COMMITTEE ON PAYMENT AND SETTLEMENT SYSTEMS

September 2000

CLEARING AND SETTLEMENT ARRANGEMENTS FOR RETAIL PAYMENTS IN SELECTED COUNTRIES

BANK FOR INTERNATIONAL SETTLEMENTS
Basel, Switzerland

Copies of publications are available from:

Bank for International Settlements
Information, Press & Library Services
CH-4002 Basel, Switzerland

Fax: +41 61 / 280 91 00 and +41 61 / 280 81 00

This publication is available on the BIS website (www.bis.org).

ISBN 92-9131-606-7

Foreword

This report has been produced by the Working Group on Retail Payment Systems on behalf of the Committee on Payment and Settlement Systems (CPSS) of the central banks of the Group of Ten countries. The aim of the report is to contribute to a better understanding of retail payment systems across the G10 countries and Australia. It is the second CPSS report on retail payment systems; the first - "Retail Payments in Selected Countries: A Comparative Study" - was published in September 1999. That report, which focused on retail payment instruments and end user markets, is complemented by the present report, which analyses the clearing and settlement arrangements for retail payments in the same group of countries.

While the previous report pointed out that retail payment instruments are diverse both within and among the selected countries, the analysis provided in this report shows that a number of similarities exist in the structure of clearing and settlement arrangements in the G10 countries and Australia. In particular, the same type of clearing and settlement arrangements, namely multilateral clearing and settlement systems, are in use in all countries. In some countries, correspondent and central bank arrangements also play an important role. In addition to this, nearly all countries have dedicated clearing arrangements for credit cards and sometimes debit cards.

Recent developments in end user markets, such as the growth of electronic commerce and the emergence of new payment instruments and methods, have increased the demand for new clearing services in some countries. The application of information and communications technology to payment processes has made it possible to meet the increasing and more demanding needs of end users. The availability of new products and communication and delivery channels, such as the internet, has allowed financial institutions to review their distribution strategy and has given customers the possibility to choose from a wider variety of payment services. Although it is very difficult to say at this point where this evolution will lead, it does highlight the dynamic nature of retail payment systems.

Mr Tresoldi, his predecessor Mr Lo Faso, and the members of the Working Group are to be commended for the analysis which they have carried out. The active contribution which the CPSS Secretariat at the BIS has made to drafting the report is acknowledged, as well as the able assistance provided by the BIS in editing and publishing the report.

Tommaso Padoa-Schioppa,
Chairman, Committee on Payment
and Settlement Systems,
and Member of the Executive Board,
European Central Bank

Members of the Working Group on Retail Payment Systems

Chairman	Stefano Lo Faso (until November 1999) Carlo Tresoldi (from November 1999) Bank of Italy
Reserve Bank of Australia	Michele Bullock
National Bank of Belgium	Jan Vermeulen
Bank of Canada	Sean O'Connor
Bank of England	Jill Paterson
Bank of France	Stéphane Kunesch Christian Masson
Deutsche Bundesbank	Klaus Edelmann Helmut Wacket (until October 1999) Birgit Zeitschel (from October 1999)
Bank of Italy	Ferdinando Sasso Roberta Casali
Bank of Japan	Junichi Iwabuchi
Netherlands Bank	Simon Lelieveldt
Sveriges Riksbank	Gabriela Guibourg
Swiss National Bank	Thomas Nellen
Board of Governors of the Federal Reserve System	Jeffrey Marquardt Martin Geislinger Ellen Meade (until September 1999)
Federal Reserve Bank of New York	Jamie McAndrews
European Central Bank	Risto Koponen
Bank for International Settlements	Marc Hollanders

Contents

1. Summary and introduction

The Committee on Payment and Settlement Systems (CPSS) commissioned a working group to examine payment systems in the G10 countries and Australia to gain a better understanding of the developments in the market for retail or small-value payment services. The report "Retail Payments in Selected Countries: a Comparative Study", published in September 1999, represented a first step in the study of retail payment systems. That report, which focused on retail payment instruments and end user markets, is complemented by the present report, which analyses the clearing and settlement arrangements for retail payments in the same countries.

While the first report pointed out that retail payment instruments are diverse both within and among the selected countries, the analysis provided in this report reveals a number of similarities in the structure of clearing and settlement arrangements in the G10 countries and Australia. In particular, the same types of clearing and settlement arrangements, namely multilateral clearing and settlement systems, are in use in all countries. In some countries, correspondent and central bank arrangements also play an important role. In addition, nearly all countries have dedicated clearing arrangements for credit cards and sometimes debit cards. All these arrangements are increasingly based on automated procedures that open up opportunities for economies of scale.

The role of the private sector in providing clearing services, already significant today, is becoming more important. Furthermore, in almost all countries clearing arrangements for payment cards are solely operated by the private sector. As the share of these instruments in the overall use of payment instruments rises, so will the share of private sector arrangements in the overall provision of clearing arrangements.

Although retail payment systems typically do not pose any immediate threat to systemic stability, a variety of risk reduction measures are used to protect such systems against systemic risk. Fraud, operational and other risks are generally addressed through technical features of various payment instruments and system controls. For instance, emerging payment media, such as internet-based instruments, are exploring the use of such security measures as public key cryptography, digital signature and other technologies. Moreover, payment systems have become more efficient over time, with important contributing factors having been technology and standardisation.

All central banks provide settlement facilities through which most retail payment systems settle, even though clearing arrangements for some payment instruments (mainly payment cards) in some countries settle in the books of a financial institution. Some central banks offer clearing facilities of their own as an alternative to private arrangements. Other central banks restrict their activities - besides settlement - to cooperating with private payment system providers to promote safety, efficiency and interoperability through developing common standards. Furthermore, many central banks have explicit legal authority with respect to payment and settlement systems which, in some countries, includes the oversight of retail payments.

The growth in cross-border payments caused by the international integration of markets, especially within the euro zone, is becoming a driving force for modernising the present system, which is still predominantly based on correspondent banking.

The demand for clearing services is also affected by recent developments in the end user market, such as the growth of electronic commerce and the emergence of new payment instruments and methods, which in some countries has increased the demand for new clearing services. Moreover, the process of consolidation of the financial sector may lead, in some cases, to greater efficiency in clearing and settlement services.

The application of information and communication technology to payment processes has made it possible to meet the increasing demands of end users through innovations in delivery channels, products and clearing arrangements. The availability of new products and delivery channels, such as the internet, has allowed financial institutions to review their distribution strategy and has given customers the possibility to choose from a wider variety of payment services. Furthermore, the application of new technology, together with the efforts by market players to reduce costs, have been

encouraging greater standardisation. The widespread application of technology and standardisation also favours the restructuring of payment processes, which tends to become separable into various activities, thereby facilitating the entry of new service providers into the market for clearing services.

This report is structured as follows: Section 2 sets out a conceptual framework providing some background on the payment process, and describing different models of transaction, clearing and settlement arrangements. Using this framework, Section 3 analyses the clearing and settlement systems of the G10 countries and Australia; it categorises the various types of systems in existence, highlighting their similarities and analysing the reasons for differences. Section 4 discusses risks and risk management in these infrastructure arrangements as well as efficiency in retail payments. The different roles that central banks play in this field are described in Section 5. Section 6 deals with an increasingly important issue for retail payments: clearing and settlement when payments are across national boundaries. Finally, Section 7 identifies the main factors that have been affecting infrastructure arrangements in recent years.

2. A conceptual framework

2.1 Scope

This report will focus primarily on clearing and settlement arrangements for retail payment services provided by financial intermediaries that - as opposed to a physical transfer of cash (banknotes and coins) - require the adjustment of accounting entries at financial institutions.

Retail payment services include non-cash funds transfer services - provided by financial, and in some cases non-financial, institutions to end user clients - associated with cheques, credit and debit transfers, card payments (ie debit and credit cards) and emerging payment instruments such as electronic money.[1] They also include ATM[2] withdrawals which - albeit involving the use of cash - give rise to debits on current accounts. The execution of payments via these instruments necessarily calls for infrastructure arrangements aimed at ensuring, for example, the valid creation of payment instruments by the payer, the exchange of relevant information between the financial institutions of the payer and the payee, and the final exchange of funds between the financial institutions concerned.

The organisation of these infrastructure arrangements depends on whether or not the payer's and the payee's financial institutions are one and the same. If they are, all phases in the clearing and settlement processes can occur within a single financial institution (in-house arrangements). If not, the payer's and the payee's financial institutions will have to interact to complete the payment process (interbank arrangements). The completion of the payment process also requires in many cases the final settlement of funds on the books of the central bank. This report will discuss primarily interbank arrangements, but references to in-house arrangements will be made when appropriate. Furthermore, except when indicated otherwise, it can be assumed that the payer and the payee are each located in the same country, where they are also assumed to maintain accounts used in the payment transaction.

2.2 The payment process

In this section a conceptual framework of the infrastructure arrangements will be presented in which the transaction, clearing and settlement processes are analysed. These processes can be divided into a number of more detailed steps and can vary according to the type of payment instrument used. A

---

[1] The properties and uses of these payment instruments were discussed in the CPSS report "Retail Payments in Selected Countries: a Comparative Study", September 1999, which is available on the BIS website (www.bis.org).

[2] Automated teller machine.

stylised description of the flow of information and payment instructions among the parties involved in a funds transfer (payer, payer's financial institution, payee, payee's financial institution) for a "generic" payment (abstracting from the clearing and settlement arrangements) is provided in a chart on the next page. If the payer uses a credit transfer, the payment instrument will go directly from the payer to his financial institution (arrow 1). If a debit instrument such as a cheque or payment card is used, the instrument will be submitted by the payee to his financial institution (arrow 2).[3] Both instruments will then be exchanged between the two financial institutions via some type of clearing arrangement. From the end users' viewpoint, the process ends with the payer's account being debited and the payee's account being credited with the amount of the payment. Finally, the financial institutions involved in the transaction undertake interbank settlement (this part of the payment process is not shown in the chart).

2.2.1 Transaction process

The transaction process ensures the creation, validation and transmission of a payment. It can be divided into a number of main steps: (a) verification of the identity of the involved parties, (b) validation of the payment instrument, (c) verification of the ability to pay, (d) authorisation of the transfer of the funds by both the payer and the payer's financial institution, (e) communication of the information by the payer's financial institution to the payee's financial institution, and (f) processing of the transaction. The structure of such steps varies considerably with the type of payment instrument. In practice, the various steps mentioned above may not be performed sequentially since a different payment procedure may be followed for each type of payment instrument in order to optimise the execution of payments using that particular instrument.

Different procedures may be used for authenticating and authorising payments. They vary depending on the different payment instruments used: for example, a debit card transaction at the point of sale (POS) with the use of a PIN code[4] generally involves both authentication (by keying in the PIN) and authorisation (confirmation of the transaction and initiating the online approval by pressing the OK key). With respect to the timing of these activities, two broad categories exist:

(i) immediate authentication and authorisation: given by the payer's financial institution at the initiation of the payment transaction process;

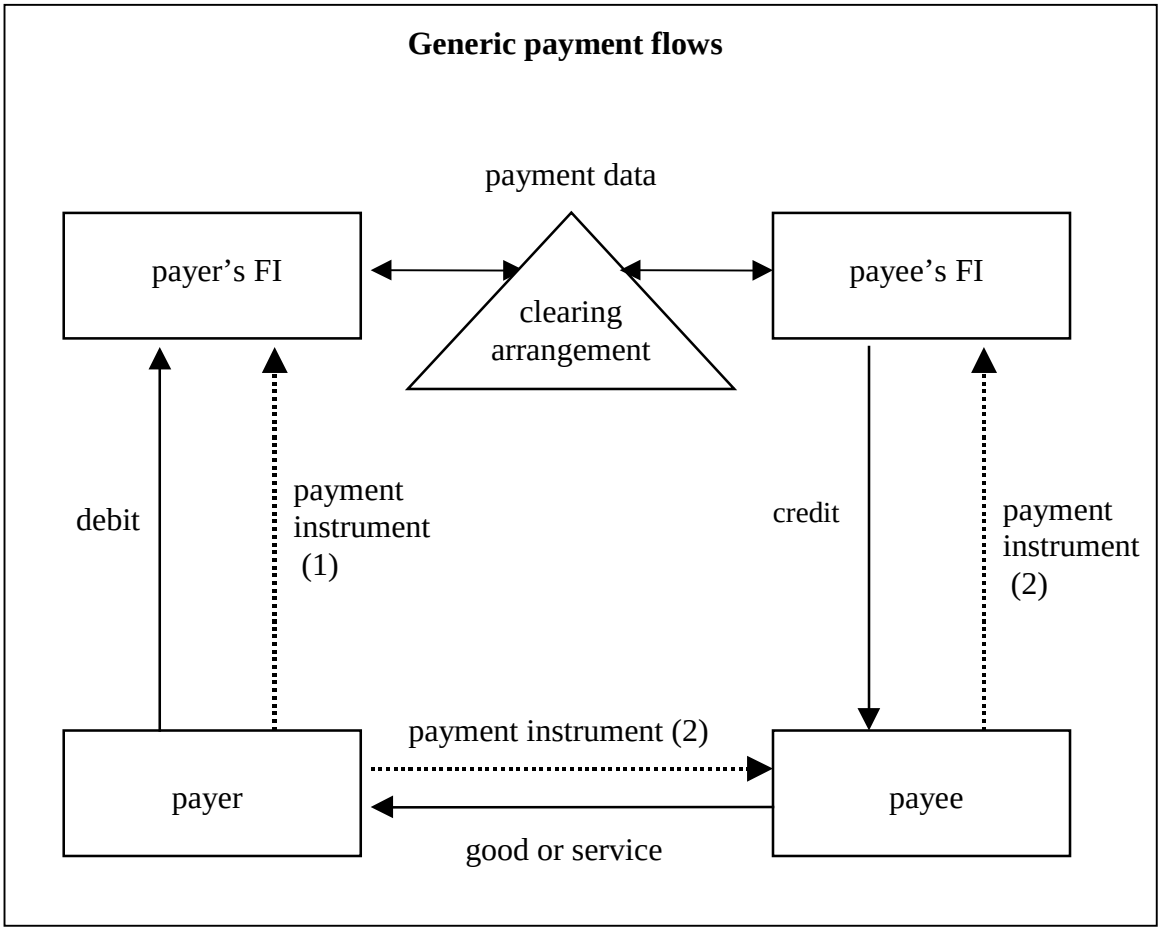
(ii) deferred authentication and authorisation: given by the payer's financial institution at the end of the transaction process following the request of the payee's financial institution handling the payment information.

Immediate authentication and authorisation occur in the case of credit transfers and card payments. With credit transfers the transaction is authenticated and authorised when the payer's financial institution verifies the identity of the payer and the availability of funds in the payer's current account and sends the information to the payee's financial institution. With electronic debit card transactions this happens in some cases automatically, generally with the use of a PIN code, through a network switch that links the POS terminal of the payee with the financial institutions involved in the transaction. This method relies upon telecommunications and computer routing of card and account information between the merchant and the cardholder's financial institution or a substitute to whom the institution has outsourced such activities in real time, much as is done for cash withdrawals at ATMs. For signature-based credit or debit card transfers, the verification of the identity and the explicit agreement to the transfer are both realised by means of a signature on the transaction paper;

---

[3] Although in the case of a payment card the payment instruction will often first be sent to the issuer of the payment card, who will then submit the payment to the clearing arrangement.

[4] Personal identification number: used to verify the identity of the cardholder, seen as the equivalent of a signature.



the authorisation may be given following online or offline authorisation procedures.[5] Deferred authentication and authorisation occur when the payer's financial institution verifies the identity of the payer and the availability of funds in the payer's account after having received the request for payment from the payee's financial institution. Typical examples are cheques and direct debits.

2.2.2 Clearing process

During the clearing process two main functions may be performed: (a) the exchange of the payment instrument or of relevant payment information between the payer's and the payee's financial institutions, and (b) the calculation of claims for settlement. The outcome of this process is a fully processed payment transaction from payer to payee as well as a valid claim by the payee's institution on the payer's institution.

The procedures for the exchange of payment instruments or payment information may consist of a number of more detailed steps: (a) matching of the transactions, (b) sorting of the transactions, (c) data collection (including integrity checks), (d) data aggregation, and (e) sending of the relevant data. Such processes vary considerably according to the operational and legal features of the different payment instruments. Procedures for the calculation of claims for settlement consist of (a) calculation of gross claims and (b) calculation of net or aggregated claims to be settled. These procedures are less affected by peculiarities of different payment instruments. Therefore, in principle and in some countries in practice, claims associated with instruments exchanged through different exchange procedures may be

[5] With online credit card payments a direct communications link through a network switch provides real-time authorisation of the payment. With offline credit card payments, the merchant usually contacts the card issuer through the switch for real-time authorisation of transactions above a minimum value.

aggregated so as to determine one single balance to be settled per institution participating in settlement.

In general, there are four types of arrangements for the clearing of payment instructions. The first arrangement takes place within one and the same financial institution, the other three types require interbank arrangements:

(i) when the accounts to be debited and credited are held in the same financial institution - termed in-house transactions - the exchange of information and the calculation of balances that characterises the clearing process can be performed within the single financial institution;

(ii) in a bilateral arrangement, the sorting and processing of payments flowing between two financial institutions is handled by the institutions themselves;

(iii) alternatively, financial institutions may employ a common third party - a separate financial institution known as a correspondent - for clearing, with one or more institutions forwarding payment instructions to the correspondent for sorting and processing. Correspondents generally provide services to other financial institutions according to contracts that are negotiated bilaterally;

(iv) multilateral clearing arrangements are based on a set of procedures whereby financial institutions present and exchange data and/or documents relating to funds transfers to other financial institutions under a common set of rules. One example of such an arrangement is a clearing house: an organisation that operates central facilities and which may also act as a central counterparty in the settlement of the payment obligations under a multilateral netting arrangement. Alternatively, multilateral arrangements may be based on a clearing association that is a coordinating body organising and facilitating clearing among institutions but which does not operate central processing facilities or act as a principal for settlement.[6]

Combinations of different arrangements are possible. A correspondent may submit payment instructions to a clearing house on behalf of its client financial institutions. More complex arrangements involve cross-membership in clearing houses. In this case, a participant in one clearing house acts as a correspondent for clearing house members with respect to the exchange of payments in a second clearing house. Alternatively, a clearing house may itself be a member of another clearing house or, more likely, enter into exchange or interchange agreements with other clearing houses. In general, linkages between correspondents and clearing houses, and cross-membership or interchange agreements between clearing houses, can expand the availability of clearing house services to a wider group of financial institutions and their customers.

The volume (ie the number) of payments to be cleared as well as the number of financial institutions involved represent the major factors in determining the relative convenience of the various types of clearing arrangements. Bilateral arrangements - except for the experience of Germany - have not typically represented efficient solutions when large volumes of payments need to be processed for a large number of delivery points. Multilateral arrangements, instead, make the processing of payment instructions more efficient by coordinating the exchange of payment instructions, operating communications networks and providing processing services. Furthermore, multilateral netting[7] allows participants to minimise the liquid balances necessary for settlement.

---

[6] Variations exist within and across countries with respect to the functions performed by specific clearing houses.

[7] In multilateral netting the system or its designated agent will compute from the total value of payment instructions exchanged a net amount that represents the difference between what is owed by each participant to all other participants and what others owe that participant. As a result of the arithmetic of multilateral netting, the multilateral net debits and credits may be a small fraction of the gross value of the original payment instruments subject to the netting.

2.2.3 Settlement process

In the settlement process, the valid claim from the payee's institution is discharged by means of a payment from the payer's institution to the payee's institution. Specifically, the steps in the settlement process are: (a) collection and integrity check of the claims to be settled, (b) ensuring the availability of funds for settlement, (c) settling the claims between the financial institutions, and (d) logging and communication of settlement to the parties concerned.

Settlement balances resulting from clearing arrangements may be posted to two types of settlement accounts:

(i) correspondent accounts that pairs of financial institutions hold with each other. The institution holding the settlement account as an asset refers to it as a "nostro" account while the correspondent bank providing the settlement account as a liability refers to it as a "vostro" account. The accounts are typically used when payments due to or due from the correspondent banks are to be settled bilaterally;

(ii) accounts held with a third-party financial institution acting as a settlement bank. Multilateral clearing organisations typically rely on a settlement bank where participants maintain individual accounts to which settlement obligations are posted.

In large-value systems settlement generally takes place in central bank money. In retail payment systems, however, settlement is performed by either the central bank or a private correspondent bank, which means that settlement takes place in central bank money or commercial bank money respectively.

The access to settlement accounts at the central bank may be either open to all institutions participating directly in clearing arrangements or limited to financial institutions satisfying specific criteria (eg institutional type, minimum payment volumes). In the latter case, financial institutions that do not have access to a central bank account settle their payments across the books of a direct participant in settlement, which, in turn, settles across the books of the central bank.

3. Organisation of clearing and settlement

3.1 Clearing

3.1.1 Clearing arrangements

In the selected countries multilateral clearing arrangements play a prominent role in the processing of retail payments. The role performed by multilateral clearing organisations varies considerably across different countries and sometimes also within the same country. The most common model is represented by clearing houses responsible for both setting the rules governing the clearing processes and providing relevant operational functions. The level of operational involvement of clearing houses, however, may differ: in most countries (Belgium, France, Italy, Japan, the Netherlands, Sweden, Switzerland and the United States) clearing houses directly provide all the relevant functions of a particular clearing process (exchange and netting procedures and sometimes also the interbank communication network). In Australia and Canada clearing arrangements are based on clearing associations that mainly establish rules while not being involved - or being involved only to a limited extent - in the provision of operational procedures. In these countries - where banking system concentration is relatively high - payment information and instruments are exchanged among financial institutions on a bilateral basis according to the rules of the clearing associations. Lastly, in Germany and the United Kingdom all variants can be found.

The structure of domestic clearing systems for retail payments (other than payment cards[8]) differs significantly with regard to the number of multilateral clearing arrangements and their specialisation. In some countries, one single clearing arrangement processes most paper-based and paperless payment instruments (Canada, the Netherlands, Sweden, Switzerland). In other countries, there exist two main clearing arrangements specialised in processing paper-based and paperless instruments respectively (Australia, Belgium, France, the United Kingdom). In the remaining countries, a larger number of clearing arrangements coexist (Germany, Italy, Japan, the United States).

In countries where various clearing organisations are in operation, this may reflect the coexistence of clearing arrangements provided by different categories of credit institutions or, also, the provision of a multiplicity of local clearing arrangements that mainly process paper-based instruments. In these countries, however, linkages among clearing arrangements frequently exist. In Germany, there are four clearing organisations for different categories of financial institutions (commercial banks, savings banks, cooperative banks, Postbank) which are interconnected either through informal exchange procedures using bilateral exchange of data carriers/telecommunications for clearing and the RTGS[9] system for settlement or through the usage of the retail clearing and settlement system provided by the Bundesbank. In Italy, clearing services for paperless payments are managed by four providers that are subject to the same rules and are linked to each other as well as to the clearing house for cheques, so that the Italian retail clearing systems are highly integrated and determine one single multilateral balance per financial institution to be settled at the central bank. In the United States, where 150 local clearing arrangements for cheques coexist with national arrangements, cross-membership is used in at least one case to link a national clearing house for cheques to regional arrangements. In Japan, a nationwide electronic clearing system handling both paper-based and paperless transactions coexists with about 600 local clearing houses for bills and cheques.

In all countries payment instruments and information are increasingly exchanged among financial institutions through automated procedures. Such a tendency depends, partly, on the increasing use of automated payment instruments (such as debit cards and direct debits), and partly on the automation of clearing procedures for paper-based instruments such as cheques. In Germany all instruments, including cheques, are cleared electronically. Only cheques with a value of DEM 5,000 and above (large-value cheques) still have to be presented in paper to the drawee bank alongside the electronic debit. The sorting and forwarding of these paper cheques takes place at the Bundesbank, where high-speed sorting machinery is used. A similar arrangement exists in France, where at present cheques with a value of less than FRF 5,000 can be cleared via a paperless procedure. By 2002, all cheques will be exchanged electronically through SIT, which already processes all paperless payment instruments. More information on cheque processing can be found in Annex B.

Retail payments are typically batched[10] and then netted (usually on a multilateral basis) for settlement each day. There are some exceptions: in Sweden, retail payments are netted on a bilateral basis; and the retail payments cleared through the Bundesbank facilities and in the Swiss system are settled on a cumulative gross basis rather than on a net basis. In the United States some cheque payments (those not delivered through a clearing house) and ACH[11] payments (those processed by the Federal Reserve) are settled on a gross basis.

---

8 Payment cards often make use of dedicated clearing arrangements operated by the private sector. The arrangements for one such instrument, namely debit cards, are discussed in detail in Annex A.

9 Real-time gross settlement.

10 The transmission or processing of a group of payment orders as a set at discrete intervals of time.

11 Automated clearing house.

3.1.2 Providers of clearing arrangements

Private sector providers are prominent in retail clearing arrangements. About one half of the selected countries (Belgium, France, Germany, Italy, the United States) have both privately run and central bank clearing arrangements for retail payments. The remaining countries in the group (Australia, Canada, Japan, Sweden, the Netherlands, Switzerland and the United Kingdom) have clearing facilities that are operated entirely through private arrangements.

In countries where both private and central bank clearing facilities exist, the central bank typically specialises in the clearing of paper-based payments, sometimes managing clearing houses on behalf of banking associations. Such a role may be explained historically on the basis of the need to overcome the inefficiencies associated with bilateral exchanges through a chain of correspondent banks in countries where the banking system was not concentrated on a national scale. However, some central banks are also involved in the provision of automated clearing facilities for retail payments.

Private sector providers of clearing services for retail payments include in some countries banking associations that may entrust a participating institution, most often the central bank, with operating the system. In most cases, however, the private sector providers of clearing services are owned by banking associations or groups of financial institutions. Some of these are specialised in operating clearing systems and provide their services mainly to their shareholders, which are the participants in the clearing system. Some other providers are represented by private sector data processing and communications firms, often owned by financial institutions, which may have a wider scope of activity also including services such as authentication, authorisation and confirmation of payments.

3.2 Settlement

3.2.1 Settlement arrangements

For retail payments, settlement is usually on a net basis once a day. But there are signs of a move to more frequent net settlements. In the selected countries, the gross or net interbank payment obligations determined by clearing arrangements are generally settled through the accounts held by financial institutions with the central bank. Central banks also generally operate the settlement systems. Canada and Switzerland are exceptions; in these countries the central bank provides settlement services but the infrastructure is privately operated. Private arrangements, in which settlement can be completed outside the central bank facilities, also exist for some retail payments in most countries.[12]

Furthermore, tiering is very common in settlement arrangements for retail payments. This means that some, usually smaller, financial institutions, do not settle at the central bank but on the accounts of other participants (often called direct participants). Actual arrangements for tiering, however, vary widely from country to country. In the Canadian system, for example, only financial institutions with substantial payment volumes are eligible to hold settlement accounts at the Bank of Canada. Other financial institutions have contracted to process and settle their payment items through one of these larger institutions, with which they hold their settlement accounts. Conversely, settlement arrangements in Germany and the United States are much less concentrated. All depository institutions are eligible to open accounts and receive payment services from the Federal Reserve (though only about half of those eligible do); this is also the case for the Bundesbank. In Germany as well as in Switzerland, direct clearing and settlement via the central bank and indirect or tiered clearing and settlement via a correspondent (eg the central institution for cooperative banks or savings banks) are possible. In Australia, the central bank has recently announced changes to eligibility requirements for settlement accounts which allow non-financial institutions to hold such accounts. Firms that provide payment services to customers with a resulting need to settle clearing obligations with other providers are, provided they meet certain conditions, eligible for settlement accounts.

---

[12] More details on central bank settlement services can be found in Section 5.1.2.

Electronic credit retail payments generally settle on the same day, except when there is a longer clearing lag, in which case settlement takes place one or two days later. Debit payments, which are sometimes processed through different clearing facilities, often settle a day or two later than credit payments in order to give the receiving institutions sufficient time to verify the client's payment instructions and the availability of funds. In the United Kingdom, however, cheques, debit card transactions and all ACH payments (both debits and credits) settle after two days. Canada is also an exception: all its payment items clear and settle through a single national system, which is organised along debit transfer lines, and the net value of these items settles on the following morning with the value backdated on the books of the Bank of Canada to the previous day.

Arrangements for intraday credit in the settlement of retail payments differ substantially across systems. Where retail payments (gross or net) are settled through RTGS systems or through book entries in the central bank's current accounts system, intraday credit facilities are available, usually against collateral. If the settlement of the clearing balances of retail payment systems takes place in a deferred net settlement system, intraday credit will typically be provided implicitly by the system.

Over the past few years innovations in retail payments have emerged.[13] Some involve entirely new instruments, such as electronic money; others involve new electronic payment delivery and processing technology such as internet payment methods, most of which are essentially new distribution channels for traditional payment instruments. At present both types of innovation use conventional payment and settlement systems that are based on closed, and sometimes proprietary, networks. This might, however, change in the future, for example with the development of new clearing and settlement systems using open networks.

One such development is taking place in Sweden, where the clearing house (BGC) recently adopted a new technical platform and new clearing procedures. The development of the new clearing platform, which is still in an early stage of implementation, has led to the full integration of all systems involved in the clearing and settlement cycle, namely the RTGS system, the BGC's clearing information system and the clearing participants' internal systems. In addition to the already existing communication channels, a new internet-based information channel and a new interface between BGC and the clearing participants were added. These allow the participants to follow their clearing positions in real time via the internet. The system will migrate from clearing and settling batches of payments once a day to several clearing and settlement cycles every day. Once fully operational the system will, in principle, allow the possibility of real-time clearing and settlement of single retail payments.

3.2.2 Providers of settlement services

Although, as a rule, settlement services are provided by central banks, there are a number of cases, mostly relating to specific payment instruments, in which settlement occurs in commercial bank money. For instance, settlement services for debit and credit cards are sometimes provided by a financial institution acting as settlement bank. Alternatively, settlement for card payments is sometimes arranged on a bilateral basis. Moreover, significant tiering arrangements (whereby settlement occurs indirectly) may take place in credit card networks, which often have thousands of participating financial institutions, as well as within group networks with a small number of member financial institutions acting as central service providers.

[13] Electronic bill presentment and payment (EBPP) is an example of a recent retail payment system innovation. A description of EBPP can be found in Annex D.

4. Risks and efficiency in retail payment systems

4.1 Risks in retail payment systems

From the moment of initiation of a non-cash payment until its settlement with finality,[14] the participants in a transaction (payer, payee and one or more financial institutions) may be exposed to certain risks. These risks arise at the level of the individual payment, and, where payments are netted, at the aggregate level as well. A payment may fail to settle for a number of reasons, discussed below, such as fraud, operational failures or the financial health of a party involved. In the context of multilateral netting systems, settlement risk is used to refer to the possibility that one or more participants in the system will be unable to settle. If one participant's failure to settle were to have implications for the settlement of other transactions, this could give rise to systemic risk.

A first type of risk is linked to fraud. *Risk of fraud* can be defined as the risk that a wrongful or criminal deception will lead to a financial loss for one of the parties involved.[15] Examples range from forging a signature on a payment instruction such as a cheque or a credit transfer to obtaining access, from a remote location, to the computer of a financial institution under a false identity. New payment instruments such as electronic money are also subject to fraud risk which may have a different profile than existing instruments: the creation of fraudulent electronic representations of electronic money that are accepted as genuine by the issuer or by other users could lead to financial losses if these fraudulent balances could be successfully exchanged for a readily transferable form of money (such as currency) or for other assets.

There is no generally accepted definition of *operational risk*; it could be described as the risk of incurring a financial loss because of various types of human or technical error. Operational risk can arise from the failure to follow or complete one or more steps in the prescribed authorisation process. Examples range from a terminal that is offline for a few minutes because of a telecommunications problem, or a failure of a computer authorising card payments that causes the whole payment card network to be down for hours or longer, to an operator-caused computer malfunction. It also includes risks associated with the failure of communications, transportation or data processing, such as the breakdown of some components of the hardware, software or communication systems, deficiencies in the internal control systems, human errors or management failure. As a result, the clearing of transactions may be adversely affected since the payments may be delayed or not processed at all. This may affect central bank reserves and, possibly, the money market.

Legal risk arises if the rights and obligations of parties involved in a payment are subject to considerable uncertainty. In the event of a participant's bankruptcy, the most significant is the legal risk that the multilateral netting arrangements between clearing members and the clearing organisation would not be upheld under national law. As a consequence, clearing organisations in many jurisdictions have been afforded special legislative protection to ensure that their netting is valid. Another significant potential source of risk is that a bankruptcy administrator might challenge a clearing organisation's right to close out positions and liquidate a defaulting member's assets. Legal disputes that delay or prevent the resolution of settlement can give rise to credit or liquidity risks, and potentially systemic risk. Such legal problems are more likely to result from the failure of a financial institution or the system itself as opposed to the default of a payer or payee. The latter type of default is more prevalent and thus more likely to have been addressed in existing law. Finally, new payment

---

[14] A payment has been settled with finality when the payer can no longer revoke the transfer of funds to the payee and the funds have been delivered unconditionally to the payee. While, by definition, a final payment cannot be revoked, this does not rule out the possibility of initiating a second payment of equal value from the former payee back to the former payer (for example, if the original payment had been made by mistake). The finality of the second payment, however, is determined independently of the finality of the original payment, each in accordance with the legal framework of the relevant payment system.

[15] This could be, for example, the provider of the payment service or the person accepting the payment. Responsibility will depend upon the legal and contractual arrangements in force.

instruments may also be subject to legal risks if appropriate legal foundations have not been put in place.

Settlement risk is a general term used to designate the risk that settlement will not take place as expected. This risk comprises both credit and liquidity risk. The risk that a counterparty cannot settle an obligation for full value when it is due, but only at some unspecified time in the future is called *liquidity risk*. Liquidity problems can result in transaction costs associated with obtaining the funds from some other source for some period of time, opportunity costs and, potentially, defaults on other obligations, including by other parties that may subsequently face liquidity problems. In addition, operational failures may be a source of liquidity risk if payments do not settle within an expected time period. *Credit risk* is the risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter. A counterparty will be unable to settle if insolvency proceedings are initiated against it. If one of the participants in a payment system, or the payment system itself, becomes insolvent, then the remaining participants may be open to losses based on their position vis-à-vis the insolvent party. For practical purposes, it may be difficult to distinguish with certainty between liquidity and credit risk.

Systemic risk is the risk that the failure of one participant in a payment system to meet its obligations will cause other participants to be unable to meet their obligations when due. In large enough magnitude, such a failure might generate credit or liquidity problems that threaten the stability of financial markets. In principle, netting systems may generate systemic risk for participants and their customers because they link together at one time the settlement of a number of payments for a group of financial institutions.[16] Systemic risk also may be present for a more broadly defined set of arrangements that include bilateral clearing or correspondent banking.

Clearing and settlement systems for retail payments are typically not considered to be a major source of systemic risk, although a settlement failure could cause significant inconvenience in an economy. This is primarily because the aggregate value of payments processed in retail payment systems is relatively small compared to the value of those processed in large-value systems. Operational risk and fraud, in contrast, could typically represent important concerns in retail payment systems.

4.2 Risk management in retail payment systems

4.2.1 The transaction process

Risk management in retail payment systems as regards the transaction process involves the introduction of technical, procedural and legal measures. These measures seek to ensure that the transaction is valid and to mitigate the amount of errors by minimising fraud and operational risks. To the extent that some errors and problems will remain, these measures attempt to allocate responsibility among all parties involved. Each type of payment instrument will have its own specific set of measures to provide some degree of certainty concerning the respective roles and responsibilities of the parties involved.

There are a variety of technical measures used to address risk. They include monetary and time limits (per transaction, per payment instrument, per client), personal authorisation codes such as PINs, cryptography to ensure the authenticity of the payers and the integrity of the information relating to the transaction, the use of certified equipment (such as EFTPOS terminals) with a certain degree of resistance against tampering, logical controls to verify that the transaction is plausible, online verification of account balances, the application of physical characteristics to the payment instruments

[16] Systemic risk can be seen as an externality created by the failure to settle a single payment obligation, if that settlement failure generates additional settlement failures in other financial institutions. Clearing house rules that outline specific procedures for handling and limiting the impact of settlement failures attempt to internalise this externality.

(eg holograms), the logging of all transactions and attempts to make a transaction, and the use of serial numbers and check digits (eg on cheques).[17]

The use of combinations of new techniques such as chipcards, mobile phones and the internet raises specific security challenges. Special attention should be paid to the implementation of authorisation and authentication protocols and procedures. These allow the verification of the identity of the sender and the integrity of the data, and prevent repudiation of the transaction.[18] This may be achieved by using digital certificate mechanisms, sometimes also referred to as PKI (public key infrastructure) technology,[19] or other evolving technology.

To complement these technical measures, retail payment systems also have procedures designed to mitigate risk. Examples of procedural measures include asking customers to keep their PIN code secret, double-checking payment data (in the case of manual verification this can be done by a second person), and establishing clear responsibility in case of errors or mistakes.

On the legal side a variety of laws and regulations both specific to payment systems and more generally (eg consumer protection rules) allocate responsibilities and may require the fulfilment of minimum procedural measures before the responsibility can be shifted to another party. Contractual terms may further define responsibilities within the legal framework, and contracts between a financial institution and its customers may further integrate risk-sharing responsibilities applicable to payments made through a specific clearing or settlement arrangement.

In some of the selected countries, payment reversal is used as a risk control mechanism for some types of retail payments. Payment reversal means that the credit risk remains with the end user, the payee in particular. This mechanism is utilised for debit payments where verification of the instructions and authorisation of the payment cannot typically be obtained before the item is cleared for settlement. Since settlement of these payments is often effected through RTGS or central bank book entries that are final, some systems will delay the entry of the settlement obligations of these payments until verification is completed. In other systems, there are schedules for reversal of payments that permit the reversals to occur after initial settlement as an offsetting payment obligation included in a subsequent settlement cycle. In some systems, payment reversals are also allowed in the event of a failure by a financial institution to settle its net debit position even when clients of the institution have sufficient balances in their accounts on which the payments are drawn.

4.2.2 The clearing and settlement process

Measures aimed at limiting operational risks are also adopted in clearing and settlement arrangements for retail payments. In most countries the providers of clearing and settlement services ensure, as a rule, an adequate degree of operational reliability for timely completion of the daily processing through adequate information systems, internal controls, backup facilities and reliable technology. Furthermore, business continuity plans are adopted in order to provide solutions to counteract interruptions in a managed way. Risk analysis is also used in order to identify the assets and operations to be protected and the potential threats to the system as well as to define safeguards and countermeasures.

---

[17] More information can be found in the reports "Security of Electronic Money", published in August 1996 by the Committee on Payment and Settlement Systems and the Group of Computer Experts, and "Risk Management for Electronic Banking and Electronic Money Activities", published in March 1998 by the Basel Committee on Banking Supervision.

[18] The denial by one of the parties to a transaction of participation in all or part of that transaction or of the content of the communication.

[19] Public key cryptography (also called asymmetric cryptography) is a set of cryptographic techniques in which two different keys (private and public keys) are used for encrypting and decrypting data. The private key is kept secret by its holder while the public key is made available to communicating entities.

Financial risk management is particularly relevant in multilateral clearing systems. For example, clearing systems could control the exposures participants incur and could have the ability to absorb potential losses. This is mostly arrived at by applying all or a combination of the following measures:

(i) preventive measures such as (1) access control: limiting participation in a clearing system to institutions that possess the financial resources and the technical and operational skills to manage the risks created in the system, (2) mechanisms to limit risks: a clearing system can impose financial limits, for example each participant can set a limit on its bilateral net credit position with each other participant, and/or the system can establish a multilateral limit for each participant on the overall exposure it is allowed to incur, and (3) legal rules: for example legal provisions for enforcing net bilateral or multilateral balances;

(ii) ex post measures such as arrangements to manage defaults: these include loss-allocation formulae and the requirement for participants to post collateral and/or establish credit lines to provide liquidity in the event of a failure to settle by one or more participants.

In practice, a variety of measures are adopted. In nearly all selected countries criteria for participating in the clearing of retail payments have been established. Belgium, Japan, the Netherlands and Switzerland have adopted a system of limits to mitigate risks, and the last three countries also make use of collateral or guarantees. A guarantee fund is under consideration for France's ACH (called SIT), which clears all credit transfers, direct debits, debit card payments and withdrawals. Loss-sharing arrangements are used in Canada, Japan, the Netherlands, Sweden and Switzerland. Legal rules exist in Belgium, Canada, France, Italy, the Netherlands and Switzerland. For the United States, risk mitigation techniques vary according to the clearing arrangement.

Unwinding is a procedure to facilitate settlement in a system when at least one participant defaults. If a participant is unable to settle its original net position, some or all of the transfers involving that participant are deleted from the system and the settlement obligations of the other participants based on the remaining transfers are then recalculated. In the event of an unwind, each surviving participant must be able to manage any change in the liquidity needed for settlement. If this change in liquidity is small relative to the participant's access to internal funds or to funds in the market (eg overnight credit), then the impact of a settlement failure is likely to be small. However, if the change in liquidity is large, participants may require emergency sources of liquidity. An unwind procedure therefore has the effect of transferring liquidity pressures and possibly losses from the failing participant to others and could, in extreme cases, result in significant and unpredictable systemic risk.

4.3 Efficiency

An efficient payment system is an essential component of a well functioning economy, facilitating the exchange of goods, services and assets. The speed and ease with which payments can be executed will therefore have the potential to affect economic activity. Furthermore, payments themselves impose resource costs on society so it is important that payment systems, like other parts of the economy, satisfy basic efficiency principles. Efficiency in payment services would imply having payment services designed appropriately for the needs of society, taking into account the various attributes that end users value in payment services.

Participants in payment services generally value low-cost payment services. Technical or productive efficiency refers to providing a certain amount and quality of payment services for a minimum of costs. The speed of processing, the accessibility and convenience of the system, and its reliability and accuracy are all aspects of quality that may add value to the users. Cost reductions beyond some point, however, may result in a slower and less accurate service. End users also value reductions in the risks associated with payment transactions. Other things being equal, lower risk is preferable to higher risk and here again there is a trade-off between risk and cost.

Over time, payment systems have become more efficient as lower-cost payment processes replace higher-cost ones and the systems have become faster, more reliable and convenient. An important contributing factor to this drive has been technology but an equally important, and not entirely separate, factor has been standardisation. Payment systems may share the characteristics of a variety of

economic networks, and as such their value to users and participants may increase as more users are attracted. Standardisation has helped to realise some of these gains by avoiding fragmentation of payment systems in some countries. Given the diversity of these standards, it is useful to distinguish between technical standards, business standards and interoperability agreements.

Technical standards establish common rules with respect to features of payment instruments or systems, for example rules with respect to message formats or communication protocols used in the exchange of payment information. Business standards are agreements, often by means of a legal contract, between providers of payment instruments or systems that stipulate the procedures, legal interpretation, and/or technical standards to be adopted as a common guideline for the interbank transaction, clearing and settlement process. Examples of such business standards include a clearing house arrangement, the use of a similar layout for certain classes of paper-based payment instruments, the use of a similar user interface for certain classes of electronic payments, and requirements with respect to security management in POS systems.

Providers of payment services may choose to cooperate beyond the level of applying the same business standards. They may decide to allow the reciprocal use of payment instruments by means of an agreement on interoperability. The degree of cooperation can vary from acting as a remote mailbox (sending all instruments and payments immediately to the issuing financial institution) to acting fully on behalf of the issuing financial institution itself (actually performing part of the processing of the payment).

Standards can have a number of positive effects on efficiency and competition. Agreements on technical standards for receiving and transmitting payments information and on business practices between providers of payment services may lead to lower development and operational costs for processing payments. Standardisation of basic features of terminals for initiating or processing payments (eg ATMs, POS terminals) allows information technology (IT) suppliers to manufacture more standardised equipment. Consequently, the market for this equipment may be larger and more open, resulting in lower prices. Interoperability agreements among the providers of a particular payment service may enhance the convenience for customers to use that service, thereby enlarging the market.

Compatibility, enhanced by standards, may enable consumers and providers to choose the best technology available, thereby favouring an optimal path of development of technology. However, full compatibility between different providers' standards may lead to a large installed base for that technology. Potentially, this can lead to three problems. First, the premature adoption of a standard may cause a technology to become "locked-in" because of the difficulty of switching to a new and more efficient technology. Second, it can lead to excessive delay in choosing a standard as alternative producers vie to become the market-leading standard, which can cause users to be reluctant to choose one technology over another as the standard. Third, agreements on standards, in some cases, can be used to limit competition in particular markets.

At the domestic level, standards have been developed largely by private organisations and associations of financial institutions. This is evident particularly in countries where the banking associations are strong. Once finalised, the standards usually come into effect by way of contractual agreement among the financial institutions participating in a given clearing or settlement system. The standard terms are in turn often incorporated into the agreement between a financial institution and its customers.

Central banks often play a role in fostering the development of such standards, whether in the exercise of oversight responsibilities or as a result of their own interests as participants.[20] Where a central bank operates the clearing or settlement system, the system standards may be enforced through a combination of contractual agreements among participants and regulations. Financial institutions contractually agree to certain standards when becoming participants in such systems, while in an area

[20] For example, in a number of countries the central bank chairs a body responsible for interbank cooperation in payment systems and, in this context, also for standardisation.

such as cheque clearing central banks in some countries issue regulations laying down standards. However, not only the prevalence of standards but also paperless procedures are a major means of cost saving and make an important contribution to more efficiency.

5. The role of central banks

This Section of the report will describe, first, the operational role of central banks in clearing and settlement, by looking at both the clearing services and the settlement services that the central banks in the selected countries offer, and, second, the oversight role of central banks with respect to retail payment systems.

5.1 Operational role in clearing and settlement

All central banks operate under a variety of constraints, resulting from a mix of legal, social, political, international, competitive and other factors. The relevance and range of these environmental factors will determine to a large extent the services offered by a central bank. The fact that each central bank has a different - possibly unique - set of services, operations and customers reflects the (sometimes very) different mix of environmental factors that apply to each central bank.

One of the most important roles of central banks is to provide a monetary asset - central bank money - that does not carry the risk of default. Interbank obligations, generated in interbank payment, clearing and settlement processes, are often discharged by making use of such monetary assets. Furthermore, central banks generally provide accounts to financial institutions in which balances of central bank money can be held.

5.1.1 Clearing services

The involvement of central banks in retail payments is diverse since these transactions are not part of monetary policy operations, are usually less urgent and, because of their smaller value, do not give rise to the same degree of systemic risk as large-value payments. Most central banks endeavour to maintain public confidence in retail payment systems. Some of them restrict their activities - besides settlement - to cooperating with private payment system providers to promote safety, efficiency and interoperability through developing common standards. Other central banks offer facilities of their own as an alternative to private arrangements. In almost all selected countries, however, clearing services for payment card transactions are provided solely by the private sector.

Retail clearing procedures may be offered by central banks not only on their own initiative (for example to process payments on behalf of the government[21]) but also at the request of the financial community. In some countries smaller financial institutions consider this to be a neutral and confidential alternative usually offered with a high level of service and at reasonable cost compared to the clearing networks of large private organisations.

The extent to which central banks are operationally involved in retail payment systems varies considerably. In countries like Japan, the Netherlands, Switzerland or Sweden the central bank does not perform any operational function in retail payment systems at all besides offering settlement services. In other countries like Australia or the United Kingdom the central bank is a shareholder in some of the private clearing arrangements and is thus able to have some influence on these systems. In Canada the central bank participates in private clearing arrangements. In Belgium a private ACH is operated on the premises and with the personnel of the central bank. In some countries central banks offer limited or even full-scale clearing facilities to the banking sector. The Italian central bank

[21] Annex C describes the arrangements for government payments, including the role of the central bank, in the G10 countries and Australia.

directly manages the clearing houses in which large-value cheques and other paper-based instruments are handled. In France and the United States, the central banks administer nationwide cheque clearing operations. The French central bank is also a shareholder in the ACH arrangement, while the central bank of the United States owns and operates the largest ACH system. The German retail clearing system RPS, run by the Deutsche Bundesbank, allows all payment instruments to be cleared nationwide. However, less than 20% of all retail payments in Germany are cleared through the central bank network.

In some countries central banks also process, clear and settle cross-border retail transactions via correspondent accounts (in some cases, but not always, with other central banks). These activities usually involve government payments, eg pension payments, as well as orders from financial institutions, foreign central banks or international institutions.

5.1.2 Settlement services

Retail payments executed via an RTGS system are settled individually; in all other arrangements clearing balances are calculated and then settled. With respect to the accounting process at the central banks for the settlement of these balances, there are two relevant factors to take into consideration: the first is the way in which the entry is made in the accounts, and the second relates to the number of entries on a given day. Concerning the entry in the accounts, traditionally two ways have been used: either the balances from the retail payment system(s) are entered in the central bank's RTGS system, or they are entered into another system operated by the central bank, such as the current accounts system. The latter method is used in Belgium and Canada. In Germany and the United Kingdom both methods are used. In Japan, both deferred net and RTGS settlement are currently possible in the central bank settlement system, where the settlement of clearing balances arising from retail payment systems is generally made via the deferred net settlement capability; a new method will start around the end of this year (see below). In the United States both methods are currently used; recently, however, a new method was introduced (see below). In other countries, the first method - through the RTGS system - is used.

The second factor relates to the daily frequency of the book entry, namely whether one single entry or multiple entries are booked. A single entry means that the clearing balances entered in the books of the central bank represent the results of all clearing cycles of that day, and hence of all different payment instruments cleared that day. Multiple entries on the other hand occur when, within the same settlement cycle, balances from different retail clearing systems are submitted separately to the central bank or when, within the same settlement cycle and within the same clearing arrangement, separate balances are calculated for different clearing cycles, usually representing different payment instruments. Most counties use a system of multiple entries; only in Australia, Canada and Italy is one single entry used.

The fact that central banks offer settlement services to their domestic interbank clearing systems through their accounts allows financial institutions to reduce their credit risk and to avoid settlement through competitors. Settlement is facilitated through the provision of intraday and overnight liquidity arrangements. Almost all retail payment systems settle on a net basis as financial institutions try to save liquidity, although in some countries, including Germany and Switzerland, the settlement of retail payments takes place on a cumulative gross basis. German financial institutions value the advantages of a gross settlement system to exchange payments whereas the aspect of liquidity is regarded as less important since only smaller amounts are involved. Whether payments are settled on a gross or net basis in the United States often varies according to the institutional arrangement. Typically, payments cleared and settled through clearing houses are netted, whereas payments cleared bilaterally and payments processed by the Federal Reserve are settled on a gross basis.

In recent years central banks in some countries have started to offer new settlement services. One such example is the Federal Reserve, which recently introduced an enhanced settlement service that combines and improves selected features from its existing net settlement services and can be used for either gross or net multilateral settlements. The service is fully automated and provides finality of settlement intraday on the settlement day to participants in clearing arrangements using the service. In

addition, the enhanced service enables the Reserve Banks to manage and limit risk by incorporating risk controls that are similar to those used in the Fedwire-based net settlement service. The Federal Reserve expects most clearing arrangements using its net settlement services to migrate to the enhanced settlement service in late 2000. Another example concerns Japan, where the central bank will abolish deferred net settlement at around the end of the year. This will make RTGS the only mode of settlement for funds transfers over its settlement system. Along with this reform, the Bank of Japan will change the method for the settlement of the balances arising from clearing systems so that settlement can be effected as RTGS entries. This improved method will apply to all major clearing systems, including those for retail payments.

5.2 Oversight role

Many central banks have explicit legal authority with respect to payment and settlement systems. The laws establishing a country's central bank or other national laws often contain a broad statement that the central bank should promote the smooth operation of payment systems (eg Australia, Belgium, France, Germany, Italy, Japan, the Netherlands, Sweden and Switzerland). While serving as a basis for central bank oversight of large-value payment systems, in some countries these statements also represent the basis for central bank oversight of retail payments. For the selected countries participating in the Eurosystem (Belgium, France, Germany, Italy and the Netherlands) this provision, together with the provision that the European Central Bank and national central banks may provide facilities and the European Central Bank may make regulations to ensure efficient and sound clearing and payment systems within the Community and with other countries, provides a basis for the oversight of payment systems as a whole, including retail payments. In contrast, the Federal Reserve generally conducts payment system oversight on the basis of its authority to provide payment services to depository institutions and to regulate and supervise banking organisations.

Some of the broadest and most recent expansions of a domestic legal framework can be seen in Australia, where a series of laws regarding payment systems were passed in 1998. The central bank has a duty to promote the efficiency and stability of payment systems. It may designate individual payment systems and mandate rules and standards, including in areas such as access to the systems. The mandate in relation to efficiency gives the Australian central bank a direct interest in retail payment systems. Finally, in Canada the central bank has regulatory oversight of payment clearing and settlement systems that pose systemic risk. The Bank of Canada has interpreted its authority to apply primarily to large-value payments rather than retail payment systems. By designating a system, the central bank may mandate certain actions by participants and may intervene directly to mitigate systemic risk.

Another concern of central banks relates to money laundering. Although mainly linked to large-value payment systems, the use of retail payment systems for such purposes cannot be ruled out.

6. Arrangements for cross-border payments

As in the case of domestic payment arrangements, cross-border payments involve a variety of payment intermediaries, monetary assets, legal and regulatory arrangements and communication channels. The added complexity is that typically more than one geographical area or jurisdiction is involved as well as, in most cases, multiple currencies. One general feature is that non-resident financial institutions do not generally participate directly in domestic interbank funds transfer systems and do not normally hold accounts with the national central bank. Therefore payments in any particular currency tend to be executed via financial institutions located in the country of issue.

The growth in cross-border retail payment transactions in recent years together with a demand for more effective and cost-efficient methods of transferring money across borders has been a decisive factor in the search for innovative organisational models for offering cross-border payment services outside the traditional correspondent banking relationships.

6.1 Correspondent banking

There are basically two ways to execute cross-border transactions: either by using accounts in the local currency with local financial institutions or by using international payment services provided by domestic financial institutions, which in turn will usually make use of their own branches or subsidiaries, other international payment channels or correspondent banking relationships abroad. For clients operating primarily at domestic level, it is more likely that they will rely on the international payment services offered by their domestic financial institutions. However, internationally active clients may also choose to hold accounts in other countries.

Enhanced correspondent banking has been widely resorted to in recent years by financial institutions wishing to upgrade the services they provide to their customers for making cross-border transfers. All examples of systems based on this technique share the feature that they make use of special or preferential relations between financial institutions in different countries. These preferential relations entail agreements between participating institutions on common formats or formatting arrangements for file transfers between different countries.

One type of this model is the "in-house" arrangement: one and the same institution, typically a large financial institution with a presence in different countries through branches or subsidiaries, becomes a member of the relevant domestic clearing and settlement systems in the countries concerned. This enables the institution in question to route its cross-border transfers through its in-house network and to enter them into the domestic clearing system of the country of destination of the transfer. A variation on the in-house model can be used by institutions that do not have, or choose not to use, their own network of branches and subsidiaries. In this case the originating financial institution transfers payment orders in the format required by the clearing system in the country of the receiving correspondent bank, which then transfers funds through the national clearing system to the beneficiary's account at the beneficiary's financial institution in that country.

Another type of model is the "club" arrangement. This differs from the in-house model in that it consists of agreements between a group of individual institutions, one or more in each country, that provide one another with indirect access to the domestic clearing system in which each club member participates. Sometimes these arrangements operate in real time and use proprietary harmonised standards enabling the participating institutions to transfer funds directly between the customers' accounts at the institutions that are members of the club. A special case of the club model is the sectoral arrangement, in which groups of institutions of the same kind or sharing common objectives work together. Such a group consists typically of several institutions cooperating within one country linking up with similar groups of institutions in other countries. Just as in the case of the club arrangement, the cross-border link established between groups of institutions that are parties to the agreement results in providing participants with indirect access to local clearing systems.

Financial institutions may, at the same time, use both the in-house model and the club model. Thus, for instance, a large financial institution may opt for an in-house solution with regard to a certain number of countries, while entering into club-type agreements with financial institutions in countries in which it has no direct presence or in which it finds such cooperation agreements more suited to its specific needs.

6.2 Payment card networks

Currency obtained with payment cards from international networks of ATMs, credit cards and, to a lesser extent, debit cards are widely used to make POS payments in cross-border retail transactions. Credit cards are also frequently used for remote cross-border payments, and increasingly it is also possible for debit cards to be used remotely. There are several ways to effect remote card payments: the information necessary to initiate the payment (such as name, card number, expiration date of the card) can be transmitted by mail, by phone and, increasingly, via the internet.

Several international organisations offer international payment card services and systems to their member institutions, for example Visa International and MasterCard International. The services offered by those organisations are very similar to the services provided in domestic markets by

national debit card or credit card networks. This applies not only to the authorisation process (the procedures are virtually the same as for domestic payments) but also to clearing and settlement arrangements. Settlement payments are handled through an international settlement bank, which means that all requests for funds or payments are settled through the correspondent services of domestic clearing and settlement systems (or through correspondent banking if the member financial institutions have an account with the settlement bank). The only difference is that, for most currencies, foreign exchange operations are carried out in order to settle the net balance for each currency. These operations take place on the basis of traditional conventions in the foreign exchange market.

6.3 ACH solutions

Remote retail cross-border payments are mainly carried out by credit transfers, even if in some cases, as already mentioned, they are executed by payment cards. However, the efficiency of cross-border retail credit transfers compares unfavourably with cross-border card payments, and is at present far below the level of domestic credit transfers. The speed of cross-border credit transfers could be improved, for example, by establishing multilateral clearing arrangements in an international context. In this context several organisational models are possible: in principle, they range from centralised solutions, such as the creation of a cross-border ACH, to decentralised solutions, such as the creation of linkages among domestic ACHs.

A centralised cross-border ACH would require the choice of one or more common settlement banks. In a solution based on cross-border linkages between domestic ACHs, the ACH in the country of the originating financial institution might be in charge of converting the currency and would then transmit the payment order (in the local currency) to the recipient ACH in the country of the beneficiary, where the order would be handled as a domestic payment. Settlement could occur by means of a designated institution (eg the central bank) in the country of each ACH or by means of correspondent banking relationships.

Recently, a project to set up a global ACH for retail payments has been launched. The National Automated Clearinghouse Association (NACHA) Cross-Border Council in the United States announced that it is sponsoring an industry initiative to explore the feasibility of building a global system for processing cross-border low-value batch payments. The Worldwide Automated Transaction Clearing House (WATCH) system would act like a common processing mechanism.

In the European Union, since the beginning of the 1990s, authorities have devoted great attention to improving the efficiency of cross-border retail credit transfers, which is considered beneficial for the development of a single European market for goods and services.[22] The need for such improvement became even more apparent with the introduction of the euro. A recent initiative to develop a cross-border payment system for retail payments is the Euro Banking Association's (EBA) decision to develop a cross-border low-value payment arrangement which would be available to a large community of financial institutions located in the European Union. This system will build on an existing payment system, namely the Euro Clearing System (Euro 1) run by the EBA. Euro 1 is a large-value net settlement system in euros which settles at the end of the day through TARGET.[23]

---

[22] Public authorities in the European Union have also created a specific legal framework governing cross-border credit transfers. The European Union's Directive of 27 January 1997 on Cross-Border Credit Transfers concerns transactions not exceeding EUR 50,000 in value that are initiated by persons other than a financial institution, but which are executed between financial institutions in two different member states. Under this Directive transactions must be executed within a contracted period from the instruction by the payer or, as a default rule, within five days of instruction by the payer. The financial institution will be liable to the payer for non-compliance. More broadly, financial institutions will be required to increase the transparency of cross-border credit transfers by providing a range of information with respect to transaction times and applicable fees and exchange rates, as well as written confirmation after the transaction has been completed.

[23] TARGET is a payment system composed of one RTGS system in each of the 15 EU countries and the ECB payment mechanism.

7. Factors influencing infrastructure arrangements

The configuration of infrastructure arrangements that prevails in the G10 countries and in Australia has been influenced over time by a variety of factors. On the demand side, the long-term process of integration of markets for goods and services has been affecting the payment needs of end users, which are an important determinant. Demand is also influenced by the consolidation of banking systems. The consolidation process, together with the efforts of the financial sector to reduce the costs associated with the processing of payments, may result in a demand for more efficient clearing and settlement systems. On the supply side, the application of information, data processing and communications technologies to payment processes has made it possible to meet the increasing and more demanding needs of end users through innovations in products, clearing arrangements and delivery channels. The widespread application of new technologies, and the related move towards standardisation, has favoured the restructuring of payment processes, and also facilitated the entry of new service providers in the market. Finally, a number of developments in the clearing and settlement of retail payments have been influenced by policy choices made by, mostly, the banking industry and, in some cases, public authorities.

7.1 Demand for clearing services

As it holds true for any industrial sector, the structure of the retail payments sector is influenced by the volume and composition of the demand for payment services by end users, which, in turn, widely reflects the structure of the exchange of goods and services in the economy. In recent years there has been a change in the relative demand for payment instruments by the end users, which has a direct impact on the demand for clearing services. This trend caused in most countries, for example, a decreasing demand for cheque clearing systems and an increasing demand for electronic clearing services for payment cards and direct funds transfers. Moreover, the emergence of new retail payment technology over the past few years has led to the development of new payment instruments and methods, which in some countries has created new demands for clearing services and, in some cases, a demand for new clearing systems.

Economic growth brings forth an increase, in terms of volume and value, in the exchange of goods and services in the economy, which leads to an increase in the number of payments to be made. There is therefore a steadily increasing demand for retail clearing services. Moreover, the growth in economic activity goes along with the opening of local markets and the increasing interdependence of domestic economic systems, which in turn determines the growth in non-local and cross-border transactions. An illustration of this is electronic commerce via the internet, the development of which could further increase the demand for international payments.

The process of integration of markets at the international level has accelerated in recent years, fostered, amongst other things, by the rapid changes in production, telecommunications and transport technologies, which have resulted in lower transaction and transport costs. The growing international integration has increased the demand for cross-border payments and hence the need for end users to have access to cross-border payment services that are as efficient and safe as comparable domestic services.

Over the past two decades, there has been a marked trend towards consolidation of financial institutions around the world. Consolidation has a number of potential implications for internal processing of payments and for clearing and settlement systems. The more consolidated the financial sector, the higher the proportion of transactions that will be in-house transactions. Such items may be cheaper for a financial institution than inter-institution transactions because they do not involve the exchange of information and payments with other institutions.

Consolidation may also lead to more efficient clearing by increasing economies of scale within a financial institution. Information technology infrastructure, particularly for electronic payments, typically represents a large fixed cost for institutions. A merger between two institutions may allow them to make some infrastructure redundant and use the remaining infrastructure more intensively, lowering the average cost per transaction processed. Consolidation of financial institutions is not,

however, the only way in which payments clearing may become more efficient. Consolidation within financial institutions, or internal consolidation, may also reduce costs through the centralising of internal processing. For example, the centralisation of cheque processing facilities could lead to increased economies of scale in some countries.

Aside from consolidation within the banking system, consolidation can also occur at the level of the payment systems infrastructure. This can take place through joint ventures, alliances or mergers of payment and settlement systems. Consolidation of payment and settlement arrangements for retail payments has the potential to increase efficiency: it obviates the need for financial institutions either to participate (directly or indirectly) in each individual payment system or to make use of correspondent banking services in order to exchange payments with institutions participating in other systems. This will lower costs and increase the speed with which clearing takes place, thereby increasing efficiency for all participants. On the other hand, the consolidation of financial institutions and/or payment systems infrastructures may have the potential to lessen competition, which may result in less pressure for innovation and cost reduction.

7.2 Supply of clearing services

Advances in electronics and telecommunications are rapidly bringing down the cost of IT equipment and the unit cost of data processing and transmission. While previously the branches of financial institutions or post offices were the primary distribution channel for payment services, other channels (using telephone or internet for instance) are now also becoming available. This has allowed financial institutions to review and, where possible, optimise their distribution strategy by promoting the most efficient distribution channels as well as giving customers the convenience of being able to choose from a wider variety of payment services. Furthermore, both the technology and the expertise in the application of technology in the financial sector have now become available to a wide range of actors. Given the rapid price decreases for IT equipment and the less important role for branches as a delivery channel, set-up costs have become less of a barrier to entering the payments market. Consequently, service providers other than financial institutions are able to play a larger role in this market.

The application of information technology can bring about a widespread standardisation of formats and procedures for the different payment instruments which results in increasing efficiency of clearing processes for payment instruments. Through the revision of internal procedures, financial intermediaries may process payment transactions on the basis of fully automated procedures from end user to end user, thus eliminating any needs for manual intervention (so-called straight-through processing) with benefits in terms of lower operational costs and higher efficiency for payment systems participants and end users.

As a result of the specialisation in equipment and applications, the process of clearing has become separable into various activities, thereby facilitating the entry into such a market of new service providers taking care of the organisation of a common activity over a broad range of users. A typical example of these service providers is financial and non-financial organisations to which financial institutions outsource clearing activities. Though some clearing activities have always been outsourced, the range of these activities has broadened markedly in recent years to include a variety of data processing and facilities management services related to the "core" clearing functions. Outsourced activities now range from transaction processing, including the posting of payments to client accounts, to the management and operation of entire data centres.

The principal advantages of outsourcing clearing activities are the cost savings to the organisation from the scale, specialisation and expertise available to the third-party processor. Focusing on the general characteristics of the information management or data processing service rather than on specific applications, the service provider may also, in some cases, attract a broad range of clients beyond those seeking applications only to payments. This generates a volume scale unavailable to most financial institutions. The nature of the provider's specialisation and the scale of its operations can translate into significant cost savings for the institution contracting for the service.

7.3 Industry and public policy choices

The long-term dismantling of regulatory barriers to foreign trade and to capital movements has fostered the process of international integration of financial markets and of markets for goods and services. The breaking down of national barriers concerns all types of economic agents (consumers, firms, financial intermediaries) and hence affects the demand for all types of retail payment services (face-to-face, remote, recurrent, etc). A notable example of the dismantling of regulatory barriers is provided by economic and monetary union in Europe, where the removal of barriers to free movement of capital, goods, services and people has been flanked by the introduction of the euro, which further contributes to market integration by reducing transaction costs and eliminating exchange rate risk.

The process of standardisation of technical features of payment instruments at the global level is frequently driven by major players. For instance, the main providers of payment cards at the international level established the EMV standard for cards based on microprocessors and the SET standard for the secure use of credit cards on the internet. Also, S.W.I.F.T. has recently undertaken a revision of its standards with a view to setting new standards covering not only technical features (eg message formats) but also processing rules, which tend to cover all links in the transaction chain (end-to-end). In other areas, such as credit transfers, the standardisation at the domestic level contrasts sharply with the limited level of standardisation of cross-border payments. In the European Union, where public authorities have devoted great attention to the improvement of the efficiency of cross-border retail credit transfers, the Eurosystem has taken the view that its operational involvement would not be justified at present, but it is playing a role of catalyst for change by being particularly involved in the promotion of the implementation of standards.

In some cases central banks, or more generally public authorities, play an important role in facilitating the introduction of new arrangements. A typical way of doing this is by intervening to change existing rules in order to support, or at least make possible, the development of new payment instruments and new payment systems. For example, the introduction of cheque truncation - a procedure whereby the physical movement of cheques is curtailed or eliminated - may require a change to commercial law, which in many countries stipulates the terms and conditions for the acceptance and collection of cheques.

8. Conclusions

The range of clearing and settlement arrangements available today is a reflection of the economic, business and technological environments existing in the G10 countries and Australia. The application of information and communications technology to payment processes has led to gradual change in the provision of clearing and settlement arrangements, which has made it possible to meet the evolving needs of the end users of payment services. Although it is very difficult to say at this point where this evolution will lead, it does highlight the dynamic nature of retail payment systems.

As concluded in the earlier report on retail payment instruments, it is hoped that the descriptive and analytical assessment of clearing and settlement arrangements within and across the selected countries in this report will contribute to a better understanding of retail payment systems and to further progress in developing safe and sound payment arrangements around the world.

Annex A

Debit card payments in the selected countries

1. Introduction

Debit card systems were developed in recent decades to provide an electronic means for consumers to access their deposit accounts at banks to pay for purchases at the point of sale. These point of sale (POS) debit card systems have proved to be popular with consumers and merchants, and to be cost-effective. In over half of the G10 countries and Australia, debit cards are now involved in approximately 20% of non-cash retail transactions, up from only a few per cent less than a decade ago. To understand better the arrangements behind these debit card systems, this annex discusses (1) reasons for and methods of participation in a debit card system; (2) basic POS debit card system models and the associated business agreements; (3) authorisation, clearing and settlement of debit card transactions; and (4) international arrangements.

2. Participation

If successful, debit card systems offer a potential improvement over other means of payment by reducing the processing costs of making a payment at the point of sale, reducing fraud, and offering a convenient electronic means of payment to consumers who do not wish to use or do not qualify for a credit card. To be successful, debit card systems must have three elements: widespread acceptance by merchants and consumers, a method of authorising the transaction quickly, and a means to compensate the various participants in the system. The first requirement, that of widespread acceptance, is typical of payment instruments generally. It needs participation by a critical mass of both merchants and cardholders. Merchants are reluctant to pay the cost of installing readers for debit cards that are used by only a small subset of their customers; likewise, consumers find carrying an additional payment card that is accepted only at a few merchants burdensome.

Adequate participation by issuing and merchant (acquiring) banks is also crucial to achieving widespread acceptance. In countries which have a relatively fragmented banking market, for example, no one bank could create widespread access even by giving a debit card to all of its deposit account holders. As a result, banks in many countries recognised the need for a multibank organisation that linked the accounts of all the banks' depositors to a wide array of merchants with whom the banks had business relationships. But banks also desire to maintain a strong identity in the minds of their potential customers. Hence in countries with more concentrated banking markets, single banks may have sufficient size to sponsor a debit card system that offers widespread access to its participants. These systems allow the sponsoring bank a greater individual part to play than is typically the case in the multibank arrangements.

In some countries systems linking different banks, usually called networks, already existed for the purpose of providing remote deposit account access to customers at automated teller machines (ATMs) or for providing card access to revolving credit accounts, and debit card networks were able to build on these. In other countries, debit card systems were created separately from any pre-existing systems. The physical arrangement of the networks usually involves telecom lines across which electronic transaction information is transmitted linked by computers that route the information between merchants and the card-issuing bank. These computers are often called "switches", as they route, or switch, the information among the participants. It has become increasingly prevalent over the past few years for these switching services to be provided by third-party processors that are not financial institutions.

Banks are able to participate in a debit card system either by (co-)owning the switch or linking via a contractual relationship (eg through membership). In cases where one or more banks own a switch, the owners will also typically participate as issuers of debit cards. This is especially true of national networks in Belgium, France, Italy, the Netherlands and Switzerland, where the banks are at the same time both owners and members of the central switch. However, for many systems, participation often extends beyond those banks that are owners. In Germany, all banks that issue debit cards participate in the debit card system, although switching services are provided only by a few of them and also by several non-financial institutions. Even in Australia and Canada, where most networks are proprietary and, hence, owned by individual banks, access agreements with the established networks allow third-party banks to issue debit cards. For networks in which a non-bank owns the switch, bank membership is essential for the provision of cards that draw on deposit accounts.

Membership arrangements also play an important role in specifying the legal rights and obligations of participants. Since the members ultimately bear any risk stemming from the system's operation, many bank-owned networks often limit membership to fellow banks. In such cases, merchants and other non-bank participants have access to the system only through an acquiring bank which is a network member. The acquiring institution may then provide a guarantee to the network on behalf of the merchant or other third party. The exact role of an acquiring institution, beyond simply providing a financial guarantee, differs from system to system. In some systems acquirers may play an active role in the transmission of information for authorisation, clearing and settlement, while in other networks the acquirer is not involved at all from an operational perspective.

3. Models of debit card systems

The means to achieve widespread acceptance, whether attempted through a single bank's network of merchants and depositors or a multibank organisation, requires business agreements among the participants in the system to govern the conditions of participation, acceptance, pricing and allocation of risk, and the arrangements for clearing and settlement of debit card transactions. For multibank organisations these business agreements often involve the creation of a separately chartered corporation that promulgates the rules governing participation and establishes or recommends pricing for costs related to network switching. Alternatively, it may involve bilateral business agreements between participants.

Two extremes define the boundaries within which most, if not all, debit card networks[24] can be classified. At one end of the spectrum is an arrangement whereby merchants link to the network of a

Figure a

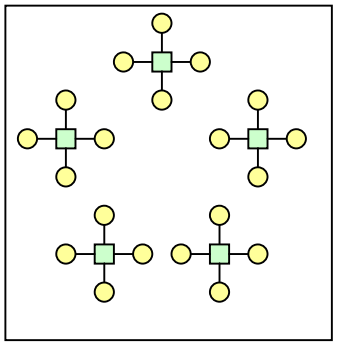
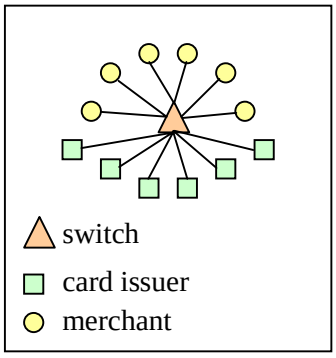


Figure b



[24] Use of the word "network" here is not intended to imply that the methods for authorisation, clearing and settlement are highly structured and/or centralised. Rather, a network is simply used to reference the links that exist between institutions that participate in each of the distinct activities associated with debit card payments.

single bank. If this institution has no links with other networks, merchants will only be able to accept cards issued by that institution (Figure a).

At the other extreme is an arrangement whereby merchants are connected to the complete set of domestic banks by a central switch (Figure b). This type of network arrangement has a greater degree of interconnectivity. To the extent that there is more than one switch catering to discrete sets of merchants and banks, however, there may still be limits on the ability of cardholders to initiate debit card transactions with some merchants. Similarly, merchants will not be able to accept debit cards from all customers.

Whenever there exists more than one domestic network, the participants in one network will be inaccessible to participants in the other network(s) unless there are some links between them. Conceptually there are a number of ways in which this can be achieved. The first solution is for switches to link together on either a bilateral or multilateral basis. This is perhaps the most common form of interconnectivity in systems with more than one network. An additional solution is for merchants (directly or through an acquirer) and/or card issuers to participate in more than one network.

Hybrids of these various techniques are also possible. In fact, in most countries, there are a variety of links. Quite often, multiple switches will arrange bilateral or multilateral relationships. In the Australian and UK Switch system for example, where the banks often own the switches, links between switches are simply bilateral technical links between financial institutions. Regional switches in the United States have also adopted bilateral agreements allowing increased connectivity. These agreements allow a switch to pass on authorisation requests to the switch with which the card-issuing bank is associated.[25] In other cases, merchants will sign up to more than one network. In the United States, merchants often belong to more than one network, and in Australia large merchants have the opportunity to establish direct links with more than one issuer, effectively performing some of the switching themselves. In some countries linking these disparate participants has become an important independent business, often performed by third-party data and telecommunications processors.

Banks may also participate in more than one network. Bank mergers in the United States led many banks to establish relationships with more than one of the regionally based networks in order to provide a debit card with greater geographical coverage. In the United Kingdom, many acquiring banks are members of both domestic debit card schemes and can therefore offer their merchant customers the ability to accept payments by cardholders in both schemes. Card issuers in Germany, through their respective banking industry authorisation systems, are linked to all of the multiple private network switches. By this design merchants need only establish relationships with one network switch provider. What is unique to the German system is that card issuers are not linked to the various network switches via membership arrangements, as card issuers are in some systems. Rather, the banking industry established a nationwide debit card system based on the eurocheque card. The switching function was subsequently outsourced to private businesses.

It is apparent that maintaining multiple independent electronic linkages between banks, merchants or switches becomes more costly as the number of linkages grows. Hence the different ways in which widespread access is achieved across systems in various countries represent, in part, an attempt to minimise the costs of widespread access. The different arrangements are therefore influenced by the number of banks in the country, the availability of pre-existing ATM networks and other banking associations, the costs of telecommunication lines and other considerations. While maintaining multiple links may be more costly in a resource sense, it may allow greater scope for competition among different providers of debit card systems, and hence may lower costs overall.

[25] In Italy there is a single nationwide POS network based on two switches linked to each other.

4. Organisational arrangements

The organisational structure of individual debit card networks and their relationship(s) with one another are in part determined by the varying methods of ownership and contractual cooperation. As alluded to above, in cases where the network contains a single card-issuing bank there are no external switching functions per se. Each bank will process its own transactions, though the actual processing may be outsourced. This example is most clearly illustrated by the Australian POS system. A number of individual banks operate their own networks. In order for their cards to be interoperable, ie accepted at non-participating merchants, all of the banks maintain reciprocal links to one another and other issuers of debit cards have access agreements with at least one network.

In the UK Switch system, member banks each have a switch and communicate bilaterally. Through bilateral technical relationships, each bank can accept debit card initiated transactions drawing on its own as well as the other member banks' cardholder accounts. Since the system operates on a bilateral basis there is no central switch.

In many of the selected countries, including Belgium, France, Switzerland, Japan and the Netherlands, there is a single switch to which most, if not all, banks are connected. Despite the similarities in terms of network configuration, ownership arrangements vary. In Belgium, France, Italy, the Netherlands and Switzerland, the majority of participating banks are indirect owners of the switch. Typically, the switch is an independently incorporated company (or a subsidiary of such a company) with the banks serving as the primary shareholders.

The German case is an exception to the common ownership structure. Rather than establishing a common/shared network switch, several companies (both financial and non-financial institutions) compete to provide switching services without being linked together. However, the Central Credit Committee (the federation of the central associations representing the German banking industry) governs the network switches in Germany. In the German POS system terminal networks of various competing network operators are linked to the banking industry's authorisation centres that are interposed between the service providers and the huge number of card-issuing institutions. Since the network switches are operated by both financial and non-financial institutions the ownership structure differs substantially.

Perhaps due to the large number of banks in the United States, the configuration of debit card networks is usually based on a shared arrangement of a central switch linking many banks. Unlike the nationwide shared network switches discussed above, there are approximately 20 large debit card network switches in the United States, ranging from solely to jointly owned. Frequently, the network switch is owned directly or indirectly by a group of participating financial institutions. There are cases, however, where the owner is a corporation that is neither directly nor indirectly affiliated with a financial institution.

As in the United Kingdom, where the Switch system coexists with a Visa system based on a central switch, Sweden has a mix of both proprietary bank-owned network switches and a shared network switch. CEKAB, the shared switch, operates as an independent company, though it is owned by four major Swedish banks. Two other large banks each operate competing proprietary network switches. Agreements between them and the shared network allow for system-wide connectivity.

5. Rule-writing, branding and fees

Rule-writing, branding and fees are important elements in the design of various network and system configurations. Again, practices vary across countries and across systems. Individual networks, whether shared or proprietary, will have a set of rules that typically specify access requirements, obligations and technical formats. The responsibility for writing rules may fall to the network switch in shared environments, whereas proprietary network rules are often determined by the card-issuing

bank. Because shared network switches involve a larger group of participants, particularly card issuers, the rules may be more extensive than those within proprietary network switches.

Another hierarchy of rules may govern the relationships between both shared and proprietary networks. In some cases bilateral business relationships between networks form the basis of these rules. Alternatively, a collective body may set rules that apply to all (or a subset of) networks in the economy. Individual shared network switches in the United States often form contractual relationships with one another for routing authorisation and clearing information between themselves. Likewise, in Sweden and Australia there exists a set of bilateral agreements between proprietary network switches (and a shared network switch in Sweden's case). These bilateral agreements are in contrast to the multilateral frameworks employed in Canada's Interac and the UK Switch systems. In both cases network members have jointly agreed on a set of centralised rules that govern payment information flows between switches. In Germany, the providers of switching services have to meet both rules and technical and operational requirements set up by the Central Credit Committee.

The agent setting rules regarding clearing and settlement of debit card payments, and any associated guarantees, depends primarily on whether these functions are performed inside or outside the network or system authorisation structure. Network switches that clear debit card payments as well as authorising them typically will have rules governing both activities. In cases where clearing and settlement take place through separate mechanisms, applicable rules will also tend to be externally determined.

Debit card branding serves several vital functions. The brand may help determine where a particular card can be used; this function is particularly relevant in countries where there are competing networks. However, even in countries with single nationwide networks, the display of a brand by merchants indicates that they will accept this form of payment.

Cards may carry the brand of the card issuer, the network, an association of networks, or a mix of the brands. In nearly all countries and all systems, cards carry the logo of the issuing bank. It is also quite common for cards to carry the brand of the network. This is primarily true for shared networks where cards from different banks can be routed through the same network switch. Proprietary networks do not have the same need to separately brand their cards. It is interesting to note, however, that in Australia, where proprietary networks establish interconnectivity agreements bilaterally, debit cards are branded only with the issuing bank's logo. Interconnectivity agreements between proprietary switches in Canada and the United Kingdom are multilateral in nature and the cards bear the names of these coordinating bodies, Interac and Switch, respectively. German debit cards are branded with the issuing bank's logo, but do not carry network-specific logos. However, they carry system logos representing the different payment procedures available for debit cards (eg cash dispensers, POS system).

In many countries interchange fees and switch fees are often determined by the network, although not all networks explicitly charge these fees.[26] The network switch often charges a switching fee to recover the technical costs associated with linking a merchant to a card-issuing bank. Whether prices are set based on either cost recovery or a particular return on investment depends in part on a network's ownership structure. The structure may involve an independent corporate entity operating with a profit motive or simply a bank-owned cooperative functioning on a not-for-profit basis. In Germany there exists no real interchange fee. The German banking industry charges the retailer a fee (0.3% of the transaction value, but not less than DEM 0.15, or roughly EUR 0.08, per transaction) for banking services such as the provision of the database link and the payment guarantee. In addition to this fee the merchants have to pay for the services provided by the network operators (installation of the terminals, helpline service, etc).

All the parties in a debit card transaction - the customer who buys an item using the debit card, the merchant who sells the item and accepts the debit card payment, and the card-issuing bank -

[26] Canada's Interac is one such network that does not charge interchange fees.

experience some costs and benefits from the use of the debit card in the transaction. Debit card transactions can conceivably offer total benefits that exceed total costs, but still result in one of the parties experiencing costs that exceed that party's benefits. Justifications for interchange fees include compensating any party who disproportionately bears the costs[27] of debit card transactions or serving as an incentive to expand the use of debit cards. In most debit card systems, interchange fees usually flow from merchant to issuer via the acquirer. However, Australia offers a unique counter-example, where issuers pay acquirers.[28]

For those networks that connect their participants via membership arrangements, there may also be membership fees. These are more closely associated with the promotion and marketing of the particular brand name that the network employs.

6. Authorisation, clearing and settlement

6.1 Authorisation

The key technical requirement for debit card systems to offer an improvement over pre-existing means of payment was the creation of a system of quick authorisation of payment.[29] Unlike paper-based debit systems, such as the cheque, electronic debit systems at the point of sale offer the merchant the potential advantage of verifying in real time that available funds in the cardholder's account are sufficient to make payment.[30] With that assurance, and the associated guarantee of payment from his financial institution, the merchant's risk of not receiving payment is virtually eliminated.[31] In this respect, debit cards offer the innovation of combining attributes of a credit instrument, ie immediate authorisation, with attributes of a debit instrument, ie acquirer initiation. The method for authorisation relies upon telephone communication and computer routing of card and account information between the merchant and the cardholder's bank in real time, much as is done for cash withdrawals at ATMs.

In all selected countries, authorisation is an essential precondition leading to the interbank transfer of funds. The importance of this step in the payments process is demonstrated by the complex infrastructures that exist in these countries for authorising transactions. These infrastructures exhibit varying levels of organisation, ranging from highly structured centralised networks in countries like Belgium and the Netherlands to more loosely configured arrangements found in Germany.

A purely online transaction takes place as follows.[32] At the point of sale, a customer swipes his or her card through a terminal and (in most systems) enters a PIN code. The transactional data, along with

---

[27] Costs may stem directly from processing transactions as well as indirectly from managing risk and providing customer support.

[28] This was also the case for Italy until 1995, when the Italian Bankers' Association promoted the creation of a new brand for payments by gradually changing the pricing structure of the network.

[29] Authorisation in this context refers to the approval of whether a transaction can proceed rather than an affirmation on the part of the payer that his/her account can be debited. In effect, responsibility for honouring the payment shifts to the authoriser. The payer demonstrates his/her willingness for the debiting of funds by signing a receipt or entering a PIN code and pressing the OK key.

[30] The real-time check of available funds is not, however, the only method used to grant authorisation. A network's rules may specify situations in which authorisation is granted offline, or without having to make a real-time balance check.

[31] Regarding the debit card procedures in Germany, different schemes are operated by the banking industry (POS system and POZ) and the merchants (electronic direct debiting). In contrast to the POS procedure, which is PIN-based, the card-issuing institutions do not guarantee payment in the other cases where cardholders give authorisation to debit their account through their signature at the point of sale. Hence the merchants assume the risk of non-payment.

[32] Online refers to the fact that merchants open a communications link with a switch that maintains open communications channels with its participating financial institutions.

information about the cardholder, including name, bank and account number, are transmitted to the bank (via the switch) holding the account on which the card draws.[33] The bank checks the transaction details to determine whether the cardholder has sufficient funds available or meets some other specified criteria.[34] If the cardholder has sufficient funds, the authorising entity approves the transaction. The authorisation is returned via the same informational infrastructure. With the authorisation in hand, the payment is initiated for clearing and settlement, and the POS purchase is considered complete. The process typically takes only a few seconds.

6.2 Clearing

When sponsored by a single bank, the clearing and settlement of debit card transactions is an in-house operation of debiting and crediting the accounts of the bank's depositors. With multibank organisations, clearing and settling the transactions becomes a key element of the arrangement organised by the interbank governing body.

Clearing of POS payments may be done by the same entity that performs authorisation, or it may involve a separate set of participants. Centralised network switches, for example, also function as clearing houses in many countries. This is true for most networks in the United States, the Visa network in the United Kingdom, and the national networks in Belgium and Switzerland. After authorisation is obtained, the relevant transactional information is resubmitted to the network switch. Operating as a clearing house, the network switch often batches these payments on a daily basis for determining the positions of its participating banks and merchants (or their acquiring banks).

Other systems do not have centralised clearing. In Australia and the Switch system in the United Kingdom, for example, each proprietary network separates "on-us" payments from "on-other" payments. Interbank transactions are then cleared on a bilateral basis. Bilateral net positions resulting from POS transactions in Australia are combined with other payment streams to form multilateral positions for all banking participants.

In Canada, France, Germany, Italy, Japan, the Netherlands and Sweden, debit card transactions are cleared using a separate infrastructure from the authorisation network. Again, the infrastructure may be a centralised clearing organisation or a set of bilateral arrangements.

National clearing organisations in France, Italy and the Netherlands determine the positions of participating banks, but do not engage in the authorisation process. The French and Dutch organisations clear other types of electronic payments as well, and so the resulting multilateral net positions encompass more than simply debit card transactions. The information regarding POS payments authorised through the CEKAB switch as well as the competing proprietary switches in Sweden are sent on to Visa, which processes these transactions to determine multilateral net positions.

In Germany the merchant is free to decide who should collect payment for purchases made and simply notifies the network operator of the bank to which payments registered in the operator's computer should be sent. The POS payments are submitted to the merchant's bank as direct debits and are cleared like any other electronic debit instrument through the privately run or central bank clearing facilities for retail payments, but are distinguishable from other non-card debits by a special tag.

---

[33] In reality there may be a number of participants in addition to the merchant, the switch and the card issuer. For example, in some systems, authorisation may not be done directly by the card issuer. Rather, the card issuer may have a contractual relationship with a separate entity to authorise transactions on the card issuer's behalf. In Germany, authorisation centres perform such a function for the various categories of German banks.

[34] An interesting exception to the standard procedure in some countries is a filling station transaction. Authorisation must be given before the amount of the transaction is known. Thus, the authorisation process involves transmitting a particular base value. When the service is complete the authorised total is replaced by the transaction total for clearing and settlement.

6.3 Settlement

There are three general methods for achieving settlement. The first involves the submission of participants' positions to a common bank that directly debits and credits accounts on its books, the second involves a central counterparty that debits and credits participants' accounts using a secondary payment instrument, and the third involves sending bilateral payments.

The most common method for settlement in the selected countries is through a settlement service offered by either the central bank or a private correspondent bank. In Australia, Canada, France, Italy, Japan, the Netherlands, Switzerland and Sweden banks make use of central bank settlement services for positions resulting from POS transactions. The Visa network in the United Kingdom makes use of a private bank's settlement services. Except for Switzerland, where positions are settled on a gross basis, settlement typically occurs by calculating multilateral net positions and then debiting and crediting accounts. POS payments in Germany are settled in the same mode as any other retail payment, and hence settlement can be completed at central bank facilities or by using private arrangements. POS payments in the Belgian network and in most networks in the United States are settled multilaterally, but not through an explicit settlement service. Rather, a central counterparty, typically the clearing house, credits and debits its participants. The clearing house, using a depository account, collects funds from participants who are in a debit position, and disburses funds to participants in a credit position. In Belgium and the United States the debiting and crediting is typically achieved via the ACH.

In the Switch system in the United Kingdom, members settle their positions on a bilateral basis by sending bilaterally netted payments through CHAPS. Although the accounts of the participating members will be altered on the basis of CHAPS activity on the books of the central bank, the Bank of England does not explicitly provide a settlement service comparable to those discussed above.

7. International arrangements

Though most of the systems outlined above are domestic in nature, international networks also exist which allow cardholders to access their deposit funds in countries other than the one in which their account is held. These networks are operated by the credit card companies, Visa, MasterCard and Europay, and often make use of existing network structures. International POS transactions are, however, small compared with credit card transactions.

The international POS networks often supplement existing domestic systems, most often through the use of co-branding. Domestic transactions are processed through the relevant domestic network and international transactions through the appropriate international network. Visa manages its international debit card programme under the "Electron" and "Visa" brands, while MasterCard and Europay jointly market "Maestro" debit cards worldwide.

Annex B

Developments in cheque processing

1. Introduction

Advances in technology have spurred innovation in cheque processing in a number of industrial countries. Traditionally, the clearing and settlement of cheques in many countries has depended on the physical movement of the original paper instrument from the bank of first deposit to the paying bank. This process can be inefficient, particularly when the paying bank determines that the cheque cannot be honoured (owing to fraud or insufficient funds) and returns it to the bank of first deposit. New procedures - such as electronic cheque presentment, cheque truncation and digital imaging - have reduced the reliance on physical presentment to effect settlement and the time necessary to collect or return cheques. In general, these procedures have improved the efficiency of cheque collection.

Section 2 of this appendix outlines the generic cheque collection process and describes innovations in the traditional procedure. Section 3 discusses current cheque collection methods in a number of major industrial countries, detailing recent innovations and ongoing changes. The section covers countries in which the cheque remains an important instrument for making retail payments (Australia, Canada, France, Italy, the United Kingdom and the United States), as well as countries in which the cheque is relatively unimportant but collection has benefited from the use of innovative procedures (Belgium and Germany).

2. Cheque collection

Although cheque collection can vary somewhat from country to country, there are common elements to the process that are useful to describe. A payee receiving a cheque from a payer, for example as payment for the sale of a good or service, will frequently deposit the cheque into an account at his bank, known as the bank of first deposit. This bank then forwards the cheque (either directly or through an intermediary collecting bank) to the bank that holds the payer's account, known as the paying bank. The paying bank typically has an opportunity to determine whether the cheque is valid (that is, that the signature is not forged or the cheque is not otherwise fraudulent) and that the account on which the cheque is drawn has a balance sufficient for payment.[35] If the paying bank determines that the cheque can be paid, or more typically a deadline for dishonouring a cheque expires, the paying bank pays (or is deemed to have paid) the cheque.

If the cheque is dishonoured, it typically becomes a return item and is returned unpaid by the paying bank to the bank of first deposit (directly, or backwards through the series of collecting banks that first handled the cheque). Typically cheques are physically returned to the bank of first deposit, although electronic return techniques may be used in some cases. If funds have been made available to a payee for the amount of a cheque deposited for collection and the cheque is dishonoured, the funds will be reclaimed by the bank.

Although the example above describes the process for the collection of an individual item, cheques generally are grouped together and submitted for collection in batches. A bank of first deposit may present a batch of cheques directly to the paying bank for payment; this practice is termed direct presentment. A bank of first deposit (or other collecting bank) may send a batch of cheques to a third

[35] If the balance is insufficient, an overdraft line of credit may be extended to pay the cheque.

party (a correspondent bank, or in some countries the central bank) for collection.[36] Furthermore, a bank of first deposit (or other collecting bank) may present a batch of cheques to the paying bank through a clearing house arrangement. One or more of these interbank collection techniques may be used in a particular country.

Interbank settlements for batches of cheques often take place on the day of presentment. At least two models of settlement finality exist. In one, interbank settlements for batches of cheques are considered provisional until the individual cheques are paid with finality. If a paying bank returns one or more cheques, the associated provisional settlements are adjusted accordingly before becoming final. In another model, interbank settlements for batches of cheques are final. If a paying bank returns cheques, the initial settlement is not disturbed; instead there is a separate interbank transaction for the returned cheques with its own settlement. Interbank settlements may be conducted on a gross or net basis, depending on the particular clearing and settlement arrangement and country.

In many countries, the terms and conditions for the acceptance and collection of cheques are stipulated in commercial law. For instance, laws in some countries traditionally require the movement of the cheque from the bank of first deposit to the paying bank, necessitating the physical transport of items for collection. In some countries, government regulations or industry agreements also supplement market practices in determining the timing with which funds are made available for withdrawal following the deposit of a cheque.

Cheque collection based on the electronic transmission of information is known as electronic cheque presentment (ECP). Electronic information typically includes a routing or identification number for the paying bank, the account number on which the cheque is drawn, and the serial number and amount of the cheque. Additional information may include signature or endorsement information, as well as information regarding intermediary banks. Different technologies are used in different countries to produce and transmit this electronic information.[37]

In some countries, laws have been changed to facilitate the use of ECP for cheque collection and return. In some others, where laws still generally require physical movements of cheques but allow commercial agreements to override certain statutory provisions, industry, clearing house or bilateral agreements have been used to support the greater use of electronic information in cheque collection, potentially including full legal presentment. In some cases, physical movements of cheques are required, but electronic information is captured and transmitted ahead of the physical movements in order to credit or debit accounts earlier and to manage the process of returning cheques more effectively.

Settlement for a cheque may take place on the basis of electronic information, but the physical movement of the paper cheque may still be required subsequently. In this case, ECP would not eliminate all costs associated with transporting cheques although it could reduce costs somewhat if slower, lower-cost transport methods can be employed. (Presumably efficiency could still be improved by reducing the time to settlement and hastening the availability of funds, even if transport costs cannot be eliminated entirely.) Alternatively, the physical movement of the cheque may be stopped at some location prior to the paying bank (for instance, the point of sale, the bank of first deposit, or a collection intermediary). If the physical movement is halted at some point in the process, the cheque is said to have been truncated. When electronic presentment is combined with truncation, collection costs are generally reduced.

---

[36] For direct presentment, a bank of first deposit would need to sort its cheques to extract those to be collected from a particular paying bank. A bank may or may not sort its cheques before forwarding them to a third party such as a correspondent bank for collection. Many of these third parties offer cheque sorting along with other services.

[37] Magnetic ink character recognition (MICR) and optical character recognition (OCR) technologies have been used for some time to facilitate high-speed cheque processing. Digital image technologies have recently been undergoing rapid development.

The physical movement of the cheque to the paying bank may still be necessary to inspect some information contained on the cheque. For example, although the paying bank can generally ascertain that there are insufficient funds in a customer's account on the basis of electronic information, it may be necessary to examine an item before declaring it fraudulent. Thus, even when electronic presentment is coupled with truncation, a paying bank may still want to inspect certain cheques before agreeing to make payment.

Steps have been taken in some countries to reduce the need for the physical movement of cheques. For example, banks may set value limits that determine whether physical presentment is necessary. Cheques below a certain value may be presented electronically, with physical movement of the cheque to the paying bank necessary only to verify that an item should be returned. In contrast, cheques above the value threshold must be physically presented to the paying bank. Value limits may be adopted in conjunction with a signature card, which may transfer from the paying bank to a payee (for example, a merchant) accepting a cheque the responsibility for verifying the signature on the cheque. Verification of the signature at the point of the transaction is intended to reduce the number of fraudulent items and limit the liability of the paying bank for low-value cheques. In some countries, a guarantee card (often a signature card combined with a preauthorised line of credit) ensures that the paying bank will pay cheques up to a certain value so long as there is no fraud.

In addition, digital imaging of cheques can be used to replace the physical movement of cheques. A digital image captures an electronic picture of the front and back of the cheque. In principle, such images could be used for presentment, inspection, return, storage and other steps in the cheque clearing process. Electronic images, however, may not provide exact copies of all aspects of a physical cheque, although both image technologies and banking practices are evolving rapidly. For example, certain endorsements on the back of a cheque may be captured imperfectly by an image. Fraudulent alterations of a cheque or physical tampering with the document may also be more difficult to detect than in the case where a physical examination of a cheque (ascertaining that the paper is of a certain quality and weight, for example) is possible. While creating the image is relatively simple and can be performed in conjunction with sorting and processing cheques, the transmission of images may be problematic. Image files are large and may be costly to transmit electronically at present; alternatives to transmitting images include loading data onto CDs or tapes, which can be delivered to the paying bank by non-electronic means. Looking forward, image technologies are expected to continue to improve and communications costs to fall, thus stimulating the use of such technologies more widely in cheque clearing and related banking operations in some countries. In addition, internet technologies may be linked to these changes, helping to broaden communication alternatives in various parts of the clearing process.

3. Country particulars

Although cheque collection procedures differ across the major industrial countries discussed in this appendix (Australia, Belgium, Canada, France, Germany, Italy, the United Kingdom and the United States), there are some common elements. For instance, at least some cheques are presented and collected electronically in all of the countries. In addition, electronic presentment is accompanied to a greater or lesser extent by truncation in Belgium, France, Germany, Italy, the United Kingdom and the United States. Value limits are employed in Belgium, France, Germany and Italy, which in general require manual procedures for the collection of high-value cheques. In Australia and Italy, new procedures have been implemented in large part to hasten the availability of funds to depositors. In Australia and the United Kingdom, changes to the cheque collection procedure were supported by amendments to existing commercial law.

In Australia, the Cheques and Payment Orders Act was amended in 1986 to permit electronic cheque presentment and truncation of the paper cheque at the bank of first deposit. To date, truncation has not been put into practice but electronic presentment and dishonour were implemented at the end of April 1999, shortening the cheque collection cycle (from at least four business days under the old procedure

to two to three business days). Before the new procedures, electronic cheque presentment was common but was done under bilateral arrangements and there was no provision for dishonouring a cheque based on electronic information. Under the new procedures, information on the accounts and the values of the cheques are sent electronically to all paying banks under standardised rules. The paying banks may decide to pay or dishonour items on the basis of the electronic details; alternatively, they may request to delay some decisions until the arrival of the paper cheque, typically a day later. There are no value limits on the items eligible for this process but individual banks may set limits above which the paper cheque is always obtained before deciding whether to pay.

In Belgium, the first country to implement cheque truncation in the mid-1970s, truncation is mandatory for low-value items,[38] with information converted to electronic format and processed through the Centre for Exchange and Clearing (CEC), the country's ACH. Cheques are truncated at the collecting bank and copied onto microfilm; the paper item is destroyed at the end of six months. In the event of a dispute, the physical cheque (or after six months a microfilm copy) is returned to the paying bank. High-value cheques are subject to manual procedures.

In Canada, the Bills of Exchange Act and the Canadian Payments Association Act of 1980 prevent truncation and require physical presentment to the paying bank. In the case of an "on-us" item where the collecting and paying banks are branches of the same financial institution, a cheque may be truncated and held at a location other than the paying branch. For all other cheques, paper presentment is required. Electronic presentment procedures are used to effect provisional settlement, with final settlement based on the paper items. Digital imaging is employed within financial institutions for storage purposes.

In France, truncated cheques have been exchanged through nine regional truncation exchange centres (so-called CREIC) operated by the central bank since the early 1980s. Banks using the CREIC truncate low-value cheques at the presenting institution (the bank of first deposit or its collection intermediary) and employ electronic methods for presentment. Although a large percentage of cheques written are below the value limit,[39] the number of truncated cheques is limited. It is primarily local banks that participate in the CREIC. Banks have recently decided to generalise the use of truncated cheques. By 2002, all cheques will be truncated and exchanged through the SIT (French ACH). The use of electronic cheque presentment in France has meant a shift in processing costs from the paying bank to the payee bank. Physical exchange rules require that the payee bank sort the cheques and then send them via a clearing house to the paying bank, which must process the cheques by the MICR line and archive them. Truncated cheques must be read and processed according to MICR line by the collecting bank, which must also archive the paper cheques.

In Germany, although law requires cheques to be presented physically to the paying bank for collection, the truncation of low-value cheques was established in 1985 in order to foster the automation of payments. The paperless procedure for cheque collection is based on an agreement between the banking industry and the central bank. The initial value limit of DEM 1,000 has been increased over the years, and since April 1993 has been DEM 5,000, or roughly EUR 2,556 (BSE procedure). With the implementation of the "Agreement on cheque collection" in September 1998, the truncation of low-value cheques has become mandatory. Truncation had previously been voluntary. According to the agreement, the first bank involved converts the submitted cheques on the basis of the information contained in the code lines, microfilms the original cheques and collects - possibly using the clearing and settlement facilities of the Bundesbank - the value in paperless form. Another procedure (GSE procedure) is in place for cheques with an amount of DEM 5,000 and above. In this case, only the Bundesbank converts high-value items into electronic data records and collects the value electronically. In the GSE procedure the Bundesbank additionally submits the original cheques to the paying bank by using, for example, courier services between its EDP centres and Bundesbank

---

[38] Items under EUR 10,000.

[39] FRF 5,000, or about EUR 762.

branches where paying banks hold their accounts or have designated such cheques to be delivered. Since September 1998 the GSE collection procedure has been enhanced and now includes any collection items that do not fulfil the requirements of the BSE agreement (for example, cheques with errors).

Truncation was implemented in Italy in 1990 for non-local cheques of low value, and since then has been extended to cover local items as well.[40] Low-value cheques are held at the bank of first deposit; presentment is made electronically. Large-value cheques are exchanged in clearing houses operated by the central bank and held by the paying bank. The move to truncation and electronic presentment for low-value items was motivated by lengthy collection times, particularly for non-local cheques. Italian law strongly discourages fraud, imposing strict penalties to prevent the writing of fraudulent or irregular cheques. As of the beginning of 2000, the legal framework of penalties has been revised. Law no 507/99 introduced a cheque-writing ban, applied to all the bank accounts of the person concerned, and entrusted the Bank of Italy with the responsibility of creating a national register containing information on persons subject to the bank-imposed cheque-writing ban as well as data on lost and stolen cheques.

In the United Kingdom, changes to the Bills of Exchange Act were enacted in 1996 to permit presentment to the paying bank at a location other than the paying branch and to allow electronic presentment. Currently, cheques are generally truncated at a central point of the paying bank and electronic methods are used for presentment. Digital imaging of cheques is employed typically only for internal processing and storage.

In the United States, the Uniform Commercial Code provides the major framework of state law governing the use and collection of cheques. The Expedited Funds Availability Act is the key federal statute governing the availability of funds and the expeditious collection and return of cheques. The Federal Reserve Board's Regulation CC implements this statute. In general US laws require the physical presentment of a cheque to the paying bank.[41] By prior agreement, cheques can be presented electronically, and truncation can be employed at some point in the collection process. To date, much of the innovation in cheque processing has been pioneered by the central bank, which collects about 25% of cheques. Approximately 20% of the cheques collected by the central bank employ electronic presentment. Banks may choose from ECP in conjunction with the delivery of the paper cheque, ECP with truncation of the paper cheque at the local central bank office (with the paper cheque following for return items), or the latter service combined with an image archive of the cheque. Recent banking industry initiatives have also sought to increase the number of cheques that are truncated and presented electronically. As a first step towards greater use of electronic technologies, such initiatives typically emphasise the transmission of electronic information to the paying bank the night before the legal presentment of paper cheques and interbank settlement. It is hoped that such arrangements will ultimately stimulate interest in the truncation and full electronic presentment of large numbers of cheques. Additional pilot projects are also under way: (1) to truncate the cheque at the point of sale and convert the payment into an ACH transaction; (2) to truncate the cheque at a remittance processing location (so-called lockboxes) and convert the payment to an ACH transaction; and (3) to combine electronic presentment with the use of digital cheque images for return items. Although practices are changing, it is still customary at many banks to return cancelled cheques to the cheque writer.

[40] Low value is defined as up to ITL 5 million (just over EUR 2,582) for bank cheques and ITL 20 million (just over EUR 10,329) for banker's drafts.

[41] In at least two states, state laws require the return of the cheque to the cheque writer.

Annex C

Government payments

1. Introduction

In retail payment systems, the government is usually an important counterparty to individuals or corporations. Government payments such as tax payments, social security transfers and salary payments to public servants often constitute an important part of retail payments.[42] While in many countries the majority of government-related retail payments are processed, cleared and settled using ordinary retail payment instruments and infrastructure, there are certain specific features that warrant analysis. This Annex briefly describes the characteristics of the process of government payments and the role of the central bank in connection with retail payment systems in the G10 countries and Australia.

2. Process of government payments

Arrangements for government payments differ significantly between the selected countries and also sometimes appear to be complex even within each country. One major reason for this may be that in most countries the payments even for one specific category of transactions can generally be made through multiple payment instruments and channels. Another reason may be related to differences across countries in prevailing retail payment instruments as well as institutional settings surrounding the government payment activities.

Broadly speaking, government payments can be characterised as the transfer of funds between the public (individuals or corporations) and the government. Despite cross-country differences in arrangements for government payments, the process of government payments typically involves the following three subprocesses:

- a subprocess between individuals/corporations and their financial intermediaries;
- a subprocess between financial intermediaries and the central bank; and
- a subprocess between the central bank and the government.

The first subprocess corresponds to access or delivery channels for individuals or corporations to make payments to or to receive payments from the government. In most of the selected countries, the major access or delivery channels are those utilising financial intermediaries, which can be either (i) commercial banks (payments via the banking circuit) or (ii) the post office (payments via the postal circuit). Payments in this process can be face-to-face or remote, cash or non-cash, and paper-based or electronic.

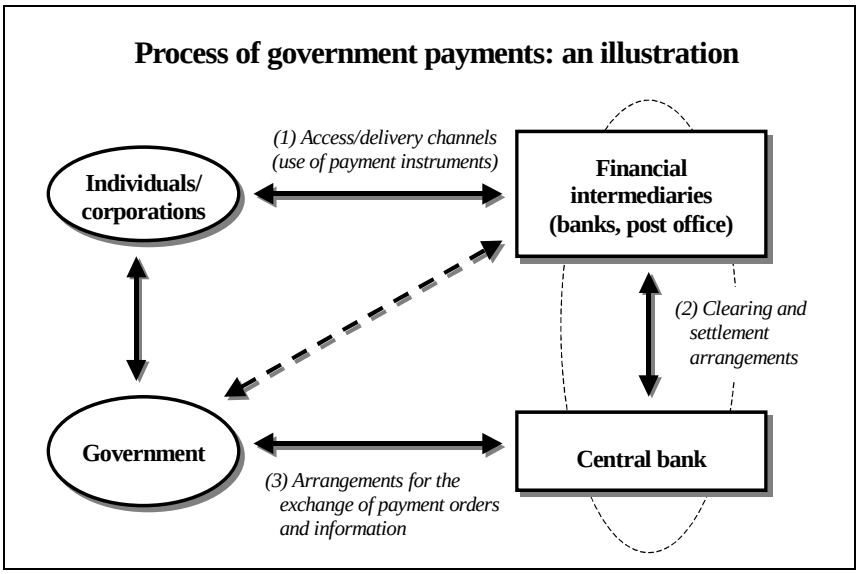
The second and third subprocesses are associated with infrastructure arrangements for the transfer of funds between the government and financial intermediaries. More specifically, the former involves interbank clearing and settlement arrangements, whereas the latter concerns arrangements for the exchange of payment orders and information between the government and the central bank. These arrangements may be paper-based or use electronic networks.

---

[42] The term "government" is generically used here to represent any relevant government or treasury agencies. Government payments can also be large-value: for example, those related to investment activities of the government.

Not all government payments necessarily follow these three subprocesses. For example, there may be cases in which the government issues payment orders to financial intermediaries without any involvement of the central bank. In some countries, payments via the postal circuit may occur in such a way.

Furthermore, there are mechanisms for exchanging the underlying information on the details of the transaction, the payer and the payee. Such information may be exchanged directly between the government and the public by mail or via different infrastructure arrangements than those related to funds transfers, or may be exchanged electronically through a funds transfer arrangement.



3. Access or delivery channels and payment instruments

In many cases, payments via the banking circuit take the form of non-cash payments whereby individuals or corporations receive payments from the government and make payments to the government from their deposit accounts with financial institutions.[43] In some countries such as Belgium and Japan, cash inpayments at financial institutions are also widely used to make payments to the government.

In most countries where the post office plays a role as a financial intermediary, it provides access or delivery channels to government payments. Payments via the post office often involve cash inpayments or encashment of cheques or special payment instruments issued by the government. The extent to which the postal channel is important varies from country to country. In the majority of countries, it is considered a complementary channel to the banking channel: it serves primarily for individuals who do not have a bank account. In some countries, postal payment instruments are also preferred for cross-border payments such as pensions because their use is less costly than other means. On the other hand, in Switzerland, reflecting the fact that the post office (Postfinance) is the biggest financial intermediary, it treats a significant portion of government payments.

The table below summarises the information on payment instruments used in the selected countries. It shows that the primary instruments are significantly different across countries. Among paper-based instruments, cheques are used in many countries. As for electronic instruments, credit transfers and

[43] In some countries, only designated financial institutions handle government payments. In Belgium, the payment of pensions via the banking circuit is made only through one specific private bank.

direct debits are popular for inpayments to the government, whereas the use of credit transfers is dominant for outpayment from the government in many countries. In some countries (Australia, France, Italy, the United States), payers are obliged by law to use direct funds transfers when they make payments above a certain amount.[44]

Major payment instruments and infrastructure arrangements in the selected countries

Country	Payment instruments for inpayment to the government	Payment instruments for outpayment from the government	Clearing and settlement arrangements (operators: CB = central bank, P = private sector entity)
Australia	Cheques, credit transfers	Cheques, credit transfers	APCS (P)[1] BECS (P)[1] [RTGS (CB)][2]
Belgium	Credit transfers, cash payments	Credit transfer, postal drafts, cash payments	CEC (P)[3] [ELLIPS (P)][2, 3]
Canada	Cheques, credit transfers	Cheques, credit transfers	ACSS (P)[1] LVTS (P)[1]
France	Direct debits, cheques, credit transfers	Credit transfers	SIT (P)[1] Cheque Clearing House (CB) [TBF (CB)][2]
Germany	Direct debits, credit transfers, cheques	Credit transfers, cheques	EMZ (CB) [ELS (CB)][2] Arrangements of banks (P)
Italy	Cash payments, cheques, payment orders	Credit transfers	BI-REL (CB) Bank of Italy ACH (CB)
Japan	Cash payments, direct debits	Credit transfers, cheques	Bank of Japan systems and procedure (CB) Zengin system (P)
Netherlands	Cash payments, credit transfers, direct debits, "acceptgiro"[4]	Credit transfers	NBC (P) TOP (CB)
Sweden	Credit transfers	Credit transfers	Bank Giro Centre (P) Postal Giro (P) RIX (CB)
Switzerland	Credit transfers	Credit transfers	Postal system SIC (P)
United Kingdom	Cheques, credit transfers, direct debit	Credit transfers, payable orders	BACS (P)[1] C&CCC (P)[1] [CHAPS (CB&P)][1, 2]
United States	Cheques, direct debit, credit transfers	Credit transfers, cheques	Federal Reserve ACH (CB) [Fedwire (CB)][2]

[1] The central bank involves itself in the system's governance by participation in the board of directors. [2] [ ] = for urgent payments. [3] Operations entrusted to the central bank. [4] Inpayment product which allows banks to pay in cash or use credit transfers.

[44] In France, this is the case for specific taxes.

4. Infrastructure arrangements and the role of central banks

Payments via the banking circuit as well as the postal circuit require mechanisms for the transfer of funds between the government and financial intermediaries. Interbank retail clearing and settlement arrangements typically serve as such an infrastructure, in particular for payment channels via the banking circuit. In some countries, RTGS or large-value systems are also used for urgent payments. A few countries have infrastructure arrangements specially designated for the clearing and settlement of government payments.[45]

To different degrees, the central bank is involved in infrastructure arrangements for the transfer of funds between the government and financial intermediaries. First, as the central bank generally maintains the account (or at least a consolidated account) of the government and also holds the accounts of financial institutions, it may function as a settlement bank across the books of which transfers between the government and financial institutions occur in order to achieve settlement.[46]

Although this feature is observed in all selected countries, the extent to which the central bank provides depository and settlement services for the government varies. In Belgium, France, Italy, Japan and the United States, the central bank, as the government's bank, executes all or most of the financial operations on behalf of the government. On the other hand, in Australia, France, Germany, Netherlands, Sweden, Switzerland and the United Kingdom, the role of the central bank is limited primarily to the maintenance and management of the government's account, because the government has its own agency (eg a treasury office or department) that conducts financial operations. Furthermore, in the Netherlands, the government's financial operations, which were traditionally conducted by the central bank, have been shifted to commercial banks. This is also increasingly the case in Australia, where the banking business of many state governments has moved to commercial banks and that of federal government agencies is now subject to commercial tender.

Second, the central bank may transmit payment orders on behalf of the government through interbank retail clearing systems so that the funds can be credited or debited to the accounts of individuals or corporations at financial institutions. This is not least because the government typically has only indirect access to interbank clearing systems. Moreover, some central banks (Federal Reserve, Bundesbank) conduct these activities through their own systems.[47]

Arrangements for the government to transmit payment orders and to exchange the information with the central bank have in many cases utilised paper-based procedures and magnetic tapes. In several countries (Australia, France, Italy and Sweden), however, electronic online or file transfer-based communication links are used. In Canada and France, infrastructure arrangements were recently introduced by which the government can submit payment orders for large-value or urgent transfers to

---

[45] In Japan, the process of funds transfers between the government and financial institutions is based on the Bank of Japan's internal procedures and systems primarily relying on the exchange of paper documents between the Bank, the government and financial institutions. Many financial institutions have contracts with the Bank of Japan to be the Bank's agency to treat government payments. Information on a very small portion of outpayments is routed through the Zengin system (retail clearing system).

[46] In Australia, Belgium, Canada, Germany, Italy, Japan, Switzerland and the United States, the central bank also functions as the fiscal agent that provides debt-related services such as issuing, servicing and redeeming government securities. In Belgium and the United Kingdom, many of the government departments currently hold at least some of their accounts with commercial banks. In countries such as Canada and the United States, special deposit accounts of the government are held at financial institutions in which payments to the government are accumulated overnight and are subsequently transferred to the government account at the central bank. In Germany, government agencies have also accounts with banks beyond the central bank for the purpose of depositing liquid funds and effecting payments.

[47] The Bundesbank also offers the government a special service for recurring cross-border retail payments such as pensions and benefit transfers.

the central bank electronically.[48] In the United Kingdom, a similar arrangement has existed for some time. In Germany, the electronic transmission of payment orders and exchange of information has been initiated; however, this process is still in its early stages. In Italy, the central bank and the government are cooperating to create an integrated electronic network for government payments on the basis of the linkage of a communications network among the government agencies with an interbank network.

5. Evolution of government payments

Traditionally, the use of paper-based procedures has been dominant in the process of government payments. In some countries such as Japan, legislation still requires the use of paper for issuing instructions related to government payments and this has been detrimental to the use of online electronic systems.

In many countries, however, there is a clear tendency towards migration from paper-based systems to automated or electronic systems in all three subprocesses of government payments. In particular, there have been a number of developments in end user markets to introduce electronic payment instruments and electronic access/delivery channels. In the United States, for example, EFTPS started operation in the mid-1990s. This enables taxpayers to send payment instructions electronically via personal computers to designated financial institutions for routing directly into the ACH. In other countries tax payments do not follow any specific procedure. Payers can submit their tax payments like any other payment to their bank electronically, if they have electronic access to their account via personal computer. Credit card payments has recently begun or has increased in Australia, Canada and France.[49] Emerging payment instruments such as electronic money and internet-based payment mechanisms have been researched or are being tested in pilot schemes. In Australia, the government has been carrying forward e-procurement projects to conduct most purchase-related simple procurement transactions by electronic means by the end of 2001. In Canada, for example, the Canadian Payments Association has recently undertaken an initiative to develop a public key infrastructure to provide access to secure and efficient payments via the internet. A pilot project for direct payments via the internet is expected to be under way by the end of this year**.**

Governments as well as central banks have taken initiatives to adopt electronic payment instruments and infrastructure arrangements to promote efficiency in government payments. Such initiatives are sometimes supported by legislation requiring the adoption of electronic payment methods.[50]

As government payments constitute an important part of retail payments, the evolution of government payment processes can have significant implications for retail payment instruments and systems. In particular, initiatives by the government to introduce electronic procedures or emerging payment instruments for government payments would create an incentive for shifting to electronic retail payment mechanisms for both end user markets and clearing and settlement arrangements.

---

[48] In Canada, an electronic facility was recently implemented to enable the government to issue LVTS payment instructions for very large government payments, which are sent directly to the payees at their financial institutions. In France, the central bank in 1998 started to operate a telecommunications network named TELBDF which enables it to transmit account-related information to the treasury and also enables the treasury to transmit large-value, urgent transfer orders to the central bank electronically. In Australia, large-value outpayments have been made electronically for many years. With the advent of RTGS, the system can now handle large-value inpayments as well.

[49] In Australia, the government accepts credit cards for low-value inpayments for a number of services at both commonwealth and state government levels. Such use has been increasing in recent years. For outpayments, governments have used credit cards for a number of years for low-value procurement purchases. In France, credit card payments are used for inpayments.

[50] In the United States, a series of laws to oblige or promote the use of electronic payment mechanisms have become effective since the mid-1980s.

Annex D

Electronic bill presentment and payment

1. Introduction

Progress in technology and rapid growth in internet access as well as electronic commerce have spurred different retail payment system innovations. EBPP (electronic bill presentment and payment) is the latest innovation and might become the most influential development in the retail payment market.

Section 2 of this Annex attempts to define EBPP briefly. The next section focuses on payment instruments and participants of an EBPP system. Section 4 outlines two general classifications. In Section 5 security and authorisation issues are discussed. Clearing and settlement are the subject of Section 6, while the last section rounds off the picture on EBPP by taking a look at its potential.

2. Definition

EBPP integrates electronically the presentment and payment of bills. Therefore, EBPP is not a new payment instrument, rather a new concept that integrates different payment instruments and facilitates billing and paying. It allows the biller to present its customer with a bill electronically rather than on paper. The payer can then use the same platform to pay the bill electronically. By far the most important feature of EBPP is that, depending on the model chosen, it has the ability to connect authorisation, clearing and settlement processes electronically.[51] However, the potential of EBPP does not only lie in the payment process itself.

For the customer or payer the EBPP tool is basically an internet-based software package which conveniently allows payment of different kinds of bills along similar lines to existing home banking applications. Moreover, other applications such as account or cash management software may be incorporated or connected to the EBPP software. However, since home banking applications cover only the customer-bank leg, hence requiring paper-based billing, more steps are needed to obtain the final settlement of transactions. Therefore, EBPP applications offer cost savings for the billers by avoiding the need to process and send paper-based bills and also add to customer convenience by allowing electronic handling and storage of the bills. Furthermore, the payer may also be able to present bills, which is an especially convenient feature for small businesses. For the payees the EBPP tool is a sophisticated package which can be used as an internet software application or as an integrated communication software package working on the basis of eg EDI (electronic data interchange) standards. It may be connected to other business-related software packages (eg delivery and accounting packages).

[51] It is also possible to have a separated application for payment and electronic bill presentment, the simplest for the latter being standard electronic mail. If no linkages exist between these applications, the customer has to transfer the information needed to the payment application. This model will not be addressed further.

3. Payment instruments and participants

In principle, EBPP systems allow any electronic payment application to be included in the EBPP application. They are especially convenient as a replacement for paper-based giro payments or cheque payments by electronic credit transfers. Instead of using an existing data media exchange facility, recurring credit transfers can also be initiated via EBPP. On the debit payment instrument side, EBPP can also be used for direct debit transactions. Furthermore, other instruments, such as electronic money as well as credit card applications, may be included in the EBPP application. A further potential instrument of an EBPP system might be a real-time online credit transfer instrument, so to speak a substitute for a debit card on the internet.

As an additional service, EBPP operators might offer paper-based bill presentment. This would allow an EBPP provider to supply a full bill presentment solution to billers dealing with customers that are not connected to the web.

The consolidator is the operator of the EBPP network. Its main function consists of the processing of transaction data during the transaction process. However, an EBPP system may take over more functions than just information processing, for example an extended account management tool for private and business applications or extended interoperability between the different systems. Additionally, the EBPP system may offer clearing and settlement services. Some or all participants are connected to the EBPP network via the consolidator.

Users fall into two categories - billers (or payees) and payers (or customers) - with substantial overlap. Billers include all kinds of commercial companies and public entities, while payers include consumers as well as commercial companies and public entities. Banks participate primarily as account providers, but also as users.

4. Models

Based on the existing EBPP systems two generic models can be defined: the direct or non-consolidation model and the consolidation model. The latter can be categorised in two ways, firstly according to how the customer accesses the bill, and secondly according to the clearing and settlement functions of the consolidator.

In the direct model a biller provides its customers with its own electronic billing and payment application, offering them a single access site for viewing billing information and effecting bill payments electronically. Depending on the payment instrument used, the bill payment information is forwarded via the biller or directly to the biller's or payer's financial institution or credit card company for execution.

The consolidation models are further differentiated by whether or not a direct link between biller and customer exists. In a customer consolidation model the electronic bill is delivered directly to the customer. The biller maintains control of bill details until delivery to the customer. Then customers are able to control and store the bills and to integrate this work into their offline programs and processes. Customers initiate the payment through their consolidator.

In contrast, the service provider consolidation models establish no direct link between biller and customer. The consolidator collects bills from several billers and provides them to the payers.[52] The customer has a single access site for viewing billing information and effecting bill payments electronically, whereas the biller forwards its billing information to one or more service providers that accumulate electronic bills from a variety of billers. Two variations of the service provider consolidation model exist: the thick consolidation model and the thin consolidation model. In the

[52] One provider in the United States takes paper bills (sent to the provider rather than the customer by agreement) and turns them into an electronic format. Customers pay over the internet and the provider writes a cheque to the biller.

former the consolidator hosts a summary and the details of all bills whereas in the latter the consolidator allows the biller to provide its own information about the bill via links to his website. While thick consolidation models are sometimes referred to as aggregators, thin consolidation models are associated with a portal.

A further line of differentiation may be drawn with respect to consolidation models. The EBPP provider may be a bank or may be closely connected to a single bank that exclusively provides accounts for billers and payers. In this way, the provider on his own or together with a single bank acts as consolidator, clearing house and settlement agent. One may call this the closed consolidation model. If the consolidator allows accounts with other banks, one can speak of an open consolidation model. Two variations of the open consolidation model exist. In the first one, the consolidator works closely together with a bank or is a bank itself, and also collects and distributes funds. In that way, the consolidator acts as clearing and settlement agent. One may call this the centralised open consolidation model. In the second model the consolidator merely performs the role of data processor. The consolidator is closely related to an ACH and the banks, which initiate interbank settlements. Here, the consolidator may perform clearing functions. However, the settlement of obligations is performed in an interbank settlement system. Whereas in the first model the flow of funds is centralised, in the second it is decentralised; hence the second is called a decentralised open consolidation model.

5. Security and authorisation

At least for a card-based transaction process, authorisation means the approval or guarantee of funds to be transferred. Although authorisation in EBPP systems does exist, it differs crucially from the authorisation process of card instruments. Another important aspect of authorisation is security, which is much more of a concern in EBPP systems as they are based on open networks.

EBPP systems rely on different technologies to ensure the system's security (eg SSL 128 bit, digital signature). Security architectures cover the following aspects: authenticity of communication partners and data source, integrity of transmitted data, confidentiality, indisputable source verification for recipient and access controls. Many security requirements may apply in connection with the authorisation process.

In order to guarantee that no participant or other unauthorised parties can carry out transactions or transmit messages using a false identity, some EBPP systems install various authorisation processes. As an example, authorisation on the basis of asymmetric encryption technology could be sequenced in the following way: first, the system checks whether or not the message (presentment and payment message) has a valid digital signature. Second, it checks whether the owner of the key is authorised to sign a message on behalf of the issuer of the message, and third, whether or not the action to be performed is authorised. The owner of the key is then specified as the party responsible for the message and the required action is processed. The system also confirms receipt by the recipient to the sender after the receipt of data or the completion of data is checked. The user can be offered different services according to his contractual role as a biller, customer, financial institution or operator. Participants' possibilities may be limited according to their status and thus authorisation for some actions may not be possible.

Authorisation in a narrower sense, ie the approval of funds transfer or guarantee of funds, is an essential precondition leading to the interbank transfer of funds. On the one hand, the customer has to authorise the payment via a special authorisation agency, or this is done by authorisation limits to different participants. The customer can simply authorise the payment by executing it, so to speak, by pressing the OK key. On the other hand, the customer's financial institution has to authorise the transfer of funds on the basis of funds available in the customer's account if the transfer is settled via an account-based payment instrument. If the customer uses a credit card no check of funds takes place, but rather a regular credit card authorisation. Where an account-based payment instrument is used, authorisation by the financial institution is not given via a special authorisation agency. In the case of EBPP the authorisation check is made by the account provider of the customer itself: there is no

authorisation by a special agency on the basis of security measures such as limits. Therefore, authorisation is reduced to checking whether or not the customer has enough funds available. The EBPP system takes care of the other steps described above (authenticity, etc). However, if insufficient funds are available, the bank rejects the payment and the customer will receive a notification.

A real-time online credit transfer instrument might also be created for EBPP systems. Authorisation for these online transactions should be given immediately. Therefore, financial institutions must be able to confirm or reject the initiation of the payment in real time. This is equivalent to the authorisation or refusal of the payment, and procedures similar to the existing ones could be used for these transfers. Authorisation by the consolidator on the basis of daily and monthly limits and regular fund checks could be a way to circumvent time-consuming online authorisation processes. However, the rapid development of communications technology may make this approach unnecessary.

6. Clearing and settlement

Clearing and settlement may be executed by conventional means as well as by new arrangements. Currently, no EBPP system offers an explicit EBPP clearing service. As some systems use direct debit or credit card payments in order to settle transactions, the clearing methods for the respective payment instrument apply. EBPP providers often aggregate customer payments to a single biller. However, in some EBPP systems no clearing is performed at all, implying that payments are settled on a gross basis. When interbank settlement is needed, it is normally done through existing payment systems. However, in-house clearing and settlement is used in most existing EBPP systems. Furthermore, banks may initiate their customers' payments, or, as an alternative, the consolidator or a related ACH may initiate execution with the consent of the payer. If there is more than one EBPP provider interoperability issues arise. With regard to the various models, however, there are important differences to be mentioned.

The direct model does not allow for an electronic straight-through processing as banks are not connected. Financial institutions have to initiate the payment by means of a data media exchange facility or another unconnected payment instrument such as direct debit or credit card payment.

In the service provider consolidation model all payment processes can be connected electronically. Through customer initiation the consolidator may be permitted to hand in payment instructions directly to the ACH, which in turn forwards payment instructions to the payment system and related information to the financial institutions. The customer consolidation model also allows for electronic straight-through processing. The consolidator executes payments in cooperation with the customers' financial institutions or an ACH. However, the details of the clearing and settlement arrangements may widely vary depending on the model. The mentioned traditional payment instruments are used as well.

Furthermore, EBPP may also allow for new ways of clearing. In a centralised open consolidation model some clearing is performed outside the banking or usual ACH industry. Taking the example of a direct debit in the context of a centralised open consolidation model, the consolidator debits the payers and deposits the amount on its account. Later on the consolidator credits the payee with the aggregated amount of all payers. The same option would also exist for credit transfers. So far, however, direct debit clearing has been performed on the basis of a bilateral or multilateral consolidation by means of netting or calculating aggregated gross amounts. However, here too other ways of clearing and settlement may be possible, eg a credit card payment.

Furthermore, as clearing and settlement preferences may vary from customer to customer and payment to payment, there might be no single way of performing clearing and settlement. Instead, customers may choose among several options for each payment.

As clearing and settlement are mostly performed by conventional means, settlement risks remain the same as with more traditional electronic payments involving interbank transfer. However, where new ways of clearing and settlement evolve, settlement risks can be addressed by standard concepts as well.

7. Conclusions

Around the world work is being undertaken on EBPP systems.[53] Cost reduction endeavours have spurred the innovation of EBPP. Most existing systems are going through their pilot phase or have started up recently. Whether eventually a single model will evolve or whether different models will coexist is not yet clear. Furthermore, the design of an EBPP system is by its very nature open to innovations. Therefore, new models may evolve over time. Although EBPP does not offer a new payment instrument its success may heavily influence the retail payment market. All in all, EBPP systems have the potential to crucially increase the efficiency of the retail payment system and its related business processes.

[53] In Australia, there is currently one EBPP scheme operating. E-Bill, partly owned by Hermes Prisidia (a large paper bill issuer in Australia) launched a service provider consolidator project in April 2000. Australia Post (a large agent for bill payment) and BPAY (a bank-owned bill payment system) are currently working on extending their services to EBPP. Two EBPP pilots have emerged in Canada. e-route was established by a consortium of banks and credit unions and the Electronic Post Office Box is a partnership between Canada Post and Bank of Montreal and the Canadian bank's IT subsidiary Cebra. Japan knows of one initiative to develop an EBPP system by a consortium of city banks, telecommunications companies and public utilities. In the United States several EBPP systems have emerged, eg CheckFree and Spectrum. CheckFree is a merger of the former CheckFree and TransPoint, which was a joint venture of First Data Systems, Microsoft and Citibank. Spectrum is a joint venture of several banks. Currently there are two EBPP systems in Sweden: e-faktura and e-giro, each jointly developed by two of the four largest banks in the deposit market. In Switzerland one system has emerged, PayNet, an EBPP system run by Telekurs Holding.