8 PAYMENT AND SETTLEMENT SYSTEM

A payments system is the set of instruments, procedures and rules used by financial institutions to transfer funds among themselves, either on their own behalf or that of their customers.[1] An efficient and well functioning payment system infrastructure is essential in safeguarding financial stability and promoting economic activities in an economy. It reduces financial risks by increasing the reliability and speedy settlement of transactions, while also facilitating the effective implementation of monetary policy by strengthening its transmission mechanism. Central banks, in their capacity as custodians of the payment system infrastructure, thus have strong incentives to establish and ensure their smooth functioning.

The payment system infrastructure in Pakistan has gradually evolved from the traditional cash and paper-based modes of payments to a network of more sophisticated, technologically driven systems (**Box 8.1**). Although cash continues to be the dominant mode of settlement of payments, especially in rural areas, non-cash modes of payment have evolved and are increasing in volume over time. Until the late '90s, these instruments were mostly paper-based with 'cheques' being the most significant payment instrument for inter-bank as well as customer transactions, in addition to other instruments such as Pay Orders, Demand Drafts etc. However, substantial investment by the banking sector in IT infrastructure in recent years has gradually reduced the reliance on paper-based modes for settling payments. Specifically, electronic banking (e-banking) has gained popularity as the preferred retail payment instrument during the last decade, and is being used for a variety of transactions such as fund transfers, payments at merchant sites as well as utility bill payments etc. Similarly, implementation of the Real Time Gross Settlement (RTGS) system by the State Bank of Pakistan (SBP) has facilitated automation of large value transactions (inter-bank fund transfers as well as securities settlement), which previously relied primarily on traditional inter-bank multilateral clearing (on end of day basis) and carried the element of settlement risk due to the potential of delayed final settlement of transactions.

SBP is the primary payment system authority in the country, and is responsible for the design, oversight as well as regulation of the large-value payment system in Pakistan, as well as its interface with NIFT etc. SBP launched the RTGS for large value transactions by the name of the 'Pakistan Real Time Interbank Settlement Mechanism (PRISM)' in July 2008,[2] and is also actively involved in the monitoring and regulation of the retail payment system in the country, issuing guidelines from time to time. SBP's oversight of Payment Systems is governed by the State Bank of Pakistan Act, 1956, and the Payment Systems and Electronic Fund Transfer (PSEFT) Act, 2007.[3]

This chapter reviews the developments in Payment System transactions during FY10. Section 8.1 gives details of developments in the Retail Payment System, while section 8.2 focuses on large value payment system developments with a special focus on PRISM. Section 8.3 concludes the chapter.

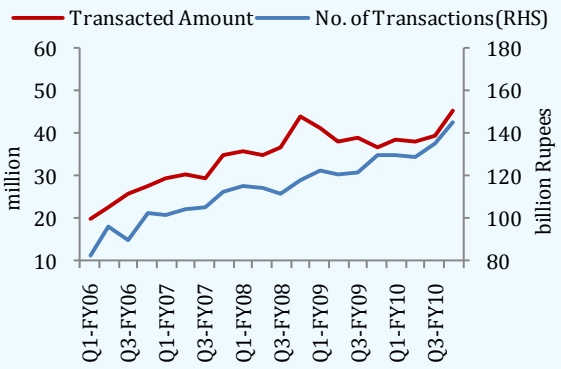
8.1 Retail Payment System

The Retail Payment System (RPS) in Pakistan has undergone notable changes in recent years due to the growing role of electronic or e-banking as a mode of payment, especially for low value transactions. Although the currency in circulation to deposit ratio increased during FY10 and cash continues to be the preferred mode of payment (especially for individuals and

[1] As defined by Bank of Canada.
[2] Details in Chapter 10, FSR 2008-09.
[3] Details in Chapter 12, FSR 2007-08.

in rural areas), the number of retail transactions (paper-based and electronic) increased to 538.9 million in FY10, compared to 495.1 million in FY09 (**Figure 8.1**). In tandem with the number of transactions, the value of transactions also increased to Rs 161.1 trillion during FY10, as against Rs 155.4 trillion during FY09. These developments are an encouraging sign for the progress of an efficient payment system, as non-cash (paper-based and electronic) retail transactions are less costly and quicker to process as compared to cash-based transactions. Cash transactions require manual counting, verification of notes and storage arrangements, which increases the transaction time and cost. Additionally, deterioration in the law and order situation has increased the risk of theft/looting of currency notes. However, despite these risks, cash transactions are preferred by people due to a number of reasons including lack of customer awareness, limited access to other means of payments due to low financial penetration, issues related to tax evasion, preference to avoid documentation of transactions etc.

Figure 8.1: Retail Transactions Trends



Source: Payment System Department, SBP

Within non-cash transactions, the number of electronic transactions increased YoY by 22.9 percent during FY10 to 196.3 million, while over the same period paper-based transactions registered a marginal increase of 2.2 percent to 342.6 million. The impact of these differences in growth rates is clearly visible from the increasing share of

Box 8.1: Payment System Network in Pakistan

Payment system transactions in Pakistan are mainly dominated by: (1) direct inter-bank fund transfers, (2) cheque clearing for inter-bank settlement and (3) securities settlement (government as well as corporate). These transactions are handled by three types of different systems in place which together form the payment systems infrastructure. These are (1) Pakistan Real-Time Interbank Settlement System (PRISM), (2) National Institutional Facilitation Technologies (NIFT) and (3) Central Depository System (CDS).

Direct inter-bank fund transfers and government securities settlement are executed through banks' cash and securities settlement accounts with SBP and have been entirely transferred to PRISM. These are reviewed in detail in section 8.2.

Cheque clearing for inter-bank settlement has been entrusted to NIFT which is a semi-automated clearing house. It was established in 1995 as a consortium of 6 commercial banks[1] and a private sector firm and offers same-day clearing (express–2 hours clearing service), inter-city clearing, and inter-branch and inter-bank clearing services. As of October 2010,[2] NIFT is operating with 20 data centers which provide services to 5,571 branches (i.e. over 90 percent of on-line branches) of 40 commercial banks in 20 major cities and adjoining 164 industrial and commercial towns. Importantly, NIFT is being used for cheque clearing for inter-bank settlement on centralized and consolidated basis, and has remained instrumental in ensuring same day settlement of critical payments across the country.

Corporate securities settlement in Pakistan is carried out through the Central Depository System (CDS) which is operated by the Central Depository Company (CDC), and maintains accounts of both its members and their customers in book entry form. This book entry system ensures dematerialization of securities abolishing the need for physical exchange of paper based securities. CDS is used to settle almost all the transactions carried out in the stock exchanges for both equity as well as bonds. Importantly, clearing of these transactions is done through the fully automated electronic system namely National Clearing and Settlement System (NCSS) which is operated by the National Clearing Company of Pakistan Limited (NCCPL), the only clearing company for corporate securities in Pakistan.[3] NCCPL sends the shares settlement instructions to CDC (after calculating the net obligations of its members), and settlement instructions for the cash leg to the settlement banks.[4]

[1] These are: Habib Bank Limited, MCB Bank Limited, National Bank of Pakistan, United Bank Limited, Allied Bank Limited, and First Women Bank Limited.
[2] Source: NIFT website.
[3] It replaced the individual clearing houses of three stock exchanges since 2001, with a view to centralize the clearing and settlement of corporate securities.
[4] These are designated as settlement banks by NCSS. Currently there are 14 settlement banks for corporate securities clearing.

electronic transactions in the total number of transactions (**Figure 8.2**), which is primarily attributed to the improving infrastructure of e-banking, SBP's efforts to create an enabling policy environment, and launch of innovative products by banks.

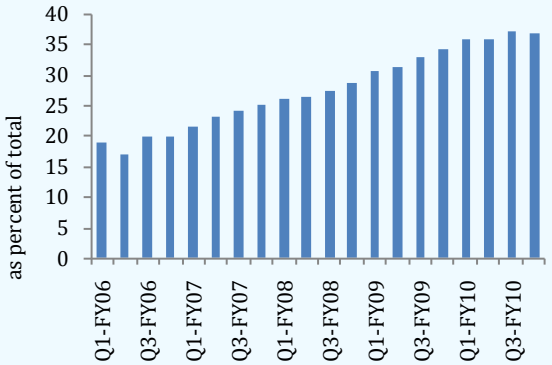
Despite these developments, the non-cash means of payment is still dominated by paper-based transactions which constituted 63.6 percent of the total transactions during FY10, though its importance is gradually declining. Notably, the value of paper-based transactions accounts for around 89.2 percent of the total amount of non-cash transactions (**Figure 8.3**). This relatively higher share of paper-based transactions in the total value compared to its share in the total number of transactions indicates that paper-based transactions are of a larger value as compared to electronic transactions. The average size of transactions also highlights this fact (**Figure 8.4**), at more than 4 times the average size of an electronic transaction. These trends suggest that the electronic means of payments are primarily used by individuals, while paper-based transactions are the preferred modes of payment for businesses.

The rest of this section reviews the composition of paper-based and e-banking services offered by the banking sector.

8.1.1 Paper-based Transactions

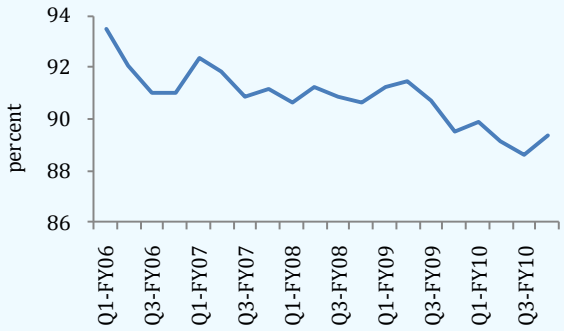
Cheques remain the most popular paper-based instruments used for cash withdrawals, funds transfer and clearing, while other instruments include pay orders, demand drafts and telegraphic transfers. The composition of paper-based instruments indicates that cheques written for cash withdrawals accounted for 46.0 percent of the total paper-based transactions in FY10 (**Figure 8.5**), and that all cheque-based transactions (withdrawals, transfer and clearing) accounted for nearly 93.3 percent of all paper-based transactions. In terms of the amount, the value of these transactions at Rs 125.7 trillion (8.7 times the GDP for FY10) was around 87.0 percent of the total value of paper-based transactions during the year. These statistics highlight the importance of paper-

Figure 8.2: Share of Electronic Transactions



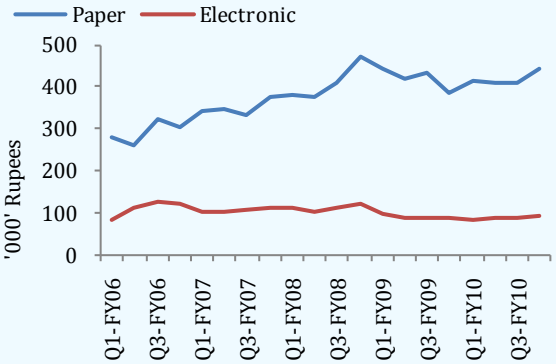
Source: Payment System Department, SBP

Figure 8.3: Share of Paper Based Transactions in Total Value of Non-Cash Transactions



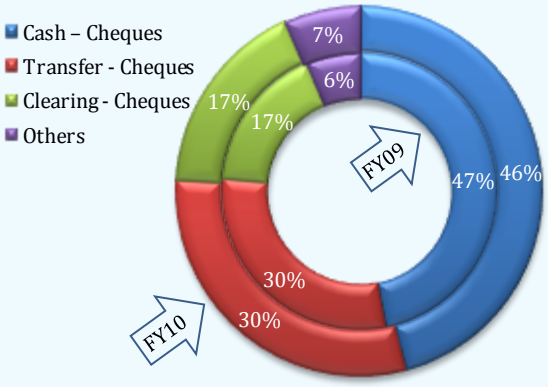
Source: Payment System Department, SBP

Figure 8.4: Average Size of Transaction



Source: Payment System Department, SBP

Figure 8.5: Composition of Paper Based Transactions



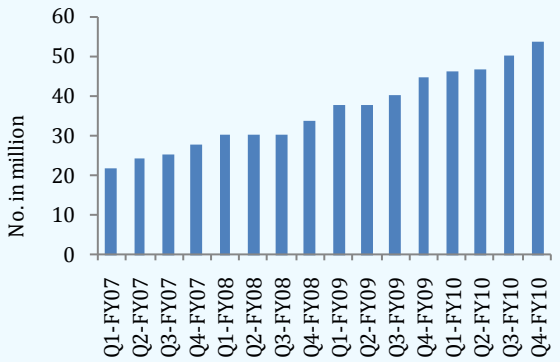
Source Payment System Department, SBP

based instruments in the functioning of payment systems.

8.1.2 E-banking Activities

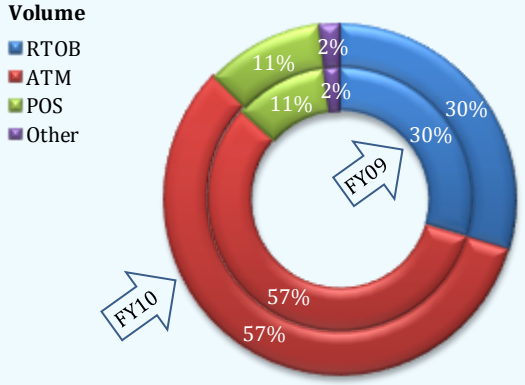
E-banking has grown tremendously in recent years. Considerable improvement in the e-banking infrastructure and activities during FY10 is a continuation of recent trends. The quarterly number of electronic transactions reached 53.4 million by Q4-FY10 as compared to 28.0 million in Q4-FY07, almost doubling in the last three years (**Figure 8.6**). This clearly reflects the increasing use of e-banking services in the payment system infrastructure. This is an encouraging development as e-banking facilities provide a viable solution for expanding the outreach of financial services to remote areas.

Figure 8.6: Quarterly Trends in Electronic Transactions



Source: Payment System Department, SBP

Figure 8.7: Components of Electronic Transactions by Volume



Source: Payment System Department, SBP

The composition of electronic transactions indicates that ATM-based transactions account for over 50.0 percent of total electronic transactions, and that the share of these transactions is gradually increasing over time (**Figure 8.7**). This rise is attributable to both the increasing number of ATM card holders and the number of financial services offered through ATMs. Real Time Online Banking (RTOB) transactions are the second largest component of electronic transactions, with a share of 30.9 percent in FY10. Transactions at POS terminals/machines account for nearly 8.0 percent of total electronic transactions, while transactions through internet, mobile banking and call centers constitute only 2.2 percent of financial transactions.

Real Time Online Banking

Banks in Pakistan have made consistent efforts since the early 1990s to automate a number of banking services to improve their operational efficiency and provide real time online banking services to their customers. However, the real impetus to these activities came in the recent past (2004 onwards) during which period the banking sector witnessed unprecedented growth in line with the boom in economic activities. Notably, the number of online branches, a prerequisite for RTOB, reached 6,671 by end-FY10 as against only 322 at end-FY00 and 1,738 at end-FY04.

Table 8.1: Trends in Real Time On-line Banking

	FY07	FY08	FY09	FY10
No. of On line Braches	4,179	5,282	6,040	6,671
No. of Transactions '000'	30,731	36,855	47,279	60,615
Transactions 'bln. Rs'	10,090	13,317	13,538	16,202
Avg. Size of Trans. '000 Rs'	328.3	361.3	286.3	267.3
Avg. Transactions/day '000'	84.2	101.0	129.5	166.1

Source: Payment System Department, SBP

As of end-FY10, the number of online branches constituted 73.3 percent of total bank branches. All these branches offer RTOB facilities including cash withdrawals, deposits and funds transfer. Recent data on RTOB indicates that the number of transactions has witnessed a YoY increase of 28.2 percent during FY10 to reach 60.3 million (**Table 8.1**). The value of these transactions was Rs 16.2 trillion, which is 19.7 percent higher than their value in the

previous year. The accelerated improvement in volume in comparison to value of transactions has resulted in a decline in average size of transactions to Rs 268,053 in FY10 as against Rs 286,343 in the previous year. Despite this decline, the relatively large size of an average RTOB transaction indicates that this facility is primarily used by the corporate sector.

ATMs

ATMs offer a wide range of round the clock retail banking facilities across the country. The major facilities include cash withdrawals, bill payments, fund transfers, payment of utility bills, cash deposits, balance inquiry, cheque book request, mini account statements etc. **Table 8.2** shows that the number of ATMs operating in the country increased by 466 during FY10 (to reach 4,465), which is slightly lower than the increase of 476 ATMs during FY09.

Table 8.2: Trends in ATM Transactions

	FY07	FY08	FY09	FY10
No. of ATMs	2,293	3,121	3,999	4,465
No. of Transactions '000'	51,511	67,912	91,126	115,677
Transactions 'bln. Rs'	316.2	4,53.0	668.5	905.0
Avg. Size of Trans. Rs	6139	6670	7328	7816
Avg. Transactions/day '000'	141.1	186.1	249.7	316.9

Source: Payment System Department, SBP

Concurrent to these developments, the number of ATM transactions has also risen from 91.1 million in FY09 to 115.7 million in FY10. On average, each ATM executed 74 transactions in a day during FY10, compared to 71 for FY09. The average value per ATM transaction has also gradually increased to Rs 7,816 as against Rs 7,328 in FY09. This increase is attributable to both the provision of funds transfer facilities by using ATMs and increased cash requirements due to the persistently high level of inflation.

The composition of ATM transactions reveals that ATMs are primarily used for cash withdrawals and account-related information transactions, as the share of other services including funds transfer, cash deposits and utility bills payment was only 3.0 percent in the total number of transactions. Specifically, funds' transfer transactions conducted through ATMs were only 2.9 million during FY10 with an average value of Rs 55,045. However, YoY growth of 39 percent in these transactions during FY10, with the already impressive rise of 139 percent in FY09, is an indication of the increasing reliance on ATMs for this facility.

Cash deposit facility through ATMs has yet to take off in a real sense as this facility is not available on all the ATMs. Only a few banks offer this facility by using an envelope or single/bunch note-acceptor mechanism. The activities on this front indicate that only 28,270 cash deposit transactions worth Rs 273.4 million were executed during FY10. In terms of the total volume of ATM transactions, these constitute just 0.02 percent. The use of this facility is expected to rise at a gradual pace as customers are generally reluctant to use it due to lack of technical know-how and fear of losing money due to machine errors.

The use of ATMs for the payment of utility bills is also a relatively new facility, but it has witnessed significant surge during the past year. A total of 140,097 bill payment transactions were made during FY10, up from 44,087 in FY09. The value of these transactions was Rs 205.9 million, indicating an average size of Rs 1,470. However, the use of this facility is expected to increase as each household has to pay at least three utility bills during a month.

Point of Sales (POS) Transactions

E-banking facilities help in executing payments at different merchant locations across the country. As of end-June FY10, 52,049 POS machines/terminals were operating throughout the country. The number of credit and debit cards utilized for POS transactions over the same period was 1.7 million[4] and 8.1 million respectively. The number of transactions

[4] This also includes 1,239 shariah-compliant credit cards.

executed on POS terminals decreased YoY by 14.3 percent during FY10 to 15.6 million, while the value of these transactions decreased YoY by 15.1 percent to Rs 75.7 billion in FY10 (**Table 8.3**).

Other Channels of E-Transactions

In addition to the facilities reviewed above, the banking sector also offers phone banking, internet banking, mobile banking and internet merchant banking facilities. The use of all these facilities is still limited as the cumulative number of such transactions was only 2.2 percent of total electronic transactions in FY10. Some of the developments in these modes of transactions are:

Table 8.3: Trends in POS Transactions

	FY07	FY08	FY09	FY10
No. of Transactions in '000'	15,589	17,485	18,280	15,673
Amt. of Transactions 'bln Rs'	53.7	68.8	89.6	75.4
Avg. Size of Trans. Rs'	3,447	3,937	4,901	4,810
Avg. Transactions Per day'000'	42.7	47.9	50.1	42.9

Source: Payment System Department, SBP

- Internet banking facilitates payments and electronic fund transfer facilities. This facility is primarily available for intra-bank account to account transfer of funds. The data for the last quarter of FY10 indicates that 0.9 million transactions worth Rs 35.1 billion were executed using this channel.
- A few banks are also offering financial services through the Call Center/Interactive Voice Response mechanism. Banks executed 0.23 million such transactions during Q4-FY10, with a value of only Rs 1.7 billion.
- Some of the banks in Pakistan are offering limited mobile banking facilities including payment through mobile phones, account to account funds transfers and utility bills payments. Banks executed 371,050 such transactions during FY10, worth Rs 1.8 billion.
- Banks also facilitate customers to open internet merchant accounts as part of the Internet Merchant Banking facility. There were only 20 internet merchant accounts as of end-FY10, which are used by the services sector and NGOs. In FY10, the banking sector executed 39,660 transactions through this channel, worth Rs 354.9 million.

Cross Border E-banking Transactions

E-banking offers cross-border transaction facilities to customers through ATMs, POS terminals and Internet banking. POS terminals have a dominant share of these transactions. Specifically, the rupee value of POS transactions was 52.1 percent of inward remittances (inflow of money) through the e-banking channel and 75.9 percent of outward remittances (outflow of money) in FY10. In absolute terms, the inflow of money on account of cross-border e-banking transactions was Rs 29.0 billion in FY10 as against an outflow of Rs 16.6 billion.

Internet transactions also include purchase of goods and services from foreign/local internet merchants. Inflow of money on these transactions was only Rs 0.3 billion during FY10 compared to outflow of Rs 1.7 billion. Finally, the inflow of money on ATM transactions was Rs 13.6 billion during FY10 against outflow of Rs 2.2 billion.

Although the share of these transactions is minuscule in the total value of electronic transactions, cross-border transactions are likely to increase as trade activities are expected to strengthen given that the prospects for global economic revival are encouraging.

While the increasing number of e-banking activities helps in improving the operational efficiency of the banking system and extending outreach of banking services to remote areas, these activities add another dimension to the risk profile of the banking sector. Specifically, the expanding use of e-banking services increases banks' reliance on third-party information services providers, which can significantly impact information security risk. It may be noted

that the specific nature of information security risks varies according to the nature of transaction. There is a lower probability of risk from informational transactions (like balance inquiry, mini statement, request for cheque book etc), while the risk can be relatively higher for transactional services. Notably, information security risk also varies according to the delivery channel used, given that it has a higher probability of occurrence in internet banking as compared to transactions conducted through different kinds of cards. In case of internet banking, the network is universally accessible and banks are exposed to viruses, hackers, insider attacks, data theft, data destruction etc. The high speed of technological change also tends to increase such risks.

Besides adding new risks, the increasing number of e-banking activities also intensifies the degree of traditional risks faced by banks. The use of e-banking tends to impact banks' liquidity risk by potentially increasing the volatility in banks' assets and deposits. Similarly, poorly executed e-banking activities can add to reputational risk. Being cognizant of all these issues, both the SBP and the banks have strived to minimize risks related to e-banking services. Moreover, the government has promulgated the Payment Systems and Electronic Funds Transfer Act, 2007 to provide legal backing to e-banking services. As mentioned earlier, SBP has also issued operational guidelines for ATMs and credit card business in Pakistan. These guidelines set forth the minimum operational standards and help in managing risks related to e-banking services.

8.2 Large Value Payment System in Pakistan: Modalities and Operations of PRISM

A large value payment system is generally associated with payment activity for high-value and critical transactions, and primarily deals with inter-bank fund transfers, third-party payments by banks on behalf of major corporate clients as well as securities settlement. The significance of transactions being settled through large value payment system can be gauged from the fact that the average value per transaction settled in PRISM under this category amounted to Rs 248.1 million as against the average amount per retail transaction at Rs 299,000 in FY10.

In general, a large value payment system can either work on a Real Time Gross Settlement (RTGS) basis or a Deferred Net Settlement (DNS) basis. RTGS is a gross settlement system in which both the processing and final settlement of funds transfer instructions takes place continuously (i.e. in real time). This mechanism is in contrast to the DNS, where the settlement of payment obligations takes place on net, end-of-day settlement basis. RTGS systems are being adopted by a significant number of economies due to their contribution in limiting settlement and systemic risks in the financial sector payment processes (**Box 8.2**). However, adopting RTGS has its downside given its increased reliance on liquidity since the settlement of payments on gross basis implies that banks might need substantial balances in their settlement accounts. Also, real time settlement implies that banks might be in need of funds at any point during the entire day. This entails some further arrangements on the part of the payment system authority to address liquidity shortages, which are more an externality of the newly adopted system rather than an indication of the actual liquidity situation in the market. Not only do such arrangements have a bearing on the smooth functioning of the RTGS, but also go a long way in ensuring the stability of the financial sector by instilling confidence in the banking system. In case of Pakistan, SBP has issued detailed PRISM Operating Rules[5] to streamline the use of the system.

PRISM is owned and operated by State Bank of Pakistan (SBP), which governs its operational as well as regulatory aspects. Its implementation is being carried out in a phased manner, to

[5] RTGS Circular No. RTGS/54/82 (7) dated March 9, 2009.

Box 8.2: Transition to RTGS

Historically, inter-bank transactions were settled using Deferred Net Settlement Systems (DNS). These systems generally worked on end of day settlement basis, where payment obligations of financial institutions were netted against each other and the balance was exchanged on bilateral or multilateral basis. DNS had the advantage of less reliance on available liquidity, and as a rule of thumb, needed $1 to settle $100 of gross payments, thereby economizing the use of banks' settlement balances. But due to the inherent risks in this form of settlement and the associated credit risk, the system was not very reliable. As financial innovation and increased economic activity lead to a surge in the number as well as the value of transactions, there was a proportionate increase in the risks involved. This resulted in a shift towards real time gross settlement systems (RTGS) where transactions are settled as and when they arise, thereby curtailing the element of settlement risk. Transactions executed in RTGS are final and irrevocable, and hence if a financial institution defaults on its obligations later during the day, those who have received payments from that bank will remain unaffected. This implies that systemic risk is eliminated due to finality of settlement balances shifted.

Developments in the field of IT have facilitated a feasible transition to RTGS. Initially the pace of implementation of RTGS was very slow, with the number of central banks using RTGS increasing from 3 in 1985 to 15 in 1995. Pioneering central banks were Federal Reserve Bank, Danish National Bank, Dutch Central Bank and the Riks Bank (Sweden). In the 1990s, mostly industrialized countries adopted the system. Since then however, RTGS has become the preferred mode of settling payments for central banks all over the world. According to a World Bank survey on payment system practices conducted in 2008, 112 out of 142 central banks surveyed had adopted RTGS as a large value settlement system by March 2008.

Source: Bech and Hobijn,(2007) & World Bank, (2008).

ensure smooth transition for the participants to the new system and to allow SBP to: (1) carefully monitor the situation for any potential problems, and (2) provide necessary support to the users, in case some problem arises. In the initial phase, the inter-bank fund transfer facility was made operational on July 1, 2008 whereas the online securities settlement facility for Government Securities was added on in August 2008. As the system stabilized, SBP introduced additional features such as the Intra-day Liquidity Facility[6] (ILF), SBP's internal transactions[7] (export refinance settlement, auction/OMOs settlements, foreign exchange transactions etc.), clearing batches received from NIFT and access to stock exchange members through their settlement banks. In general, the system continues to evolve over time to make use of all the facilities inbuilt in the main RTGS application (**Box 8.3**).

This section reviews the operational performance of PRISM in settlement of large value transactions during FY10, besides exploring the impact of PRISM implementation on banks' liquidity needs and relevant policy actions taken by SBP.

8.2.1 Major Operations of PRISM

Since its launch in July 2008, PRISM has been used extensively and has processed 530,056 transactions amounting to more than Rs 135 trillion, as of end-FY10 (**Figure 8.8a**). During FY10, the system settled 293,644 transactions against 236,412 transactions during FY09, exhibiting an increase of 24.2 percent. The total amount settled through PRISM also increased by 17.1 percent to Rs 72.8 trillion, up from Rs 62.2 trillion in the previous year. Importantly, the volume as well as value of transactions executed in the first two years, points to the scope as well as the significance of a large value payment system in the economy. For FY10 specifically, the amount settled through PRISM was 5.7 percent of the GDP. Average daily volume of transactions stood at 965 approximately, with daily average settled amount at Rs 239 billion approximately (**Figure 8.8b**).

[6] As discussed in section 10.2, Chapter 10,Payment and Settlement System, Financial Stability Review 2008-09.
[7] These are currently being executed fully through RTGS.

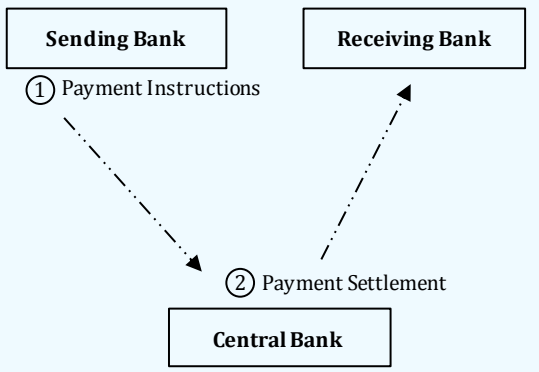
Box 8.3: Operational Features of PRISM

Since its inception in July 2008, PRISM has evolved into the core component of the large value payment system infrastructure in the country. However, PRISM in its current form is not solely a large value payment system since there is no minimum threshold for the amount of transactions being settled through the system. Following are some of the modalities of PRISM.

- Types of Participants
  All the financial institutions with access to PRISM are Direct Participants on mandatory basis, while those who do not have a settlement account with SBP can use the facility by becoming sub-participants of a specific Direct Participant (by designating any Direct Participant as their settlement agent). Further, participants who have a settlement account with SBP but do not have access to PRISM can become Indirect Participants whereby their transactions are executed and settled through the Service Bureau(a facility set up at SBP premises with a view to execute transactions on participants' behalf) as per their instructions. Currently there are 42 direct participants of PRISM which include all the commercial banks, 4 Development Finance Institutions (DFIs),[1] and 1 microfinance bank.[2]
- RTGS Applications
  Participants can execute their transactions using two applications which are: (i) RTS/X for cash transactions (also called cash module) and (ii) Depo/X for securities transactions (also called CD-Holdings module of PRISM).
- Nature of Transactions
  Although the system was created for large value transfers, currently no minimum threshold level has been set for the value of payment obligations to be settled. In future however, when participants will be allowed to execute transactions on behalf of their customers, the volume of transactions may require a minimum threshold.
- Priority Setting
  Participants can assign different priority levels to their transactions based on the criticality of transaction. Payments due to SBP, for clearing purposes or DvP transactions, are assigned priority levels from 1 to 9 while transactions by participants can be assigned priority levels from 10 to 99, and the latter can also be reprioritized by the participant which initiated the transaction. Transactions with SBP are given due weightage in the system and participants cannot change the priority level for transactions with SBP.
- Queue Management
  In case of insufficient funds, the system holds the transactions in a queue until requisite funds become available from some other source. These transactions are released from the queue on the availability of funds on a First in First out (FIFO) basis, within assigned priorities. Participants can manage their fund transfer queues by reprioritizing the execution of their transactions depending upon availability of funds and criticality of transactions.
- Gridlock[3] Resolution
  Since transactions in real time and gross basis are not synchronized, with payments of one bank being receipts of another, the system can potentially experience gridlocks in case of insufficient funds in the payer's account at any point in time, as queues get piled up in a significant amount. These gridlocks can be resolved by applying the in-built gridlock resolution mechanism, which has the ability to offset or re-prioritize the queued transactions. It works by pooling the pending payments together in a central processor, and looks for set of payments which could be settled simultaneously (essentially the idea behind this is netting of the mutual obligations) and settles them as soon as they appear. Gridlock resolution mechanism, can be activated (manually or automatically) by setting a number of parameters like value, volume etc of payments in queue. For PRISM, the gridlock resolution mechanism is being used manually whereby SBP has the authority to apply this mechanism if it feels the need.
- Finality and Irrevocability of Transactions and Settlements
  Transactions in PRISM are deemed final and irrevocable once the system has executed both legs of transactions (which are done simultaneously), and payer and payee have received debit and credit confirmation respectively. Finality of payments settled in PRISM are protected under the Payment Systems & Electronic Funds Transfer Act, 2007.[4] Hence, the participating financial institutions are themselves responsible to ensure that all transactions being processed through the system are legitimate, and SBP under no circumstances would amend any transactions on behalf of participants.
- Message Flow Design
  PRISM employs the "V" design of message flow, whereby the central bank settles the transaction after receiving full details from the paying bank. Receiving bank gets the confirmation only after the payment has been settled (**Figure 1**). This implies that the bank receiving payment will only be able to utilize its funds once the transaction is settled, thereby reducing the liquidity risk associated with advance use of receivable funds.

- Connectivity
  SBP is using both wired as well as wireless media of communication to connect the participants with each other and SBP.
- Confidentiality
  Confidential nature of information calls for use of state of the art cryptographic facilities in the system as well as message validation mechanism.
- Service Bureau
  SBP has also set up a service bureau which can be used by PRISM participants in case they experience any issue with using the network or the RTGS application. Currently this facility is working under operational guidance from the main RTGS setup, but in future it will be operationally segregated from the RTGS office.

Figure 1: "V" Design of Message Flow Structure



[1] Pak Kuwait Investment Company, Pak Oman Investment Co., Pak Libya Investment Co., and Saudi Pak. Industrial & Agricultural Investment Co.
[2] Tameer Microfinance Bank.
[3] "A situation that can arise in a funds or securities transfer system in which the failure of some transfer instructions to be executed (because the necessary funds or securities balances are unavailable) prevents a substantial number of other instructions from other participants from being executed": BIS CPSS, 2003.
[4] http://www.sbp.org.pk/psd/2007/EFT_Act_2007.pdf

Figure 8.8a: PRISM Activities

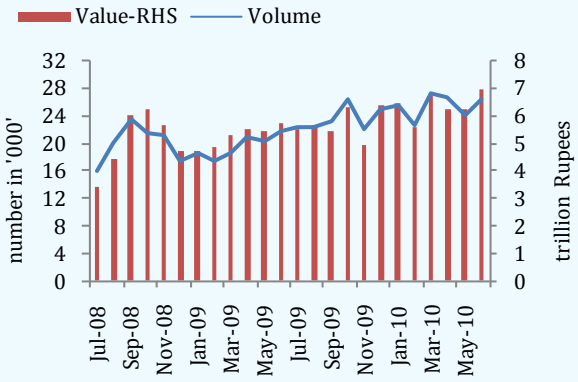
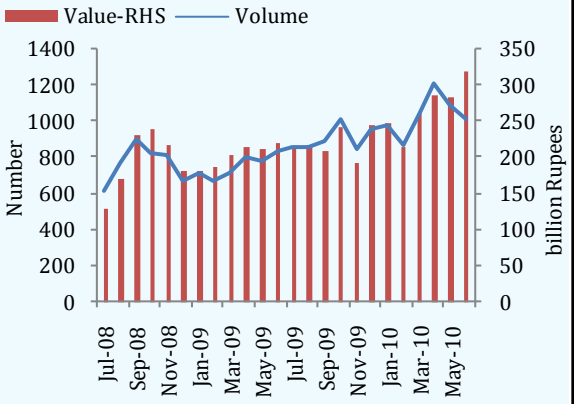


Figure 8.8b: Average Daily Transactions in PRISM



Source: Payment System Department, SBP

PRISM has been designed to handle all large-value payments as well as transactions related to settlement of government securities. The 'payment component' of PRISM settles payments for the purpose of inter-bank fund transfers, the cash leg of securities market transactions, and net settlement positions of cheque clearing. The second component of PRISM is a securities settlement system for government securities' transactions resulting from sale/purchase of MTBs and PIBs in the primary and the secondary market. Since end-FY10, the NCCPL has been allowed to use the system for settlement of its final balances through fund transfers between accounts of different members of Karachi Stock Exchange (KSE) through their settlement banks, using the cash module of PRISM. Thus, in general, the operations of the system can be categorized into following four areas:

Retail Cheque clearing/ Settlement of Multilateral Net Settlement Batches (MNSBs) received from NIFT

Initially, the banks' Settlement Accounts (also known as Current Accounts) with SBP were netted out at 16 locations by employing SBP BSC services. With the initiation of NIFT services, the netting process transformed into a more efficient and automated mechanism, employing equipment like the Magnetic Ink Character Recognition (MICR) Reader/Sorter etc. for image-based processing of cheques. This facilitated the shift to cheque truncation[8] whereby physical movement of cheques is not needed, reducing substantially the time needed for clearing. Nonetheless, the clearing process was still not centralized and consolidated which was a prerequisite for smooth functioning of RTGS since it would ensure timely completion of banks' settlements. Hence in 2007,[9] NIFT clearing operations were changed from decentralized processing to centralized multilateral netting on a countrywide basis.

Under the new arrangements, instead of providing individual netted amount at each SBP branch, NIFT Karachi office was authorized to collect and consolidate data from all NIFT automated centers (20 local offices and the Karachi office) and provide country-wide net position to SBP BSC Karachi, in the form of Multilateral Net Settlement Batches (MNSBs) for final settlement. With the inception of RTGS, the settlement of these clearing batches was transferred to the system. At present, PRISM settles three clearing batches (Normal, Inter-city, Same day) and one Return Batch (Same day Returns). These clearing batches are processed within designated timings imposed by SBP from time to time,[10] and participants are required to comply with the operating rules of PRISM during the process. Specifically, to execute the clearing within the designated timings, participants with net debit balance and insufficient funds are required to obtain funding immediately. They can also avail the automatic intra-day liquidity facility (ILF) from SBP in case of non-availability of funds (discussed in section 8.2.2). Therefore, clearing is assigned the highest priority in the queue for ILF.

The System settled 51,736 clearing transactions amounting to Rs 11.6 trillion during FY10, which was 20.8 percent higher in volume and 11.4 percent higher in value against FY09. These figures suggest that 'Retail Cheque Clearing' constitutes less than one- fifth of the transactions being settled in PRISM (**Table 8.4**).

Table 8.4: Composition of Settlement in PRISM

percent share in total

	Volume of Transactions		Value of Transactions	
	FY09	FY10	FY09	FY10
Securities Settlement	19.4	18.1	42.4	49.7
Inter-bank Fund Transfer(IFT)	62.5	64.3	40.8	34.3
Retail Cheque Clearing Batches	18.1	17.6	16.8	16.0

Source: PSD SBP

Inter-bank Funds Transfer (IFT)

Instructions for inter-bank fund transfer can be initiated by SBP as well as participants, and in case of insufficient balance in payer's account, the transactions are placed in a queue according to their designated priority level, as discussed above. Notably, the payment instructions are executed according to their priority level but at a given priority, transactions are settled on FIFO basis. Transactions with SBP are treated as critical and any participant whose fund transfer to SBP remains unsettled after the designated time can be penalized.

[8] Cheque truncation is a mechanism of cheque clearing where cheques are presented to the paying bank in electronic or image form, thereby eliminating the need for physical movement of cheques. The process has reduced the inter-city clearing time substantially.

[9] SBP Circular No. RTGS/ 248 /65-2007 dated July 24th, 2007.

[10] Currently, settlement of Normal Clearing is executed from 9:00 to 9:30 am, Intercity Clearing from 10:45 to 11:15 am, Same-day clearing during 12:00 to 12:30pm and Returns Batch from 2:30 to 3:00 pm. Source: PSD-RTGS Circular No. 185/ 82(7)-2009 dated September 18, 2009.

During FY10, the system settled Rs 24.98 trillion on account of IFT, which is 1.67 percent lower than the amount settled during FY09. Volume of transactions settled however increased by 27.8 percent and the system settled 188,706 transactions in FY10 against 147,646 transactions in FY09. This implies that on average, the amount per transaction settled for the purpose of IFT, was lower in FY10 at Rs 132 million in FY10 as against Rs 172 million in the previous year. IFTs are the most significant component of transactions being settled in PRISM on the basis of volume, at 64.2 percent of the total transactions settled in FY10 (**Table 8.4**). Once a threshold for the value of transactions is put into place, there will be a subsequent impact on the volume of these transactions.

Government Securities Transactions

PRISM operating rules direct the participants to maintain a Depository (Depo) account with SBP which is further divided into two categories for operational reasons. Firstly, the 'Own' account which is used for settlement of securities owned by participants themselves and secondly, the Investment Portfolio Securities (IPS) account which is used to hold and transfer securities on behalf of their customers. Hence, PRISM participants can carry out securities transactions on their own account as well as on behalf of their customers. Moreover, these accounts can also be used for securities transactions with SBP and hence the system facilitates the conduct of SBP market operations as well as government securities auctions.[11]

Furthermore, the system can execute transactions on both Delivery versus Payment[12] (DvP) as well as Delivery versus Free[13] (DvF) basis, as called for by the participants. In both cases it serves to reduce the asynchronous settlement risk in securities transactions by carrying out both legs of the transaction simultaneously.

Securities' transactions amount is the largest component of transacted amount in the system and accounts for nearly half of the amount settled so far in PRISM (**Table 8.4**). However on the basis of volume, these transactions are only one-fifth of the total transactions. During FY10, the system settled Rs 32.6 trillion on account of 53,202 securities transactions, with average amount per transaction at about Rs 680 million.

Funds Settlement Facility for NCCPL

As detailed in Box 8.1, NCCPL is responsible for final settlement of corporate securities transactions by sending final positions (on net basis) of its customers to CDC (for securities leg of transactions) and settlement banks (for cash leg of transactions). This final settlement of funds through settlement banks, whereby accounts of members in surplus balance are credited while those with negative balance are debited, has been shifted to the system w.e.f. June 30 FY10,[14] and is executed via PRISM participants.

8.2.2 Liquidity Management and RTGS/PRISM

RTGS worldwide is in general a large value payment system mechanism, which implies that the scale as well as criticality of transactions being executed is quite high. In addition to this, as discussed above, the transactions being settled are asynchronous with payment of one bank becoming receipts of the other and hence liquidity strain faced by one bank can have a domino impact on others in the system. Although the queuing mechanism in RTGS can counter the problem to a great extent, still the system can potentially experience gridlocks when payment instructions are piled up due to a system-wide impact of shortfall of funds

[11] The securities settlement application, Depo/X, includes an auction plug-in module for managing government securities auctions.
[12] Defined by BIS CPSS, 2003 as "a mechanism in an exchange-for-value settlement system that ensures that the final transfer of one asset occurs if and only if the final transfer of (an) other asset(s) occurs".
[13] Used for simultaneous exchange of securities, since no cash is involved.
[14] Since this facility was initiated only recently, no data for this category of settlement is available so far.

with some of the banks. To avoid these gridlocks, central banks all over the world generally provide intra-day liquidity facility to the participating banks (**Box 8.4**).

Provision of explicit intra-day credit is also well founded on the grounds that holding extra reserves for intra-day payment settlement could have substantial opportunity cost for banks and hence could result in reluctance on their part to settle transactions immediately, with a preference to wait for incoming funds.[15] Such an occurrence can undermine the optimal use of RTGS and can also intensify gridlocks in the system.

Box 8.4: Types of intra-day credit facilities and case of Pakistan

Modalities for provision of intra-day liquidity differ at different central banks in the world. Generally the policy tools used to rationalize the use of intra-day credit can be categorized into three groups namely: (i) quantity limits being used in Switzerland and Japan, (ii) collateralized credit being provided in Germany, Netherlands, Sweden, France, and United Kingdom and (iii) priced credit being employed by the Federal Reserve Bank of New York.

Some countries also apply a mix of above three tools to optimize their use. The decision to adopt the type of intra-day credit facility depends on the structure of the financial sector in the country, the central banks' approach to liquidity risk management, available technologies as well as the cost of the collateral. In case of Pakistan, recent developments in financial markets in the form of higher government borrowing from scheduled banks and resultantly higher availability of collateral in the form of eligible government securities has facilitated the intra-day credit policy and SBP is providing *free*, and *unlimited* intra-day credit against 100 percent collateral (for details see section 8.2.2).

Furfine and Stehm (1998) and IMF(1998).

Banks generally fulfil their intra-day need for funds through the inter-bank market, resorting to the central bank as a last option. However, if the intra-day loans are not settled on the same day and the intra-day credit spills into the overnight market, it could affect the overnight interest rates with the potential of diluting the central bank's monetary policy actions. This spill-over is clearly more likely in case of inter-bank market transactions for intra-day credit, since central banks do not have full control over the inter-bank market to ensure same day settlement of the intra-day loans between banks. However, the central bank can prevent these transactions from taking place at all.

Studies[16] suggest that central bank facilities for intra-day credit on easy terms can serve this purpose, by incentivising banks to avail credit from the central bank during the day. Therefore, it is suggested that central banks should intervene in the intra-day market by providing necessary liquidity without any cost, but at the same time ensure that the intra-day loans are not converted into overnight credit. The latter can be addressed by enforcing same day settlement of the loan. Besides, fully collateralizing the loan would ensure that participants would economize on the use of the facility by ensuring better liquidity management on their part.

Central Bank Intra-day Credit and Market Liquidity

It has been argued that introduction of the intra-day funds facility could increase the liquidity in the system, directly by increasing the turnover of reserves held by banks at the central bank. Hence RTGS has been criticized for not thinking through the implications for market liquidity with the use of an intra-day credit facility. However, even though an intra-day credit facility is not a pre-requisite for the introduction of RTGS, participants can still issue cheques on their settlement account (with the central bank) even when they do not have enough balance in these accounts. Hence, they could overdraw their settlement account during the day with the central bank, without explicitly seeking liquidity.[17] This implies that banks are generally being provided the intra-day liquidity facility implicitly and without any limits or collateralization. Consequently, the explicit intra-day credit would streamline the

[15] Furfine and Stehm (1998).
[16] Dale & Rossi, 1996 and Vanhoose (1990).
[17] Wijesinghe (2007).

whole process besides facilitating the functions of RTGS. This practice was also observed in case of the domestic banking sector before the introduction of real time settlement through PRISM.

SBP Intra-day Liquidity Facility

Payment system activity in general is associated with need for market liquidity which (as mentioned above) further intensifies with the introduction of RTGS. To ensure financial sector stability, SBP proactively manages the liquidity position in the inter-bank market, in line with its monetary policy stance, while also managing the government's borrowing needs which are met either by the central bank or through scheduled banks. Often these conflicting goals could have far reaching consequences. The relatively higher need for liquidity as an externality of RTGS/PRISM can thus add to the problem, more so in a monetary tightening phase. But a carefully designed liquidity facility, with minimum implications for market liquidity as well as monetary policy, has kept this externality for PRISM in check.

In addition to the monitoring, regulation and processing of payments, SBP provides an unlimited intra-day credit facility namely intra-day liquidity facility (ILF) to banks on fully collateralized basis without charging any price.[18] The facility has been designed carefully to prevent any indirect implications for SBP's monetary policy implementation as discussed above. Specifically, since the collateral arrangement for the ILF entails commercial banks to enter into a same day repurchase agreement with SBP, the funds availed do not spill into the overnight market. At the operational level, SBP gives special emphasis on carrying out the buyback on same day basis, and buyback is currently being initiated by SBP on FIFO basis. Hence, ILF is provided for a very short time even within a given day, with the objective of avoiding gridlocks and does not create any impact on the liquidity position in the market. All the transactions so far have been completed on same day basis and no spill-over to overnight credit has occurred. PRISM also has the provision to automatically carry out the buy-back of securities at the end of the day in case any ILF transaction remains unsettled (not bought back), subject to availability of sufficient funds in participant's settlement account. In case of insufficient funds, SBP can impose a penalty on the participants, and can even redeem the securities placed as collateral.

Eligible securities for pledging purpose are MTBs and PIBs. Moreover, the facility is provided only against free[19] securities and SBP validates the securities before holding these as pledges. The facility is provided for three sets of operations, namely: (1) clearing (this receives top priority in the queue for ILF), (2) inter-bank transactions where securities are netted and (3) maturity of government securities auctions, OMO injections and discounting.

Request for ILF is initiated by the participants themselves and they also provide details of the securities to be pledged, which are verified using the Securities module. Upon successful verification, the system blocks these securities and the cash-leg of the transaction is carried out. Currently the face value of the securities being pledged is treated as the loan amount to be disbursed but in future, the system has the provision for applying a haircut[20] to the actual value of securities. Haircut application is soon expected to become operational, as a market risk reduction mechanism. Participants availing the facility will have to return the amount of loan actually disbursed (not the value of the security pledged) and hence the loan would still

[18] Intra-day funds facility with fee is being used by Federal Reserve Bank. As suggested by Vanhoose (1990), explicit or implicit pricing of intra-day funds facility could affect the volatility of 24 hour or longer term interest rates, which could act counter to the monetary policy stance of the central bank.

[19] Currently participants give the details of the securities to be pledged which are then validated by viewing the respective participant's Depo account. Going forward, matching of securities to the requested ILF amount as well as validation of securities will be an automated process carried out by the system.

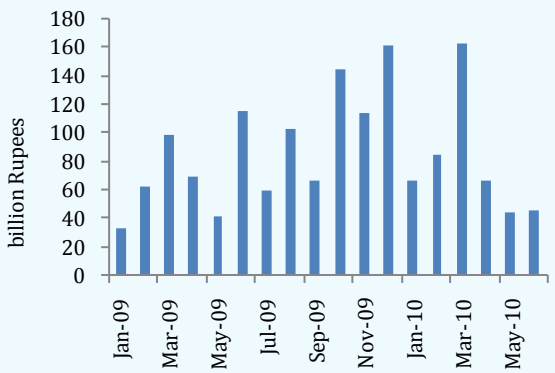
[20] As per BIS CPSS, 2003, haircut is "the difference between the market value of a security and its collateral value. Haircuts are taken by a lender of funds in order to protect the lender, should the need arise to liquidate the collateral, from losses owing to declines in the market value of the security".

be free of cost. Upon completion of the cash leg of the transaction, participants receive credit confirmation while SBP receives debit confirmation. Once the securities are delivered to the SBP ILF account with the securities module, the transactions stands complete. The buy-back of this transaction is recorded as the value date (same day). **Figure 8.9** gives a synopsis of monthly ILF utilization since the start of the facility in January 2009.

8.2.3 Major Sources of Intra-day Liquidity Pressure: Role of Policy Actions

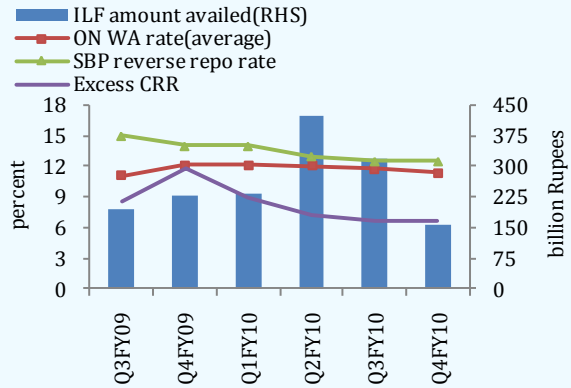
Market liquidity strains are likely to show in ILF utilization as evident from **Figure 8.10**. Clearly, ILF utilization in Q2 and Q3-FY10 reflected the strained market liquidity position prevalent at that time. In particular, net contraction in net foreign assets (NFA) of the banking sector coupled with a rise in the demand for private sector credit, lower retirement of loans for commodity operations and loans to PSEs resulted in pressure on liquidity during these quarters. Despite improved deposit generation, bank liquidity in general remained stressed which is evident by the low level of excess cash reserves held by banks at SBP, as well as the overnight rates which remained close to the SBP reverse repo rate. This prompted SBP to intervene in the market by injecting Rs 1,596.4 billion and Rs 1,141.1 billion in Q2-FY10 and Q3-FY10 respectively. This stress was despite lower government borrowing through T-bills in comparison to preceding quarters. Data shows that overall liquidity stress did trickle into intra-day liquidity management which resulted in higher utilization of ILF.

Figure 8.9: Monthly ILF Utilization



Source: Payment System Department, SBP

Figure 8.10: Bank Liquidity and ILF Utilization



Source: SBP

As discussed in section 8.2.1, on the basis of value, government securities settlements are the most significant component of transactions settled through PRISM. This implies that government securities transactions involve far more market liquidity than inter-bank transactions, which points to the significance of these transactions. Hence the system's liquidity requirement will definitely change with increase in these transactions and if the banking sector is already under liquidity stress, some spill over of these pressures is expected to be seen in ILF usage. This implies that SBP policy actions as well as government securities auctions could have possible externalities for the functioning of PRISM in form of intra-day liquidity stresses.

Moreover, this phenomenon has also been observed in context of queue management in the system, where generally the settlement dates for SBP OMOs' maturities as well as government auctions coincide with piling up of a relatively higher number of queues. Generally it has been observed that on the weekly settlement days of auctions and OMO maturities, number of queues at peak times is around 50-70 percent higher, in comparison to normal days. Despite this pressure on the system, management of intra-day liquidity through ILF has ensured smooth functioning of PRISM during the past two years.

8.2.4 Future Initiatives

PRISM has been operational for over two years and now handles a wide variety of transactions. Going forward, the implementation of the features detailed below will enhance the capacity of the system.

- Automated REPO ILF Operation: Going forward, the system will introduce automatic generation of ILF requests whereby PRISM will itself generate requests for ILF, sensing the needs of the distressed participants (using the built-in liquidity parameters set). Not only will the system generate liquidity requests but the securities to be pledged will also be matched automatically to the liquidity requirement.
- Automated ILF Buyback Operation: Similarly, Buyback ILF operations will be automated and at a designated time in the day, all the transactions in ILF will be reversed
- Conversion of ILF operations to Discount Window operations: The system also has provision for the participants to make a request for conversion of ILF to discount window (DW) facility, but this aspect has not become operational in PRISM.
- Application of Haircut: As mentioned above, application of haircut on the face value of securities while providing ILF is a market risk reduction mechanism. This feature will be introduced soon and will also be an automated procedure (system will apply the assigned haircut, for example 5 percent, and disburse the remaining amount as loan).
- Cross Border Settlement: PRISM Message structure is SWIFT compliant and therefore PRISM can be integrated with the Cross Border Settlement System if required.

8.3 Conclusion

Payment systems have evolved tremendously during the past few decades, with the increasing sophistication of modes of payment settlements, and have come a long way from the traditional paper-based modes, with evolution of electronic payment instruments on the back of modern technological advancements. In Pakistan, the development of electronic banking has been a major milestone in transforming the retail payments landscape in the country. Launch of PRISM in 2008 was then the next necessary step in making the large value payment mechanism centralised and fully mechanised resulting in minimum reliance on the traditional cheque clearing process for inter-bank transactions. During FY10, the payment system activity kept its upward trend with both retail as well as large value transactions exhibiting stellar growth.

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