.9
FY91	137.0	169.8	125.1	265.1	126.0	9.5	400.6	25.4	162.6	588.6	1,016.7
FY92	151.8	207.9	147.8	302.9	159.7	43.0	505.6	33.3	168.7	707.6	1,205.2
FY93	166.9	216.4	156.5	327.8	206.3	61.3	595.4	50.2	178.9	824.5	1,333.0
FY94	184.7	243.4	168.6	358.8	252.5	92.1	703.4	63.6	216.0	983.0	1,561.1
FY95	215.6	306.0	202.5	423.1	296.5	105.1	824.7	70.9	255.5	1,151.2	1,865.9
FY96	234.1	310.1	207.1	448.0	344.7	146.0	938.7	83.9	303.9	1,326.5	2,120.2
FY97	244.1	333.1	192.3	443.6	386.8	222.9	1,053.2	117.8	372.3	1,543.4	2,428.3
FY98	272.9	369.5	201.0	480.3	447.4	278.6	1,206.3	100.1	483.9	1,790.2	2,677.7
FY99	287.7	398.0	349.1	643.0	516.6	120.9	1,280.5	92.9	623.6	1,997.0	2,938.4
FY00	355.7	497.8	375.4	739.0	549.1	112.5	1,400.6	84.0	715.0	2,199.6	3,793.4
FY01	375.5	533.2	374.7	761.4	610.5	154.2	1,526.0	39.2	761.7	2,326.9	4,162.7
FY02	433.8	584.6	427.3	875.0	727.1	157.5	1,759.5	38.3	846.6	2,644.4	4,401.7
FY03	494.6	669.5	608.2	1,106.2	846.3	126.1	2,078.7	43.7	981.6	3,104.0	4,821.3