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# The Reserve Equation and the Analytics of Pakistan's Monetary Policy

**Rubina Hassan***

## Abstract

*This paper deals with the computation and analysis of some fundamental reserve aggregates and associated monetary statistics, which impart important information regarding the design and conduct of monetary policy at the State Bank of Pakistan (SBP). Specifically, we compute the data series for borrowed, unborrowed, free, and drainable reserves using balance sheet data published by the SBP for the period 1985-2009. Results show that Pakistan's monetary policy revolves around managing the exchange rate while using the t-bill rate as a key policy instrument. However, the value of the t-bill rate is both incorrectly and sub-optimally related to macroeconomic fundamentals rendering monetary policy time inconsistent. This hinges on the finding that, since 2000/01, the SBP has targeted the net free reserves of the banking system at 4 percent of total private deposits. Among other observations, we find that the scope of open market operations as a tool of monetary policy remains limited and that this limited role of open market defenses derives from the concern of the central bank to sterilize its own foreign exchange reserves. Furthermore, the growth rate of unborrowed plus drainable reserves bears a strong negative correlation with the annual average rate of inflation, which, on account of the former being consistently negative since 2005, implies that neither the government nor the SBP have an overriding concern for controlling inflation.*

**Keywords:** Monetary policy, central banks, Taylor rule, monetary targets, Pakistan.

**JEL Classification:** E51, E52, E58.

## 1. Introduction

This paper deals with the computation, presentation, and analysis of some fundamental reserve aggregates and associated monetary statistics for Pakistan that the State Bank of Pakistan (SBP) does not explicitly publish (or even make any reference to in policy discussions)

* Assistant Professor, Department of Economics, University of Karachi.

but which, nevertheless, impart important information regarding the design and conduct of monetary policy at the SBP.

Our analysis originates in the fundamental question as to what drives monetary policy at the SBP. The SBP describes its policy as a set of discretionary measures that are implemented as and when deemed necessary, and which derive from a detailed review of the state of the economy, the practices of the banking system, and the statement of objectives of monetary policy (see, for example, SBP, 2009a, 2009b). In contrast to the claims of the SBP, we find that changes in the t-bill rate are systematically related to the rate of growth of national output, the rate of inflation, and the currency depreciation rate (Hassan & Shahzad, 2010).[1] This implies that the SBP implicitly subscribes to a Taylor type rule (see Taylor, 1993, 1998) which, quite unusually, dictates that it (i) raise the t-bill rate when output growth declines (Malik and Ahmad, 2007, also observe the same), and (ii) raise the t-bill rate when inflation increases (only in the long run) but by less than the amount of increase in inflation. This situation is further complicated by the SBP's claim that changes in the t-bill rate do not necessarily reflect changes in monetary policy and that the key monetary policy instrument at the SBP is the discount rate (SBP, 2009b).

The design and conduct of monetary policy—apart from the standard procedure of determining objectives, setting quantitative targets, choosing instruments, and ascertaining the way changes in instruments will help attain these objectives—requires the central bank to choose an operational target of monetary policy. This operational target is "an economic variable, which the central bank wants to control, and indeed can control, to a very large extent on a day-by-day basis through the use of its monetary policy instruments" (Bindseil, 2004). The SBP has never explicitly stated its operational target in any of its publications except for the recent monetary policy statement (SBP, 2009b) which states that the SBP targets the rate of monetary expansion consistent with (i) estimates of net foreign assets, (ii) estimates of the government's budgetary borrowing, and (iii)

[1] The policy rule equation referred to here states that:

$$TBR = 4.60 + 0.66 * TBR_{-1} - 0.18 * INFL - 0.48 * \left[ \frac{YN_R - (YN_R)_{-1}}{(YN_R)_{-1}} \right] + 0.26 * INFL_{-1} - 0.15 * DEPRIC_{-1} - 6.72 * D04$$

*TBR*, *INFL DEPRIC* and $YN_R$ and *D04* indicate the t-bill rate, inflation rate, currency depreciation rate, real national output, and the 2004 dummy, respectively. Hassan and Shahzad (2010) estimate this equation consistently (as all right-hand variables are stationary) using OLS with actual data for 1991-2007. The equation has an adjusted 95 percent fit with no signs of autocorrelation, heteroscedasticity, parameter instability, or structural shift, and tracks the policy rate with precision. It typifies the Taylor rule when we assume that expected inflation and potential output, respectively, equal their last-period values.

aggregate demand pressure reflected in the saving-investment gap. The statement outlines a complete operational procedure for monetary policy in terms of a target range set for the reverse repo rate that is consistent with the fundamental equation of monetary policy (see Bindseil, 2004, for a detailed rationale for and description of the policy equation).

The question as to whether the operational target of monetary policy should be a reserve variable—as suggested by the reserve position doctrine (RPD)—or an interest rate variable (which constitutes recent practice at many central banks) has been the subject of a longstanding debate in monetary policymaking (see Bindseil, 2004). Since the SBP has never officially subscribed to either of these positions and since it actively denies subscribing to a Taylor-type rule, we need to construct reserve aggregates for Pakistan to ascertain the operational basis of its monetary policy. Specifically, we use the balance sheet data of the SBP and the banking system to construct various reserve variables such as free reserves, borrowed reserves, and unborrowed reserves, in conjunction with the reserve equation to determine which operational targets of monetary policy the SBP has used in the past. Since, from a purely technical viewpoint, operational targets specified in terms of interest rates can be translated into reserve targets and vice versa by making use of the fundamental equation of monetary policy (see Bindseil, 2004; Mayes & Toporowski, 2007), this exercise is expected to reveal the cornerstones of the SBP's monetary policy. The analysis is also important in that it provides for the core element of any econometric model that incorporates banking sector behavior while analyzing monetary policy.

The remaining paper is organized as follows. In Section 2, we explain the theoretical linkages that lead to the empirical determination of the reserve equation for Pakistan. The reserve equation is then used to derive some useful monetary statistics for Pakistan for the period 1975-2007. Statistical calculations of the various components of reserve money, reserve equation, and monetary statistics are reported in Section 3, along with a discussion on their behavior and insights into monetary policy. The paper concludes with Section 4.

## 2. Reserve Equation and the Analysis of Monetary Policy

The analysis of monetary policy in terms of the reserve equation was the central idea of the RPD, which remained the popular monetary policy paradigm at the Federal Reserve Bank from the 1920s until the late 1980s, when the Federal Reserve first switched to inflation targeting and

then to interest rate management as a guide to monetary policy.[2] The RPD posits that, by managing one or the other reserve aggregates, the central bank can easily keep money supply on its desired path.[3] A formal analysis of money supply in terms of reserve aggregates originated in Meigs (1962) and has been described in many standard monetary economics texts (see, for example, Teigen, 1978; Branson, 1989). Although central banks and academic economists no longer rely on the reserve concepts when describing or setting monetary policy, the informational content of these concepts can seldom be denied (see Toporowski, 2006).

Below, we show both theoretically and empirically how the monetary data published by the SBP can be used to determine the quantity of reserve money and the reserve equation for Pakistan. We then explain some essential facts about monetary operations and monetary policy that the SBP has never explicitly published or used but which, spontaneously, constitute the core of its monetary operations and monetary policy.

### 2.1. *Derivation of the Reserve Equation*

Reserve money can be defined in three different ways: first, it is the sum total of the liabilities of the central bank; second, since assets and liabilities balance out,[4] reserve money is also the aggregate of the asset side of the central bank's balance sheets; and third, reserve money can be determined by accounting for the sources and uses of reserves. The first definition is a purely theoretical definition of reserve money. An

[2] The Federal Reserve has never adopted explicit inflation targeting. However, this is a debatable issue. Bindseil (2004) argues that the Federal Reserve under Alan Greenspan followed an implicit inflation targeting regime. Clarida, Gali, and Gertler (2000) argue that an active stance against inflation proved decisive in controlling inflation during the Volcker-Greenspan era. They write: "It is not the target but the attitude to inflation which matters." Similarly, Favero and Rovelli (2001) try to determine the preferences of a central bank by calibrating first-order conditions for the minimization of an appropriate quadratic loss function. They also find a slight shift (although statistically insignificant) in Federal Reserve behavior during the Volcker-Greenspan era toward inflation. Bernanke (2004) explains how the Federal Reserve has emerged as a strong inflation fighter without explicitly subscribing to an inflation targeting regime. Rudebusch and Svensson (1998) describe a large number of policy rules that are consistent with an inflation targeting (explicit or implicit) regime.

[3] Borrowed reserves, unborrowed reserves, total reserves, and excess reserves have all been proposed and used as potential operational targets of monetary policy over the 70-year lifespan of the RPD. A discussion of when and how a certain reserve aggregate was used by the Federal Reserve as a target and why it was abandoned can be found in Bindseil (2004).

[4] The standard balance sheet equation states that assets = liabilities + equity. However, we seldom make such a classification when dealing with the analytics of monetary policy in terms of central bank balance sheets; see Bindseil (2004) and Toporowski (2006). This type of classification is usually made for a central bank when dealing with the issue of central bank autonomy (see Ernhagen et al. 2002).

empirical determination of reserve money essentially originates in the second definition. (Another version of the second definition states that reserve money equals the sum of net domestic and foreign assets of the central bank.) Finally, while commercial banks use reserves for maintaining required and excess reserves (including vault cash), they obtain the same either by acquiring government debt (unborrowed reserves) or loans from the central bank (borrowed reserves). The reserve equation categorizes monetary data in accordance with each of these definitions so that they all yield the same aggregate quantity.

While it does not elaborate on reserve-related concepts and the reserve equation, the SBP's monetary survey defines reserve money in two equivalent ways (SBP, 2002, 2005):

$$R = NDA_{SBP} + NFA_{SBP} \tag{1}$$

$$R = CC + OD + RR_D + RR_T + RR_{NBFI} + RE + VC \tag{2}$$

Table-1 and Table-2 (see Annex) show the schematic balance sheets of the SBP's Issue Department and Banking Department (see SBP, 2002, 2005). Aggregating the respective sides of these two balance sheets to form a consolidated balance sheet and then writing the result in the form of an equation gives us the following:

$$\begin{aligned} &C + C_{Banking} + CRF + D_F + D_P + D_B + D_O + SDR_{Allocation} + BPay + Reval + Liab_{other} = \\ &G + F + SDR_{Issue} + C_{Issue} + S_{Issue} + G_{RBI} + A_{RBI} + C_{Banking} + BoE_{Internal} + S_{Banking} + BoPak \\ &+ SDR_{Banking} + GDB + A_G + A_{Banks} + A_{NBFI} + I_{Banks} + I_{NBFI} + I_G + I_{Other} + Asst_{Other} \end{aligned} \tag{3}$$

This equation can be manipulated (see Hassan and Shahzad, 2009, for details) to read as follows:

$$\begin{aligned} R = &\left(G + G_{RBI}\right) + \left(F + SDR + A_{RBI} + BoPak\right) + \left(Coins_{1\,plus} + Coins_{Subs} + OD\right) \\ &+ \left(S_{Issue} + S_{Banking} + I_G\right) + \left(BoE_{Internal} + GDB + A_G + A_{Banks} + A_{NBFI} - D_F - D_P - D_O\right) \\ &+ \left(I_{Banks} + I_{NBFI} + I_{Other}\right) + \left(Asst_{Other} - CRF - BPay - Reval - Liab_{other}\right) - C_{Banking} \end{aligned} \tag{4}$$

where the terms in parentheses can be identified respectively as the SBP's gold stock, foreign exchange holdings, treasury currency, portfolio of government securities, credit (net of government deposits), investments, and other balancing items (see, for example, Mishkin, 2006; Federal

Reserve Bank, 2002; Jordan, 1971].[5] Equation-4 provides a direct way of computing the quantity of reserve money using the balance sheets of the central bank. It tells us what assets denominate the outstanding quantity of reserve money in the economy and can thus, very adequately, be called the supply of reserve money.[6] The demand for reserve money arises out of its various uses by the nonbank private sector and the banking sector (hence, called the uses of reserves), and can be determined as per Equation-2.[7]

The reserve equation is defined as the equation showing the sources and uses of reserve money. Equation-2 describes the uses of reserve money. The standard definition of the sources of reserve money states that reserve money equals the sum of treasury currency ($C_T$), borrowed reserves ($RB$), unborrowed reserves ($RU$), and other balancing reserves ($A$) (see Toporowski, 2006; Bindseil, 2004; Federal Reserve Bank, 2002; Teigen, 1978; Jordan, 1971):

$$R = C_T + RU + RB + A \tag{5}$$

Treasury currency is defined as currency issued by the federal government in the form of coins and other deposits. Unborrowed reserves equal the central bank's portfolio of government securities plus total discounts and advances made by the SBP less the borrowings of scheduled banks from the SBP (Teigen, 1978), while borrowed reserves are defined as the total borrowings of scheduled banks from the central bank. The last term $A$ represents all other sources less all other uses and represents the maximum amount of resources that can be drained from the economy through defensive open market operations (see Teigen, 1978; Jordan, 1971). Defining net free reserves of the banking system as excess reserves (including vault cash) less borrowed reserves (see Teigen, 1978; Jordan, 1971), we can rewrite Equation-5 as:

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[5] The International Monetary Fund (IMF)'s *Monetary and Financial Statistics Manual* maintains that "central bank or central government holdings of unissued or demonetized currency are not financial assets and should not be recorded in sectoral balance sheets" (IMF, 2005). The last term in Equation-4 thus represents nothing more than the SBP's confusion as to whether or not to include currency held in the banking department as an asset of the issue department (see Hassan and Shahzad, 2009, for a detailed discussion on this issue). In what follows, we construct different definitions of reserve money and accompanying data while assuming that this confusion does not exist.

[6] Since the sum of the first and second terms in parentheses in Equation-4 represents the SBP's net foreign assets, Equation-1 implies that the sum total of the remaining components must be the SBP's net domestic assets.

[7] The demand and supply of reserve money become equal only when we remove the last term (i.e., currency held in the SBP's Banking Department) from Equation-4. This proves the inaccuracy of the SBP's balance sheet data.

$$\begin{aligned} R &= C_T + RU + RB + A \\ &= C_T + RU + RE + VC - RE - VC + RB + A \\ &= C_T + (RU - RF) + RE + VC + A \end{aligned} \tag{6}$$

In order to determine these variables empirically, we need to look at the consolidated balance sheets of the SBP and commercial banks. Table-3 (see Annex) shows a schematic representation of the balance sheet of the scheduled banks in Pakistan. The balance sheet can be written in equation form as:

$$D + T + RB = RR_D + RR_T + BC + BSI + RE + VC + x \tag{7}$$

The banking system's balance sheet identity states that the sum total of demand and time liabilities ($D$ and $T$) plus the discount liabilities of the banking system ($RB$) equal required reserves against demand and time liabilities ($RR_D$ and $RR_T$), bank credit ($BC$), banking sector investments ($BSI$), excess reserves ($RE + VC$), and a balancing factor ($x$: all other assets less all other liabilities). The banking system's balance sheet provides data on borrowed reserves[8]. The definition of treasury currency may be read directly from equation 4 above. We are thus left to determine the quantity of unborrowed reserves and the factor A. In line with the definitions used by Federal Reserve Bank (2002), Teigen (1978) and Jordan (1971), we define unborrowed reserves as the portfolio of government securities held by the SBP plus total discounts and advances made by the SBP (net of government deposits) less the borrowings of scheduled banks from the SBP. Thus, adding together the fourth and fifth terms in parentheses from Equation-4 and subtracting the amount of borrowed reserves from this total gives us an estimate of the amount of unborrowed reserves.

$$RU = (S_{Issue} + S_{Banking} + I_G) + \begin{pmatrix} BoE_{Internal} + GDB + A_G + A_{Banks} + A_{NBFI} \\ - D_F - D_P - D_O \end{pmatrix} - RB \tag{8}$$[9]

[8] The category "loans and advances to banks and nonbank financial institutions" in the SBP's balance sheet does not somehow match discount borrowings from the SBP.

[9] The SBP publishes data on borrowed reserves (advances from the SBP), excess reserves, vault cash (cash in banks' tills), one rupee and above coins, subsidiary coins, and other deposits. The volume of treasury currency, borrowed reserves, and free reserves is therefore known with certainty. However, data on unborrowed reserves has not been published in a readily usable format. We derive it using the definition in Equation-8. To the extent that unborrowed reserves are over/underestimated (because of the nonavailability of further disaggregated data that might need re-categorization), the factor A will need to be counter-adjusted. However, we expect this adjustment to be of a much smaller magnitude to make any significant differences to our analysis.

Finally, subtracting treasury currency, unborrowed reserves, and borrowed reserves from the total quantity of reserve money (Equation-5), we get data on the factor $A$ that represents all other sources less all other uses of reserves.[10] The reserve equation is thus empirically determined. Combining the above results, we can write the complete reserve equation as

$$CC + OD + (RR_D + RR_T + RR_{NBFI}) + (RE + VC) \equiv R \equiv C_T + (RU - RF) + (RE + VC) + A \tag{9}$$

Canceling out excess reserves and vault cash on both sides, we get

$$(CC + OD - C_T) + (RR_D + RR_T + RR_{NBFI}) = (RU - RF) + A \tag{10}$$

Equation-10 is the reserve equation. It provides an important link between currency in circulation, required reserves, unborrowed reserves, and net free reserves of the banking system. The reserve equation is important because all its variables are directly linked with monetary policy instruments. Required reserves are linked to the reserve requirement ratios and the volume of demand deposits. Changes in unborrowed reserves take place through open market operations and are therefore related to the t-bill rate. Finally, the net free reserves of the banking system have a very close relationship with the interest rate differential (the money market rate less the discount rate) and deposits of the banking system. Monetary policy, whether it works through open market or discount operations (in the short run) or through reserve requirement setting (in the long run) can therefore be directly evaluated by making use of this identity.

### 2.2. *The Reserve Equation and Analytics of Monetary Policy*

The various definitions of money supply used by the SBP read:

$$\begin{aligned} M_2 &= (CC + OD) + (DD + TD + RFCD) = (CC + OD) + D_p \\ &= (NCGS + NCPS + NCO) + NFA \\ &= NDA + NFA \end{aligned} \tag{11}$$

[10] Using Equation-4, Equation-6, and Equation-8, we get $A = \begin{pmatrix} G + \\ G_{RBI} \end{pmatrix} + \begin{pmatrix} F + SDR + \\ A_{RBI} + BoPak \end{pmatrix} + \begin{pmatrix} I_{Banks} + I_{NBFI's} + I_{Other} + Asst_{Other} \\ -CRF - BPay - Reval - Liab_{Other} \end{pmatrix}$. This clearly shows that the term $A$ represents the net foreign assets of the central bank plus its investments (net of capital gains, other liabilities, etc.) and, therefore, is the maximum amount of resources that can be drained out of the monetary system through defensive open market (sterilization) operations.

The reserve equation (Equation-10) and the demand definition of money supply (the first part of Equation-11) together with the assumptions that (i) the ratio of currency (including other deposits) to money supply is stable and predictable, and that (ii) required reserves are linked to deposits via the reserve requirement ratio, generate the definition of the reserve multiplier. Defining $\eta = (CC + OD)/M_2$, and $RR = \varphi \cdot D_P = \varphi(1-\eta)M_2$, we can write this relationship as

$$M_2 = \left(\frac{1}{\eta + \varphi(1-\eta)}\right) \cdot (RU + C_T + A - RF) = \mu \cdot (RU + C_T + A) - \mu \cdot RF \quad (12)$$

The money supply model in Equation-12, links money supply $(M_2)$ to the reserve multiplier $(\mu)$ and reserve components, and simultaneously breaks money supply into its endogenous and exogenous components. Since the quantity of unborrowed reserves and treasury currency is directly under the control of the system, and since $A$ can always be effectively drained out of the system through defensive open market operations, the first term represents the purely exogenous part of money supply. The second component is the net free reserves of the banking system and represents the endogenous part of money supply (Teigen, 1978; Branson, 1989). The central bank usually controls free reserves through its discount and standing facilities operations. Proponents of the reserve approach to money supply believe that once the quantity of unborrowed and free reserves is determined, the level of private deposits can be determined residually by making use of the expression: $\Delta RR = \Delta RU - \Delta RF + \Delta A$ [11]. The ratio of unborrowed reserves and free reserves to total private deposits, therefore, describes nothing else but monetary policy.

Finally, using Equation-1 and the last component of Equation-11, and defining $m_D = NDA/NDA_{SBP}$ and $m_F = NFA/NFA_{SBP}$ as the domestic and foreign asset money multipliers, respectively, we can write the overall money multiplier $(m = M_2/R)$ as $m = m_D \cdot \delta_D + m_F \cdot \delta_F$ ,

[11] This identity is the total differential of Equation-10 while holding currency in circulation constant. The differentials that appear in the expression are behaviorally related to bank deposits and the various interest rates, thereby also cross-linked to one another. Thus, when free reserves or unborrowed reserves change, they also cause a change in bank deposits, exerting a second-round indirect influence on required reserves (see Meigs, 1962, for a detailed discussion of these concepts). Casting out all these differentials in terms of their relationship with bank deposits and then inverting this functional relationship, our result indicates that bank deposits are residually determined through this identity. Clark and Kwack (1976) derive the same result in a slightly different context.

where the $\delta$ terms reflect the respective shares of domestic and foreign assets in reserve money. Since the numerator on the right-hand side of Equation-12 equals reserve money less excess reserves, we expect the reserve multiplier $(\mu)$ to be larger than the simple money multiplier $(m)$ and the true descriptor of how much credit the banking system can generate from a given volume of reserve money.

## 3. Statistical Computations and Analysis

Using the above definitions and drawing on data from the SBP's balance sheets, the consolidated balance sheet of the commercial banks, monetary statistics, and monetary survey, we can construct data on the various components of the sources and uses of reserve money in the Pakistan economy for the period 1975-2009. All data is taken from the *Handbook of Statistics on Pakistan Economy 2005* and the SBP's annual reports (2006, 2007, and 2008), and counter-checked against the SBP's monthly bulletins and various Economic Surveys. The results of our statistical computations are provided in Table-5 (see Annex). The computed data series are then used to construct the time profile of a number of reserve indicators (derived in Section 2 above), the graphs of which are plotted in the figures following the data tables (see Annex).

Tables-5(a) and 5(b) illustrate our computed data series showing, respectively, the supply and demand components of reserve money. Table-5(a) corresponds to our categorization of the SBP's balance sheet data in accordance with Equation-4. Table-5(b) is simply a reprint of different data series from the sources listed above. Table-5(c) illustrates data on the sources of reserve money constructed in concordance with Equation-6. This dataset is then used to construct a time profile of unborrowed, free, and drainable reserve ratios; the ratio of broad money to unborrowed reserves; the endogenous and exogenous components of reserve money; the total volume of discretionary open market operation instruments along with its growth rate; the difference between unborrowed and drainable reserve ratios in comparison with the t-bill rate; the reserve multiplier in comparison with the simple money multiplier; the breakup of the simple money multiplier into its domestic and foreign components; and the growth rate of unborrowed reserves alongside the rate of inflation. The graphs are sufficient evidence of the fact that the SBP is doing much that is unneeded and neglecting a great deal while making monetary policy.

First and foremost, unborrowed and drainable reserve ratios are mirror images of each other. This means that the SBP carries out open

market operations only to counter-balance changes in the factor $A$. Since $A$ consists of the SBP's foreign assets and its investments in banks and nonbank financial institutions (NBFIs) (net of factors that reflect its profitability), the essential conclusion is that the SBP carries out open market operations to balance these changes and its own business initiatives. The volume of open market operations thus becomes endogenous to the system. It therefore appears to be a historical fact, and essentially in this accounting context only, that changes in the t-bill rate do not reflect the SBP's monetary policy.

The SBP's motivation for carrying out open market operations also seems unconvincing. It defines its net foreign assets as the sum total of the first and second terms in parentheses in Equation-4 less some components of the category of "other deposits" (see SBP, 2005). The definition makes it clear that the SBP's foreign assets are earned reserves and not borrowed collateral (see Dooley and Garber, 2005, for details of these concepts). In a subsequent paper, we show that the control over domestic asset expansion requires the central bank to offset changes not in its own net foreign assets (which are earned reserves) but the net foreign assets of commercial banks, including other governments' deposits, the country's net position at the IMF, etc., but excluding their foreign bills.[12] Since the strategy of the SBP's open market operations resides in counter-balancing its own net foreign assets, it becomes obvious that the SBP is deeply concerned with managing the exchange rate, quite in contrast to its publicly held opinion that it is not doing so.

To demonstrate the flaw in this strategy, we compare the simple money multiplier with the reserve multiplier. We find that the difference between the two multipliers averaged at 0.3 before 1991 and at approximately 0.7 since then. One is thus forced to believe that the foreign currency denominated private deposit accounts allowed in 1991 have something to do with this difference. Mirakhor and Zaidi (2004) observe that, as per SBP policy requirements, commercial banks are required to sell the foreign exchange deposited with them to the SBP at a premium at the end of each working day. This implies that the SBP supplies extra short-term excess reserves to the banking system, thereby enabling them to disburse more credit, if and when required, than would otherwise be possible. Thus, while the SBP continues to believe that the banking system can transform every rupee of reserve money into (about) three rupees of

[12] This idea has been fully elucidated in the author's dissertation. The historical origins of the same can be traced back to the concept of the liquidity definition of balance of payments. Some useful discussions of this can be found in McKinnon (1969) and Knoester (1979).

broad money, the banking system actually translates it into four rupees.[13] The SBP's open market operations strategy lends further support to this endogenous credit expansion. Comparing the domestic and foreign asset components of the money multiplier, we find that the former is much larger than the latter. Still, the SBP is more concerned with draining away these foreign assets (as discussed above) than mopping up domestic liquidity. The domestic asset multiplier averaged at a value of 4 between 1991 and 2002, and increased to an average value of 17 (peaking at a value of 30 in 2003) between 2003 and 2007. On the other hand, the foreign asset multiplier remained a fractional value averaging at 0.80 (peaking at a value of 1.06 in 2007) during the entire 2003-07 period. The SBP's open market operations thus encourage long-run rent seeking by the commercial banking sector, thereby providing endogenous support to inflation.

Next, the total volume of discretionary open market instruments (the sum total of unborrowed plus drainable reserves) as a ratio of total private deposits shows a declining trend ever since financial liberalization in 1991. The monetary system thus appears to have some historical preoccupation with not making open market operation instruments the primary tool of monetary policy. The growth rate of the same variable is strongly negatively correlated with the rate of inflation (the correlation coefficient between the two is -0.6 over the period 1999/2000 to 2006/07). The recent inflation episode that took place at the end of 2005 can therefore be entirely attributed to a failure of monetary policy. To add substance to this argument, we note that the level of unborrowed reserves (as a percentage of total private deposits) started declining in 1999/2000 and became negative in 2002/03, stayed negative until 2004/05, became positive again in 2005/06 only to continue declining again (in fact, the difference between unborrowed and drainable reserves has been negative since 1999/2000). This indicates that the monetary system was providing excessive liquidity in the form of discount loans to commercial banks. This event corresponds to a similar situation that the US economy recently witnessed when financial turmoil led to unborrowed reserves becoming negative, marking the beginning of an inflation episode. The SBP has always asserted that Pakistan has shown no signs of being hit by

[13] The primary factor underlying this difference is the way in which excess reserves are accounted for by the monetary authority and monetary system. While the monetary authority needs to add excess reserves to form the reserve money aggregate (Equation-2), the monetary system treats excess reserves (net of discount borrowings) as a crunch on its reserve base (Equations-9 and 10). Thus, reserve money increases in volume as excess reserves increase, but the reserve base of the banking system shrinks, and hence a quantitatively larger multiplier value is obtained (the close association between the difference of the two multipliers and the free reserve-to-deposit ratio supports this intuition).

financial turmoil as the US and Euro-zone did in 2007/08. The data, however, speaks to the contrary.

That the SBP's open market operations strategy derives from some unfounded concerns becomes evident when we look at the graph that shows the difference between unborrowed and drainable reserve ratios alongside the t-bill rate. The difference between the unborrowed and drainable reserve ratios indicates nothing else but optimal open market operations (see Toporowski, 2006). Hence, we expect the t-bill rate to be a replica of this graph. However, we find that, at the SBP, the two become the same only when we plot the lagged value of the t-bill rate (which is an annual average) alongside the reserve difference. The SBP's monetary policy strategy is thus seen to lag behind in time, indicating again that the bank takes about six months to know what is happening in the economy and the money market. Viewed from another perspective, since the t-bill rate does not match the difference between the unborrowed and drainable reserve ratios in the current time period, monetary policy may well be identified as time-inconsistent (this could be one interpretation of why the output coefficient in our estimated Taylor rule equation is negative).

The conclusions that this discussion points to is that the SBP (i) speciously uses open market operations to balance changes in earned foreign exchange assets and its own business initiatives, thereby trivializing the t-bill rate; (ii) follows a time-inconsistent monetary policy owing to a one-year lag in taking the t-bill rate to its optimal level; (iii) is preoccupied with not using open market operations as the core monetary policy instrument; (iii) is unclear as to how this links to the formation of inflation expectations, and hence (iv) disowns inflation and its control.[14]

As for the answer as to what the SBP's monetary policy is about, we find that, prior to 1999/2000, the ratio of broad money to unborrowed reserves fluctuated around 4.6 percent of total private deposits, while since

[14] The answer as to who has ultimate control over inflation and currency depreciation comes from the answer as to how costly it is for the system to increase any (or both) of them. These costs are leveraged by the levels of domestic public debt holdings and external reserves. Thus, for example, if the government holds a large volume of outstanding public debt, inflation would be very costly in that it will eventually increase the service cost of this debt to the government. Similarly, a large volume of external indebtedness (or foreign reserve holdings) will make currency depreciation difficult for the central bank because it would then increase its service costs (or reduce the value of reserves) over and above the expected gains from increased exports. It follows that a strategy of increasing the exogenous component of money supply and accumulating foreign exchange reserves is sufficient to induce control over inflation and the currency exchange rate. The falling level of the sum of unborrowed and drainable reserves (which constitute the exogenous component of money supply) is therefore evidence that the SBP and the government are both absolutely hesitant to control inflation.

2000/01 onward, the SBP has managed to keep the net free reserves of the banking system closely fluctuating around 4 percent of total private deposits. Both these strategies of monetary policy have been demonstrated as inconsistent a long time ago even by proponents of the RPD. Free reserves have been known to be an improper target of monetary policy since the 1960s. Unborrowed reserves were demonstrated to be an improper target of policy both on account of the implementation complexities involved in the process and because of the wide swings in interest rates produced by it (see Bindseil, 2004, for a review of when a certain reserve aggregate was used as a policy guide by the Federal Reserve and how and why it failed). Recounting Meigs's (1962) arguments about free reserves being false indicators of the reserve pressure and on the practical failure of the 1979 Federal Reserve policy move[15] (see also Poole, 1982), we find that the SBP's spontaneous strategy of monetary policy lacks direction.[16] In fact, since the SBP has never explicitly stated that it is engaged in targeting the free reserves of the banking system, we can well infer—in light of the arguments put forward by Brunner and Meltzer (1964), Poole (1968), Bindseil (2004), Bindseil and Würtz (2007), and Gavin (2007)—that the SBP actually uses the discount rate as an anchor for conducting monetary policy.[17] The steady-state value of this anchor does not derive from any known estimates of the productivity of the domestic capital stock. Rather, its value is kept close to the t-bill rate, and not contrariwise (because announcements regarding the discount rate are always accommodative and have lagged behind changes in the inter-bank money market rate, only to allow more room for its variability. This implies that the true descriptor of the SBP's monetary policy is the t-bill rate, which is—incorrectly—related to inflation and output levels.

## 4. Conclusion

This paper computes and analyzes some fundamental reserve aggregates and associated monetary statistics that the SBP does not

[15] Meigs (1962) argues that (i) a given level of free reserves may be associated with different levels of money growth and deposit expansion, (ii) equal volumes of free reserves in different periods do not imply same bank behavior, (iii) changes in free reserve levels are inappropriate indicators of tight/easy monetary policy, and (iv) free reserves targets are self defeating.

[16] We call this strategy *spontaneous* because the SBP has never explained whether any of these reserves, unborrowed or free, are inelastic or contrariwise (as suggested by Gordon and Leeper, 1994) to the corresponding rate of interest. In fact, since the t-bill rate was constant during the 1980s and only white noise averaging 12.5 percent emerged during the 1990s, unborrowed reserves were perfectly elastic to the rate of interest. Similarly, the net free reserves ratio appears to have been positively correlated with the discount rate since 2001.

[17] The recent monetary policy statement (SBP, 2009b) did not announce anything new about monetary policy. It only made explicit what the SBP had been doing without announcing it.

publish or take into account, but which impart important information about the design and conduct of monetary policy at the SBP. Specifically, we compute the data series for borrowed, unborrowed, free, and drainable reserves using balance sheet data published by the SBP for the period 1985-2009 with a view to empirically determining the reserve equation for Pakistan. These data series are then used to analyze the strategy of monetary policy at the SBP.

We find the following:

1. The operational target for carrying out monetary operations at the SBP appears to have been a free reserves target since 2000/01, which, interpreted in the light of the fundamental equation of monetary policy and the various monetary policy statements of the SBP, is equivalent to using the discount rate as a policy anchor, whose value in turn derives from the t-bill rate.

2. The scope of open market operations as a tool of monetary policy remains limited owing to the declining trend in the sum total of drainable and unborrowed reserves (which equals the volume of discretionary open market instruments and also represents the exogenous component of broad money supply) held at the SBP.

3. Even this limited role of open market defenses derives from the SBP's concern to sterilize its own earned foreign exchange reserves rather than the unearned foreign exchange assets of the banking system. This is reflected in the unborrowed and drainable reserves being mirror images of each other. Since this observation also implies that the source of open market operations lies in the SBP's foreign asset accumulation (inter alia), one can conclude that the t-bill rate is endogenous to the monetary system. In fact, this is merely restating the fact that open market operations derive from a concern with managing the exchange rate.

4. The limited scope and concern regarding the conduct of open market operations is sub-optimally distributed in time whereby the t-bill rate lags behind its optimal value by about six months to one year and renders monetary policy time-inconsistent.

5. The growth rate of unborrowed plus drainable reserves bears a strong negative correlation with the annual average rate of inflation, which, on account of the former being consistently negative since 2005, implies that neither the government nor the SBP show significant concern for controlling inflation.

The conclusions recounted above imply that the SBP's monetary policy revolves around managing the exchange rate. The key policy instrument for implementing this strategy is the t-bill rate, which also guides the SBP in setting the discount rate. Two independent observations—the policy rule equation and the difference between unborrowed and drainable reserve ratios—suggest that value of this instrument is incorrectly set. This finding, combined with the presence of a significant Laursen-Meltzer effect in the face of the fact that the exogenous component of broad money is continuously declining, implies that the SBP is responsible for the ongoing inflation episode in Pakistan.

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## *Annexure*

**Table-1: Schematic Balance Sheet of SBP (Issue Department)**

| **Liabilities** | **Assets** | |
|---|---|---|
| Currency held in SBP (Banking Department) | Gold coins and bullion | |
| | Approved foreign exchange | Sterling securities |
| | | Government of India securities |
| Notes in circulation | | India notes |
| (five rupee and above bills issued) | Unutilized allocation of special drawing rights | |
| | Domestic assets | Rupee coin/notes |
| | | Government of Pakistan securities |
| | | Internal bills of exchange and commercial papers |
| | Assets with RBI pending transfer to Pakistan | Gold coins and bullion |
| | | Sterling securities |
| | | Government of India securities |
| | | Rupee coins |

***Source***: State Bank of Pakistan (2005).

**Table-2: Schematic Balance Sheet of SBP (Banking Department)**

| **Liabilities** | | **Assets** | |
|---|---|---|---|
| Capital and reserves | Paid-up capital | Notes and coins held by SBP (Banking Department) | |
| | Reserve fund | Bills purchased and discounted | Internal bills of exchange |
| Deposits | Deposits of federal government | | Government treasury bills |
| | Deposits of provincial government | Foreign exchange | Balances held outside Pakistan |
| | Deposits of banks | | Special drawing rights held with IMF |
| | Other deposits at SBP | Advances to government | Government debtor balance |
| Allocation of special drawing rights by IMF | | | Loans and advances to government |
| Bills payable | | Loans and advances to scheduled banks | |
| Revaluation account | | Loans and advances to | |
| | | NBFIs | |
| Other liabilities | | Investments of SBP in | Scheduled banks |
| | | | NBFIs |
| | | | Government securities |
| | | | Other assets |
| | | Other fixed assets | |

***Source:*** State Bank of Pakistan (2005).

**Table-3: Schematic Balance Sheet of Banking Sector**

| Liabilities | | | Assets | |
|---|---|---|---|---|
| Capital paid-up and reserves | | | Statutory reserves | On-demand liabilities |
| Demand liabilities in Pakistan | Inter-bank | Borrowings | | On-time liabilities |
| | | Deposits | Balances in Pakistan | Cash in Pakistan |
| | Others | Deposits general | | Balances with SBP |
| | | Deposits other | | Other balances |
| Time liabilities in Pakistan | Inter-bank | Borrowings | | Money at call and short notice in Pakistan |
| | | Deposits | Foreign currency | Held in Pakistan |
| | Others | Deposits general | | Balances with banks abroad |
| | | Deposits other | | |
| Borrowings from SBP | | | Bank credit | Advances To banks |
| Borrowings from banks abroad | | | | To others |
| Money at call and short notice in Pakistan | | | | Bills purchased and discounted |
| Other liabilities | | | Investment in securities and shares | Federal govt. securities |
| | | | | Provincial govt. securities |
| | | | | Treasury bills |
| | | | | Others |
| | | | Other assets | |
| | | | Advance tax paid | |
| | | | Fixed assets | |

***Source:*** State Bank of Pakistan (2005).

**Table-4: List of Terms Used in Equations**

| Symbol | Description |
|---|---|
| $C$ | Notes in circulation (currency issued) |
| $C_{Banking}$ | Currency held by SBP (Banking Department) |
| $CRF$ | Capital and reserves |
| $D_F$ | Deposits of federal government |
| $D_P$ | Deposits of provincial government |
| $DoB$ | Deposits of banks |
| $D_O$ | Other deposits at SBP |
| $SDR_{Allocation}$ | Allocation of special drawing rights by IMF |
| $B_{Pay}$ | Bills payable |
| $Reval$ | Revaluation account |
| $Liab_{other}$ | Other liabilities |
| $G$ | Gold coins and bullion |
| $F$ | Approved foreign exchange |
| $SDR_{Issue}$ | Unutilized allocation of special drawing rights |
| $C_{Issue}$ | Rupee coins/notes |
| $S_{Issue}$ | Govt. of Pakistan securities |
| $BoE_{Internal}$ | Internal bills of exchange and commercial papers |
| $G_{RBI}$ | Gold coins and bullion with RBI |
| $A_{RBI}$ | Other assets with RBI |
| $S_{Banking}$ | Bills purchased and discounted (internal bills of exchange and government t-bills) |
| $BoPak$ | Balances held outside Pakistan |
| $SDR_{Banking}$ | Special drawing rights held with IMF |
| $GDB$ | Government debtor balance |
| $A_G$ | Loans and advances to government |
| $A_{Banks}$ | Loans and advances to scheduled banks |
| $A_{NBFI}$ | Loans and advances NBFIs |
| $I_{Banks}$ | Investment in scheduled banks |
| $I_{NBFI}$ | Investment in NBFIs |
| $I_G$ | Investment in government securities |
| $I_{Other}$ | Other investments |
| $Asst_{Other}$ | Other fixed assets |

## Table-5(a): Reserve Money and its Components (Supply)

| Year | Gold Stock | Foreign Exchange of SBP | Treasury Currency | SBP's Portfolio of Government Securities | SBP Credit | Government Deposits at SBP | Other Balancing Items | Reserve Money |
|---|---|---|---|---|---|---|---|---|
| 1985 | 9,661.60 | 6,558.10 | 2,937.00 | 66,879.70 | 29,543.10 | 29,645.50 | (15,684.20) | 70,249.80 |
| 1986 | 11,276.80 | 12,008.10 | 3,110.00 | 68,552.50 | 37,238.20 | 34,573.70 | (19,412.40) | 78,199.70 |
| 1987 | 15,052.40 | 11,218.40 | 3,359.00 | 76,342.80 | 45,308.30 | 31,557.50 | (19,504.10) | 100,219.50 |
| 1988 | 15,286.50 | 4,367.40 | 3,520.00 | 82,114.80 | 53,005.70 | 30,209.20 | (19,924.90) | 108,160.70 |
| 1989 | 15,342.20 | 5,729.60 | 5,877.00 | 90,110.60 | 58,919.20 | 35,475.50 | (18,544.90) | 121,958.80 |
| 1990 | 14,960.30 | 9,175.90 | 4,968.00 | 110,990.40 | 65,449.40 | 46,809.40 | (18,081.30) | 140,655.20 |
| 1991 | 17,448.70 | 8,951.20 | 5,892.00 | 119,695.20 | 84,499.20 | 45,222.50 | (21,384.10) | 169,879.90 |
| 1992 | 17,443.10 | 20,401.80 | 6,517.00 | 173,778.50 | 77,460.80 | 65,101.50 | (22,206.40) | 208,293.50 |
| 1993 | 20,841.80 | 6,647.30 | 7,663.00 | 198,513.10 | 93,975.10 | 71,345.90 | (32,436.60) | 223,858.10 |
| 1994 | 24,296.50 | 63,164.60 | 8,987.00 | 188,715.60 | 95,957.10 | 89,418.80 | (32,905.30) | 258,797.10 |
| 1995 | 24,663.20 | 77,697.30 | 8,331.00 | 212,563.20 | 111,539.20 | 79,872.00 | (48,931.90) | 305,989.40 |
| 1996 | 27,566.90 | 63,989.40 | 10,079.00 | 240,450.00 | 90,013.90 | 81,487.40 | (40,531.70) | 310,080.70 |
| 1997 | 27,970.50 | 37,201.30 | 10,360.00 | 288,496.20 | 112,921.20 | 89,869.80 | (40,033.60) | 347,046.20 |
| 1998 | 28,291.20 | 32,997.80 | 9,677.00 | 253,189.90 | 148,589.80 | 99,394.30 | (3,872.90) | 369,478.80 |
| 1999 | 28,067.00 | 78,408.60 | 9,428.00 | 381,913.50 | 197,865.80 | 227,441.10 | (70,258.10) | 397,983.80 |
| 2000 | 31,508.10 | 59,715.90 | 11,217.00 | 573,371.20 | 220,666.50 | 323,991.60 | (74,679.70) | 497,807.60 |
| 2001 | 36,199.20 | 132,612.20 | 14,726.00 | 618,890.50 | 201,292.70 | 498,613.10 | 28,094.20 | 533,201.40 |
| 2002 | 40,020.30 | 287,586.10 | 17,567.00 | 328,592.80 | 179,238.00 | 327,154.70 | 58,749.40 | 584,599.00 |
| 2003 | 41,918.20 | 576,935.30 | 8,165.00 | 110,390.80 | 157,971.30 | 355,360.00 | 129,459.80 | 669,480.50 |
| 2004 | 48,305.20 | 645,544.70 | 7,721.00 | 133,274.90 | 188,703.00 | 310,451.70 | 59,771.70 | 772,868.90 |
| 2005 | 54,746.20 | 625,039.10 | 10,115.00 | 331,273.10 | 208,092.30 | 366,468.30 | 46,378.60 | 909,176.20 |
| 2006 | 77,557.70 | 689,674.80 | 12,529.00 | 516,661.20 | 224,235.50 | 410,494.60 | (108,689.30) | 1,001,473.70 |
| 2007 | 82,598.00 | 850,521.10 | 15,120.00 | 460,752.70 | 278,350.30 | 408,415.90 | (68,357.20) | 1,210,569.10 |
| 2008 | 124,607.70 | 612,461.00 | 12,595.00 | 1,042,646.20 | 240,270.30 | 428,693.30 | (215,431.40) | 1,388,455.70 |
| 2009 | 166,246.60 | 755,208.70 | 13,012.00 | 1,199,879.70 | 379,973.20 | 747,727.50 | (258,791.50) | 1,507,801.10 |

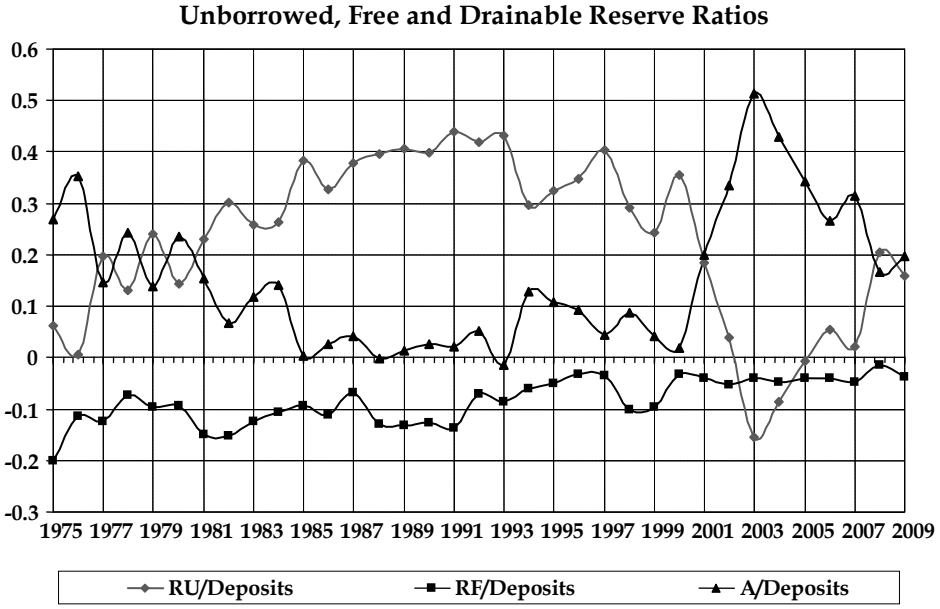
**Table-5(b): Reserve Money and its Components (Demand/Uses)**

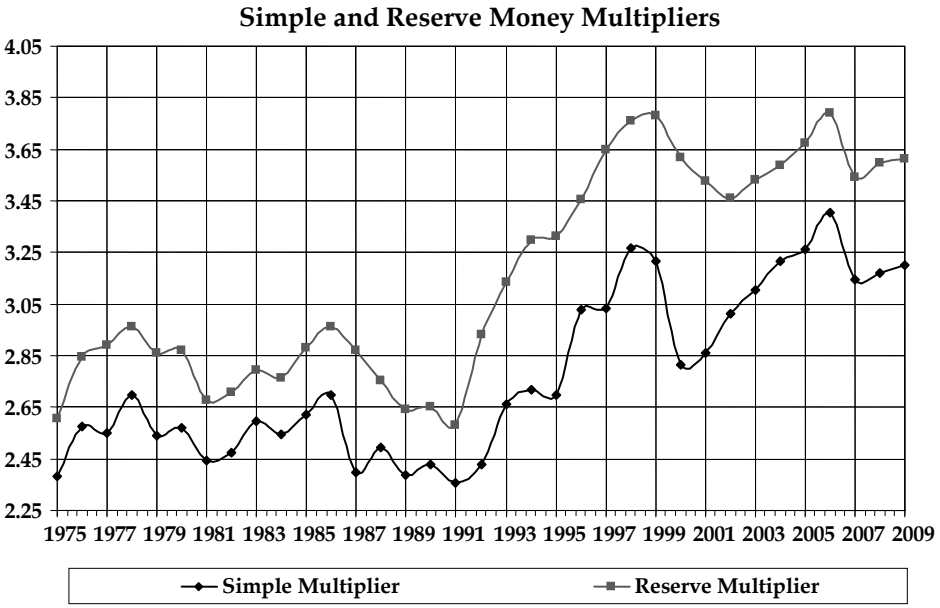
| Year | Currency in Circulation | Other Deposits | Required Reserves (DD) | Required Reserves (TD) | Deposits of NBFIs | Excess Reserves | Vault Cash | Reserve Money |
|---|---|---|---|---|---|---|---|---|
| 1985 | 56,701.70 | 742.00 | 3,674.26 | 3,691.65 | (825.80) | 2,178.89 | 4,087.10 | 70,249.80 |
| 1986 | 63,293.90 | 878.00 | 4,269.63 | 4,721.71 | (1,922.80) | 2,811.36 | 4,147.90 | 78,199.70 |
| 1987 | 74,765.50 | 1,102.00 | 4,722.42 | 5,370.64 | (2,348.40) | 11,984.15 | 4,623.20 | 100,219.50 |
| 1988 | 87,856.40 | 1,218.00 | 5,492.49 | 5,762.18 | (2,419.60) | 5,116.43 | 5,134.80 | 108,160.70 |
| 1989 | 97,996.80 | 3,132.00 | 6,035.63 | 6,171.27 | (3,110.50) | 6,749.91 | 4,983.70 | 121,958.80 |
| 1990 | 115,523.30 | 2,209.00 | 7,275.60 | 7,396.30 | (3,574.10) | 6,474.10 | 5,351.00 | 140,655.20 |
| 1991 | 136,999.40 | 3,114.00 | 8,533.25 | 9,196.25 | (2,582.50) | 7,280.50 | 7,339.00 | 169,879.90 |
| 1992 | 152,236.40 | 3,322.00 | 10,693.15 | 11,469.35 | (5,053.90) | 26,664.50 | 8,962.00 | 208,293.50 |
| 1993 | 166,864.90 | 4,449.00 | 12,311.45 | 13,960.00 | (7,501.80) | 22,473.55 | 11,301.00 | 223,858.10 |
| 1994 | 184,928.10 | 5,506.00 | 14,500.95 | 17,718.05 | (9,342.00) | 31,527.00 | 13,959.00 | 258,797.10 |
| 1995 | 215,579.60 | 5,055.00 | 16,918.80 | 20,916.45 | (9,511.20) | 40,667.75 | 16,363.00 | 305,989.40 |
| 1996 | 234,110.10 | 6,791.00 | 18,999.15 | 25,296.15 | (13,650.40) | 19,206.70 | 19,328.00 | 310,080.70 |
| 1997 | 244,140.90 | 7,135.00 | 19,960.15 | 29,118.25 | (11,806.70) | 40,677.60 | 17,821.00 | 347,046.20 |
| 1998 | 272,922.90 | 6,412.00 | 22,762.00 | 32,293.75 | (13,365.10) | 29,684.25 | 18,769.00 | 369,478.80 |
| 1999 | 287,716.90 | 6,212.00 | 25,902.95 | 33,918.15 | (15,150.10) | 40,513.90 | 18,870.00 | 397,983.80 |
| 2000 | 355,677.80 | 7,959.00 | 28,687.50 | 33,466.90 | (38,668.20) | 91,216.60 | 19,468.00 | 497,807.60 |
| 2001 | 375,465.80 | 11,292.00 | 30,655.85 | 36,358.85 | (20,696.40) | 80,947.30 | 19,178.00 | 533,201.40 |
| 2002 | 433,815.90 | 13,847.00 | 35,106.40 | 40,933.05 | (14,360.90) | 48,843.55 | 26,414.00 | 584,599.00 |
| 2003 | 494,576.80 | 3,499.00 | 43,858.65 | 46,158.20 | 912.70 | 50,060.15 | 30,415.00 | 669,480.50 |
| 2004 | 578,116.70 | 2,116.00 | 55,985.65 | 52,621.40 | 4,798.20 | 42,798.95 | 36,432.00 | 772,868.90 |
| 2005 | 666,056.90 | 3,355.00 | 66,350.85 | 63,489.45 | 8,210.30 | 58,251.70 | 43,462.00 | 909,176.20 |
| 2006 | 740,529.40 | 4,931.00 | 72,363.85 | 76,220.90 | 5,073.30 | 53,916.25 | 48,439.00 | 1,001,473.70 |
| 2007 | 848,773.50 | 7,012.00 | 211,867.46 | 17,470.53 | (2,264.40) | 78,095.01 | 58,072.00 | 1,210,569.10 |
| 2008 | 986,793.70 | 4,261.00 | 316,878.48 | 0.00 | (85,662.70) | 97,219.52 | 68,966.00 | 1,388,455.70 |
| 2009 | 1,160,536.20 | 4,662.00 | 184,586.15 | 0.00 | (12,835.10) | 93,845.85 | 77,006.00 | 1,507,801.10 |

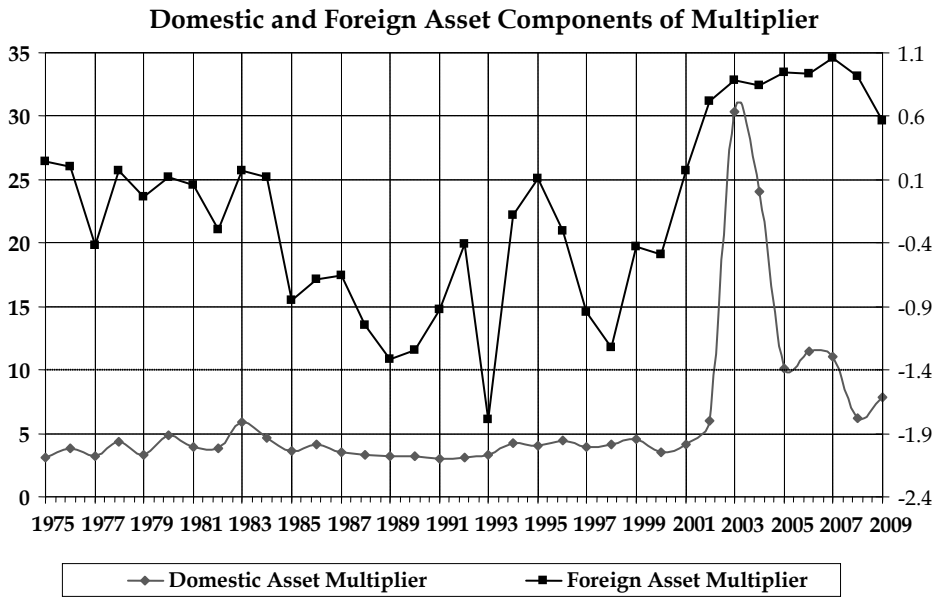
## Table-5(c): Reserve Money and its Components (Sources)

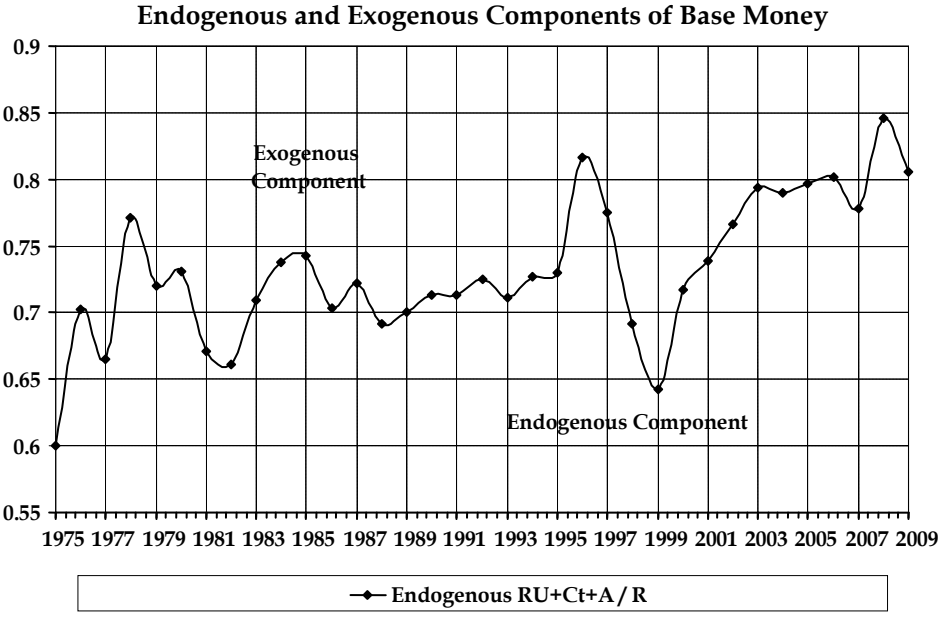
| Year | Treasury Currency | Borrowed Reserves | Discretionary Open Market Instruments | | Excess Reserves | Vault Cash | Net Free Reserves | Reserve Money |
|---|---|---|---|---|---|---|---|---|
| | | | Unborrowed Reserves | Drainable Reserves | | | | |
| 1985 | 2,937.00 | 18,065.30 | 48,712.00 | 535.50 | 2,178.89 | 4,087.10 | (11,799.31) | 70,249.80 |
| 1986 | 3,110.00 | 23,159.40 | 48,057.60 | 3,872.70 | 2,811.36 | 4,147.90 | (16,200.14) | 78,199.70 |
| 1987 | 3,359.00 | 27,811.20 | 62,282.40 | 6,766.90 | 11,984.15 | 4,623.20 | (11,203.85) | 100,219.50 |
| 1988 | 3,520.00 | 33,340.10 | 71,571.20 | (270.60) | 5,116.43 | 5,134.80 | (23,088.87) | 108,160.70 |
| 1989 | 5,877.00 | 36,547.70 | 77,006.60 | 2,527.50 | 6,749.91 | 4,983.70 | (24,814.10) | 121,958.80 |
| 1990 | 4,968.00 | 40,285.00 | 89,345.40 | 6,056.80 | 6,474.10 | 5,351.00 | (28,459.90) | 140,655.20 |
| 1991 | 5,892.00 | 48,785.00 | 110,186.90 | 5,016.00 | 7,280.50 | 7,339.00 | (34,165.50) | 169,879.90 |
| 1992 | 6,517.00 | 57,267.00 | 128,870.80 | 15,638.70 | 26,664.50 | 8,962.00 | (21,640.50) | 208,293.50 |
| 1993 | 7,663.00 | 64,577.00 | 156,565.30 | (4,947.20) | 22,473.55 | 11,301.00 | (30,802.45) | 223,858.10 |
| 1994 | 8,987.00 | 70,583.00 | 124,670.90 | 54,556.20 | 31,527.00 | 13,959.00 | (25,097.00) | 258,797.10 |
| 1995 | 8,331.00 | 82,668.00 | 161,562.40 | 53,428.00 | 40,667.75 | 16,363.00 | (25,637.25) | 305,989.40 |
| 1996 | 10,079.00 | 56,914.00 | 192,062.50 | 51,025.20 | 19,206.70 | 19,328.00 | (18,379.30) | 310,080.70 |
| 1997 | 10,360.00 | 77,999.00 | 233,548.60 | 25,138.60 | 40,677.60 | 17,821.00 | (19,500.40) | 347,046.20 |
| 1998 | 9,677.00 | 113,919.00 | 188,466.40 | 57,416.40 | 29,684.25 | 18,769.00 | (65,465.75) | 369,478.80 |
| 1999 | 9,428.00 | 142,147.00 | 210,191.20 | 36,217.60 | 40,513.90 | 18,870.00 | (82,763.10) | 397,983.80 |
| 2000 | 11,217.00 | 141,016.00 | 329,030.10 | 16,544.50 | 91,216.60 | 19,468.00 | (30,331.40) | 497,807.60 |
| 2001 | 14,726.00 | 139,367.00 | 182,203.10 | 196,905.30 | 80,947.30 | 19,178.00 | (39,241.70) | 533,201.40 |
| 2002 | 17,567.00 | 136,556.00 | 44,120.10 | 386,355.90 | 48,843.55 | 26,414.00 | (61,298.45) | 584,599.00 |
| 2003 | 8,165.00 | 137,882.00 | (224,879.90) | 748,313.40 | 50,060.15 | 30,415.00 | (57,406.85) | 669,480.50 |
| 2004 | 7,721.00 | 162,335.00 | (150,808.80) | 753,621.70 | 42,798.95 | 36,432.00 | (83,104.05) | 772,868.90 |
| 2005 | 10,115.00 | 185,068.00 | (12,170.90) | 726,164.10 | 58,251.70 | 43,462.00 | (83,354.30) | 909,176.20 |
| 2006 | 12,529.00 | 198,725.00 | 131,677.10 | 658,542.60 | 53,916.25 | 48,439.00 | (96,369.75) | 1,001,473.70 |
| 2007 | 15,120.00 | 269,109.00 | 61,578.10 | 864,762.00 | 78,095.01 | 58,072.00 | (132,941.99) | 1,210,569.10 |
| 2008 | 12,595.00 | 213,293.00 | 640,930.20 | 521,637.50 | 97,219.52 | 68,966.00 | (47,107.48) | 1,388,455.70 |
| 2009 | 13,012.00 | 293,641.00 | 538,484.40 | 662,663.70 | 93,845.85 | 77,006.00 | (122,789.15) | 1,507,801.10 |

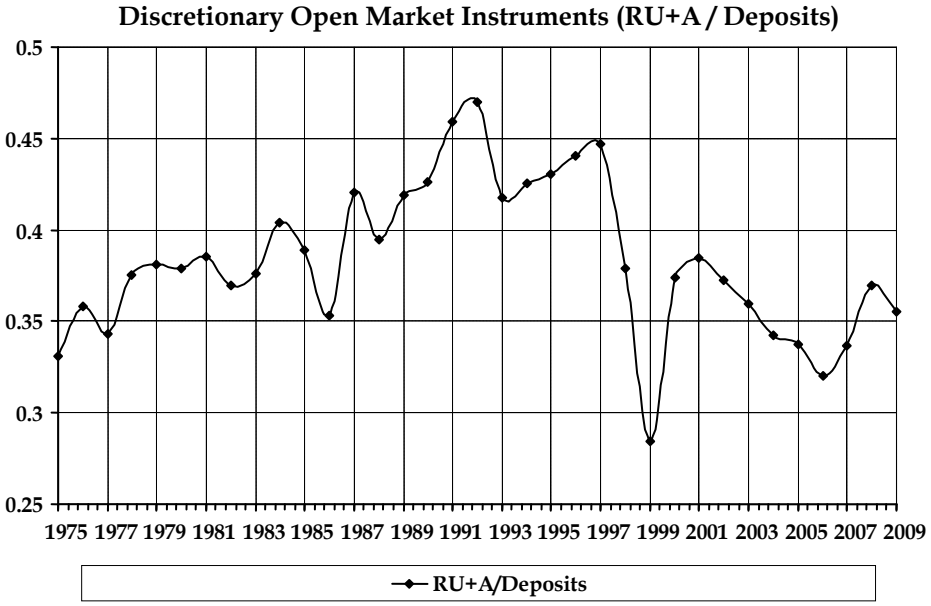
## Graphs of Selected Monetary Policy Indicators

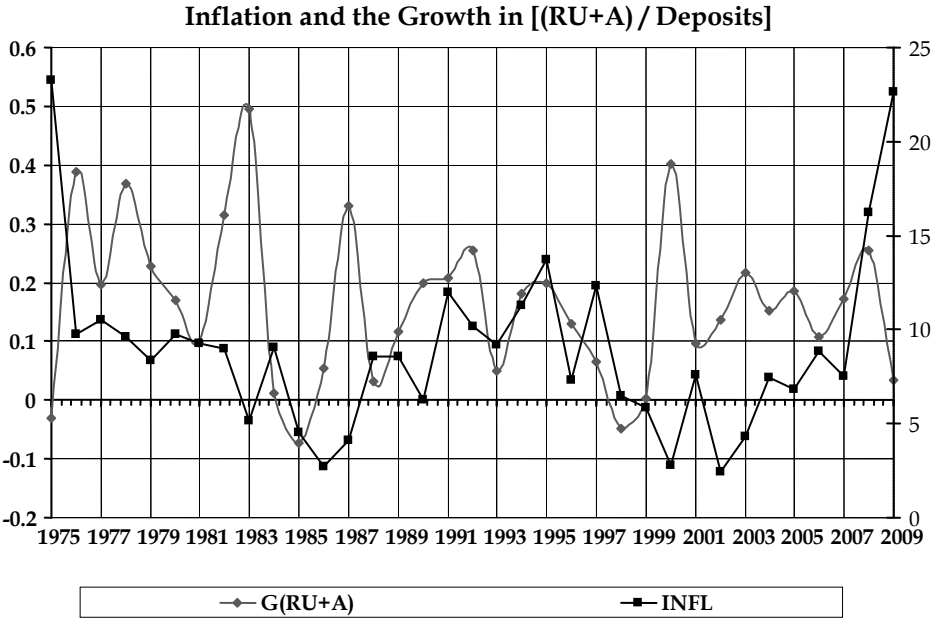


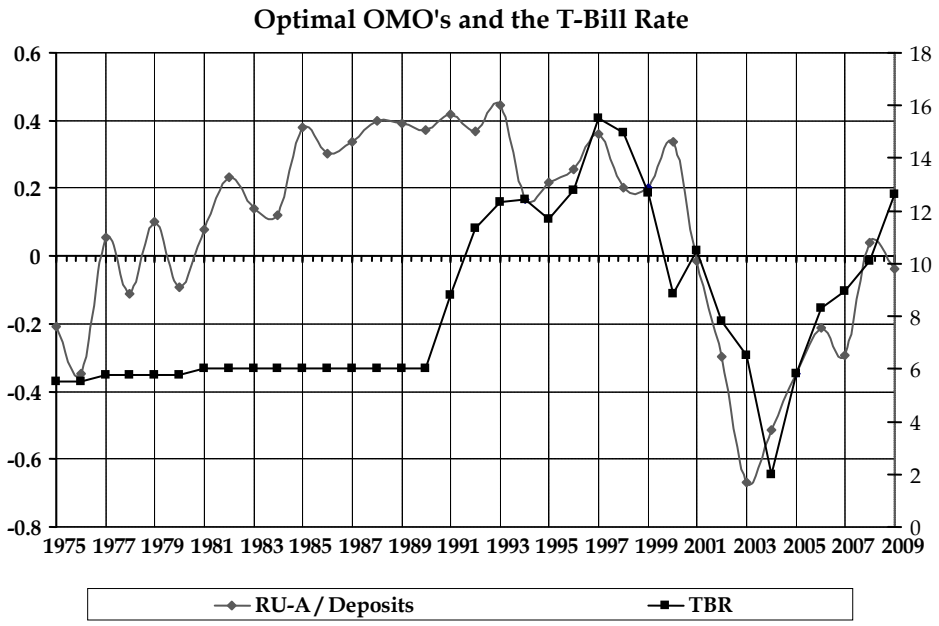



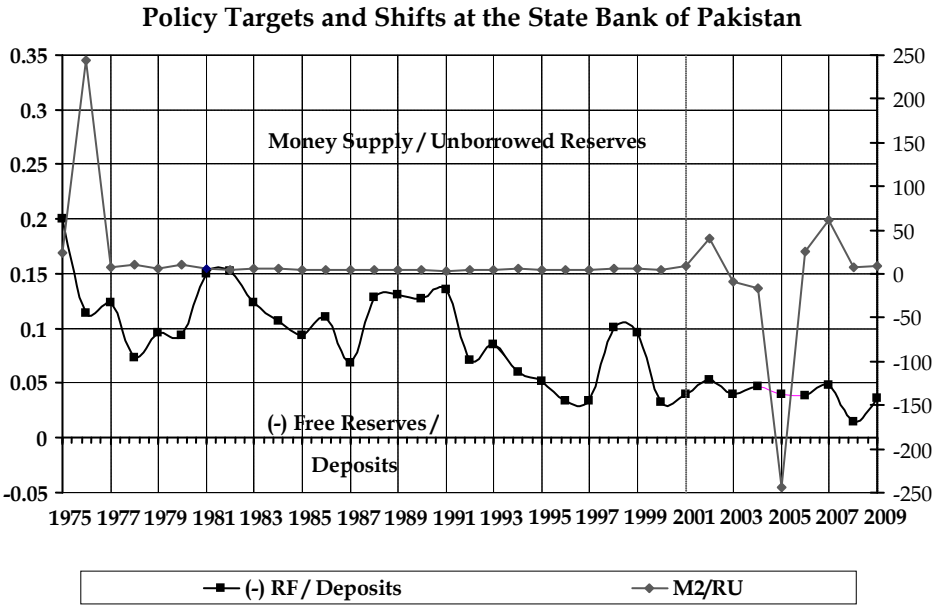

Domestic and Foreign Asset Components of Multiplier
35
30
25
20
15
10
5
0
1.1
0.6
0.1
-0.4
-0.9
-1.4
-1.9
-2.4
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
Domestic Asset Multiplier
Foreign Asset Multiplier


Endogenous and Exogenous Components of Base Money
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
Exogenous Component
Endogenous Component
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
Endogenous RU+Ct+A / R


Discretionary Open Market Instruments (RU+A / Deposits)
0.5
0.45
0.4
0.35
0.3
0.25
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
RU+A/Deposits


Inflation and the Growth in [(RU+A) / Deposits]
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
25
20
15
10
5
0
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
G(RU+A)
INFL


Optimal OMO's and the T-Bill Rate
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
18
16
14
12
10
8
6
4
2
0
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
RU-A / Deposits
TBR


Policy Targets and Shifts at the State Bank of Pakistan
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
250
200
150
100
50
0
-50
-100
-150
-200
-250
Money Supply / Unborrowed Reserves
(-) Free Reserves / Deposits
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
(-) RF / Deposits
M2/RU

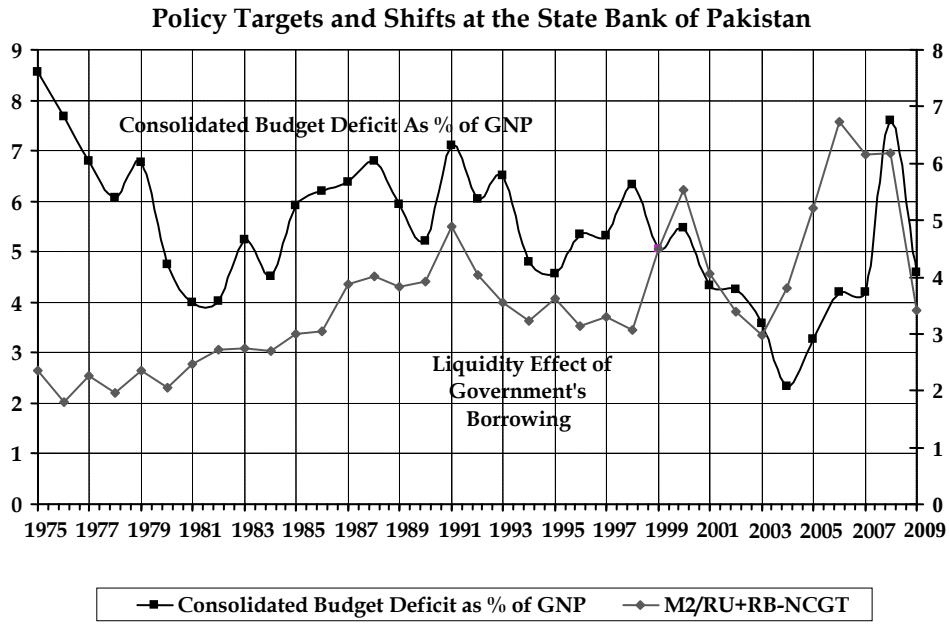

Policy Targets and Shifts at the State Bank of Pakistan
Consolidated Budget Deficit As % of GNP
Liquidity Effect of Government's Borrowing
0 1 2 3 4 5 6 7 8 9
1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
Consolidated Budget Deficit as % of GNP
M2/RU+RB-NCGT

**Table-6: Reserve Ratios Indicating the Historical Targets of Pakistan's Monetary Policy**

| Year | M2/RU | Criteria | Year | (-) RF/Deposits | Governor of SBP |
|---|---|---|---|---|---|
| 1979 | 6.00 | When a central bank targets unborrowed reserves, the ratio of money supply to unborrowed reserves remains constant | 1979 | 0.0960 | 8. A. G. N. Kazi |
| 1980 | 10.08 | | 1980 | 0.0934 | 8. A. G. N. Kazi |
| 1981 | 6.55 | | 1981 | 0.1494 | 8. A. G. N. Kazi |
| 1982 | 4.95 | | 1982 | 0.1522 | 8. A. G. N. Kazi |
| 1983 | 5.68 | | 1983 | 0.1240 | 8. A. G. N. Kazi |
| 1984 | 5.63 | | 1984 | 0.1067 | 8. A. G. N. Kazi |
| 1985 | 3.78 | | 1985 | 0.0931 | 8. A. G. N. Kazi |
| 1986 | 4.39 | | 1986 | 0.1102 | 8. A. G. N. Kazi |
| 1987 | 3.85 | | 1987 | 0.0682 | 9. V. A. Jaffrey |
| 1988 | 3.77 | | 1988 | 0.1279 | 10. I. A. Hanfi |
| 1989 | 3.78 | | 1989 | 0.1307 | 11. Kassim Parekh |
| 1990 | 3.82 | | 1990 | 0.1271 | 11. Kassim Parekh |
| 1991 | 3.64 | | 1991 | 0.1361 | 10. I. A. Hanfi |
| 1992 | 3.93 | | 1992 | 0.0704 | 10. I. A. Hanfi |
| 1993 | 3.80 | | 1993 | 0.0849 | 10. I. A. Hanfi |
| 1994 | 5.64 | | 1994 | 0.0596 | 12. Mohammad Yaqub |
| 1995 | 5.10 | | 1995 | 0.0514 | 12. Mohammad Yaqub |
| 1996 | 4.89 | | 1996 | 0.0333 | 12. Mohammad Yaqub |
| 1997 | 4.51 | | 1997 | 0.0337 | 12. Mohammad Yaqub |
| 1998 | 6.40 | | 1998 | 0.1010 | 12. Mohammad Yaqub |
| 1999 | 6.09 | | 1999 | 0.0956 | 12. Mohammad Yaqub |
| 2000 | 4.26 | | 2000 | 0.0328 | 13. Ishrat Husain |
| 2001 | 8.38 | The switch to free reserve targeting disturbs the unborrowed reserve ratio erratically | 2001 | 0.0398 | 13. Ishrat Husain |
| 2002 | 39.92 | | 2002 | 0.0530 | 13. Ishrat Husain |
| 2003 | (9.24) | | 2003 | 0.0395 | 13. Ishrat Husain |
| 2004 | (16.49) | | 2004 | 0.0472 | 13. Ishrat Husain |
| 2005 | (243.74) | | 2005 | 0.0394 | 13. Ishrat Husain |
| 2006 | 25.87 | | 2006 | 0.0391 | 14. Shamshad Akhtar |
| 2007 | 61.83 | | 2007 | 0.0483 | 14. Shamshad Akhtar |
| 2008 | 6.86 | Policy environment settles down | 2008 | 0.0150 | 14. Shamshad Akhtar |
| 2009 | 8.97 | | 2009 | 0.0363 | 14. Shamshad Akhtar |