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Payment Systems in India: Opportunities and Challenges

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Abstract

An efficient payment system acts as an enabler for speeding up liquidity flow in the economy, apart from ensuring proper utilization of limited resources it also eliminates systemic risks. Flow of funds across borders demands the security, integrity of the payment system and the harmonization of the systems in the related countries. The paper dwells with the need to modernize the payment system and migrate from paper-based to electronic mode of payment system to enhance efficiency and save cost. It delves in to the core of payment systems in the select countries with a comparative analysis. Benchmarking against the BIS core principles of Systemically Important Payment Systems revised as core principles of Financial Markets Infrastructure has been done to ensure convergence with the international best standards for Governance of Payment systems. The payment system of any country, though advanced and sophisticated, does face various risks, viz. bank failures, frauds, counter-party failures, etc. Such aberrations could

trigger a chain-reaction that might ultimately result in disruption and distrust of the payment system. For example, if one large payment transaction cannot be settled, it disturbs other transactions leading to failure of the institutions involved in the process ultimately upsetting the entire payment system in the country. Such systematic and cascading breakdown of the payment system can hinder efficacy of monetary policy and badly impact confidence in the financial system. Minimization of systemic risk is therefore a critical challenge facing the regulators. Like in any ambitious economy, in India too, the fast advances in information technology, changes in regulatory framework, setting up of new institutions have aided to the rise of new payment practices, products and delivery channels for small as well as large value, and urgent payments. The paper shows areas for improvement in the efficiency in existing payment systems in India and the other countries especially in regard to the liquidity risk, operational risks, access criterion, transparency etc. In the end, the paper makes a modest attempt to identify opportunities and challenges for India. Numerous major changes in the payment system would take place at a quicker pace as e-commerce becomes more prevalent in the economic activities in the country.

Keywords: **Payment Systems; India; Efficiency; Payment Systems Regulation; Developed Economies**

INTRODUCTION

Payment and Settlement Systems constitute a major aspect of a country's financial and economic structure. A payment system is a system which enables payment between two entities i.e. a payer and payee and constitutes clearing, settlement or payment service [1]. Humphrey and Setsuya [2] argued that there is a need to modernize the payment system and move away from paper-based to electronic mode of payment system to improve efficiency and save cost. According to the estimate of the authors, the cost of any nation's payment system may be equivalent to about 3 percent of its Gross Domestic Product (GDP). An efficient payment system acts as an enabler for speeding up liquidity flow in the economy, apart from ensuring proper utilization of limited resources it also eliminates systemic risks [3]. Like in any ambitious economy, in India too, the fast advances in information technology, changes in regulatory framework, setting up of new institutions have aided to the rise of new payment practices, products and delivery channels for small as well as large value, and urgent payments. Numerous major changes in the payment system would take place at a quicker pace as e-commerce becomes more prevalent in the economic activities in the country.

The payment system of any country, though advanced and sophisticated, does face various risks, viz. bank failures, frauds, counter-party failures, etc. Such aberrations could trigger a chain-reaction that might ultimately result in disruption and distrust of the payment system. For example, if one large payment transaction cannot be settled, it disturbs other

transactions leading to failure of the institutions involved in the process ultimately upsetting the entire payment system in the country. Such systematic and cascading breakdown of the payment system can hinder efficacy of monetary policy and badly impact confidence in the financial system. Minimization of systemic risk is therefore a critical challenge facing the regulators. The central bank in any country is therefore taking suitable actions to reduce systemic risks and is continuously engaged in promoting a sound and efficient payment system.

This paper provides an overview of payment systems in India and a comparative analysis of its Payment Systems with selected developing and developed economies. After introducing the payment and settlement systems, the rest of this paper is arranged in three more sections. Section two presents a review literature of payment systems in general, an overview of payment systems in developed countries (USA, UK, Europe, Japan) and developing country (China) and an overview of payment systems in India. Section three provides a comparative analysis of India's Payment Systems with selected developing and developed economies and benchmarked against the BIS core principles. Finally, section four provides challenges and opportunities for India.

LITERATURE REVIEW

Lamberte [4] studied the efficiency of the prevailing payment system in the Philippines and concluded that it has been changing fast recently as the Central Bank of Philippines and Bankers' Association of the Philippines is relentlessly trying to make it less prone to systemic risks and more efficient. Some of the key problems with large value transfers that may give rise to systemic risks is addressed by the newly introduced RTGS system for MIPS2 (Multi-Transaction Interbank Payment System). Sangsubhan [5] observed that the payment system in Thailand has been constantly enhanced to catch up with the international standards. Improvements of the BAHTNET (Bank of Thailand Automated High Value Transfer Network), the clearing system and other e-payment systems are in progress. There is a need to enhance the oversight and efficiency of this payment system to ensure a secure environment, in line with global standards and to take steps for joining international funds transfer systems.

Murphy [6] having reviewed the progress of payment systems in the United States concluded that bank regulators should be concerned regarding possible operational risks. Network providers are increasingly consolidating among themselves leading to concentration risk and opening up issues in the areas of pricing, quality of service and product innovation. Bank regulators are not able to address this issue due to lack of direct responsibility on their part.

Shirakawa [7] suggests that the Japanese payment systems have demonstrated a high level of robustness, mainly due to the patient efforts that the relevant players have made to improve the systems over the years. Investments in payment and settlement systems bring very high returns for the economy in the long run. He and Sappideen [8] studied the

progress of the payment system in the Chinese banking sector and acknowledged the requirement for a transparent, comprehensive and a sound legal framework.

Balakrishnan [9] having analyzed the various Indian Payment Systems from 2003 to 2009 and estimated that there would be a saving of US$ 10 billion annually if India were to move its entire physical payment to electronic payment. He suggested that it will be beneficial if India could bring over the 1,55,000 post office branches and about 1,69,000 branches of cooperative institutions into the electronic payment network.

OVERVIEW OF PAYMENT SYSTEMS IN DEVELOPED AND DEVELOPING ECONOMIES (US, UK, EUROPEAN UNION, CHINA, JAPAN)

Payment Systems in European Union

Payment and settlement systems in the euro area were initially created to meet domestic requirements. The harmonization, integration and consolidation of retail payments and retail payment systems have not advanced speedily as payment practices differ extensively across the euro area [10]. In 1999 to institute a euro area-wide RTGS system for the settlement of euro payments in central bank money, the Eurosystem[1] launched the trans-European Automated Real Time Gross Settlement Express Transfer System (TARGET). Afterwards by substituting the decentralized structure of the original TARGET system by a Single Shared Platform (SSP), a more advanced and harmonized payment and settlement services across Europe were developed in the form of a second-generation system called TARGET 2, which was accomplished by May 2008. TARGET 2 is the backbone of all payment and settlement arrangements in euro. It is the principal system for liquidity management for banks as it permits access to central bank credit and operates in central bank money. A phenomenal character of TARGET 2 is that it ranges even beyond the euro borders and its payment services in euro are available across a wide-ranging geographical area [10]. TARGET2 connects 24 central banks of the EU and around 55,000 banks in the entire world. It is one of the biggest payment systems on earth. The banking industry in January 2008 created the Single Euro Payment Area(SEPA) to attain a totally unified market for retail payment facilities in the euro area. On 1 August 2014 SEPA was effortlessly enforced for credit transfers and direct debits in the euro area. It permitted businesses and consumers to use a lone payment account for all euro credit transfers and direct debits.

In addition to TARGET2 there is a second large value payment system called EURO1 which is maintained by a private entity and covers entire euro area. EURO1 system belonging to EBA[2] CLEARING Company is a euro-controlled net settlement system

[1] The Eurosystem is the monetary governing body of the eurozone which is an amalgamation of European Union member states. It has embraced Euro as official currency. It comprises of European Central Bank (ECB) and the central banks of other eurozone member states. Its main function is to implement the monetary policy as determined by the ECB.

[2] European Banking Authority-The European Banking Authority (EBA) is an independent EU Authority which

possessed by private banks. By the end of the day it settles the closing stand of its participants via TARGET2. To balance the EURO1 system STEP1 and STEP2 were created which was maintained by EBA CLEARING. By giving an alternative for the handling of commercial and retail payments the STEP1 system supplements the EURO1 large value payment system. STEP 2 operates both SEPA credit transfers and credit transfers which conform with the European banking industry's resolutions on credit transfers in euro. SEPA direct debits are also processed under STEP2.

By 31 October 2016 the migration process for euro-denominated credit transfers and direct debits in non-euro area countries will conclude [11]. SEPA system has enhanced cash flow, low costs and eased entry to new markets which has helped the customer immensely. Besides the customer now counts on only one bank account, one bank card, one SEPA Credit Transfer (STC) and one SEPA Direct Debit (SDD). Pan-European International Bank Account Numbers (IBAN) are now allotted to customers. The IBAN system can automatically identify the sender of the money which facilitates companies to collect payments across Europe very easily. Reconciliations have become more efficient due to IBAN [12].

A key development in Europe is the revision of the Payment Services Directive (PSD) to create PSD2. The objectives of PSD2 are to modernise the legal framework in line with technical and market developments, promote innovation, increase customer choice and consumer protection, and to enhance security for online payments [13]. The European Union (EU) is examining an immediate payments scheme knowing that it will help to further standardise payments across the Union and drive economic growth.

Payment Systems in United States of America (USA)

In USA, there are two large value payment systems of systemic importance: Fedwire – a real time gross settlement, operated by the Federal Reserve System (The Fed), and the Clearinghouse Interbank Payment Systems (CHIPS) which is a privately-owned payment system combining net and gross real time settlement [14]. To process large value and urgent US dollar transfers Fedwire and CHIPS are employed by depository institutions and their customers.

The Fedwire is a real time gross settlement (RTGS) system run by the Board of Governors of the Federal Reserve System. CHIPS is developed and run by the clearing house, which on the other hand is owned by the biggest US banks or US associates of large foreign banks. To settle the payments either the balance maintained in the participant's CHIPS account at the Federal Reserve Bank of New York (FRBNY) is used or it may concurrently be cleared by inbound payments. All residual payments, which are not settled during the day, are netted on a multilateral basis through Fedwire fund transfers to the CHIPS' account at the FRBNY. To pay quickly its opening and closing position obligation, every

works to ensure effective and consistent prudential regulation and supervision across the European banking sector.

CHIPS participant should have access to credit and liquidity.

Historically US has multiple payment networks which processes retail payments. For processing small value electronic payments it has a batch system called Automated Clearing House (ACH). ACH system processes both credit and debit transfer payments. All the procedures and guidelines that administer the network is decided by National Automated Clearing House Association (NACHA) which is a national association of depository financial institution members. Recently new type of transactions were incorporated in ACH which were made by customers like point of purchase (POP), payments approved over telephone (TEL), payments originated over internet (WEB). All such transactions require separate processes each time a transaction is initiated. Based on network volume breakouts, the largest number of ACH payments are categorized as prearranged payment and deposit entries (PPDs), which include direct deposit of payroll and automatic bill payment [15]. A major category of business ACH payments are corporate cash concentration and disbursement entries (CCDs), which include ACH debits used to consolidate funds held by one corporation across multiple accounts into one, as well as ACH credits used for business-to-business payments. Growth in ACH payments is not only because of the sustained growth in major consumer and business categories of payments i.e. (PPDs and CCDs), but also because of the emergence of new types of payments, particularly WEB payments, a category of ACH in which a consumer has authorized a one-time debit to their account over the Internet. Such payments are often initiated by a biller or e-commerce retailer based on a consumer authorization of the payment on their website.

Payment Systems in United Kingdom (UK)

There are two retail payment systems in UK : (a) The BACS (Bankers' Automated Clearing Services) System which provides an ACH (Automated Clearing House) service handling electronic payments, (b) the Cheque and Credit Clearing Company which deals in paper instruments like cheques and credit vouchers. For both these systems there are two types of access arrangements in the form of direct settlement members and indirect participants. In Bank of England's books of accounts settlement between direct members happens.

In UK BACS is considered to be the biggest retail payment system. It has a three-day clearing cycle and is a deferred multilateral net settlement system. The BACS Payment Schemes Ltd is responsible for the BACS' Direct Debit and Direct Credit products. A high proportion of the transfers handled represent regular disbursements such as wages, pensions, utility bill payments, insurance premiums or subscriptions. The core processing of BACS' transactions is outsourced to a single third party – VocaLink Ltd. To reduce settlement risk, BACS has incorporated means like soft net debit caps and new referral type, regression in suitable conditions and the launch of the Liquidity Funding and Collateralization Agreement (LFCA) [16].

To deliberate on non-competitive matters concerning transmitting money, an Association

for Payment Clearing Services (APACS) which is a private sector body was established in 1985 for major banks and building societies. Currently the APACS includes the three operational clearing companies: (i) Clearing House Automated Payment System (CHAPS); (ii) BACS Ltd, and (iii) Cheque and Credit Clearing Company Ltd. The Bank of England is a full member and a shareholder of the three main clearing companies and of APACS. It operates the RTGS system which processes real time payments and settles payment obligations of banks in settlement accounts which it holds. To facilitate uninterrupted flow of payments through CHAPS system, the Bank offers the member banks with supplementary intra-day liquidity through repo provisions.

Most of the high value wholesale payments go through CHAPS–RTGS System. CHAPS Euro links to the pan EU-TARGET system. Thus, CHAPS Euro can be used by member banks to transmit both domestic and cross-border payments. CHAPS Sterling and CHAPS Euro have worked on a common (SWIFT-based) technical platform since August 2001 after the execution of the New CHAPS project. Currently it comprises of only one system, CHAPS sterling, as CHAPS-Euro was discontinued in May 2008 as a part of final phase of the TARGET 2 commencement [16].

In May 2008, the Faster Payment Service (FPS) was announced as a new payment system in the UK. CHAPS Co offers clearing service to FPS members and their customers and is overall responsible for managing FPS. In comparison to other retail payment sytems in UK like BACS or cheque and credit clearings which settles on a T+2 basis, FPS settles on a real time basis. All payment messages conform to the ISO 8583 standard, except those bulk payments submitted via the “direct corporate access” channel, which utilises the bespoke format used for Bacs payment messages [17]. The Cheque and Credit Clearings (C&CC) system facilitates directives given in cheques and paper credits to be processed, exchanged and settled between banks. The volume and value of payments processed in the C&CC has been gradually decreasing over the last few years.

The LINK is a shared ATM network in UK which allows customers of a particular bank to transact in any other member bank ATMs. The LINK-ATM Scheme processing has been outsourced to VocaLink Ltd in 2008. Visa Europe and Master Card Europe (MCE) operate the main debit and credit card system in the UK [16]. Management of the MasterCard credit and Visa credit and debit schemes is conducted on an international basis, and, the Bank discusses with the other central banks about the best methods to oversee these cooperative schemes. The Bank involves the ECB in the oversight of Visa Europe, which is a significant operator in the euro-area credit card market.

Payment Systems in Japan

In order to stimulate the effectiveness of banking operations and maintain stability of country’s payment system, the Bank of Japan (BOJ) has established and ran the Bank of Japan Financial Network System (BOJ-NET) since October 1988. At the beginning of 2001, the The BOJ-NET Funds Transfer System (BOJ-NET FTS) abolished designated-

time net settlement (DNS) mode and made RTGS the only mode for settlement [18]. The BOJ recommended reforms in the functioning of BOJ-NET FTS and commissioned the Next-Generation RTGS project to reduce further settlement risk in payment and settlement systems.

In October 2010 Zengin-Net (Japanese Banks' Payment Clearing Network) started its operations as the first fund clearing agency in Japan. In September 2010 based on the "Payment Services Act" (enforced in April 2010) it obtained a license for the fund clearing business [18]. Tokyo Clearing House (TCH) handles clearing of checks and bills (promissory notes). In June 2009, the Japanese National Diet enacted the Payment Services Act (PSA). The PSA established the regulatory framework for issuers of prepaid payment instruments including "electronic money", non-bank providers of funds transfer services and central counterparties for funds transfer transactions [19].

Payment Systems in China

The People's Bank of China (PBC) takes care to fulfill its statutory obligations of maintaining smooth operations of the payment, clearing and settlement systems, along with the general oversight function by providing its transfer network to the various banking institutions, namely more than 2000 local clearing houses (LCHs), the paper-based non-local funds transfer system and the National Electronic Interbank System (NEIS) [8]. The PBC also concentrates on developing and operating High Value Payment Systems (HVPS) and Bulk Electronic Payment Systems (BEPS) and connects them with business systems of money market, bond market, interbank lending market and other financial markets to provide final fund settlement for allied institutions, such as banking institutions, participants in financial market and specialized clearing institutions [20].

PBC has developed several interbank payment systems, which include the Cheque Imaging System (CIS), and the Internet Banking Payment System (IBPS). These systems are owned by PBC. China National Advanced Payment System (CNAPS) comprises of three primary payment systems: HVPS, BEPS and IBPS. It includes two levels of processing centres: (a) the National Processing Center (NPC) and processing centres at provincial cities; (b) Shenzhen City Clearing Processing Centers (CCPCs). Dedicated communication networks connect CCPCs to NPC. Transaction processing in HVPS is as follows: NPC accepts and then forwards the payment transactions and finally on a real time basis it submits transactions to the clearing account management system. Cheque Image System (CIS) is a cheque truncation system supporting the use of cheques nationwide. It converts physical cheques into images, and then transmits the cheque image and related information to the drawer's bank. Currently BEPS processes the clearing and settlement of truncated cheques [21].

China is in the process of turning the Renminbi (RMB) into a full-fledged global currency. The goal is to make the RMB among the top three currencies in the world. In spite of the rapid worldwide expansion of the RMB, its internationalization still faces many challenges.

China therefore announced ambitious plans in April 2012 to build a new system for international payments [22]. This system, called Cross-Border Interbank Payment System (CIPS), should further facilitate cross-border RMB clearance among market players. The planned rollout of this new interbank payment system, originally planned for 2014, has been delayed, owing to the complexity of integrating RMB into the global system and the long-term sustainability of the system itself [22].

OVERVIEW OF PAYMENT SYSTEMS IN INDIA

Traditional Payment Systems

Currency continues to be an important means of payment in India accounting for about one fifth of M3, which is nearly three times higher as compared to other developed countries. In addition, there are cheques and drafts for payments in commercial transactions [23]. Other paper instruments include bankers' cheques, payment orders, payable "At Par" cheques which include interest or dividend warrants, refund orders, gift cheques, etc.; all these are in operation even today.

There were more than 1100 clearing houses operating all over India, which facilitated cheque payments. The RBI, State Bank of India and other public sector banks used to manage them. The cost of processing payment instructions was very high due to the decentralized mode of functioning of these cheque-clearing houses. As the volumes of check transactions started increasing rapidly in the 1980's, banks found it difficult to handle the huge volumes, which delayed payment of credit to customers. Therefore, a mechanized cheque processing technology called Magnetic Ink Character Recognition (MICR) was inducted. There were 71 MICR-CPCs operating in India in the year 2008-09. In 1064 clearinghouses where MICR-CPC was found unviable, the settlement operations were computerized. Here the settlement was done electronically though the instruments were sorted manually [24].

Electronic Payment Systems

RBI took the lead and developed an effective electronic payment infrastructure in India. Its vision was to promote a safe, secure, reliable and efficient payment system. To empower RBI to regulate and supervise payment and settlement systems, the Payment and Settlement (PSS) Act was enacted in 2007. It also provides a legal basis for multilateral netting and settlement finality. RBI has decided to set up a national organization to own and operate all retail payment systems in India, so that it will be possible to achieve greater efficiency through uniformity and standardization in retail payments, expand its reach and develop innovative payment products to increase customers' confidence. In April 2009 the National Payments Corporation of India (NPCI) started its operations. It is owned by banks and financial institutions [25].

On October 15, 2009, the RBI authorized the NPCI to take over operations of National

Financial Switch (NFS). NFS covers 596 member banks with about 215,000 ATMs as of December 2015. NFS approved transaction volume for Dec 2015 was 327 million [26]. Under the RuPay domestic card payment scheme in 2011-12, NPCI was granted approval under the PSS Act, 2007 to issue RuPay cards through banks in India. The objective behind introducing a domestic card scheme is to ensure a healthy competition with other international card payment networks and efficient price discovery [27]. India's first domestic card, the RuPay card (ATM and micro-ATM cards) was launched by NPCI through banks in India. Consequently NPCI was allowed to launch POS acceptable RuPay debit and prepaid cards in India. To help unbanked community in India to withdraw remittances sent by senders/remitters from their bank accounts, RBI granted 'in-principle authorisation' to 2 entities during 2013-14 to set up a payment system which will cater to the demands of the unbanked. The modus operandi followed to facilitate this cardless payment service is as follows: The unbanked beneficiary has to use a mobile number for identification and pin codes for enabling withdrawal.

RTGS is a high value payment system operated by RBI which processes payments from one bank to another on a gross basis and real time. The next generation RTGS (NG-RTGS) was introduced in October 2013 as the current RTGS is highly liquidity intensive. It has added facilities like liquidity saving features, extensible mark-up language (XML) based messaging system compatible to ISO 20022 standards, an advanced gridlock resolution mechanism, improved security measures, operational reliability and business continuity. National Electronics Funds Transfer (NEFT) System which is a deferred net settlement system was operationalized in 2005 by RBI. It uses the Structured Financial Messaging Solution (SFMS) of the Indian Financial Network (INFINET) and is highly secured. It provides one-to-one funds transfer capability to bank customers.

The Cheque Truncation System (CTS) was implemented in February 2008, on a pilot basis in the National Capital Region of New Delhi to enhance the efficiency of the paper-based clearing system. Currently through 53 direct member banks all the banks are participating in the system. There is no need of presenting the cheque physically at the clearinghouse, instead only its electronic image is to be forwarded. As a result, CTS provides a cheaper mode of settlement as compared to manual and MICR clearing. Besides, cheques can also be realized on the same day in CTS. As of May 2014, the entire volume of 47 MICR centres migrated to grid CTS, thus closing down these centres [28]. To process cheques at centres with low volumes and also to facilitate 'local' level clearing for participating banks an ECCS application package was used.

Immediate payment system (IMPS) launched in November 2010 by NPCI is an instant/real time inter-bank payment mechanism for participating banks customers which works 24 by 7 and all days in an year. Appropriate risk mitigation measures are introduced as debits and credits are immediate and settlement happens multiple times a day. Transaction can be originated from multiple channels like SMS, USSD, Mobile, ATM and Internet and transfer can be done using UID, Mobile number and MMID or IFSC code and account number. Another similar innovative payment service launched by NPCI in 2012 which

works purely on Unstructured Supplementary Service Data (USSD) channel is *99# service. This service was launched foreseeing the potential of Mobile Banking and the need for immediate low value remittances for aiding financial inclusion. Bank customers can use this service by dialing *99# on their mobile phone which is a "Common number across all Telecom Service Providers (TSPs)" and transact through an interactive menu showed on the mobile screen.

To provide a second option to users of bulk payment systems other than Electronic Clearing Service (ECS), NPCI operationalized the National Automated Clearing House (NACH) in 2012-13. This system is meant for bulk credit transfers in push mode and bulk payment receipts in bulk mode. It supports electronic mandate management and paper based mandate management systems and uses ISO 20022 message formats. In addition, it also supports the AADHAAR based benefit transfers. It has multiple options for routing the payments – IFSC code, MICR and AADHAAR mapper in particular. The migration of transactions from the ECS suite to NACH started from December 2014 and today practically all participants are on board in the NACH system.

To allow bank customers to make balance enquiry, cash withdrawal, cash deposit, and remittances through the micro-ATMs at BCs using Aadhaar[3], NPCI established Aadhaar Enabled Payment Systems (AEPS) in 2011-12. Using Aadhaar as an authentication mechanism the system can also be used to route government benefits to beneficiaries. Financial inclusion initiatives are further boosted by AEPS which is a bank-led model. To facilitate benefit transfers such as MGNREGA, Social Security Pension, Handicapped Old Age Pension from government departments, NPCI developed Aadhaar Payment Bridge System which is a centralised electronic transfer system. These transfers are routed through their respective sponsor or accredited bank, to the beneficiaries using Aadhaar numbers.

A pan-India integrated bill payment system called Bharat Bill Payment Systems (BBPS) is being operationalized by NPCI under the PSS Act, 2007 to offer inter-operable and reachable bill payment services to customers through a network of agents. It will simplify the issues encountered by consumers who are forced to use various options (as introduced by respective billers) to meet their bills payment necessities. During 2015-16 the process of authorisation of NPCI to act as a Bharat Bill Payment Central Unit (BBPCU) and authorisation of Bharat Bill Payment Operating Unit (BBPOU) will be accomplished.

Customer Comfort and Innovations

India has embraced a bank led mobile payment model to inspire the use of mobile phones as a channel of payment. In 2012-13, the Reserve Bank has rationalized the rules for

[3] On behalf of the Government of India the Unique Identification Authority of India issues Aadhaar which is a 12 digit individual identification number. This number will serve as a proof of identity and address, anywhere in India.

issuance of semi-closed PPIs in terms of categories and KYC requirements. This was done to enable decline in cash-based transactions and augment the objectives of financial inclusion [29]. To transport cash to the white label ATMs (WLA), WLA operators are today allowed to tie up with other commercial banks, besides the sponsor bank. Authorised bodies (banks and non-banks) have increased domestic remittances through formal payment channels after RBI relaxed the domestic money transfer guidelines in October 2011. These actions intend to help citizens, particularly domestic migrants to accomplish their remittance needs through formal channels.

Table 1 provides a checklist of the availability of Payment System Options/Features in US, UK, Europe, Japan, China and India.

Table 1: Availability of Payment System Options/Features in US, UK, Europe, Japan, China and India.

Payment System Options/Features	**USA**	**UK**	**Europe**	**Japan**	**China**	**India**
High Value-RTGS(Credit Transfer)	√	√	√	√	√	√
Retail-One to One (Credit Transfer)	√	√	√	√	√	√
Retail- One to Many(Credit Transfer)	√	√	√	√	√	√
Retail-Many to One(Direct Debit)	√	√	√	√	√	√
E-Money/PPI	√	√	√	√	√	√
Instant/Faster Payments	×	√	×	×	√	√
Mobile Payments	√	√	√	√	√	√
Domestic Card Payment System	√	√	×	√	√	√
Domestic Card	√	×	×	√	√	√
EMV chip technology	√	√	√	√	√	√
Interchange fee regulation for cards	√	√	√	×	√	√
2FA regulation for online card payments	×	√	√	×	√	√
Cheque Truncation	√	×	×	×	√	√

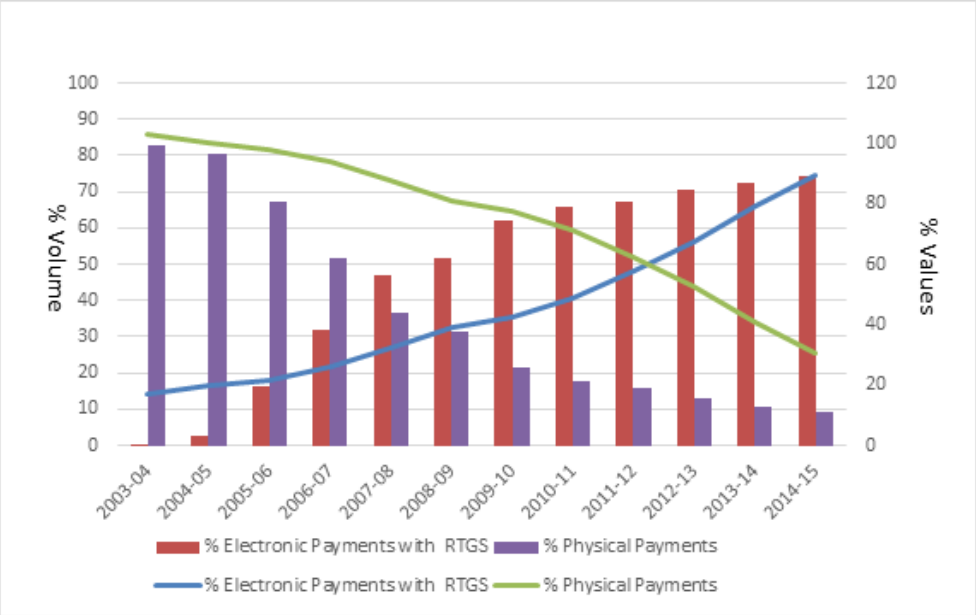
System/Cheque Imaging System						
Legal framework for payments	√	√	√	√	√	√
Separate organization to handle retail payments	×	×	×	√	×	√

PAYMENT SYSTEMS BUSINESS TRENDS IN INDIA

Performance of Paper-based Payments and Electronic Payments at Aggregate Level

Chart 1 (appendix Tables 1 and 2) depicts the performance/throughput of the various payment systems in India for over 11 years from 2003-04 to 2014-15. There is a healthy positive growth in electronic payments (EP) as compared to paper-based payments which has reduced both in volume (86 per cent of total to 25 percent) and value (99.6 percent to 11 percent). The physical payment volume at 25 per cent of the total is still significant. Since high-value payments seem to have already migrated to RTGS, these are really low-value cheques/physical instruments, adding to the overall inefficiency. Therefore, any strategy to move to EP should have two elements: encouraging the use of EP and discouraging the use of physical instruments (Chart 1).

Chart 1: Contribution of Physical Payments and Electronic Payments with RTGS.

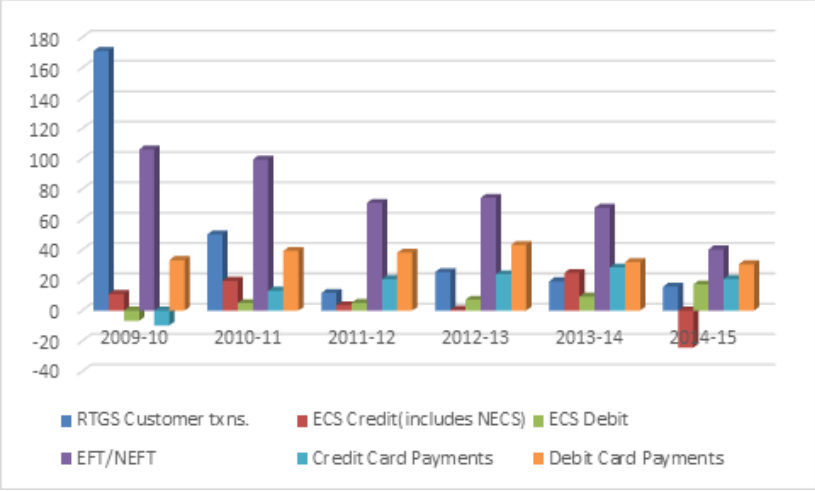


Performance of Electronic Payments

Chart 2 (appendix Tables 3 and 4) depicts the details of payments between 2009-10 and 2014-15. In terms of both volume and value, NEFT transactions show the best growth rate among all EP channels. The contributing factor for the above trend may be attributed to regulatory interventions which were adopted during this period e.g., increase in the number of NEFT settlements from six to eleven, reduction of customer charges for small transactions.

RTGS clearly emerges as the principal payment system in India for wholesale payments. In the short time that it has been in existence, it has bypassed the cheque-based clearing volume in terms of amount and now accounts for over 80 per cent of the payment volume(in terms of amount) in India. The physical cheques that remain may well be only low-value cheques/instruments (Chart 2).

Chart 2: Retail Electronic Payment Systems – YOY Growth in Volumes (%).



Performance of all Retail Payment Systems including newly added ones

Chart 3 (appendix Table 5) provides details of all retail payment systems (newly introduced as well as old ones) for 2012-13, 2013-14 and 2014-15. Percentage contribution of CTS (Cheque Truncation Scheme) to total paper clearing in terms of both volume & value has grown from around 20 per cent to 79 per cent respectively. This indicates that there is an increasing trend of cheques being processed through CTS option which is a good sign. This trend is also being complemented by the closing down of MICR centres which are being eventually migrated to CTS. CTS paper clearing option which was introduced in India for the first time in year 2008 is more efficient in compared to MICR and non-MICR clearing options.

Chart 3: Paper Clearing Volume (million).

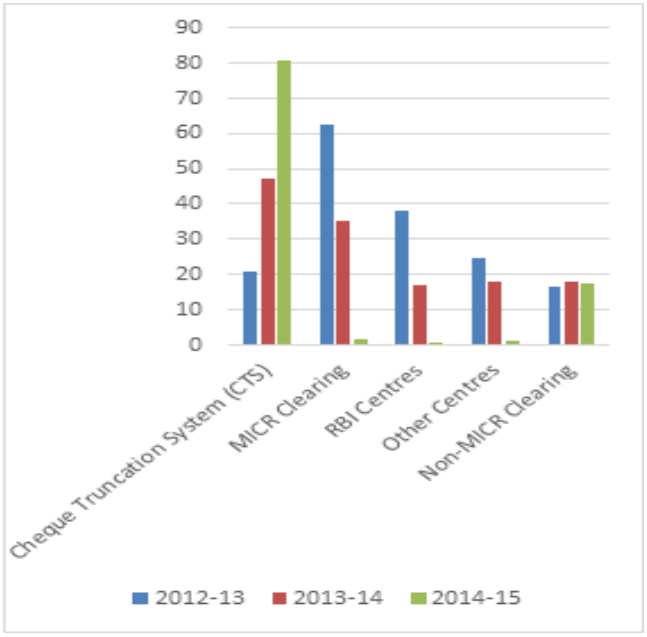
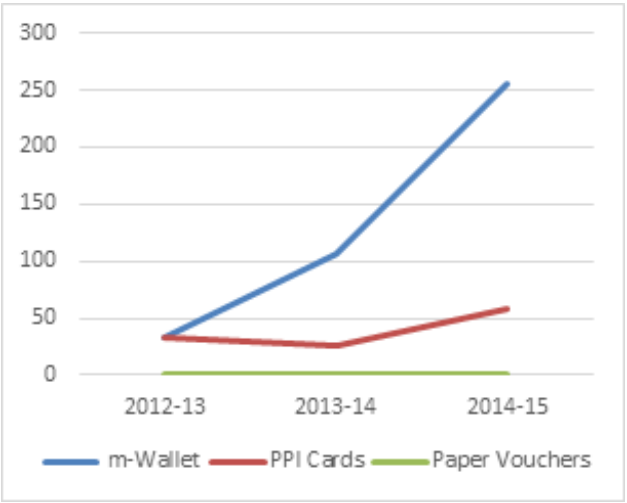


Chart 4 (appendix Table 6) provides the PPI details for the period 2012-13 to 2014-15. Out of the three PPI types, percentage contribution of m-wallet transactions to total PPI transactions in terms of volume is showing an increasing trend from 48 per cent to almost 81 per cent. This may be due to the relaxations which were brought in the PPI guidelines by RBI which has led to participation from the mobile network operators also to offer PPI's in m-wallet form.

Chart 4: PPIs Transaction Volumes (million).



Charts 5 to 8 (appendix Tables 7-10) indicate the relative importance of txn volumes of various payment instruments conducted by non-banks in the 5 countries.

- As far as card payments are concerned in Japan most of card payments happen through credit cards and a very negligible payments are done through debit cards. Japan has a substantial amount of payments happening through e-money payment instruments.

- Cheque payments are mostly done in India and USA. China has significantly reduced volume of cheque txns. Japan and UK also has very low cheque txns.

- In USA, 44.6% of value of payment transactions happen through credit transfers and 38.2% payment txn values are processed through direct debit. In comparison India transacts 87% of payment values through credit transfers whereas direct debits are quite negligible and stands at 0.1%.

- High value payments are done through cheques in China which is quite obvious from the data (4.5% of cheque txns contribute 24% of values). USA transacts 14.5% of payment values through cheques whereas India transacts 10.4% value through cheques.

Chart 5: Debit card txn volume (millions).

Chart 6: Credit card transaction (volume in million).

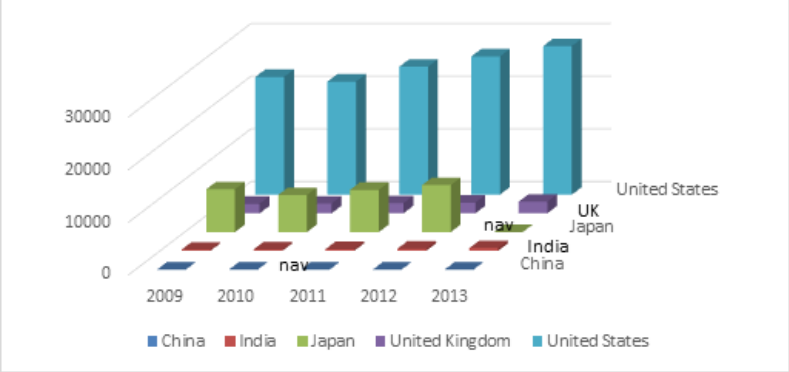


Chart 7: Cheques (% of total number of transactions).

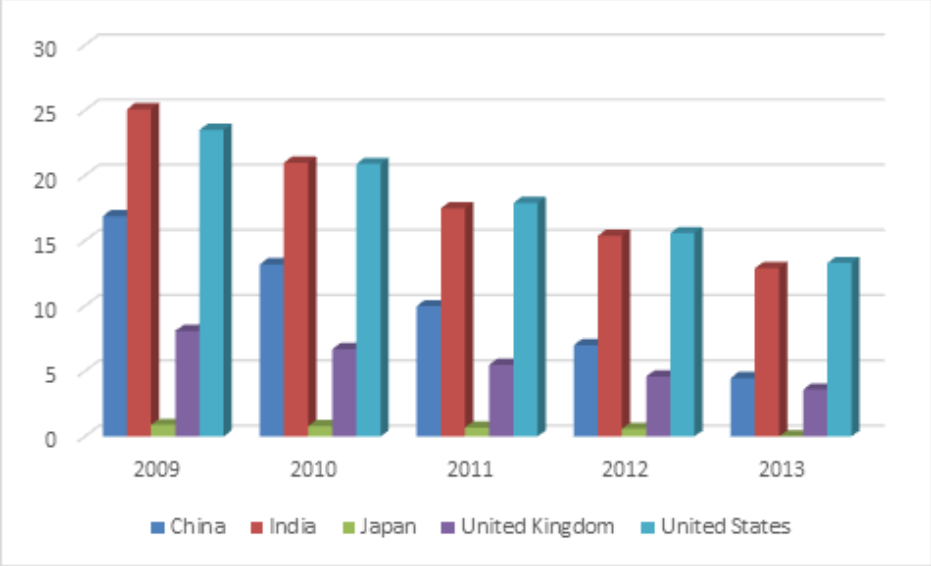
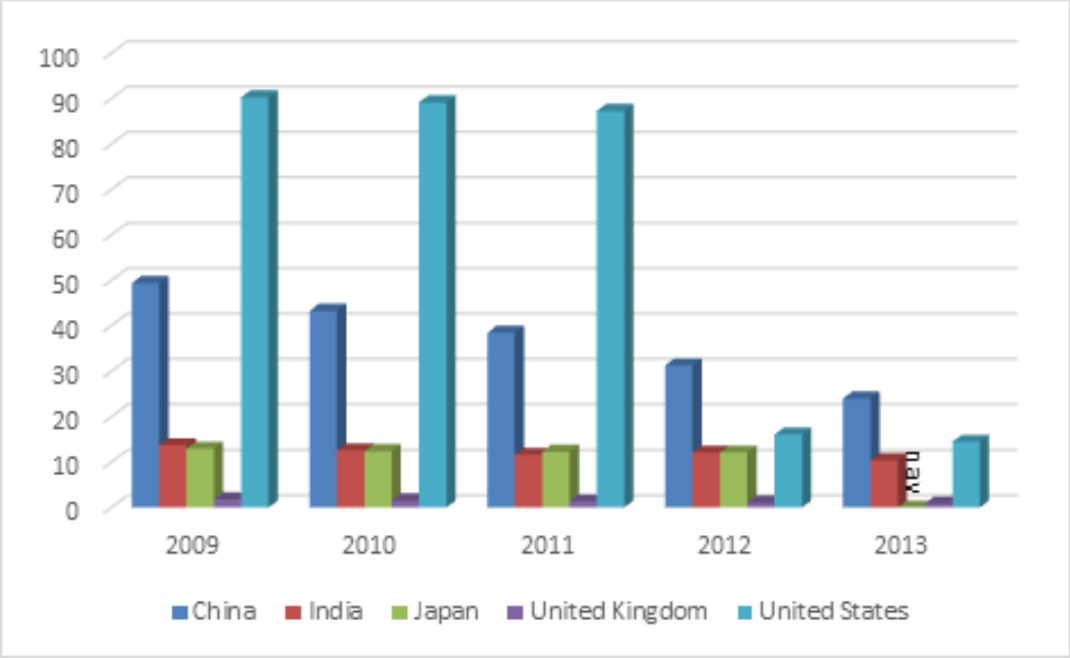


Chart 8: Cheque (% of total value of txns).



COMPARATIVE ANALYSIS AND BIS BENCHMARKING

This section provides a comparative analysis of India's Payment Systems with selected developing and developed economies and also its compliance to the BIS principles.

ECS/NACH

BACS in UK coinciding to India's ECS/NACH

- ECS/NACH processes payments within a two-day clearing and settlement cycle whereas the same process is three days in case of BACS in UK.
- BACS users submit payment instructions directly to the system. On the contrary ECS/NACH users have to submit payment instructions through a sponsor bank only.

BEPS in China coinciding with India's ECS/NACH

- BEPS (Bulk Electronic Payment Systems) is a centralized clearing system which closely resembles India's NEFT system, NECS credit system and NACH system. ECS debit still functions in decentralized fashion in India.
- BEPS deals with paper based debit payments whereas ECS, NEFT and NACH do not deal with processing paper instruments like cheques and drafts.
- BEPS is real time bilateral net settlement system whereas NEFT, ECS and NACH are deferred multilateral net settlement systems.
- BEPS handles bulk credits, bulk debits, one to one real time credit, one to one real time debit. This is unlike that in India where ECS/NACH handles bulk credits and debits and NEFT system for handling one to one credits.
- India's NEFT and ECS/NACH does not run 24 x 7 unlike BEPS in China. For mitigating settlement risks, BEPS system follows net debit cap principle, netting, queuing and matching of queuing transactions. Default handling procedure in ECS/NACH involves utilizing margin money, invoking the line of credit extended to defaulting bank, activating the loss sharing mechanism or any other guaranteed mechanism.

ACH in USA coinciding to India's ECS/NACH

- The Federal Reserve and a private sector ACH operator known as EPN (Electronic Payments Network) operates ACH (Automated Clearing House) credit and debit which is a batch-oriented electronic payment system (enables bulk, repetitive as well as one-off payments) in USA. This is unlike India's ECS credit and debit payment system which is a decentralized system operated by around 70 clearing houses managed by RBI and a few Indian public sector banks. Even NECS is operated by RBI. Unlike in USA, private sector is not involved in ECS operations in India. But due to the formulation of NPCI, the new version of ECS i.e. NACH is now under NPCI's i.e. private sector control and operation.

- There are a lot of difficulties for the banks who are the users of ECS payment system in India due to the decentralized mode of operation of ECS. Hence, looking into industry best practices, ECS credit system has already been centralized in India which is known as the National ECS credit system (NECS credit) operated by the Reserve Bank of India. NACH system operated by NPCI is completely centralized which processes bulk and repetitive payments today.

- ACH community in USA has recently included transactions initiated by consumers such as point of purchase, payments authorized over telephone, payments initiated over internet which is not possible in India's ECS/NACH.

- ACH in USA also processes cheque payments called check conversion. NACH/ECS in India does not process cheque payments.

- Individuals, corporations or other entities are originators (those who initiates entries into the Automated Clearing House Network) in ACH. This is unlike our ECS/NACH payment system where originators are corporations and not individuals. For example, in ACH an individual who in this case is the originator, for paying his electricity bill can instruct his banker to debit his account and make payment to the biller's account using the ACH network. This is not possible in ECS debit payment system/NACH.

- There is a marked difference between USA's ACH and India's ECS/NACH payment system in terms of who is the originator and the receiver. Receivers (those who have authorized an Originator to initiate a credit or debit entry to a transaction account held at a Receiving Depository Financial Institution) in ACH are individuals, corporations or other entities. This is unlike our ECS payment system/NACH where receivers are individuals and not corporations. For example, a company purchasing goods (buyer) from another company (seller) can authorize the seller to initiate a debit transaction to its (buyer's) bank account through the ACH network. This is also a one-time payment which is not possible in ECS debit payment system/NACH.

- Provisions of the NACHA Operating Rules and Guidelines must be abided by Originating and Receiving depository financial institution participating in ACH. Similarly, the sponsor and the destination banks in ECS have to abide by the provisions of the Procedural Guidelines on Electronic Clearing Service (credit clearing and debit clearing) laid down by RBI. NPCI in India frames operating rules and business practices for sponsor and destination banks in NACH.

SEPA in Europe coinciding to India's ECS/NACH

- India and its adjoining countries (SAARC countries) can think of a SEPA (Single Euro Payment Area) like payment system which can allow consumers, companies and other economic players to make and receive payments amongst each other or within national borders under the same basic circumstances, privileges and responsibilities. The prerequisite is, of course, having a common currency. Benefits of having a common payment system are many as has been seen in SEPA.

- SEPA direct debit covers both repeated and payments occurring only once in euro. This is unlike our ECS debit/NACH payment system which can be used only for recurrent payments like utility bill payments. ECS debit/NACH cannot be used for one-off payments

like buying a product from an online merchant and authorizing the merchant to debit customer's account by using ECS debit/NACH payment system.

- Before taking a SEPA like initiative, India has to first move to a National ACH system. Already India has moved to a National ECS system (NECS) which can process bulk credits centrally. Also the newly formed NACH system by NPCI can process both bulk credits and debits centrally. Customers paying by SEPA direct debit from an account in another EU country does not have to pay cross border charges. This is the biggest advantage to customers who can buy goods/services from any other country within the same payment area without incurring extra charges. This will give a huge boost to e-commerce. The same type of centrally operating system (National ACH) has to function in other SAARC countries also before they move to a SEPA kind of system.

- To standardize the means of identifying bank accounts and banks when making/receiving payments, the International Bank Account Number (IBAN) and the Bank Identifier Code (BIC) needs to be introduced in India. This will make the systems less complex by not having to process/understand multiple different local formats. SEPA permits consumers and companies to use a single payment account for all euro credit transfers and direct debits.

- Customers using SEPA direct debit can select the debit date they want to pay with. Likewise, the company also has a flexibility to collect money throughout the month rather than on one date. This flexibility is not present in India's NACH system.

NEFT/IMPS

ZENGIN in Japan coinciding to India's NEFT/IMPS

- ZENGIN system processes one to one payments as well as bulk payments which are of one to many type. NEFT in India also does both one to one and one to many payments.

- High value payments more than 100 million yen are processed on a RTGS basis in ZENGIN where settlement of small value payments takes place on DNS basis. In contrast, NEFT and IMPS both settle on Deferred Net Settlement (DNS) basis.

- To avoid "unwinds" resulting from defaults by participants, the system operator (currently RBI) acts as a central counterparty in NEFT using the principle of novation to mitigate risk in a DNS system. This principle is followed in the French retail payment system, SIT as well as in BEPS and Zengin system mentioned above. Sender net debit cap and guarantees are introduced as risk mitigation measures. National Payments Corporation of India (NPCI) operated IMPS payment system already has a well-established default handling mechanism like sender net debit cap and guarantees, etc.

- The Zengin and the Tokyo Clearing House are operated by the Japanese Bank's Payment Clearing Network. This broadly conforms to the ownership and operation models of retail payment systems in many developed countries where such systems are owned and operated either by the bankers' association/payment system association (Japan, South Africa, etc) or by companies set up by the participants (UK, France, Italy, etc). NPCI which is a company set up by participants can take over the operations of NEFT from RBI which is the current industry practice and conforms to BIS guidelines. NPCI has developed another important real time and 24*7 operating payment system in India (IMPS) which it currently operates which again conforms to industry best practice.

Faster Electronic Payments in UK coinciding to India's IMPS

- The nationwide electronic fund transfer system NEFT can be enabled to move funds from the remitter to the beneficiary on a near real time basis on similar lines to that of Faster Payments in UK and IMPS in India.
- Faster electronic payments processes both one to one and one to many payments like payment of wages by a corporate institution. IMPS currently processes only one to one payments. NEFT does both one to one and one to many payments.
- To mitigate settlement risks, net sender caps and fixing individual transaction limits can be employed for NEFT system. Risk mitigation mechanism like net sender cap is already present in IMPS system.

SEPA Credit Transfers in Europe coinciding to India's NEFT/IMPS

- RBI can expand the reach of NEFT system and cover all SAARC countries on similar lines like that of SEPA. Inter-bank fund transfer between these countries would become more efficient.
- To standardize the means of identifying bank accounts and banks when making/receiving payments, the International Bank Account Number (IBAN) and the Bank Identifier Code (BIC) needs to be introduced. This will make the systems less complex by not having to process/understand multiple different local formats.
- Banks are today introducing their own M-Payment application for credit transfer leveraging on evolving SEPA payment channels. It allows clients to pay for goods with their smartphones using money from their bank accounts. NEFT/IMPS can provide similar platform to banks in India which will aid purchase txns as well apart from remittances through NEFT/IMPS.

RTGS (Large Value Payment System)

CHAPS in UK coinciding to India's RTGS

- A bypass mode offers the main contingency option if CHAPS becomes unworkable at both its primary and recovery site for a significant period of time. Here messages are

sent directly between sending and receiving members circumventing CHAPS clearing system. CHAPS later calculates multilateral net settlement positions after members provide CHAPS with agreed bilateral positions. RTGS in India doesn't have similar mechanism to handle contingencies. Instead RBI has recently allowed SWIFT to build a domestic network in India through which Indian banks and companies can send and receive financial information for local transactions. So if the current INFINET network and SFMS messaging system becomes inoperable, the SWIFT parallel back up network can be used for routing RTGS transactions. Thus, systemic and concentration risks can be reduced by having two channels of communication.

- An operational clearing company known as CHAPS Clearing Company operates UK's CHAPS payment system. Bank of England provides the RTGS settlement account for the participating banks. In India, RBI itself operates the RTGS system and also provides settlement account for the member banks. A dedicated company may be formed which would look after RTGS operations in India.

TARGET in Europe coinciding to India's RTGS

- SAARC countries can come together and develop a central RTGS system like TARGET (Real Time Gross Settlement Express Transfer) which can connect to their local RTGS system. This will facilitate faster inter-bank and customer payments between these countries. The prerequisite is to decide upon a common currency.

EURO1 system in Europe coinciding to India's RTGS

- It is a large value payment system owned privately by EBA clearing company. It is a euro-dominated net settlement system. In India there is only one large value payment system in the form of RTGS whereas in Europe there are two large value systems.

- Apart from processing individual transactions submitted by its participants , it also processes the balances of STEP1 service and gross values of STEP2 system which are both retail payment systems in Europe. Similarly RTGS in India settles the net positions of retail payment systems like NEFT, ECS, NFS, etc.

HVPS in China coinciding to India's RTGS

- The pricing principle followed by the People's Bank of China for various payment systems is not aimed at making profits. The objective is to balance the interests of the system operators and system users. Regarding pricing, the objective of RBI is similar to that of People's Bank of China. RBI charges a meagre amount to the system operators, i.e. the banks and has regulated service charge that banks levy on the customers.

- In China, the time a payment transaction is put through determines the pricing, i.e. transactions put through during the peak hour of a system's working are charged higher

than transactions put through at non-peak hours. Similar pricing mechanism is also implemented in India for RTGS, which aids to preventing clogging of the system.

Fedwire in USA coinciding to India's RTGS

- Federal Reserve fees for the Fedwire service are based upon the Federal Reserve's general pricing policies of cost recovery. Presently, Fedwire levies transaction fees to both the originating institution (debit side) and receiving institution (credit side). In contrast, RBI gives RTGS facility free to the receiving banks. But in order to recover the costs of operating the system, RBI has come out with a pricing policy which is a standard practice.

- For risk management, RBI has already formulated gridlock resolution mechanism and granting access to intra-day liquidity (IDL) facility to the members.

CHIPS in USA coinciding to India's RTGS as well as NEFT

- CHIPS (Clearing House Inter-bank Payment System) is to a certain extent similar to India's NEFT system. CHIPS and NEFT both are not running 24 x 7. Both are net settlement system. But there are some distinct dissimilarity also. CHIPS is not a multilateral net settlement system like NEFT. CHIPS is a real time operating payment system like RTGS in India since the settlement happens on a real time basis. CHIPS does not wait for batch payment files to come from all the participants, whenever it sees an opportunity for settlement it runs an optimization algorithm and settles either one, two or more payment orders. This is unlike NEFT where there are 11 batch settlements happening after a fixed time span (deferred multilateral net) in a day and hence not a real time settlement. Thus CHIPS is a hybrid system which employs both gross and net settlement mechanisms like RTGS system in India.

- CHIPS is a large value inter-bank payment system like RTGS in India whereas NEFT is strictly a retail payment system.

- Also CHIPS is owned and operated by CHIPSCo which is a standard industry practice unlike NEFT and RTGS which is operated by the RBI.

- CHIPS has implemented adequate risk management practices as follows. During the operating day, CHIPS does not release any payment order unless it can be debited against the participant's current position, and no participant's current position is permitted to fall below zero. All payment orders are final upon release to the receiving participant. CHIPS has credit criteria for participants to make sure that CHIPS participants have adequate access to sources of credit and liquidity to pay promptly each day their opening position requirements and their closing position requirements. NEFT and RTGS participants in India gets intra-day liquidity facility from RBI to keep their RTGS settlement account funded throughout the day during liquidity problems.

Card Payment System

China Unionpay in China coinciding to India's Card Payment System

- There is a need to make ATMs of all banks in the country accessible to all bank customers at reasonable service charges. In India all banks have joined the National Financial Switch (NFS) which is a national ATM shared payment network. All domestic ATM transactions are getting processed through the NFS. However, foreign transactions continue to be processed by Visa/MasterCard/American Express, etc.

- Domestic POS transactions are gradually moving to a domestic card payment settlement network called RuPay on the lines of China Unionpay. NPCI is running this network. An India specific card called RuPay card is a reality in India. Foreign POS transactions through RuPay card are getting processed through Discover Financial Service (DFS) as there is an agreement between NPCI and DFS. For facilitating this, the international card scheme DFS is linked to the RuPay Information Switch Centre. The RuPay Switch eventually would have full range of switching functionality (ATM, POS, Internet and Mobile transactions). Ecommerce in India would thus get a huge boost.

Card payment system in USA coinciding to India's card payment system

- The largest credit card and signature-based debit card networks in the United States are Visa and MasterCard. American Express and Discover Card are also major credit card networks. In India all credit card and debit card transactions originated from POS terminals are processed by Visa, MasterCard and RuPay. American Express is also a credit card network in India. PIN-based debit card transactions effected in USA are processed primarily by private operators like Star, Interlink, NYCE and Pulse.

- In India, card transactions originated from ATMs are processed by shared ATM networks like Cashnet, NFS, etc. and Visa and MasterCard. Cashnet is managed by a private operator known as Euronet India whereas NFS is managed by NPCI. Private operators in USA like Star and Pulse process card transactions originating from both ATMs and POS. This is unlike in India where private operators like Cashnet , NFS process only card transactions originating from ATMs. NPCI the retail payments company formed in India is planning to merge NFS into the domestic card payment switch (RuPay) which would have a full range of switching functionality (ATM, POS).

Table 2 provides a synoptic overview of the Payment Systems in US, UK, Europe, Japan, China and India

Table 2: Overview of Payment Systems in US, UK, Europe, Japan, China and India

Countries	**Payment Systems Contents**	
	Brief description	**Observations and Features**

	of options available	
US	✓ ACH ✓ Fedwire ✓ CHIPS ✓ VISA, Mastercard, American Express, Discover, STAR, Interlink, NYCE, Pulse	✓ ACH is batch oriented electronic payment system which also processes cheque payments called check conversion ✓ Fedwire is large value RTGS system ✓ CHIPS is a hybrid system which employs both gross and net settlement mechanisms, It is a large value payment system ✓ Federal Reserve Board issues rules relating to debit card interchange fees ✓ Discover, STAR, Interlink, NYCE, Pulse are domestic card payment system
UK	✓ BACS ✓ Faster Electronic Payments ✓ CHAPS ✓ LINK	✓ BACS has a three day clearing cycle, Implemented risk mitigation mechanisms like debit caps and regression functionality ✓ Faster Electronic Payments processes payments on real time basis, It processes both one to one and one to many payments ✓ CHAPS is an RTGS system, Bypass mode offers the main contingency option, Has no lower limit for transaction values ✓ LINK is domestic shared ATM network
Europe	✓ SEPA Direct Debit ✓ SEPA Credit Transfer ✓ TARGET ✓ EURO1 ✓ STEP1 ✓ STEP2	✓ SEPA Direct Debit covers both recurrent and one-off payments in Euro, Allows consumers and businesses to use a single payment account(IBAN) ✓ SEPA Credit Transfer provides banks a platform to launch their own M-Payment application ✓ TARGET is a Euro area wide RTGS system for settlement of euro payments in central bank money ✓ EURO1 is large value payment system, It is euro-dominated net settlement system ✓ STEP1 and STEP2 are both retail payment systems
Japan	✓ ZENGIN ✓ JCB	✓ ZENGIN Processes one to one as well as bulk payments of one to many type ✓ High value payments are processed on a RTGS basis in ZENGIN, settlement of small value payments take place on DNS basis in ZENGIN ✓ JCB is domestic card payment system

China	✓ BEPS ✓ HVPS ✓ China Unionpay ✓ IBPS	✓ BEPS is real time bilateral net settlement system;Handles bulk credits, bulk debits, one to one real time credit, one to one real time debit, It runs 24*7 ✓ HVPS is an RTGS sytem ✓ China Unionpay is a domestic card payment settlement network ✓ IBPS handles interbank retail payment txns via internet
India	✓ ECS/NACH ✓ NEFT ✓ IMPS ✓ RTGS ✓ VISA, Mastercard, RuPay, NFS	✓ ECS/NACH handles bulk and repetitive payments(both on credit and debit side) ✓ NEFT is deferred net settlement system, Processes one to one and one to many retail payments ✓ IMPS is a 24*7 and real time operating retail payment system;Fund transfers can be initiated from mobile, ATM, Internet banking and branch ✓ RTGS processes high value interbank payments as well as retail payments above Rs 2 lakhs per transaction ✓ RTGS and NEFT payment messages are carried interbank through a propriety network(WAN) called INFINET operated by IDRBT which is the technology arm of RBI ✓ NFS processes interbank card payments originated from ATMs ✓ RuPay is a domestic card network, It processes card payments originated through POS and online merchants

Compliance to BIS Core principle: Smooth working of the payment systems is critical for the financial stability and conduct of monetary policy of the economy. In view of importance of payment systems, the BIS had suggested ten core principles of Systemically Important Payment Systems (SIPS) in 2001 and following the financial crisis in 2008, these were revised as core principles of Financial Markets Infrastructure (FMI). These principles therefore form the international best standards for Governance of Payment systems. While many central banks have placed their self-assessment to these principles in public domain, such assessment for Payment systems in India is not available in public domain. The value of RTGS customer payments at Rs. 631 trillions during the year 2014-15 exceeded the total electronic and paper based netted settlements at Rs. 150 trillions and value in domestic money and securities market at Rs. 425 trillions which are netted at CCIL and settled outside RTGS [30,31]. Since the large value customer transactions dominate the volume in RTGS, the RTGS is the Large Value Payment system (LVPS) rather than as a Financial Markets Infrastructure (FMI). The retail payment system in India

has high liquidity obligation and inadequate liquidity optimization causing liquidity risk. The trend in Indian payment system, therefore, is not in tune with trend observed in other international payment systems. As RTGS handles bulk of the value of retail payments (which exceed the wholesale payments) while financial markets are settled outside RTGS, this paper considers RTGS as the Systemically important payment system in India and tries to map the compliance of RTGS with the core principles in Table 3.

Table 3: Mapping of RTGS with BIS core principles of Systemically Important Payment Systems

BIS Core Principle	**Status Recording**	**Compliance position**
System should have well founded legal basis under all relevant jurisdiction.	The payments are governed by the RBI Act, 1934 Payment & Settlement systems Act 2007 and IT Act 2001	Detected
System's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks through participation	Rules and procedures not in public domain. Despite experiencing liquidity risk through participation, the banks prefer RTGS for high value. The occurence of frauds shows operational risks through participation for banks as well as customers.	Not obvious
System should have clearly defined procedures for management of credit risk and liquidity risks, which specify the respective responsibilities of the system operator and participants and which provide appropriate incentives to manage and contain those risks.	Techniques for management of liquidity risks and responsibilities of the system operator, RBI, for liquidity support are not in public domain. Incentives to manage liquidity risk and contain them not obvious as banks continue to route all high value transactions through Gross settlement.	Not obvious
The system should provide final settlement on the day of value, preferably during the day and at minimum at the end of the day	The RTGS is used for the retail customer payments, some netted payments and interbank payments which are settled on real time basis.	Detected
A system in which multilateral netting takes place should, at a minimum , be capable of ensuring timely completion	Only high value retail payments are settled through RTGS where application of this	Not applicable

of daily settlements in the event of an inability to settle by the participants with largest single settlement obligation	principle is not relevant.	
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.	The settlement is done in the settlement account of the bank with RBI with facility of Intra day overdraft.	detected
The system should ensure high degree of security and operational reliability and should have contingency arrangement for timely completion of daily processing.	The RTGS contingency arrangements may be part of the Business Continuity plan of the RBI. The assurance is not in public domain but no interruption in public domain.	Mostly detected
System should provide a means of making payment which is practical for users and efficient for economy	The remitter has option to use NEFT with hourly settlement and lower customer charges while the receiver can receive funds within two hours. Practical and effective characteristic for the user making payment is not proven.	Not obvious
The system should have objective and publically disclosed criteria for participation, which permits fair and open access.	Membership rules for RTGS are not in public domain. Membership not extended to all banks participating in the financial markets through membership of CCIL.	Not obvious
The system's Governance arrangements should be effective, accountable and transparent.	The compliance to core principles not in public domain.	Not obvious
Central Bank Responsibilities in applying core principles		
The Central bank should define clearly its payment system objectives and should disclose its role and major policies with respect to Systemically important payment system	The RBI has positioned its vision document in public domain but the objectives of RTGS are not in public domain. RBI's role and guidelines for liquidity management are not divulged.	Not obvious
The Central bank should ensure that system it operates comply with the core principles	Compliance to core principles is not available in public domain.	Not obvious

The Central Bank should oversee compliance with the core principles by systems it does not operate and should have ability to carry out this oversight	Since RTGS is run by the RBI itself, this principle does not apply.	Not applicable
The central bank, in promoting payment system safety and efficiency through the core principles, should cooperate with other central banks and with other relevant domestic or foreign authorities.	Not relevant as RTGS is used for domestic settlement.	Not applicable

Source: Adapted from [31]

It is observed from the mapping that compliance to some core principles such as techniques for understanding liquidity risk through participation, operational risks, management of liquidity risk , system operator's obligation for liquidity support , motivations for managing liquidity risk, access criterion, transparency regarding Intra Day Liquidity (IDL) support, etc. is not evident from perceived trends and public documents. The trend in Indian payment system, therefore, is not in conformity with trend detected in other international payment systems.

CHALLENGES AND OPPORTUNITIES FOR INDIA

- There is a healthy positive growth in electronic payments in India compared to paper-based payments which is indeed a good sign. The continuing efforts of RBI and the banks to migrate from paper to electronic payments had a favorable influence. Among the electronic payment options, RTGS has been widely accepted as the payments mechanism by corporates and banks, and that on the retail payment side, a lot needs to be done to increase the use of electronic payments. RTGS clearly emerges as the principal payment system in India for wholesale payments. In the short time that it has been in existence, it has bypassed the cheque-based clearing volume in terms of amount and now accounts for over 80 per cent of the payment volume (in terms of amount) in India. In terms of both volume & value, NEFT transactions shows the best growth rate among all EP channels during the period 2009 – 10 to 2014 – 15.

- On an average, the number of transactions for a credit card is in the region of 29 transactions per year while for debit cards it is abysmally low of about 1.5 transactions per year. In India, credit cards are rarely used in the ATM for cash withdrawal and debit cards are seldom used outside ATM cash withdrawal purposes. Thus to promote debit card for purchase transactions, a lot of awareness campaigns and incentives are to be built in. Further, despite their being close to 574.5 million cards (debit and credit both), their contribution to total electronic payments in India in terms of value is only a measly 0.39 percent of the total EP. This indicates that most retail transactions happen by cash, and India has a long way to go to eliminate cash as the primary payment mechanism for retail

payments. Acquiring infrastructure in India (POS terminals) is very low (11 lakhs POS v/s 1.5 crore retailers) which needs to be augmented fast. Enabling conditions like providing tax rebate to merchants/retailers, subsidizing cost of POS terminals, etc., should be introduced to improve the overall acquiring eco-system.

- Percentage contribution of CTS to total paper clearing in terms of both volume and value has grown from around 20 per cent in 2012 – 13 to 79 per cent in 2014 – 15 respectively. This indicates that there is an increasing trend of cheques being processed through CTS option which is more efficient than MICR clearing. This trend clearly contributes to the efficiency of overall payment system in India.

- In India, prepaid payment instruments (PPI) are offered in three forms: mobile wallets, PPI cards and paper vouchers. Out of these 3 PPI types, percentage contribution of m-wallet transactions to total PPI transactions in terms of volume is showing an increasing trend from 48 percent in 2012 – 13 to almost 81 per cent in 2014 – 15. Most of these m-wallets are being issued by the mobile network operators and e-tailers in India.

- While comparing non-bank payment transactions in the 5 countries under consideration viz., USA, UK, Japan, China and India, from 2009 to 2013 it is found that number of cheque transactions are declining in all the 5 countries. India and USA are still high user of cheques as compared to the other 3 countries though the rate of decline of cheque transactions in USA is higher than that of India. Growth in card payment transactions is quite high in China over the 5 years in consideration as compared to that of India although both started on an equal footing in 2009. In USA, 44.6% of value of payment transactions happen through credit transfers and 38.2% payment transaction values are processed through direct debit (ACH). In comparison, India transacts 87% of payment values through credit transfers whereas direct debits (through ECS Debit) are quite negligible and stands at 0.1%. This indicates that payment of loan EMI's, utility bills, etc., are still being majorly done through cheques in India by retail customers. So there is a huge scope of migrating such payments to direct debit mode. Corporate institutions/billers/sponsor banks in India have to proactively migrate such collections to ECS Debit and now through NACH payment mode. NPCI has already created a world class direct debit payment infrastructure in the form of NACH which is a highly efficient system and has adopted ISO 20022 message standards which is a global standard. China and USA processes 24% and 14.5% of payment values respectively through cheques. In comparison, India transacts only 10.4% of payment values through cheques which indicates India has successfully migrated high value payment transactions to electronic payment modes. Average value per transaction through cards is the highest for China in comparison to the other selected countries. This means that Chinese people are doing high value retail purchases through cards. India should take some aggressive steps to migrate high value retail purchase transactions to cards payment mode. Acquiring infrastructure (POS/PG) in India should be enhanced on a mission mode. Japan has recorded higher average value per transaction for debit cards in comparison to credit cards which indicates Japanese people prefer to do high value retail purchases through debit

cards. Debit card transactions in India should be incentivized so that more people in India prefer debit cards over credit cards for doing high value retail purchases. There are more debit cards in India (553 million) compared to credit cards (21 million).

- Payments submitted to ECS/NACH are subject to a two – day clearing and settlement cycle unlike that of BACS in UK which has a 3 day clearing cycle, thus ECS/NACH is more efficient than BACS in this aspect. China has one main retail payment system which handles all types of payments like bulk credits, bulk debits, one to one real time credit and one to one real time debit. On the contrary, India has several retail systems like ECS/NACH for handling bulk credit and debits and NEFT for handling one to one credits etc. In the long run, India should also strive to have one main retail electronic payment system like China. The ACH community in USA has recently included transactions initiated by consumers such as point of purchase, payments authorized over telephone and payments initiated over internet which is currently not possible in India's ECH/NACH. Going further, NPCI should consider incorporating these features in NACH.
Originators and receivers in ACH are individuals, corporations or other entities. This is unlike the ECS/NACH system where originators are only corporations and not individuals. Similarly, receivers are only individuals and not corporations. Thus, there is a marked difference between ACH of USA & NACH of India. India and its neighboring countries (SAARC countries) can contemplate of a SEPA (Single Euro Payment Area) like payment system which can allow consumers, companies and other economic players to make and receive payments amongst each other or within national borders under the same basic circumstances, privileges and responsibilities.

- Currently, customers paying by SEPA direct debit from an account in another EU country does not have to pay cross border charges which is a big advantage to customers. Same benefits can be passed on to consumers in SAARC countries if a SEPA like system is implemented in this region. ECS Debit/NACH cannot be used for one-off payments like buying a product from an online merchant and authorizing the merchant to debit one's account by using ECS Debit/NACH unlike that of SEPA direct debit which make this sort of payments possible. Going further, NPCI would like to incorporate this feature in NACH. To standardize the means of identifying bank accounts and banks when making/receiving payments , the International Bank Account Number (IBAN) and the Bank Identifier Code (BIC) needs to be introduced in India like SEPA system in Euro Area. This will make the systems less complex by not having to process/understand multiple different local formats.

- Retail payment systems are mostly owned and operated either by bankers' association/payment system associations like in Japan and South Africa or companies set up by the participants like in UK, France and Italy. NPCI which is a company set up by participants can take over operations of NEFT from RBI which is the current industry practice and conforms to BIS guidelines. Faster electronic payments in UK process both one to one and one to many payments like payment of wages by a corporate institution. IMPS currently processes only one to one payments which can be extended to process one to many payments as well. RBI can expand the reach of NEFT system and cover all

SAARC countries on similar lines like that of SEPA. As a result, inter-bank fund transfer between these countries would become more efficient. Banks are today introducing their own M-Payment application for credit transfer leveraging on evolving SEPA payment channels. It allows clients to pay for goods with their smartphones using money from their bank accounts. NEFT/IMPS can provide similar platform to banks in India which will aid purchase transactions as well apart from remittances through NEFT/IMPS.

- The main contingency option incorporated in CHAPS of UK when both its primary and recovery site becomes inoperable is that messages are delivered directly between sending and receiving members bypassing CHAPS clearing system. Later, members provide CHAPS with agreed bilateral positions and then CHAPS calculates multilateral net settlement positions. Similar mechanism to handle contingencies can be adopted for RTGS in India. An operational clearing company knows as CHAPS Clearing company operates UK's CHAPS system. A dedicated company may be formed which would look after RTGS operations in India while the participant banks' RTGS settlement account continues to remain with RBI. SAARC countries can come together and develop a central RTGS system like TARGET which can connect to their local RTGS system. This will facilitate faster inter-bank and customer payments between these countries thus giving a boost to cross-country commerce between them. CHIPS of USA is a real time operating payment system which employs both gross and net settlement mechanisms (hybrid system). It does not wait for batch payment files to come from all participants, whenever it sees an opportunity for settlement it runs an optimization algorithm and settles either one, two or more payments orders. NEFT in India can be converted from a deferred net settlement system to a hybrid system in order to improve its efficiency. CHIPS is owned and operated by CHIPSCo. (a private company) which is a standard practice. Operations of NEFT and RTGS should also in the long run move to a private company (say NPCI) formed by participant banks while RBI continues to provide settlement account to participating banks.

- Domestic POS transactions in India are gradually moving to a domestic card payment settlement network called RuPay on the lines of China Unionpay. NPCI is running this network. An India specific card called RuPay card is a reality in India. The RuPay Switch eventually would have full range of switching functionality (ATM, POS, Internet and mobile transactions). Ecommerce in India would thus get a huge boost. US govt. issues EBT prepaid cards to distribute govt. benefits. Govt. of India does not issue prepaid cards though it pushes govt. benefits through Aadhaar Payment Bridge Payment system, but these benefits/payments are restricted currently only to bank accounts. It should consider issuing EBT prepaid cards and pushing govt. benefits to the unbanked population of India. Alternatively, it may consider pushing govt. benefits/payments to the prepaid cards/mobile wallets issued by non-banks like telcos, e-tailers and pvt operators in India. RBI has set a debit card MDR cap of 1% of txn value for values greater than Rs 2000 and 0.75% for values less than Rs 2000. In contrast, covered issuers in USA are permitted to receive an interchange fee up to a cap comprised of 21 cents per transaction plus 5 basis points of value of txn. USA has thus created an enabling regulation which has promoted card

payments in the country. Adoption of card payments in India is low in spite of the MDR capping. It needs to be rationalised further– if required it may be capped at some amount/slab rate/fixed rate etc. For example, MDR currently is Rs 100 (1%) for transaction value of Rs10,000 and Rs200 (1%) for transaction value of Rs 20,000. This increase in MDR to be paid by merchants to acquiring banks as the value of transaction increases, demotivates merchants to accept cards, hence MDR should be capped at some point (say at Rs 100). Similarly, the interchange fees also needs to be standardized/rationalized. Currently it varies (from 0.6% to 0.8%) according to the variant of the debit card. The Government may also deliberate introducing a differentiated MDR structure for some crucial transaction segments, such as utility payments and railway ticketing. These two transaction segments generate substantial volumes of transactions, have substantial ticket sizes and are presently cash dominated. To shoot usage of electronic payment channels, create significant revenue, allow real benefit at the point of purchase and result in considerable cash-handling cost savings a reduced MDR for debit cards and RuPay cards for above two transaction use-cases can be considered. SAARC countries can come together and develop a SAARC card payment settlement company. One single card which can be used in all the SAARC countries should be the offering of the company. Benefits of having such a card is immense, since it can be used for making payments in any of the SAARC countries without charging a hefty amount to the customer as is being charged today by Visa and MasterCard when a card issued by an Indian bank is swiped abroad. Already in India, RuPay card and RuPay domestic card payment network is established. This card and network can be extended to banks in SAARC countries.

- The Government initiatives for financial inclusion, benefits transfers through bank accounts and promotion of digital payments have transformed the Payment System initiatives in India into world's largest Digital Governance initiative. The retail payment system in India, therefore, needs to be aligned to this objective.

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APPENDIX

Table 1: Throughput of Physical Payments and Electronic Payments with RTGS for the last 11 years.

FY	Physical Payments		Electronic Payments with RTGS		Total Payments		% Electronic Payments with RTGS		% Physical Payments	
	Volume	Values	Volume	Values	Volume	Values	Volume	Values	Volume	Values
2003-04	1022.8	115960	167	521.43	1189.8	116481	14.04	0.45	85.96	99.55
2004-05	1166.9	104589	229	3584.1	1395.9	108173	16.41	3.31	83.59	96.69
2005-06	1286.8	113291	285.7	27166	1572.5	140457	18.17	19.34	81.83	80.66
2006-07	1367.3	120424	381.2	74035	1748.5	194459	21.8	38.07	78.2	61.93
2007-08	1460.6	133961	539.5	171422	2000.1	305382	26.97	56.13	73.03	43.87
2008-09	1395.9	124612	679.1	205044	2075	329656	32.73	62.2	67.27	37.8
2009-10	1379.26	104040	749.94	302050	2129.2	406090	35.22	74.38	64.78	25.62
2010-11	1387.4	101300	954.22	374963	2341.6	476263	40.75	78.73	59.25	21.27
2011-12	1341.9	99012	1241.6	417382	2583.5	516394	48.06	80.83	51.94	19.17
2012-13	1313.7	100182	1689.8	546930	3003.5	647112	56.26	84.52	43.74	15.48
2013-14	1254	93015	2446.8	624047	3700.8	717061	66.11	87.03	33.89	12.97
2014-15	1196.5	85434	3513.5	699741	4710	785175	74.6	89.12	25.4	10.88
Growth (%)										
2009-10	-1.19	-16.51	10.43	47.31	2.61	23.19	NA	NA	NA	NA
2010-11	0.59	-2.63	27.24	24.14	9.98	17.28	NA	NA	NA	NA
2011-12	-3.28	-2.26	30.12	11.31	10.33	8.43	NA	NA	NA	NA

2012-13	-2.1	1.18	36.1	31.04	16.26	25.31	NA	NA	NA	NA
2013-14	-4.54	-7.15	44.8	14.1	23.21	10.81	NA	NA	NA	NA
2014-15	-4.58	-8.15	43.6	12.13	27.27	9.5				

Source: RBI, Annual Report, 2003-04 to 2014-15
Notes on the data: 1) All volumes are in million, 2) All values are in Rs. billion, 3) The figures of card payments as electronic payment mechanism are for transactions at POS terminals only, 4)Interbank fund transfers through RTGS is excluded in the numbers

Table 2: Throughput of physical payments and Electronic Payments without RTGS for the last 11 years.

FY	Physical Payments		Electronic Payments without RTGS		Total Payments		% Electronic Payments without RTGS		% Physical payments	
	Volume	Values	Volume	Values	Volume	Values	Volume	Values	Volume	Values
2003-04	1022.8	115959.60	167.0	521.43	1189.8	2003-04	1022.8	115959.60	167.0	521.43
2004-05	1166.9	104588.95	228.9	1087.50	1395.8	2004-05	1166.9	104588.95	228.9	1087.50
2005-06	1286.8	113291.34	285.0	1463.83	1571.8	2005-06	1286.8	113291.34	285.0	1463.83
2006-07	1367.3	120424.26	378.7	2356.93	1746.0	2006-07	1367.3	120424.26	378.7	2356.93
2007-08	1460.6	133960.66	535.3	10419.92	1995.9	2007-08	1460.6	133960.66	535.3	10419.92
2008-09	1395.9	124612.02	667.8	5003.22	2063.7	2008-09	1395.9	124612.02	667.8	5003.22
2009-10	1379.26	104039.88	719.5	6882.56	2098.8	2009-10	1379.26	104039.88	719.5	6882.56
2010-11	1387.4	101300	908.5	13100	2295.9	2010-11	1387.4	101300	908.5	13100
2011-12	1341.9	99012.1	1190.6	22137.8	2532.5	2011-12	1341.9	99012.1	1190.6	22137.8
2012-13	1313.7	100181.8	1625.8	33932.6	2939.5	2012-13	1313.7	100181.8	1625.8	33932.6
2013-14	1254.0	93014.8	2370.4	50432.6	3624.4	2013-14	1254.0	93014.8	2370.4	50432.6

2014-15	1196.5	85434.14	3425.1	68690	4621.6	2014-15	1196.5	85434.14	3425.1	68690
Growth (%)										
2009-10	-1.19	-16.51	7.74	37.56	1.70	2009-10	-1.19	-16.51	7.74	37.56
2010-11	0.59	-2.63	26.27	90.34	9.39	2010-11	0.59	-2.63	26.27	90.34
2011-12	-3.28	-2.26	31.05	68.99	10.31	2011-12	-3.28	-2.26	31.05	68.99
2012-13	-2.10	1.18	36.55	53.28	16.07	2012-13	-2.10	1.18	36.55	53.28
2013-14	-4.54	-7.15	45.80	48.63	23.30	2013-14	-4.54	-7.15	45.80	48.63
2014-15	-4.58	-8.15	44.49	36.20	27.51	2014-15	-4.58	-8.15	44.49	36.20

Source: RBI, Annual Report, 2003-04 to 2014-15
Notes on the data: 1) All volumes are in million, 2) All values are in Rs. billion, 3) Inter-bank funds transfer through RTGS is excluded in the numbers, 4) The figures of card payments as electronic payment mechanism are for transactions at POS terminals only

Table 3: Retail Electronic Payment System Indicators - Volumes (interbank RTGS not considered).

FY	RTGS Customer txns.	ECS Credit (includes NECS)	ECS Debit	EFT/ NEFT	Credit Card Payments		Debit Card Payments		Total Elect. Payment with RTGS	Total Elect. Payment without RTGS
					No. O/S Cards	Volume	No. O/S Cards	Volume		
2003-04	0	20.3	7.9	0.8	-	100.2	-	37.8	167	167
2004-05	0.1	40.1	15.3	2.5	-	129.5	-	41.5	229	228.9
2005-06	0.7	44.2	36.0	3.1	17.3	156.1	49.8	45.7	285.8	285.1
2006-07	2.5	69.0	75.2	4.8	23.12	169.5	74.98	60.2	381.2	378.7
2007-08	4.1	78.4	127.1	13.3	27.55	228.2	102.44	88.3	539.4	535.3
2008-09	11.23	88.39	160.06	32.16	24.70	259.56	137.43	127.65	679.06	667.83
2009-10	30.44	98.1	149.3	66.3	18.33	234.2	181.97	170.2	748.54	718.1
2010-11	45.72	117.3	156.7	132.3	18.04	265.1	227.84	237.1	954.22	908.5
2011-12	51.02	121.5	164.7	226.1	17.65	320.0	278.28	327.5	1210.82	1159.8
2012-13	63.99	122.2	176.5	394.1	19.55	396.6	331.20	469.1	1622.49	1558.5
2013-14	76.35	152.5	192.9	661.0	19.18	509.1	394.42	619.1	2210.95	2134.6
2014-15	88.39	115.3	226	927.6	21.11	615.1	553.45	808.1	2780.49	2692.1
Growth (%)										

2009-10	171.06	10.98	-6.72	106.15	-25.79	-9.77	32.41	33.33	10.23	7.53
2010-11	50.20	19.57	4.96	99.55	-1.58	13.19	25.21	39.31	27.48	26.51
2011-12	11.59	3.58	5.11	70.90	-2.16	20.71	22.14	38.13	26.89	27.66
2012-13	25.42	0.58	7.16	74.30	10.76	23.94	19.02	43.24	34.00	34.38
2013-14	19.32	24.80	9.29	67.72	-1.89	28.37	19.09	31.98	36.27	36.97
2014-15	15.77	-24.39	17.16	40.33	10.06	20.82	40.32	30.53	25.76	26.12

Source: www.rbi.org.in; RBI Annual Report, 2003-04 to 2014-15 Notes on the data: 1) All numbers are in million, 2) The figures of cards are for transactions at POS terminals only, 3) PPI's, IMPS, ACH are recently introduced Payment Systems, hence these systems are not considered in this analysis.

Table 4: Retail Electronic Payment System Indicators -Values (interbank RTGS not considered).

FY	RTGS Customer Transaction	ECS Credit (includes NECS)	ECS Debit	EFT/ NEFT	Credit Card Payments	Debit Card Payments	Total Electronic Payment with RTGS	Total Electronic Payment without RTGS
2003-04	0	102.28	22.54	171.25	176.63	48.74	521.44	521.44
2004-05	2496.62	201.80	29.21	546.01	258.68	53.61	3585.93	1089.31
2005-06	25702.12	323.24	129.87	612.88	338.86	58.97	27165.94	1463.82
2006-07	71678.08	832.73	254.41	774.46	413.61	81.72	74035.01	2356.93
2007-08	161001.73	7822.22	489.37	1403.26	579.85	125.21	171421.64	10419.91
2008-09	200041.08	974.87	669.76	2519.56	653.56	185.47	205044.3	5003.22
2009-10	295167.77	1200	700	4100	600	300	302067.77	6900
2010-11	361862.90	1800	700	9400	800	400	374962.90	13100
2011-12	395244.50	1837.80	833.60	17903.50	966.10	534.30	417319.80	22075.30
2012-13	512997.84	1771.30	1083.10	29022.40	1229.50	743.40	546847.54	33849.70
2013-14	573614.03	2492.20	1268.00	43785.50	1539.90	954.10	623653.73	50039.70
2014-15	631050.74	2019.10	1739.80	59803.80	1899.20	1213.40	697726.04	66675.30
Growth (%)								
2009-10	47.5535775	23.09	4.52	62.73	-8.20	61.75	47.32	37.91
2010-11	22.5956682	50	0	129.27	33.33	33.33	24.13	89.86
2011-12	9.22493022	2.1	19.09	90.46	20.76	33.58	11.30	68.51
2012-13	29.792531	-3.62	29.93	62.10	27.26	39.14	31.04	53.34
2013-14	11.8160712	40.70	17.07	50.87	25.25	28.34	14.05	47.83
2014-15	10.0131285	-18.98	37.21	36.58	23.33	27.18	11.88	33.24

Source: www.rbi.org.in; RBI Annual Report, 2003-04 to 2014-15
Notes on the data: 1) All values are in Rs billion, 2) The figures of cards are for transactions at POS terminals only, 3) PPI's, IMPS, ACH are recently introduced Payment Systems, hence these systems are not considered in this analysis.

Table 5: Retail Payment Distribution and EP distribution for 2014-15.

Retail payments distribution for 2014-15 2014-15 % contribution analysis				
			% contribution	
Transaction Type	**Number**	**Amount**	**Number**	**Amount**
Cheques	1196.51	85434.14	25.40	10.88
RTGS	88.39	631050.74	1.88	80.37
ECS Credit	115.35	2019.14	2.45	0.26
ECS Debit	226.01	1739.78	4.80	0.22
NACH	340.17	1220.88	7.22	0.16
NEFT	927.55	59803.83	19.69	7.62
IMPS	78.37	581.87	1.66	0.07
Credit card	615.12	1899.16	13.06	0.24
Debit card	808.09	1213.49	17.16	0.15
PPI	314.46	213.42	6.68	0.03
Total	4710.02	785176.45	100.00	100.00

Electronic payments distribution for 2014-15 2014-15 % contribution analysis				
			% contribution	
Transaction Type	**Number**	**Amount**	**Number**	**Amount**
RTGS	88.39	631050.74	2.52	90.18
ECS Credit	115.35	2019.14	3.28	0.29
ECS Debit	226.01	1739.78	6.43	0.25
NACH	340.17	1220.88	9.68	0.17
NEFT	927.55	59803.83	26.40	8.55
IMPS	78.37	581.87	2.23	0.08
Credit card	615.12	1899.16	17.51	0.27
Debit card	808.09	1213.49	23.00	0.17
PPI	314.46	213.42	8.95	0.03
Total	3513.51	699742.31	100	100

Source: RBI Annual Report, 2014-15; www.rbi.org.in

Notes on the data: 1) All volumes are in million, 2) All values are in Rs. billion, 3) Inter bank funds transfer through RTGS is excluded in the numbers, 4) The figures of card payments as electronic payment mechanism are for transactions at POS terminals only

Table 6: Profile of all Retail Payment Systems from 2012-13 to 2014-15.

System	**Volume (Million)**					
	2012-13		**2013-14**		**2014-15**	
1. RTGS Customer Transactions	**63.99**		**76.35**		**88.39**	
2. Paper Clearing	**1,313.05**	**% contribution to total paper clearing**	**1,257.31**	**% contribution to total paper clearing**	**1,196.51**	**% contribution to total paper clearing**
2.1 Cheque Truncation System (CTS)	275.04	20.95	591.38	47.04	964.86	80.64
2.2 MICR Clearing	823.31	62.70	440.07	35.00	22.43	1.87
2.2.1 RBI Centres	496.81	37.84	215.50	17.14	7.50	0.63

2.2.2 Other Centres	326.5	24.87	224.57	17.86	14.93	1.25
2.3 Non-MICR Clearing	215.31	16.40	225.86	17.96	209.82	17.54
3. Retail Electronic Clearing	**694.07**	**% contribution to total retail electronic clearing**	**1,108.32**	**% contribution to total retail electronic clearing**	1,687.44	**% contribution to total retail electronic clearing**
3.1 ECS DR	176.53	25.43	192.91	17.41	226.01	13.39
3.2 ECS CR (includes NECS)	122.18	17.60	152.54	13.76	115.35	6.84
3.3 EFT/NEFT	394.13	56.79	661.01	59.64	927.55	54.97
3.4 Immediate Payment Service (IMPS)	1.23	0.18	15.36	1.39	78.37	4.64
3.5 National Automated Clearing House (NACH)			86.50	7.80	340.17	20.16
4 Cards	**6,398.35**	**% contribution to total card txns**	**7,219.13**	**% contribution to total card txns**	8,423.99	**% contribution to total card txns**
4.1 Credit Cards	399.13	6.24	512.03	7.09	619.41	7.35
4.1.1 Usage at ATMs	2.52	0.04	2.96	0.04	4.29	0.05
4.1.2 Usage at POS	396.61	6.20	509.08	7.05	615.12	7.30
4.2 Debit Cards	5,999.21	93.76	6,707.10	92.91	7,804.57	92.65
4.2.1 Usage at ATMs	5,530.16	86.43	6,088.02	84.33	6,996.48	83.05
4.2.2 Usage at POS	469.05	7.33	619.08	8.58	808.09	9.59
5 Prepaid Payment Instruments (PPIs)	**66.94**	**% contribution to total PPI txns**	**133.63**	**% contribution to total PPI txns**	314.46	**% contribution to total PPI txns**
5.1 m-Wallet	32.7	48.85	107.51	80.45	255.00	81.09
5.2 PPI Cards	33.76	50.43	25.60	19.16	58.91	18.73
5.3 Paper Vouchers	0.48	0.72	0.53	0.40	0.55	0.17
6. Mobile Banking	**53.3**		**94.71**		**171.92**	
7. Cards Outstanding	**350.75**	**% contribution to total cards**	**413.60**	**% contribution to total cards**	574.56	**% contribution to total cards outstanding**

		outstanding		**outstanding**		
7.1 Credit Card	19.55	5.57	19.18	4.64	21.11	3.67
7.2 Debit Card	331.2	94.43	394.42	95.36	553.45	96.33
8 Number of ATMs (in actuals)	**114014**		**160055**		**181398**	
9 Number of POS (in actuals)	**845653**		**1065984**		**1126735**	
10 Grand Total (1+2+3+4+5)	**8,536.40**		**9,794.74**		**11,710.79**	

Source: www.rbi.org.in; RBI Annual Report, 2012-13 to 2014-15

Note : 2.1: Pertain to two centres - New Delhi and Chennai, 2.3: Pertain to clearing houses managed by 21 banks, 5: Available from December 2010, 6. Include IMPS transactions.

	2012-13		**2013-14**		**2014-15**	
System	**Value (Rs Billion)**					
1. RTGS Customer Transactions	**512,997.84**		**573,614.03**		**631,050.74**	
2. Paper Clearing	**100,396.48**	**% contribution to total paper clearing**	**93,316.04**	**% contribution to total paper clearing**	**85,434.14**	**% contribution to total paper clearing**
2.1 Cheque Truncation System (CTS)	21,779.52	21.69	44,691.39	47.89	66,769.93	78.15
2.2 MICR Clearing	57,503.97	57.28	30,942.81	33.16	1,850.40	2.17
2.2.1 RBI Centres	36,045.97	35.90	15,246.84	16.34	614.51	0.72
2.2.2 Other Centres	21,458.00	21.37	15,695.97	16.82	1,235.89	1.45
2.3 Non-MICR Clearing	20,898.28	20.82	17,681.84	18.95	16,939.34	19.83
3. Retail Electronic Clearing	**31,881.14**	**% contribution to total retail electronic clearing**	**47,856.29**	**% contribution to total retail electronic clearing**	**65,365.51**	**% contribution to total retail electronic clearing**
3.1 ECS DR	1,083.10	3.40	1,267.96	2.65	1,739.78	2.66
3.2 ECS CR (includes NECS)	1,771.28	5.56	2,492.19	5.21	2,019.14	3.09
3.3 EFT/NEFT	29,022.42	91.03	43,785.52	91.49	59,803.83	91.49
3.4 Immediate Payment Service (IMPS)	4.33	0.01	95.81	0.20	581.87	0.89
3.5 National Automated			214.81	0.45	1,220.88	1.87

Clearing House (NACH)						
4 Cards	**18,637.36**	**% contribution to total card txns**	**22,159.58**	**% contribution to total card txns**	25,415.27	**% contribution to total card txns**
4.1 Credit Cards	1,243.93	6.67	1,556.72	7.03	1,922.63	7.56
4.1.1 Usage at ATMs	14.42	0.08	16.87	0.08	23.47	0.09
4.1.2 Usage at POS	1,229.51	6.60	1,539.85	6.95	1,899.16	7.47
4.2 Debit Cards	17,393.44	93.33	20,602.86	92.97	23,492.65	92.44
4.2.1 Usage at ATMs	16,650.08	89.34	19,648.35	88.67	22,279.16	87.66
4.2.2 Usage at POS	743.36	3.99	954.51	4.31	1,213.49	4.77
5 Prepaid Payment Instruments (PPIs)	**79.22**	**% contribution to total PPI txns**	**81.05**	**% contribution to total PPI txns**	**213.42**	**% contribution to total PPI txns**
5.1 m-Wallet	10.01	12.64	29.05	35.84	81.84	38.35
5.2 PPI Cards	49.62	62.64	28.36	34.99	105.35	49.36
5.3 Paper Vouchers	19.60	24.74	23.63	29.15	26.24	12.30
6. Mobile Banking	**59.90**		**224.18**		**1,035.30**	
7 Grand Total (1+2+3+4+5)	**663,992.04**		**737,026.99**		**807,479.08**	

Source: www.rbi.org.in; RBI Annual Report, 2003-04 to 2014-15

Note : 2.1: Pertain to two centres - New Delhi and Chennai, 2.3: Pertain to clearing houses managed by 21 banks, 5: Available from December 2010, 6: Include IMPS transactions.

Table 7: Use of payment instruments by non-banks: number of transactions per payment instrument(millions, total for the year).

	Credit transfers					**Direct Debits**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	818.2 (10.5)	1022 (24.9)	1172.6 (14.7)	1410 (20.2)	1837.2 (30.3)	Nav	nav	nav	nav	nav
India[8]	198.2 (48)	299.4 (51.1)	403.2 (34.7)	586 (45.3)	910 (55.3)	149.3 (-6.7)	156.7 (5.0)	164.7 (5.1)	176.5 (7.2)	192.9 (9.3)
Japan[6]	1414.5 (0.9)	1418.1 (0.3)	1438.4 (1.4)	1499.8 (4.3)	1522.2 (1.5)	Nav	nav	nav	nav	nav
United Kingdom[1]	3274.6 (2.8)	3396.3 (3.7)	3601.5 (6.0)	3693.1 (2.5)	3871.1 (4.8)	3149.2 (2.3)	3229.3 (2.5)	3322.4 (2.9)	3416.7 (2.8)	3524.9 (3.2)
United States[3]	7323.5 (5.2)	7667.5 (4.7)	8008.8 (4.5)	8493.6 (6.1)	9026.5 (6.3)	11389.8 (1.6)	11736.3(3.0)	12209.2(4.0)	12821.7(5.0)	13574.6(5.9)
	Cheques					**E-money payment transactions**				

	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
China	875.5 (-0.8)	896.5 (2.4)	846.7 (-5.6)	783.7 (-7.4)	693.4 (-11.5)	Nap	nap	nap	nap	nap
India	1380.3 (-1.2)	1387.4 (0.5)	1341.9 (-3.3)	1313.7 (-2.1)	1257.3 (-4.3)	Nap	9.7	30.6 (215.5)	66.1 (116.0)	133.6 (102.1)
Japan[7]	96.2 (-14.1)	88(-8.5)	82.6 (-6.1)	77.5 (-6.2)	73.1 (-5.7)	1509.6 (35.3)	2000.4 (32.5)	2342 (17.1)	2836.6 (21.1)	3453.4 (21.7)
United Kingdom[2]	1282 (-8.6)	1113 (-13.2)	970 (-12.8)	848 (-12.6)	718 (-15.3)	Nav	nav	nav	nav	nav
United States[5]	24464.9 (-6.1)	22389.2 (-8.5)	20378 (-9.0)	18334.5 (-10.0)	16319.7 (-11.0)	Nav	nav	nav	nav	nav
	Card payments (except e-money)					**of which: by cards with a debit function**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	3491.2 (32.0)	4849.4 (38.9)	6413 (32.2)	9009.1 (40.5)	12971 (44.0)	Nav	nav	nav	nav	nav
India	3760.6 (37.2)	4747.7 (26.2)	5745.4 (21.0)	6414.3 (11.6)	7241.6 (12.9)	3517.6 (42.1)	4470.5 (27.1)	5409.5 (21.0)	5999.2 (10.9)	6711.9 (11.9)
Japan	8146.6 (56.1)	7052.1 (-13.4)	8039.6 (14.0)	8931.5 (11.1)	nav	13.2 (5.8)	13.4 (2.0)	13.4 (0.0)	12.9 (-3.6)	12.4 (-4.1)
United Kingdom	8185 (7.8)	8807 (7.6)	9901 (12.4)	10546 (6.5)	11608 (10.1)	6017 (10.5)	6604 (9.8)	7612 (15.3)	8155 (7.1)	9040 (10.9)
United States[4]	60871.5 (4.7)	65228 (7.2)	73285.9 (12.4)	77938.6 (6.3)	84220.5 (8.1)	38518.9 (12.6)	43780.4(13.7)	49006.1(11.9)	51717.2(5.5)	56020.8 (8.3)

	of which: by cards with a credit function				
	2009	**2010**	**2011**	**2012**	**2013**
China	Nav	Nav	nav	Nav	nav
India	236.5(-10.5)	267.1(12.9)	322.2(20.6)	399.1(23.9)	512(28.3)
Japan	8133.4(56.2)	7038.6(-13.5)	8026.2(14.0)	8918.5(11.1)	nav
United Kingdom	1819(1.6)	1857(2.1)	1926(3.7)	2023(5.0)	2194(8.5)
United States	22352.6(-6.5)	21447.6(-4.0)	24279.8(13.2)	26221.4(8.0)	28199.7(7.5)

Source: BIS(2014),"Statistics on payment, clearing and settlement systems in the CPMI countries", Committee on Payments and Market Infrastructures

Notes: Figures in parenthesis indicates increase in number of transactions (%) over the previous year

E-money and card payments are considered ATM/POS kind of transactions and include ATM cash withdrawal transactions as well

[1] Credit transfers in UK comprises of paper based and non-paper based payments. It also includes interbank payments settled in CHAPS and inter-branch paper credit transfers plus some in-house automated transactions (including some transactions on banks' own accounts).

[2] Cheque transactions in UK includes inter-branch cheques and estimates of in-house processed cheques, also includes some own account items.

[3] Credit transfers in USA are non-paper-based ACH transactions. It includes an estimate of the number of on-us payments. Direct debits are also ACH transactions which includes an estimate of the number of on-us payments.

[4] Payments made in the United States using cards issued inside and outside the United States.

[5] E-money products have not been widely adopted in the United States. In this reporting period, e-

money transaction terminals, volume and value are negligible relative to other card instruments. Annualised number of paid cheques includes commercial cheques, US Treasury cheques and postal money orders.

[6] Credit transfer figures in Japan are for the year ending March of the following year. It includes transactions handled by the ZENGIN system and other retail payment networks; excludes credit transfers through on-us accounts.

[7] E-money payment transactions in Japan are figures for the year ending March of the following year. Cheque payments includes total number of transactions handled by all bill and cheque clearing systems in Japan.

[8] Credit transfers in India comprises non-paper-based transactions. It includes transactions through RTGS (customer), ECS Credit, NECS Credit and NEFT. Direct debit includes transactions through ECS debit payment system

Table 8: Use of payment instruments by non-banks: relative importance of payment instruments, in number of transactions (% of total number of transactions).

	Credit transfers					**Direct debits**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	15.8	15.1	13.9	12.6	11.9	Nav	nav	nav	nav	nav
India	3.6	4.5	5.2	6.8	9.3	2.7	2.4	2.1	2.1	2.0
Japan	12.7	13.4	12.1	11.2	nav	Nav	nav	nav	nav	nav
United Kingdom	20.6	20.5	20.2	20.0	19.6	19.8	19.5	18.7	18.5	17.9
United States	7.0	7.2	7.0	7.2	7.3	10.9	11.0	10.7	10.9	11.0
	Cheques					**E-money payment transactions**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	16.9	13.2	10.0	7.0	4.5	Nap	nap	nap	nap	nap
India	25.1	21.0	17.5	15.4	12.9	Nap	0.1	0.4	0.8	1.4
Japan	0.9	0.8	0.7	0.6	nav	13.5	18.9	19.7	21.3	nav
United Kingdom	8.1	6.7	5.5	4.6	3.6	Nav	nav	nav	nav	nav
United States	23.5	20.9	17.9	15.6	13.3	Nav	nav	nav	nav	nav
	Card payments (except e-money)					**of which: by cards with a debit function**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	67.3	71.7	76.1	80.4	83.7	Nav	nav	nav	nav	nav
India	68.5	71.9	74.8	75.0	74.4	64.1	67.7	70.4	70.1	68.9
Japan	73.0	66.8	67.5	66.9	nav	0.1	0.1	0.1	0.1	nav
United Kingdom	51.5	53.2	55.6	57.0	58.9	37.9	39.9	42.8	44.1	45.8
United States	58.5	60.9	64.4	66.3	68.4	37.0	40.9	43.0	44.0	45.5

	of which: by cards with a credit function				
	2009	**2010**	**2011**	**2012**	**2013**
China	nav	nav	Nav	nav	nav
India	4.3	4.0	4.2	4.7	5.3
Japan	72.8	66.7	67.4	66.8	nav
United Kingdom	11.4	11.2	10.8	10.9	11.1
United States	21.5	20.0	21.3	22.3	22.9

Source: BIS (2014),"Statistics on payment, clearing and settlement systems in the CPMI countries", Committee on Payments and Market Infrastructures

Table 9: Use of payment instruments by non-banks: relative importance of payment instruments, in value of transactions (% of total value of transactions).

	Credit transfers					Direct debits				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	49.4	55.2	59.6	66.5	73.4	Nav	nav	nav	nav	nav
India	85.0	85.8	86.8	85.5	87.0	0.1	0.1	0.1	0.1	0.1
Japan	85.4	85.9	86.0	86.0	nav	Nav	nav	nav	nav	nav
United Kingdom[1]	96.3	96.3	96.4	96.8	96.9	1.3	1.4	1.5	1.4	1.4
United States	Nav	nav	nav	42.9	44.6	Nav	nav	nav	38.2	38.0
	Cheques					**E-money payment transactions**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	49.4	43.3	38.5	31.3	24.0	Nap	nap	nap	nap	nap
India	13.7	12.6	11.6	12.1	10.4	Nap	0.0	0.01	0.01	0.01
Japan	13.0	12.4	12.3	12.1	nav	0.04	0.06	0.07	0.08	nav
United Kingdom	1.8	1.6	1.4	1.1	0.9	Nav	nav	nav	nav	nav
United States	90.3	89.2	87.3	16.1	14.5	Nav	nav	nav	nav	nav
	Card payments (except e-money)					**of which: by cards with a debit function**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	1.3	1.6	1.9	2.2	2.7	Nav	nav	nav	nav	nav
India	1.2	1.5	1.5	2.3	2.5	1.15	1.41	1.39	2.10	2.30
Japan	1.6	1.6	1.6	1.8	nav	0.03	0.02	0.02	0.02	nav
United Kingdom	0.6	0.7	0.7	0.7	0.7	0.39	0.45	0.50	0.46	0.52
United States	9.7	10.8	12.7	2.7	2.9	4.14	4.83	5.74	1.22	1.28

	of which: by cards with a credit function				
	2009	**2010**	**2011**	**2012**	**2013**
China	Nav	nav	nav	nav	nav
India	0.1	0.1	0.1	0.2	0.2
Japan	1.5	1.6	1.6	1.8	nav
United Kingdom	0.2	0.2	0.2	0.2	0.2
United States	5.5	6.0	7.0	1.5	1.6

Source: BIS (2014), "Statistics on payment, clearing and settlement systems in the CPMI countries", Committee on Payments and Market Infrastructures
Notes: [1] Data for United Kingdom comprises of interbank transactions for credit transfers. Cross-country comparison should be treated with caution since the value of these transactions is comparatively large.

Table 10: Use of payment instruments by non-banks: average value per transaction. (USD, total for the year)[1]

	Credit transfers					**Direct debits**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	48364	52422	61507	70670	77379	nav	nav	nav	nav	nav
India	67315	50270	39490	22574	14627	97	103	108	115	112
Japan[2]	18531	20857	23152	21872	19093	nav	nav	nav	nav	nav
United Kingdom[3]	32328	29560	30052	32196	30336	439	453	504	499	494
United States	nav	nav	nav	8171	8231	nav	nav	nav	4819	4658
	Cheques					**E-money payment transactions**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	45170	46877	55042	59909	66991	nav	nav	nav	nav	nav
India	1560	1597	1581	1426	1267	nav	32.3	43.4	22.4	10.5
Japan	41505	48706	57676	59770	51387	9.0	10.1	11.1	11.0	9.7
United Kingdom	1557	1518	1591	1598	1597	nav	nav	nav	nav	nav
United States	1292	1361	1377	1420	1481	nav	nav	nav	nav	nav
	Card payments (except e-money)					**of which: by cards with a debit function**				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
China	45170	46877	55042	59909	66991	nav	nav	nav	nav	nav
India	1560	1597	1581	1426	1267	nav	32.3	43.4	22.4	10.5
Japan	41505	48706	57676	59770	51387	9.0	10.1	11.1	11.0	9.7
United Kingdom	1557	1518	1591	1598	1597	nav	nav	nav	nav	nav

United States	1292	1361	1377	1420	1481	nav	nav	nav	nav	nav

	of which: by cards with a credit function				
	2009	**2010**	**2011**	**2012**	**2013**
China	nav	nav	nav	nav	nav
India	56.3	55.6	47.5	58.3	51.8
Japan	58.3	76.0	77.5	74.9	nav
United Kingdom	92.5	93.0	97.8	94.0	90.2
United States	86.7	95.4	92.7	93.1	93.3

Source: BIS(2014),"Statistics on payment, clearing and settlement systems in the CPMI countries", Committee on Payments and Market Infrastructures

Notes: [1] Except as noted, converted at annual average exchange rates; [2] For credit transfers and e-money payment transactions, total for the financial year since the value of these transactions is comparatively large, ending March of the succeeding year , converted at average financial year exchange rates; [3] For credit transfers, data for United Kingdom include interbank transactions. Cross-country comparison should be treated with caution since the value of these transactions is comparatively large.