

# XIII

## PAYMENT AND SETTLEMENT SYSTEMS

13.1 The ongoing process of payment and settlement systems reform gained momentum during 2001-02. Significant milestones marking the year's developments were the introduction of the Negotiated Dealing System (NDS) for transactions in Government securities, the implementation of the Centralised Funds Management System (CFMS) and progress in the operationalisation of the Real Time Gross Settlement (RTGS) system. Given the predominant usage of cash as a means for settlement of payment transactions, the switch over to non-cash based modes like cheques, Electronic Clearing Service (ECS) and Electronic Funds Transfer (EFT) has been a gradual but definitive trend which strengthened during 2001-02.

### Clearing Operations

13.2 The growing turnovers in financial market segments and the increasing volumes of payment transactions routed through the Reserve Bank and the banking system have underscored the importance of clearing operations in underpinning the efficiency of the financial system (Table 13.1). At the heart of the settlement system is the clearing operations conducted by a network of 1,038 clearing houses in the country.

**Table 13.1 : Annual Turnover in Financial Markets**  
(Rupees crore)

	2001-02	2000-01
1	2	3
Central Government Securities Market (outright)	24,23,933	11,44,291
Call/Notice Money Market	1,28,29,129	1,10,62,419
Equity Market (BSE)	3,07,292	10,00,032
Equity Market (NSE)	5,13,167	13,39,510
Cheque clearances through MICR Clearing	7,68,979	7,25,806
Value of ECS Transactions	5,921	3,587
Value of EFT Transactions	202	137
Total Cheque Clearance (including ECS and EFT)	1,20,69,577	1,07,47,119
Ratio of Cheque Clearance to GDP	5.2	5.1

### Cheque Clearances

13.3 The value of transactions settled through the clearing system increased by 12.3 per cent to Rs.1,20,69,577 crore during 2001-02 (Chart XIII.1). The ratio of cheque clearances to GDP stood at 5.2 during 2001-02 as compared with 5.1 per cent during 2000-01. Five new centres, viz., Surat, Ernakulam, Thiruvananthapuram, Jalandhar and Agra were brought into the map of Magnetic Ink Character Recognition (MICR) based processing centres during 2001-02, bringing the total number of MICR centres to 25. Other centres are located at Ahmedabad, Amritsar, Bangalore, Bhopal, Chandigarh, Chennai, Coimbatore, Delhi, Hyderabad, Indore, Jaipur, Kanpur, Kolkata, Lucknow, Ludhiana, Madurai, Mumbai, Nagpur, Pune and Vadodara. Computerised cheque clearing is in vogue at all the Clearing Houses managed by the Reserve Bank and at the other major clearing houses in cities where business activity is substantial.

### Electronic Funds Movement Systems

13.4 The facilities available under the various electronic payment systems of the Reserve Bank

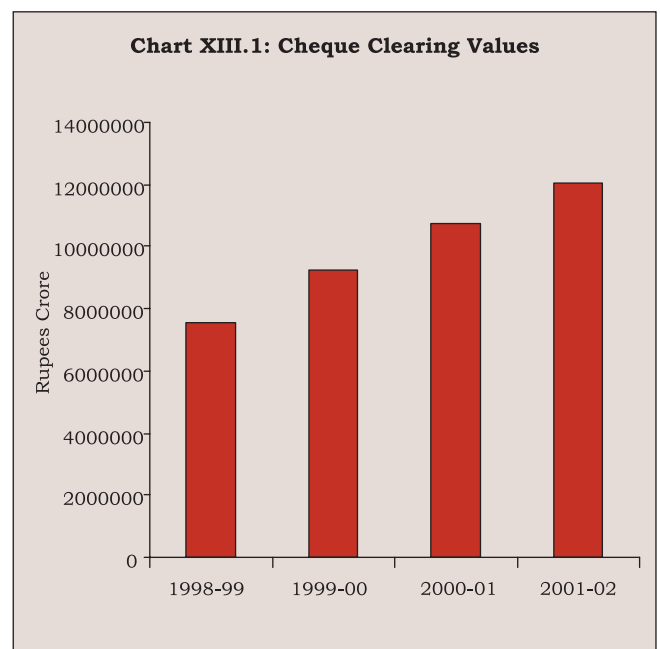
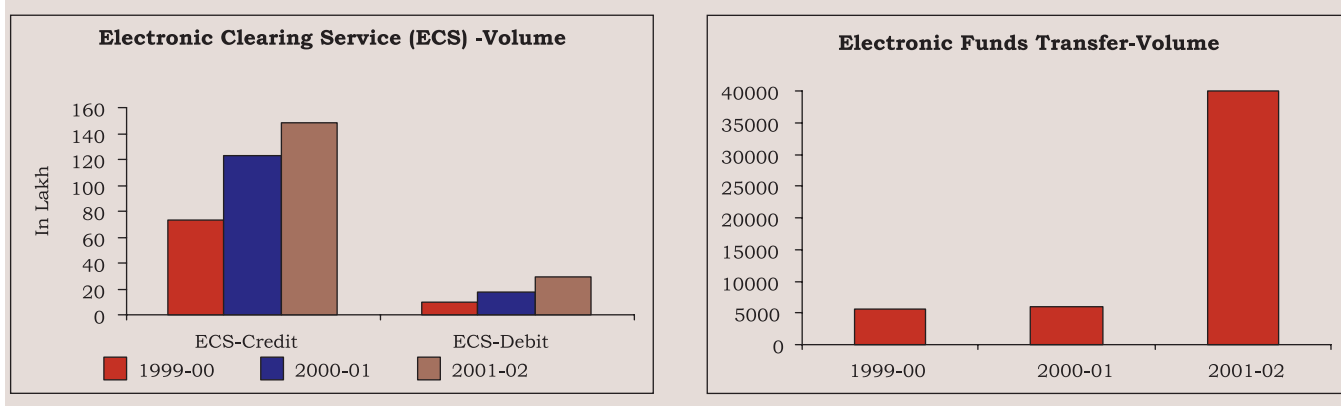


Chart XIII.2 : Electronic Clearing and Transfer



were further improved during the year. This included introduction of Centralised ECS, multiple daily settlements for EFT and increasing the per transaction limit of EFT transactions to Rs. 2 crore. Under the Centralised ECS, a user can submit ECS data at a single location for transfer amongst beneficiaries located at any of the other centres forming part of the ECS network. With the introduction of multiple daily settlements, EFT settlements are now available at 12:00 noon, 2:00 p.m. and 4:00 p.m. on weekdays and at 12:00 p.m. and 2:00 p.m. on Saturdays, thus providing for funds settlements on a same-day basis. The facility has been received well in the context of the introduction of the T+3 based rolling settlement at the stock exchanges.

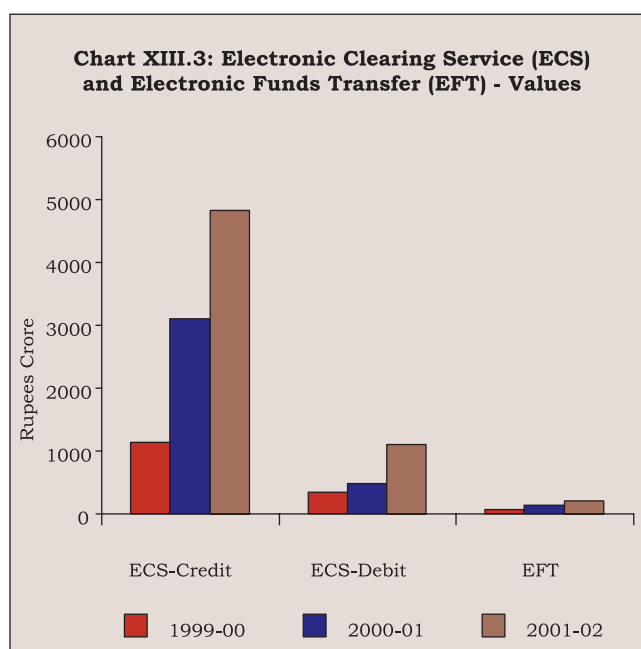
13.5 The number of ECS-Credit clearing users rose to 268 at end-March 2002 from 217 at end-March 2001. ECS-credit volume at 148.1 lakh transactions during 2001-02 was 20.8 per cent higher than the previous year. ECS-Debit clearing recorded a rise of 69.0 per cent to 29.2 lakh transactions with 91 utility organisations availing of the facility. The growth in usage of EFT has been substantial with the volume of transactions increasing from 6,000 during 2000-01 to 40,000 during 2001-02 (Chart XIII.2). The value of ECS-Credit transactions increased by 56 per cent to Rs.4,818 crore during 2001-02 while that of ECS-Debit transactions more than doubled from Rs.498 crore during 2000-01 to Rs.1,102 crore during 2001-02 (Chart XIII.3).

### Payment and Settlement Systems

#### Centralised Funds Management System

13.6 The development of the Centralised Funds Management System (CFMS), which enables funds managers of banks to obtain a national position of

Chart XIII.3: Electronic Clearing Service (ECS) and Electronic Funds Transfer (EFT) - Values



balances in their accounts with the Reserve Bank, was completed during the year with the software installed at all the offices of the Reserve Bank.

#### Real Time Gross Settlement System

13.7 The process of short listing the vendor for the development of the software for the RTGS system was completed during the year. As part of the development process, the High-Level Specifications have been finalised.

#### INFINET

13.8 In order to establish an efficient, safe and dependable communication backbone to address the networking requirements of banks, the Reserve Bank had set up the Indian Financial Network (INFINET)

in 1999 through the Institute for Development and Research in Banking Technology (IDRBT). The network, which was initially available for use by the public sector banks (PSBs), was extended to all banks and financial institutions (FIs) as part of a Closed User Group. The NDS and the CFMS are common inter-bank applications running over the INFINET, introduced during 2001-02. The INFINET network was upgraded during the year. Implementation of a terrestrial network in the form of leased lines connecting 21 important financial centres of the country has been completed. As on March 31, 2002, there were 90 members of the INFINET including banks and other FIs such as term lending institutions, primary dealers and mutual funds. The number of Very Small Aperture Terminals (VSATs) stood at 890 at end-March 2002 as compared with 700 at end-March 2001.

#### *Structured Financial Messaging Solution*

13.9 An important pre-requisite for a complete communication system is the attendant message transfer utilities. The Structured Financial Messaging Solution (SFMS), which provides this facility on the INFINET, was launched during the year after a successful trial run period in which three leading PSBs were involved. The SFMS uses message formats which are very similar to those of the Society for Worldwide Financial Telecommunication (SWIFT) so as to enable banks to use SFMS with relative ease. SFMS is available on Windows 2000 and UNIX flavours such as Sun Solaris, AIX and HP-UX.

#### *Public Key Infrastructure (PKI)*

13.10 In order to provide for the vital requirement of security in respect of the financial and non-financial messages transmitted over the INFINET using the SFMS, Public Key Infrastructure (PKI) was developed for use by the SFMS and for common inter-bank applications. The PKI developed for the purpose matches international standards and is equipped with smart-card based access control systems at the user end.

#### *Securities Settlement System*

13.11 Live operations of the NDS commenced on February 15, 2002 after a three month extensive testing period. The NDS provides for screen-based trading in Government securities. The operationalisation

of the Clearing Corporation of India Ltd. (CCIL) was also completed.

#### *Computerisation in Public Sector Banks*

13.12 Mechanisation and computerisation of banks and other FIs have received high priority in keeping with the broadening and deepening of payment system reform. The focus has been on the PSBs which account for a significant share of the banking business in the country. Although the process of computerisation has been time-consuming, substantial progress has been achieved. The targeted computerisation of 70 per cent of the business of PSBs was achieved in 2000-01 (Table 13.2). In 2001-02, efforts were devoted towards networking of branches in the top cities generating substantial business for individual banks.

**Table 13.2 : Computerisation in Public Sector Banks**  
(as at end-December 2001)

Level of Computerisation	Number of Banks
1	2
1. More than 80 per cent	7
2. Between 75 and 80 per cent	13
3. Between 70 and 75 per cent	7
<b>Total</b>	<b>27</b>

#### *Electronic Payments*

13.13 Developments in electronic payments schemes have evoked considerable interest over the last several years. Card-based products are designed to facilitate small value retail payments by offering a substitute for bank notes and coins and to complement traditional instruments such as cheques. Similarly, network based or software based products are designed to facilitate small value payments over the internet (remote payments) as a substitute for making payments using credit cards on open networks. Banks in India have started offering internet banking services (Box XIII.1). The Reserve Bank issued guidelines in June 2001 for ensuring safe and secure internet banking.

13.14 Smart cards, which are multipurpose in nature and where settlement across different banks is involved, are currently being issued by banks in the country. The Government of India, Ministry of Communications and Information Technology has embarked on a pilot project for defining common standards for multi-application SMART Cards. The

**Box XIII.1**

**e-Banking, e-Payments and Electronic Data Interchange**

With technology having played a significant role in the development of newer modes of payment and settlement, many banks have introduced innovative products such as e-banking and e-payments. Simply put, e-banking is the process of conduct of banking with the use of electronic tools and facilities. The service-based areas of activity of banks have perhaps been the largest beneficiary of e-banking. Internet banking has been the predominant mode of e-banking in India with the Internet offering itself as a new delivery mechanism for the banks in reaching the customer.

Commencing with simple transactions such as enquiry facilities, today messages sent through the internet to banks perform tasks such as funds transfer and account opening. Internet banking, however, necessitates that banks have a secure web server and a centralised data base of their customers to facilitate information flow from customers to the bank and vice versa. While some banks already have systems to meet this requirement, others are at various stages of implementation.

Effecting payments through electronic means constitute e-payments. Various forms of e-payment are in existence such as e-cheque, card based payments (credit, debit and smart cards) and EFT. All these are available in the country

and the large scale usage of these are dependent on the levels of technology at banks and their ready acceptance by the constituents of banks.

Yet another facilitating factor in the use of technology is Electronic Data Interchange (EDI). EDI facilitates transfer of information/data across different communities in an economy. EDI is the base for functions such as 'Just-in-time' processing by manufacturing companies and also has deep roots in electronic commerce and electronic trade. Recognising the benefits of EDI for the exporter/importer community, the Government has taken up, through the Reserve Bank and the Indian Banks' Association, the implementation of EDI in the banking sector. The project envisages finalisation of message formats, providing for connectivity and migrating towards a paperless environment. While the message formats have all been finalised, one of the major benefits announced by the Reserve Bank for exporters is the abolishment of the GR forms for export transactions and the migration to a common Statutory Declaration Form (SDF) for the Customs, from where the data relevant to the banks and the Reserve Bank would be extracted. The progress achieved by banks in EDI implementation which is initially aimed at the 114 export intensive centres of the country is being constantly reviewed.

multi-application card would be used for voter identification, electronic debit/credit, e-purse, transport card, health information, postal application,

insurance, etc. The Reserve Bank, the Indian Institute of Technology, Mumbai, the IDRBT, banks, vendors and users are participating in the project (Box XIII.2).

**Box XIII.2**

**Smart Card Based Security for Computer Based Applications**

A smart card is a credit card sized plastic card which has an integrated circuit with a micro-processor chip embedded in it. These chips hold a variety of information from stored (monetary) value used for vending machines to secure information and applications for higher end operations such as medical/healthcare records. They allow storage of thousands of times the information stored on magnetic stripe cards. They are more reliable and more secure because of high security mechanisms such as advanced encryption and biometrics. The cards have built-in facility for protection against fraudulent operations. The cards can either be exhaustible or rechargeable. In either case, they have built-in memory and processor along with an operating system, which performs the financial operations.

Multiple application smart cards like the Java Card and MULTOS have a variety of uses. They hold personal information (such as driver's licence, social security, medical information, auto insurance, voter registration, workplace ID, website passwords keys for making digital signatures and encrypting data) and provide functions such as working as a phone card, a charge card, a video rental

credit tracker, a credit card, a debit card and an electronic cash repository.

Two broad categories of smart cards are: Contact and Contactless cards. A Contact smart card requires insertion into a smart card reader or a terminal called a Card Acceptance Device. These cards have a contact plate (typically gold plated) on the face, which makes an electrical connector. A Contactless card has an antenna coil and chip embedded within the card and hence requires only close proximity to a reader equipped with an antenna. Most Contactless cards also derive the internal chip power source from this electromagnetic signal. These are ideal for applications such as mass transit, which require very fast card interface. In addition, Hybrid cards (with two chips, each with contact and contactless interface) and Combination cards (single chip cards with both Contact and Contactless interface) are available.

After the smart card is issued to the consumer, the

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protection of the card is provided by an application manifested in the Personal Identification Number (PIN). Unblocking of the PIN to retrieve information has to be carried out with the knowledge of the correct PIN, usually a set of numbers. Consecutive presentations of invalid PIN up to a certain number of times unblock the PIN irreversibly or invalidate the whole card to prevent further attacks. Unblock PIN instructions then need to be carried out typically by the card issuer.

Smart cards have been in operation in India in the financial industry and other sectors. Smart card based payment systems developed for the banks by IDRBT in association

with the Reserve Bank, Indian Institute of Technology, banks and a few vendors have established interoperability between different technologies and standard of cards, card readers and clearing and settlement system. Technical standards for cards and card readers have been formulated by IDRBT incorporating best international practices. The Reserve Bank has also issued operational guidelines to banks and financial institutions on smart card deployment. The SFMS, also developed by IDRBT in cooperation with the Reserve Bank, uses smart cards for purposes of access and authentication to its users. Digital certificates through a Public Key Infrastructure are now embedded in the smart cards issued for the purpose.

### Legal Issues

13.15 In view of the crucial need for an appropriate legal base for technologically developed payment and settlement systems, a Working Group constituted in the Reserve Bank had made recommendations relating to amendments to the Negotiable Instruments Act, 1881 to provide for inclusions arising out of electronic data. These recommendations have been forwarded to the Government for further action. Simultaneously, work on drafting a Payment Systems Act to provide for all the requirements of payment and settlement systems, their applicability, rights and responsibilities of the participants, netting and gross settlement has been undertaken. The draft is at an advanced stage of completion. The proposed Act would also provide for EFT.

### Core Principles

13.16 National payments systems are increasingly being evaluated against international standards. In this regard, the Core Principles for Systemically Important Payment Systems of the Bank for International

Settlements have emerged as a set of benchmarks. To examine the applicability of these international standards and codes in respect of the Indian payment and settlement systems, an Advisory Group under the chairmanship of Shri M.G. Bhide was constituted. A detailed examination of the core principles has revealed that while there is general conformity to most of the core principles, the areas which required action are as follows: (i) the need for certain enabling provisions under the law, especially to make netting systems legally valid; and, (ii) the need for evolving a proper framework for counterparty risks and risks to the service provider. The proposed Payment Systems Act, the CCIL and the proposed RTGS system would provide for these requirements. This would ensure that systemic efficiency is achieved in the payment and settlement systems (Box XIII.3).

13.17 Given the important role of technology in the development of the financial system, the Reserve Bank aims to establish a modern, robust, efficient, secure and integrated payment and settlement system for the country (Box XIII.4). In order to share with the

### Box XIII.3

#### Core Principles for Systemically Important Payment Systems

A robust and efficient payment system is a key requirement in promoting financial stability since payment systems are a major channel through which shocks may be transmitted across domestic and international financial systems and markets. In recognition of this, the Committee on Payment and Settlement Systems of the Bank for International Settlements had in January 2001 published a paper 'Core Principles For Systemically Important Payment Systems'.

The Core Principles, ten in number, are a common set of universal international standards and best practices.

These principles are aimed at reducing risks, achieving safety, measuring the efficiency of the financial systems and encouraging the development of appropriate strategies for operation of safer and more efficient systemically important payment systems worldwide. They also incorporate the responsibilities of the central bank in applying these principles. The Core Principles draw heavily from the Lamfalussy Report on Inter-bank Netting Schemes published in 1990. A summary of the Core Principles and the responsibilities of the central banks in

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applying them are as follows:

*Core Principles*

1. The system should have a well-founded legal basis under all relevant jurisdictions.
2. The system's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks they incur through participation in it.
3. The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and which provide appropriate incentives to manage and contain those risks.
4. The system should provide prompt final settlement on the day of value, preferably during the day and at a minimum at the end of the day.
5. A system in which multilateral netting takes place should, at the minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single settlement exposure.
6. Assets used for settlement should preferably be a claim on the central bank; where other assets are used, they should carry little or no credit risk.
7. The system should ensure a high degree of security and operational reliability and should have contingency arrangements for timely completion of daily processing.
8. The system should provide a means of making payments which is practical for its users and efficient for the economy.

9. The system should have objective and publicly disclosed criteria for participation, which permit fair and open access.
10. The system's governance arrangements should be effective, accountable and transparent.

*Responsibilities of the Central Bank in Applying the Core Principles*

1. The central bank should define clearly its payment system objectives and should disclose publicly its role and major policies with respect to systemically important payment systems.
2. The central bank should oversee compliance with the Core Principles.
3. The central bank should oversee compliance with the Core Principles by systems it does not operate and it should have the ability to carry out this oversight.
4. The central bank, in promoting payment system safety and efficiency through the Core Principles, should cooperate with other central banks and with any other relevant domestic or foreign authorities.

At present, in India, the clearing and settlement systems are all Deferred Net Settlement Systems; the Core Principles, hence, are applicable. Considerable progress has been made in terms of compliance to the Core Principles. These involve (a) publishing of "Payment Systems Vision Document" by the Reserve Bank detailing the objectives, roles and policies *vis-à-vis* payment system; (b) initiatives in establishing a legal basis to multilateral netting in the form of Payment System Act; (c) establishment of CCIL for guaranteed settlement of transactions in Government securities and inter-bank transactions in foreign exchange; (d) putting in place appropriate procedures in the Deferred Net Settlement Systems that would address the risks in settlement; and, (e) moving towards RTGS system.

constituents of the payment and settlement system a common scenario of the general direction of reform, a Vision Document "Payments System in India" was published in December 2001. The Document provides a picture of the nature of reforms planned for the immediate future to usher in systems which function for the mutual benefit of the participants and their

constituents and for the overall efficiency of the system.

**Outlook**

13.18 A forward-looking path for the consolidation, development and integration of payments systems in

**Box XIII.4**

**Impact of Technology on the Financial System**

Banking is undergoing rapid transformation. Prime factors ushering these changes are competition, productivity and efficiency of operations, reduced operating margins, better asset/liability management, anytime and anywhere banking. Exploiting the benefits of technology holds the key to enabling the financial system to manage the forces of change.

developments in technology – such as the proliferation of electronic products like card based transactions and EFT. The usage of physical cash is set to undergo substantial change in the context of electronic products substituting cash. Newer delivery channels for the customer – such as internet banking and Automated Teller Machines and even mobile banking – are some of the

Payment systems too have benefited from the

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innovations which have had a positive impact for both banks and their customers. For the corporate customer, there are benefits in the form of improved cash management products which facilitate better funds management by the clientele of banks.

Technology in banks has also thrown up a host of challenges. Some of these relate to the need for standardisation of the hardware, operating systems, system software and application software, apart from message formats for inter-bank communication, need for effective security, a technology plan for each bank and the attendant implementation related infrastructure, effective communication facilities and effective human relations management in a highly technological environment. The need for Business Process Re-engineering would stand out as a necessity in the context of changed work procedures consequent upon large-scale implementation of technology.

One of the major challenges arising out of technology implementation relates to security. With the evolution of delivery channels relating to fund-based services such as, EFT, the security measures need to be developed adequately. Various concepts such as digital signatures, certification, storage of information in a secure and tamper-proof manner assume significance and will be part of the practices and procedures in the day-to-day functioning of banks in the future. A concern for central banks also occurs on account of risks arising out of technology.

With increased dependence on technology, the need for Information Systems Audit also assumes significance coupled with the availability of skilled personnel not only for implementing technology but also manning such technology based activities and conducting audit thereof. Overall, technology would offer a good tool for improved customer service, better house-keeping and increased systemic efficiency and productivity for the banks of the country.

India has been set out in the Vision Document and the Reserve Bank would persevere with reforms in pursuance of this vision. For this purpose, infrastructural developments would encompass expansion of inter-branch networking and connectivity, at least among the commercially important centres of the country. With the INFINET becoming fully operational and widespread in usage, e-banking encompassing e-payments and Electronic Data Interchange would be easily facilitated. Software development for the RTGS is under way and this would enable real time fund settlement and an effective risk control strategy for preventing domino effects of individual defaults. Work relating to introduction of MICR based clearing at various centres important for their share in financial transactions is in progress. The second phase of the CFMS would provide for movement of funds between banks across the 17 locations of the Reserve Bank where Deposit Accounts Departments function.

13.19 The role of the Reserve Bank as prime mover of payment and settlement reform in the financial

system in India has been engaging critical attention in the context of the clear demarcation of its responsibilities as regulator and supervisor. At the same time, increasing attention is being focussed on the risks in the payment systems, especially in the large value and systemically important payment systems. Risk monitoring and risk reduction activities have become highly technical and analytical and are regarded as specialised functions. A movement towards segregation of the operation and regulation of payment systems with respect to most of the significantly important payment systems has been set in motion. To begin with, for the MICR cheque clearing systems in centres other than the four metropolitan centres, the management of operation has since been entrusted with a suitable commercial bank. Similarly, for the securities settlement system and the proposed inter-bank foreign exchange clearing system, a separate institution, *i.e.*, CCIL would be responsible. This strategy will continue till the identified significantly important payment systems are implemented and integrated and attain stability.