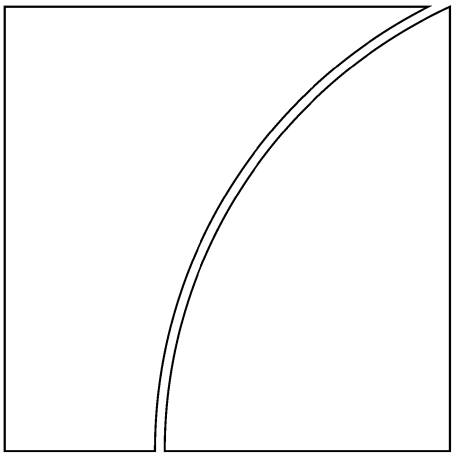
Committee on Payment and Settlement Systems



Innovations in retail payments

Report of the Working Group on Innovations in Retail Payments

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Foreword

Over the past decade, a number of innovative developments in retail payments have emerged. Many central banks take an interest in retail payments as part of their role in maintaining the stability and efficiency of the financial system and preserving confidence in their currencies. Although most retail payment systems are not considered systemically important, their potential weaknesses with regard to security and reliability could nonetheless affect the financial system and the economy. Innovations in retail payments can therefore raise policy issues for central banks.

In June 2010, the Committee on Payment and Settlement Systems (CPSS) set up a working group to investigate developments in retail payments, focusing especially on innovations. This report, produced by that group, first provides an overview of innovative retail payment activities in the CPSS and other selected countries from a fact-finding exercise, which attempted to cover influential developments in retail payment instruments and schemes over the past decade. Based on the trends observed and the economics of retail payments, the report identifies a number of exogenous and endogenous factors that could serve as drivers for retail payment innovations or as barriers to them. The analysis was also used to suggest some pointers as to what can be expected over the next five years. Finally, the report identifies a number of issues for central banks concerning their various responsibilities and tasks as catalysts, overseers and/or operators of payment systems.

The CPSS is very grateful to the members of the working group and its chair, Dirk Schrade (Deutsche Bundesbank), for their excellent work in preparing this report.

Paul Tucker, Chairman
Committee on Payment and Settlement Systems

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Executive summary

Over the past decade, many innovations in retail payments have emerged. These may affect the retail payment market – for example, by influencing users in their choice of payment instruments and by significantly reshaping the payment processes. Innovations can potentially cut processing costs and increase social welfare. For central banks, however, they also raise policy issues, as they have implications for the soundness and effectiveness of the retail payment system.

To gain an overview of innovative retail payment activities in the CPSS and several other countries, a fact-finding exercise was conducted that attempted to cover influential developments in retail payment instruments and schemes over the past decade. In all, some 122 innovations were reported by 30 central banks. The fact-finding did not aim for a comprehensive coverage of all retail payment innovations in the respective countries, but rather for a good overview that can serve as a basis for assessing the current status of retail payment innovations.

The report identifies five product categories: (i) innovation in the use of card payments; (ii) internet payments; (iii) mobile payments; (iv) electronic bill presentment and payments; and (v) improvements in infrastructure and security.

The retail payment trends identified from the fact-finding can be summarised as follows:

- In view of the considerable number of new developments, the market is dynamic. However, only a few innovations have so far had a significant effect on the market.
- Most innovations are developed for the domestic market, and only a few have international reach, although similar products and categories have emerged worldwide.
- There is an increased focus on speeding up payment processing, either through faster settlement or through faster payment initiation.
- Financial inclusion has served as an important driving force for innovations in many countries, either under a government mandate or because of the new business opportunities opened up by an untapped market.
- The role of non-banks in retail payments has increased significantly, owing in part to the growing use of innovative technology that allows non-banks to compete in areas not yet dominated by banks.

Based on the trends identified and the economics of retail payments – notably the concepts of economies of scale and scope, network effects and two-sided markets – the report identifies a number of exogenous and endogenous factors that could serve as drivers for retail payment innovations or as barriers to them.

The key exogenous factors are technological developments, user behaviour and regulation. User demand is probably the most important driver for innovation, since it is the basis for a valid business case, either through the utilisation of potential revenues or through the realisation of economies of scale and scope in producing the services. The regulatory framework is also an important influence on innovation in retail payments. For example, as payment markets tend to be oligopolistic, many regulators have sought to foster competition in the payments market as a whole by easing the requirements for suppliers of payment services.

The main endogenous factors are cooperation and standardisation. Owing to the network effects inherent in the retail payment market, common standards may help to achieve a necessary critical mass and can create a stable ground for new players coming into the market. In the same manner, cooperation can help to reduce costs through shared investment or economies of scale and scope. Pricing and price structures that may include

interchange fees are also relevant, but their effects on innovation will vary with differing circumstances. Lastly, security aspects also deserve attention from payment service providers, since inadequate security, whether real or perceived, could undermine public confidence in a new payment solution and hence its business case.

Based on the underlying economics of payments as well as the drivers and barriers identified, the report suggests some pointers as to what could be expected over the next five years:

- Technical developments are likely to blur product categories, since access devices and access channels are becoming interchangeable.
- Near Field Communication (NFC) has the potential for future growth, as it supports faster payment processing, potentially increasing user convenience and efficiency.
- E-commerce could further boost the demand for internet payments, particularly as existing payment methods do not always meet users' efficiency or security needs.
- Globally active players may have the advantage in leveraging their coverage and market power when offering innovative payment solutions across borders.
- In many cases, innovations in retail payments represent only incremental improvements to existing and established payment services. However, large leaps can occur, particularly in countries where the payment infrastructure is underdeveloped.
- Distinct changes in retail payments could potentially be triggered by factors such as the emergence of new payment schemes, non-banks broadening the scope of their business remits, and regulatory changes.
- Although technology will lead to more convergence in payments at the global level, significant differences between regions are likely to persist.

As central banks generally attach importance to innovations in payments, the report identifies a number of challenges and issues for central banks that will impinge on their various responsibilities and tasks as catalysts, overseers and/or operators of payment systems:

- Monitoring and assessment of new developments in retail payments by central banks is considered important, but central banks may be required to step up efforts, inter alia, to collect statistical data, to do analytical research and to ensure the availability of appropriate skills.
- Communication of central bank policy objectives and central banks' work regarding new developments in retail payments can help to ensure transparency and to provide guidance to the market. Central banks may face reputational challenges if their assessment and guidance turn out to be inadequate.
- Innovations in retail payment markets can raise new questions regarding standardisation and interoperability, which most central banks promote and facilitate, eg by fostering the dialogue between different stakeholders or by actively contributing to the development of domestic or global standards. For central banks, the challenge may be to find an appropriate level of involvement in these activities.
- As innovations emerge and markets develop, central banks face the challenge of reviewing their existing oversight frameworks and might need to seek cooperation with other authorities both nationally and internationally, not least in view of the growing role of non-banks and global providers.
- Central banks might need to assess the potential effects of innovations on the services they offer, especially from the liquidity and operational risk point of view.

- Central banks might wish to monitor the impact of innovations on cash and monetary policy, although most central banks consider the current impact of innovations on cash and monetary policy to be limited.

Finally, the report underlines the need for further work in several areas related to innovations in retail payments, including definitions.

Section 1: Introduction

This report aims at gaining a closer insight into innovations in retail payments. The topic's importance is heightened by the latest technological, market-driven and regulatory developments, which could pave the way for radical changes. Innovative payment instruments hint at the direction that these changes may take, even if their market impact is still modest. To be able to assess and anticipate such trends, central banks need to have a clear understanding of the latest developments in this marketplace.

Retail payments differ from large-value payments in several ways. First, retail payments typically relate to the purchase of goods and services by consumers and businesses. As compared with interbank transactions, they are used in more varied situations, such as face-to-face payments at the point of sale (POS) and remote payments via the internet. Second, retail payments are executed using a greater variety of payment instruments than large-value payments. Third, retail payments make more extensive use of private sector systems for transaction processing than do large-value payments, for which, to a large extent, central bank-operated real-time gross settlement (RTGS) systems are used. Though much smaller in value than interbank transfers, retail payments typically account for the vast majority of payments in volume terms.

Central banks typically take an interest in retail payments as part of their role in maintaining the stability and efficiency of the financial system and preserving confidence in their currencies. Although retail payment systems are not generally considered systemically important, their potential weaknesses with regard to security and reliability could nonetheless affect the financial system and the economy. For this reason, central banks are keen to promote the safety, soundness and effectiveness of retail payment systems.

Since 1996, the Committee on Payment and Settlement Systems (CPSS) has actively monitored developments in innovative retail payments, in particular electronic money products. Its main focus has been on providing central banks with information that might assist them in monitoring the growth of electronic money and in assessing its possible consequences. The surveys conducted for this purpose were initially carried out twice a year and their content was confidential, with information shared only between participating central banks. In view of the widespread public interest in electronic money and with the consent of the participating central banks, the CPSS later decided to make the survey content available to the public (most recently in a 2004 publication).[1]

[1] See CPSS reports: *Security of electronic money* (1996), *Survey of electronic money developments* (2000), *Survey of electronic money developments* (2001) and *Survey of developments in electronic money and internet and mobile payments* (2004).

In addition, the CPSS has published three reports identifying current market trends and exploring policy issues that may arise for central banks in the area of retail payment instruments and systems.[2]

Many innovative retail payment instruments[3] have been developed since the last CPSS publication in 2004, and their variety and number continue to increase. Many of these innovations were driven by technological developments such as the spread of smartphones and Near Field Communication (NFC)[4] technology, as well as the rapid growth of e-commerce. People have become more willing to make payments via modern communication channels, such as internet and mobile phones. And payment services based on the use of mobile phones or business correspondents/agents are growing at a particularly fast rate in countries where banks for various reasons have been unable to provide payment services to certain segments of the population.

Against this background, the CPSS formed a Working Group on Innovations in Retail Payments (the "working group") to look into retail payment innovations in the CPSS countries[5] during the past decade. In this report, "retail payment innovation" is defined as a new or significantly improved instrument, solution or scheme that has achieved a significant share of the relevant retail payment market or at least has the potential to take one.

The report attempts to: (i) catalogue innovative developments in retail payments in the CPSS countries,[6] (ii) identify common characteristics among those innovations and appropriate ways of classifying them; (iii) identify drivers for and barriers to innovation; and (iv) identify potential issues and challenges for central banks. The basis of the analysis is the fact-finding exercise conducted by the working group. It also draws on surveys on innovations in retail payments conducted by the ECB and the World Bank.

As existing publications do not always agree on the definitions of many relevant terms used in the report, a specific challenge for the working group has been to come up with appropriate definitions with regard to innovations in payments. While this report generally relies on the CPSS glossary,[7] new terms are defined where necessary and existing definitions are amended in the light of recent developments, as appropriate. Such a challenge points to a need to update the CPSS glossary.

The rest of this report is divided into five sections. Section 2 provides an overview of payment habits in the CPSS countries and reports on the working group's fact-finding exercise. Section 3 offers a theoretical background to assist in understanding the developments observed. Section 4 identifies drivers for and barriers to innovations. Finally, Section 5 outlines future prospects, while Section 6 focuses on the issues and challenges for central banks with regard to innovations in retail payments.

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[2] See CPSS reports: *Retail payments in selected countries: a comparative study* (1999), *Clearing and settlement arrangements for retail payments in selected countries* (2000) and *Policy issues for central banks in retail payments* (2003).

[3] This report focuses only on multipurpose retail payment instruments unless otherwise stated.

[4] NFC is a technology that enables the wireless transfer of data over a limited distance (for most applications, about 4 to 10 cm). It can be used, inter alia, to establish a connection between a POS and a payment device.

[5] The CPSS members are Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Italy, Japan, Korea, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The term "CPSS countries" used in this report refers to all CPSS economies (including Hong Kong SAR).

[6] In order to enrich the fact-finding, selected innovations in other countries were included. "Other countries" in the sense of this report are Finland, Luxembourg, Malaysia, the Philippines, Portugal, Slovenia and Spain.

[7] See CPSS, *A glossary of terms used in payments and settlement systems*, 2003.

Section 2: Innovations in retail payments: fact-finding exercise

2.1 Payment habits in the CPSS countries

According to the Red Book statistics (see Annex 1), the use of traditional payment instruments – ie credit transfers, direct debits, credit cards and debit cards – is still dominant in retail payments. In many CPSS countries, credit and debit cards are used most often, followed by credit transfers and direct debits. For these payment instruments, most notably credit and debit cards, the number of transactions is growing in almost all countries. While cheques are still used frequently in some countries, their use is on the decline in most of the world. Electronic money payments[8] are used least, although a fair number of cards with such a function have been issued. Their numbers are very high in Singapore and Hong Kong, but elsewhere they have begun to penetrate the market significantly only in a few countries, such as Japan. In these countries, electronic money is associated mainly with public transport. However, these results should be interpreted with some caution since the interpretation of what is considered electronic money appears to vary from country to country. Moreover, statistics on electronic money may understate the real level of usage in some countries.[9] The need to thoroughly overhaul the definition, concept and reporting of electronic money is further underlined by the variety of regulatory regimes in CPSS countries and the volume of innovative developments over the last decade, such as the ever broadening array of prepaid card instruments.[10]

In order to take a closer look at current habits in the use of retail payment instruments, including cash, the working group asked for its members' views on the most frequently used payment instruments solutions or schemes used in their countries in the following four situations: (i) proximity payments at the point of sale; (ii) prearranged remote payments for consumer bills or business-to-business (B2B) payments; (iii) spontaneous remote payments via the internet; and (iv) person-to-person (P2P) payments. Working group members could choose up to three frequently used payment instruments for each situation.

The survey (see Figure 1) reveals that cash continues to be the most frequently used payment instrument for both proximity and P2P payments. Credit transfers are frequently used for spontaneous remote payments via the internet as well as for prearranged remote payments and P2P payments. Direct debits are the most frequently used instrument for prearranged payments. Credit cards are the most frequently used instrument for spontaneous remote payments via the internet and are also frequently used for proximity payments. Debit cards have also gained in popularity for proximity payments. Cheques are still fairly often used in P2P payments and prearranged payments in some CPSS countries.

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[8] According to the CPSS glossary (2003), electronic money is defined as value stored electronically in a device such as a chip card or a hard drive in a personal computer. The methodology for the Red Book statistics already refers to a broader concept that includes electronic money stored on servers or mobile phones. Consequently, for the purpose of this report, "electronic money" is defined as monetary value represented by a claim on the issuers which is stored on an electronic device such as a chip card or a hard drive in personal computers or servers or other devices such as mobile phones and issued upon receipt of funds in an amount not less in value than the monetary value received and accepted as a means of payment by undertakings other than the issuer. The term "electronic money payments" refers to payments where the holder of electronic money transfers electronic money value from his/her electronic money balance to the electronic money balance of a merchant or another person. Lastly, "cards with an electronic money function" are multipurpose prepaid cards, in many cases reloadable, which can be used at the sites of several merchants or service providers for a wide range of purposes.

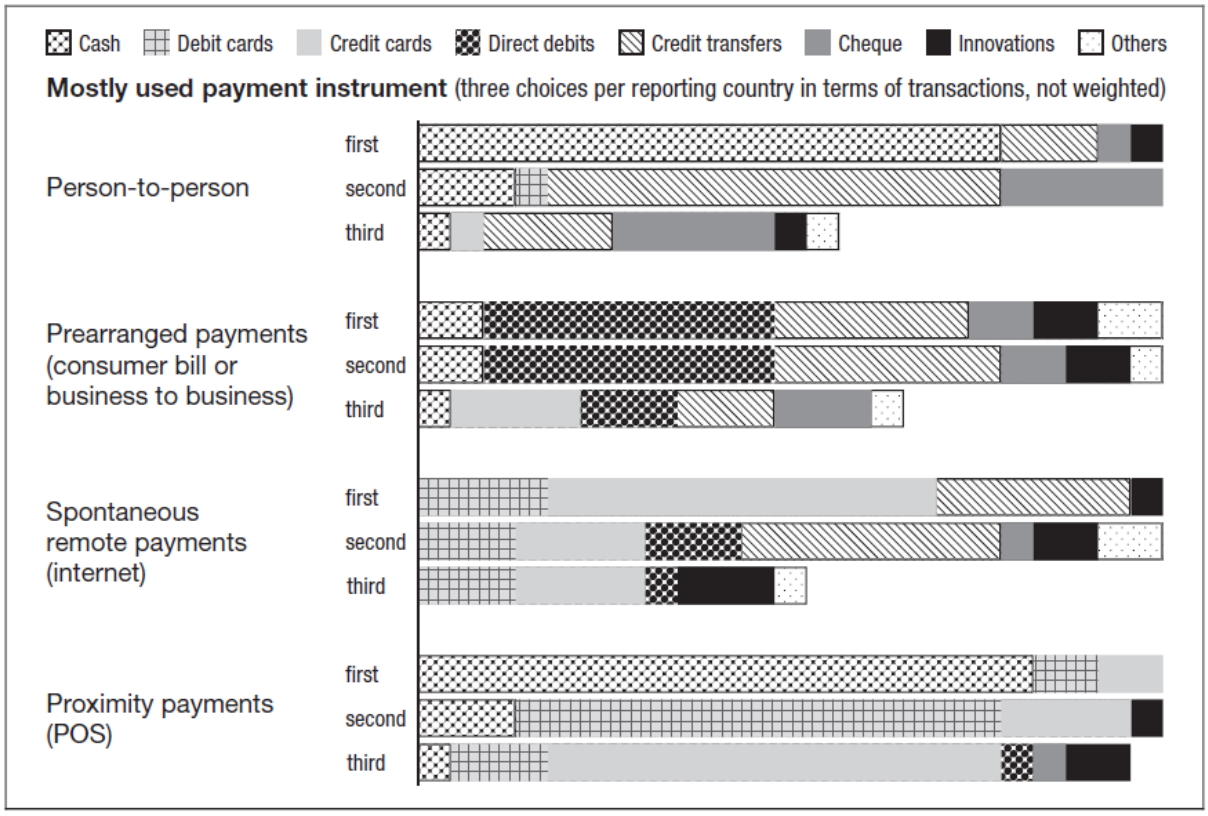
[9] For example, all PayPal transactions in Europe are assigned to Luxembourg.

[10] According to the 2010 Federal Reserve Payments Study, there were 6 billion prepaid card payments in 2009, amounting to 5.5% of all non-cash payments (not included in the Red Book statistics).

Only a few innovative payment solutions were reported to be frequently used in the above four situations. In P2P payments, near real-time credit transfers and internet-based payment networks were mentioned. In prearranged payments, electronic bill presentment and payment (EBPP) systems, which include systems that only provide electronic bill payment functions (see Section 2.3.2), were selected as frequently used. In spontaneous remote payments, specific online banking-based payment solutions and internet-based payment networks were reported. In proximity payments, innovative payment solutions based on electronic money were selected as frequently used.[11]

Figure 1

Use of payment instruments in specific situations



Source: Survey conducted by the working group, 2011.

2.2 Methodological aspects of the fact-finding

A fact-finding exercise on innovative retail payments was conducted amongst the CPSS member central banks (and selected other countries). It attempts to cover influential developments in (non-cash) retail payment solutions and schemes (multipurpose only) in these countries during the past decade, including details of certain features and characteristics (see Table 1 for the features and characteristics reported for each innovation).

[11] Since the replies are based on simple ranking and the country-by-country approach, the information given here does not allow for quantitative conclusions on the overall importance of the innovations mentioned.

As innovation is an ongoing activity and some innovations may not come to the attention of central banks, the fact-finding did not aim to cover all retail payment innovations in the respective countries, but rather tried to collect information that would provide a good overview of innovative activities in the reporting countries. The report does not cover general technical and business trends, such as cloud computing and outsourcing as well as other strategic approaches in terms of the business behaviour of individual banks, since the focus is not on IT developments but on the payment instruments and schemes themselves.

Table 1

Features and characteristics of innovations reported in the fact-finding

Features	Characteristics
Funding type	prepaid, debit, credit
Access channel	POS, internet, other telecommunication networks, branch/automated teller machine (ATM), other
Access device	computer, mobile phone, telephone, card, other
Main usage	P2P, P2B, B2B, government payments
Market impact[1]	high, medium, low, pilot phase
Product group	internet payment, mobile payment, innovations in the use of card payments, EBPP, improvements in infrastructure and security
Access technique	remote, proximity (contact, contactless)
Scheme owner	bank(s), non-bank(s), both bank(s) and non-bank(s), central bank(s)
Cooperation	banks only, bank(s) and non-bank(s), non-banks only, no cooperation
Purpose	improved security, improved efficiency (reduced use of cash or cheques, lower processing costs, speeding-up of processing, overcoming infrastructural lags, inclusion of unbanked or underbanked, government payments, fostering competition, improved convenience, other)
Focus	payment initiation, overall payment process and clearing and settlement, payment receipt, new scheme

[1] The assessment was based on the respondents' discretional criteria, such as the volume and value of transactions and influence on user habits.

In total, 122 innovations in retail payments were reported by 30 central banks, with each central bank reporting between one and 12 innovations (see Annex 2 for the descriptions of the reported innovations, Annex 3 for the reported innovations by product group, and Annex 4 for the summary of the fact-finding exercise). The number and character of responses varied not only because of potentially different states of innovation in each country, but also because of the central bank respondents' individual views on the importance of various innovations. Consequently, the responses include developments that may be considered innovative in one country but not in others.

It is important to note that some innovations were reported in the form of concrete products and some in the form of a "stylised" group, eg prepaid cards. In part, this is due to the different financial, technological and other considerations of the reporting central bank in each country. However, allowing countries to apply their own judgment on how to report

innovations was ultimately considered to be more useful than applying a uniform method that would fail to account for the differing political and socio-economic conditions across the countries concerned. In this regard, the subjective nature of the data does not provide a basis for rigorous statistical and quantitative estimation. Rather, as mentioned above, the aim was to provide an overview that can serve as the basis for a comprehensive assessment of the state of innovation in retail payments.

Several central banks reported innovations that were terminated after the pilot phase or closed due to insufficient market success. These innovations are not included in the annexes but provided valuable insights with regard to the analysis of drivers for and barriers to innovations (see Section 4).

Recently, related surveys have also been conducted by the World Bank (see Box 1) and the ECB (see Box 4). Where applicable, the results of these surveys have been included in this report to give a better understanding of the current trends and developments in retail payment innovations.

Box 1

The World Bank's Global Payment Systems Survey: questionnaire on innovative retail payments

In recognition of the relevant innovation taking place in the retail payment market, the World Bank conducted a survey in 2010 on innovations in retail payment instruments and methods.[1] A total of 101 central banks completed the survey, and 173 innovative retail payment instruments and methods that include both products and product groups were reported. The main findings from the survey are as follows:

- There is a fairly widespread adoption of electronic channels for the initiation of payment transactions using innovative retail payment instruments and methods.
- The use of innovative payment instruments and methods is still much lower than the use of traditional ones. However, they are considered important for financial inclusion in more than 14% of the countries.
- While non-banks are playing a greater role in the provision of innovative payment instruments and methods, banks remain the most significant players in this field.
- Customer funds are fully protected in about 60% of innovative payment instruments and methods.
- P2B payments, utility bill payments and P2P payments were the most common types of payment offered by the providers of innovative payment instruments and methods. Less than 10% of the instruments and methods support government payments.
- The majority of innovative payment instruments and methods have very limited interoperability.
- Innovative payment instruments and methods appear to have fairly well developed pricing models.
- Generally, innovative payment instruments and methods are not directly connected to the clearing and settlement infrastructure.
- Security and fraud issues seem to be getting inadequate attention.
- For 60% of the innovative retail payment instruments and methods, central banks identified themselves as the sole overseers of those instruments and methods. For 10%, they indicated to have cooperation with other authorities with regard to the oversight of those innovative payment instruments and methods.
- In general, central banks have a very measured view about the anticipated impact of innovations in their countries.

[1] See World Bank, "Annex 1 Questionnaire for Collecting Information on Innovations in Retail Payment Instruments and Methods Worldwide", *Global Payment Systems Survey 2010* (forthcoming at www.worldbank.org/paymentsystems).

2.3 Types of innovation

The retail payment innovations and developments reported in the fact-finding exercise can be categorised in several ways. This report refers to the OECD's Oslo Manual, which makes the distinction between process-related and product-related innovations.[12] Process-oriented categorisation focuses on the back office, the area of the payment process where innovation is generally only observed by payment service providers (PSPs). Product-oriented

[12] See OECD, *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data: Third Edition*, 2005.

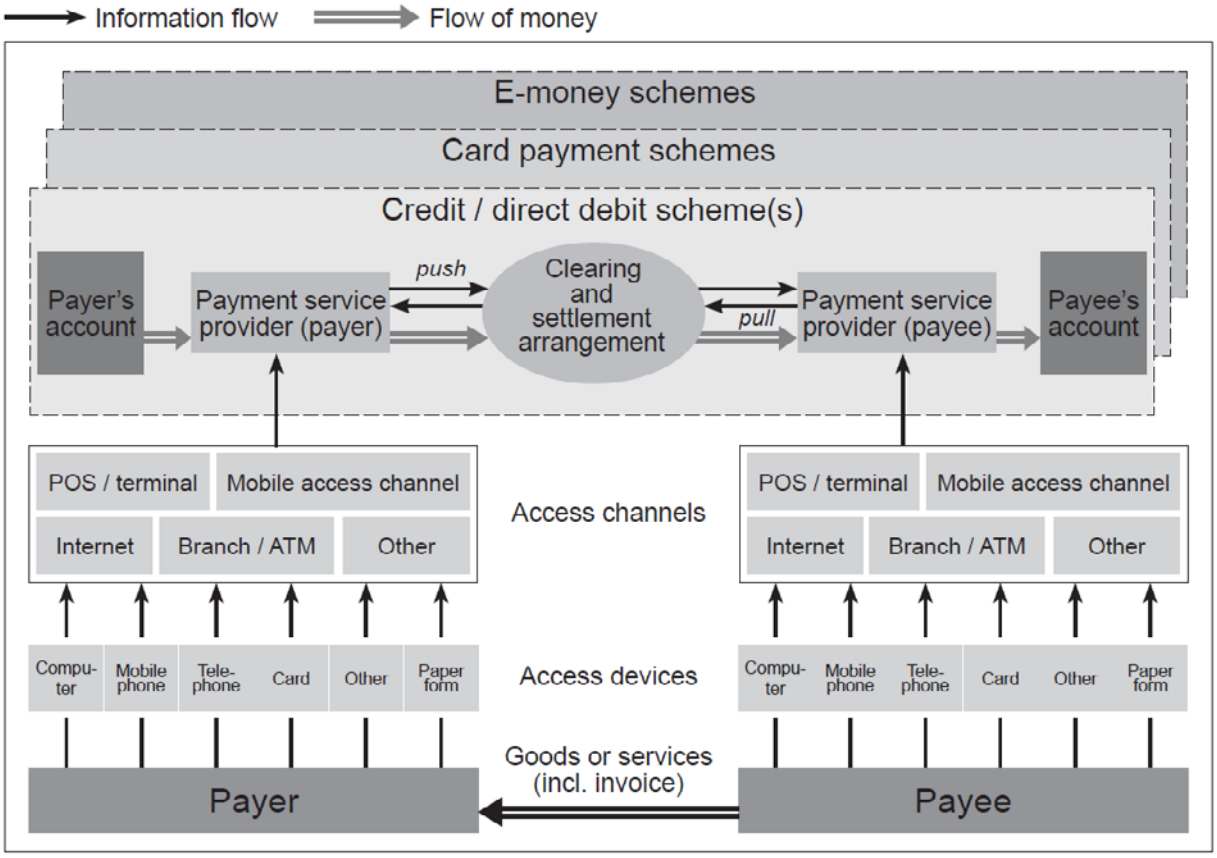
categorisation applies the intuitive features of a payment instrument that are obvious from the user's point of view. However, it is important to note that these categorisations may not be stable in the long term, since new developments may have unforeseen effects on payment processes and products.

2.3.1 Process-oriented categorisation

One way to categorise innovations in retail payments is to look at the payment process. Typically, the overall payment process or payment scheme is described as a four-party system consisting of the payer, the payer's PSP, the payee and the payee's PSP.[13] The payer makes payments by allowing his/her funds to be transferred to the payee. This funds transfer is made when the payer's PSP debits the payer's account, and the payee's PSP credits the payee's account, typically by means of clearing and settlement processes. See Figure 2 for a stylised representation of the retail payment process.

Figure 2

Payment process in retail payments



Note: This figure is simplified to some extent; the process could be much more complex in reality (eg through the involvement of additional PSPs).

Source: Working group.

[13] In the payment process of card payments, there is typically a fifth party, the card scheme.

(i) Payment initiation

The first step of the payment process is the initiation. More than half of the reported innovations[14] focus on this stage of the payment process. A payment transaction can be initiated by either the payer or the payee. If the transaction is initiated by the payer, it is called a "push transaction". If it is initiated by the payee, it is called a "pull transaction". For instance, credit transfers are push transactions, and direct debits, cheques and card payments are typically pull transactions. However, card payments could also involve a push element if the clearing and settlement of the card payment involve a credit transfer.

Access channels[15] and access devices[16] are necessary to initiate a payment. Access channels can be branch offices, ATMs, terminals at the POS, the internet or other telecommunication networks. They can be owned either by a PSP, by the payee (eg the merchant) or a third-party service provider. Access devices are needed to reach the access channels. These can be telephones, mobile phones, computers, credit and debit cards, or paper forms. They are typically owned or used by the payer or the payee.

The initiation of a payment typically requires: (i) validation of the payment instrument; (ii) verification of the involved parties' identities; and (iii) verification of the ability to pay.

(ii) Overall payment process, including clearing and settlement

About one third of the reported innovations refer to improvements or adjustments of the overall payment process (eg EBPP). In some cases, innovations have broken up the traditional payment process so that new PSPs can offer specific services as a complement to the traditional process (eg EBPP providers or businesses offering their payment solutions to other businesses). In a narrower sense, innovations might refer to clearing and settlement defined as steps in the payment process that are organised in bilateral or multilateral arrangements between two or more PSPs. In many cases, there is a time lag between the initiation of a payment and its clearing and settlement.

(iii) Receipt of a payment

Another process is the receipt of a payment, which accounts for about 10% of all reported innovations. Since there can be a significant time lag between a payment's initiation and its receipt, the payee may face a counterparty risk vis-à-vis the payer.[17] Some innovations have extended the type of payment guarantee that is typically an element in card payments to the payee of a push transaction, ie the payee receives a payment guarantee as soon as a credit transfer is successfully initiated by the payer.

One key issue for the relevant parties in the process is how to reconcile the transaction once it has been successfully processed, given that this is hardly possible using traditional payment instruments (typically, credit transfers). Innovative payment solutions, including information flows related to the identification of the payer or to the transaction itself, may help to fill this gap.

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[14] The total number of process categorisations exceeded 100%, as some of the reported innovations fall into more than one process category.

[15] The access channel connects the payer/payee and the PSP so that a payment can be initiated or received.

[16] The access device is linked to the access channel so that payments can be initiated or received.

[17] On the other hand, payers have an interest in ensuring that they actually receive the goods or services in exchange for the payments they have made (see Section 4.1.2). This is a particular concern in e-commerce.

(iv) New schemes

The above categorisation focuses on the innovations that occur within the payment schemes – for example, innovative solutions for faster initiation of card payments. It is also possible that innovations create a completely new payment scheme (eg electronic money or virtual currency schemes). However, in general, these schemes are not completely separated from the "traditional" world, as they allow for flexible funding means (eg via credit transfers, direct debits and/or card payments) and are thus dependent on the traditional banking infrastructure (or on other infrastructure enabling, for example, conversion of cash into electronic money). All in all, about a quarter of the reported innovations are new schemes.

2.3.2 Product-related categorisation

Another way to categorise innovations in retail payments is to focus on the consumer experience, ie to identify product groups based on similarities in their use. In retail payments, two general approaches could be envisaged. First, the categorisation could be based on the access devices used to initiate payments (eg cards, mobile phones). Second, the access channel could be used for categorisation (eg internet, mobile telecommunication networks, POS). But neither approach is fully satisfying in the light of rapid technological change. For example, mobile phones can offer access to the internet as well as to mobile telecommunication networks. Moreover, a payment product using NFC chips at the POS might be based on various access devices, since NFC chips can be embedded in both cards and mobile phones. Similarly, a payment product might support a variety of access channels, allowing payments to be initiated via the internet, for example, as well as via the mobile communication network. A comprehensive classification would thus have to be based on a multitude of different dimensions.[18]

Nevertheless, a product-oriented categorisation can provide a useful overview of the key features, effects and risks of innovations in retail payments. This report will therefore make considerable use of this type of categorisation. To avoid the drawbacks of any single set of classification criteria, the working group also adopted a pragmatic approach. Overall, this report identifies five different product-related categories. (For the product-related categorisation of the fact-finding phase, see Annex 3.)

(i) Innovation in the use of card payments

This product category relates to cards as access devices for payments. Roughly one quarter of all reported innovations are related to the use of card payments. Very often, these innovations are offered by card schemes and can usually be categorised into a three- or four-party model. A four-party model comprises card holders, accepting parties (eg merchants), issuers (eg card-issuing banks) and acquirers (eg banks or other service providers for the accepting parties). In a three-party model, the role of the issuer and that of the acquirer are combined. Alternatively, the products might also be classified as electronic money schemes.

Innovative use of card payments refers to the following access channels:

(a) Payments on the internet. Innovations in card-not-present transactions for online shopping (eg virtual card numbers).

[18] See V Bleyen, L Van Hove and M Hartmann, "Classifying payment instruments: a matryoshka approach", *Communications & Strategies*, vol 79, 2009, pp 73–94: this paper attempts to combine the different categorisation approaches into a single classification scheme, which is structured like a matryoshka, or Russian doll, where the nested figurines represent different subclassifications.

(b) Payments at the POS, ie contactless card payments using NFC technology as well as new devices connected to mobile equipment that allow cards to be accepted.

Moreover, a number of innovations relate to the funding of card payments, notably the increasingly popular multipurpose prepaid cards that allow for the use of different access channels (eg ATM and POS). One impetus behind such innovations is the drive to make government payments more efficient.

(ii) Internet payments

Almost one fifth of the reported innovations are innovations in internet payments. This product group refers mainly to the access channel. In this case, payments are initiated by devices connected to the internet (eg desktop PCs, laptops, tablets and mobile phones), where payment instructions are transmitted and confirmed between customers or merchants and their respective PSPs in the course of an online purchase of goods or services (ie related to an e-commerce transaction). Thus, a credit transfer or a direct debit that is simply initiated by an online banking application is not considered to be a true internet payment.

In this category, the fact-finding includes the following three main types:

(a) Online banking-based solutions that forward customers from the e-merchant's website to their online banking application. Such services are, in many cases, connected with bill presentment in e-commerce. Some service providers are authorised by the account holders' bank to initiate credit transfers on behalf of the bank customer from their systems, but others are not. The latter are known as "overlay payment services".

(b) Escrow services where a third party is interposed between the payer (buyer) and the payee (seller) in an e-commerce transaction and ensures the delivery versus payment of the goods or services.

(c) Electronic money payments via the internet.

(iii) Mobile payments

For the purposes of this report, it is not the access device but the access channel that defines a mobile payment. In this context, mobile payments are payments initiated and transmitted by access devices that are connected to the mobile communication network using voice technology, text messaging (via either SMS or USSD[19] technology) or NFC. This means that not only traditional mobile phones but also other devices such as tablet computers can serve as access devices for mobile payments. Almost a quarter of the reported innovations can be categorised as mobile payments.

As a corollary, payments, such as credit transfers or direct debits, that are only initiated and authorised via the internet using mobile phones (eg by a mobile banking application using an app on a smartphone) are not considered to be mobile payments; instead they are categorised as internet payments. The same is true for online payments where the mobile phone is only used for authentication purposes (eg by sending a transaction number (TAN) for online banking transactions via a mobile phone). POS payments using a chip embedded in mobile phones or NFC sticker posted on mobile phones are considered to represent card payment innovations provided that a card version of this service is available (typically, a

[19] Unstructured Supplementary Service Data (USSD) is a communication protocol used by Global System for Mobile (GSM) mobile phones.

credit card product embedded in a phone using NFC). Only if no card alternative is provided should it be considered to be a mobile payment.

Based on the above, three types of mobile payments were identified in the fact-finding:

(a) Mobile payments using traditional bank accounts.

(b) Mobile payments using the mobile phone bill collection process; payers pay the invoiced mobile payment amount as part of their mobile phone bill; the payee receives the amount from the mobile phone operator.

(c) Mobile payments using prepaid accounts (sometimes called “mobile money”).

(iv) Electronic bill presentment and payment (EBPP)

These include both of the following processes: (i) the payee electronically presents the bill to the payer; and (ii) the payer initiates the payment using the electronically presented bill. Furthermore, the payer can store the bill and the related payment documentation electronically. Since there are no common standards for EBPP, there are proprietary solutions that may only include the electronic bill payment, but not the electronic presentment (see Box 2 for an example of EBPP). Around 10% of the reported innovations are related to this category.

Box 2

Electronic bill presentment and payment with SADAD

In the early 1990s, more than 60% of invoices in Saudi Arabia were settled, mainly in cash, at bank branches. This was inconvenient for customers and operationally inefficient for billers and banks. To overcome this issue, large billers made arrangements with banks to improve the bill collection process. As these efforts were not collaborative, however, each biller had to set up links with each bank. This resulted in a complex network of bilateral agreements, which had significant drawbacks.

Against this background, the Saudi Arabian Monetary Agency (SAMA) in 2004 established a new centralised system, known as SADAD, that provides a uniform interface between billers and banks and is open to all interested parties. SADAD offers a single platform for the management and reconciliation of invoices between companies and their retail customers. Billers can upload their invoices to the system, and customers can access and settle them through a range of banking channels that include POS, ATMs, online banking, telephone banking, bank branches and, in some cases, mobile banking.

With more than 100 billers linked, SADAD had a market share in 2010 of more than 91% of all invoices in Saudi Arabia. Thanks to the wide adoption of SADAD, the use of bank branches for invoice payments has declined from 73% in 2003 to 6% in 2010. Over the same period, the use of ATMs increased from 19% to 41% and online banking rose from 1% in 2003 to 35%.

(v) Improvements in infrastructure and security

About a quarter of the reported innovations can be categorised as innovations that improve payment processing efficiency by, for example, optimising clearing and settlement arrangements and/or improving security.

This category includes:

(a) Cheque truncation or cheque imaging systems.

(b) Shortening the time for clearing and settlement.

(c) Providing payment services to the unbanked or underbanked.

(d) Security improvements.

It is worth mentioning that, in some countries, cheque truncation is considered to be not just an infrastructural innovation but as a broader innovation in the whole payment process. One example is a service that enables account holders to create cheques electronically and send them to billers at the POS. In other cases, account holders can deposit cheques by creating electronic images with special image acquiring devices, scanners or cameras attached to PCs or smartphones.

2.4 Purposes of innovations

Innovations often aim to exploit gaps in the existing supply of retail payment services. In this report, the purposes of innovation are grouped into two main categories, namely "improved efficiency" and "improved security". The former can be divided into several subcategories, such as reduced cash usage, lower processing costs, improved convenience, and inclusion of the unbanked or underbanked. In the fact-finding, the reporting central banks could attach up to four purposes to each innovation to better highlight its major objective. It is important to keep in mind that the purposes considered in this report are not exhaustive. Moreover, they are not necessarily mutually exclusive and they may be interdependent. Not every purpose necessarily has the same level of significance. Furthermore, these purposes need not necessarily reflect central banks' policy objectives.

According to the fact-finding exercise (see Annex 4 for details), the majority of innovations aim to improve convenience – seeking, for example, to increase the user-friendliness of the payment instrument for consumers or ease the implementation process for merchants accepting the payment instrument. This reflects the high importance of convenience to customers and merchants when they decide which payment method to use or to accept.

Second, more than half the reported innovations, mainly involving the innovative use of card and mobile payments, seek to cut down on the use of cash. Speeding-up of processing[20] also accounted for almost half the reported innovations. Purposes less frequently mentioned in the fact-finding phase include lower processing costs,[21] overcoming infrastructural lags,[22] including the financial inclusion of unbanked or underbanked customers,[23] improved security, fostering competition and reduced usage of cheques. Least frequently cited is the provision of governmental payments.

2.5 Trends for retail payments

Due to limitations on gathering precise statistical data, the working group's analysis of retail payment trends is based mainly on the fact-finding exercise.

(i) The market is dynamic, but few innovations have significant market impact so far

Participating central banks reported a considerable number of new developments. However, the market impact of most of these innovations was assessed to be low. Moreover, while central banks were asked to identify innovations over the past 10 years, most of the reported

[20] The purpose of speeding up processing, especially in payment initiation and clearing and settlement, is to achieve real-time or near real-time payments.

[21] A reduction in processing costs feeds through, in particular, to lower operating costs for PSPs or merchants. It should be differentiated from the meaning of costs in a macroeconomic context as used in Section 3.

[22] Overcoming infrastructural lags aims to provide products or services that are not available via the existing infrastructure.

[23] The purpose of financial inclusion is typically to provide low-income population groups in either developing or developed countries with improved access to financial services (see Section 4.1.5).

innovations were introduced during the last five years. This may reflect the fact that many innovations had failed in the early years, and that few of them have lasted long enough to be reported.

(ii) Most innovations are domestic in scope, but similar products and categories have emerged worldwide

Almost all reported innovations were developed for domestic purposes. Out of 122 reported innovations, only 25 were said to have international reach. Many of these are prepaid instruments used for cross-border internet or card payments. No new EBPP or mobile payment solutions for cross-border usage were reported. In general, similar types and categories of innovations were reported by most central banks, even though the exact focus in each economy might differ in line with domestic market conditions. This is illustrated by the definition of the five product categories, as outlined in Section 2.3.

(iii) Speeding-up of payment processing gained importance

About half the reported innovations are intended to speed up payment processing. This trend towards speed is driven by both user demand and advances in technological capability. In some cases, specific mandates or interventions by public authorities can be an additional factor. The majority of reported innovations in infrastructure improvements are designed to facilitate real-time or near real-time processing with a view to speeding up interbank settlement. This type of improvement generally facilitates faster retail account-to-account transfers between consumers and businesses. Such innovations are not always voluntary but must, in general, entail cooperative efforts by the banking industry, sometimes with the central bank's involvement. In the non-interbank domain, various steps in the payment process have been accelerated, notably the initiation of payments at the POS or in e-commerce. In this respect, more than half of the reported innovations in card payments related to the use of contactless payment technology.

(iv) Financial inclusion as the driving force for innovation

Financial inclusion is increasingly a topic of political relevance for national governments and international forums. About one fifth of the reported innovations aim at financial inclusion, either under a government mandate or because of new business opportunities opened up by an untapped market. They tend to focus on mobile payments, innovations in the use of card payments and improvements in infrastructure and security (eg business correspondents/agents). Even if most reported innovations are designed for the domestic market, some might also be used for cross-border remittance payments.

(v) The role of non-banks is significantly increasing

The role of non-banks in retail payment innovations has increased significantly, owing in part to the growing use of innovative technology that allows non-banks to compete in areas such as mobile and internet payments which are not yet dominated by banks. While half of the reported innovations are owned only by banks or central banks, the remaining half, mostly in mobile and internet payments, are either owned by non-banks or owned jointly by banks and non-banks. In more than half the cases where non-banks are scheme owners, they are new players in the market. This indicates that while some level of cooperation or joint ownership may exist, non-banks are increasingly competing with banks in the field of innovative retail payments. The fact-finding shows that, in many cases, the market impact of innovations is higher in the case of cooperation between banks and non-banks than for innovations offered solely by non-banks.

Box 3 outlines some of the trends observed in the eSEPA survey conducted by the ECB.

Box 3

The ECB's eSEPA survey

The Single Euro Payments Area (SEPA) aims to establish a true internal market for non-cash retail payments in Europe. This project builds a path through which innovations in the field of retail payments can be channelled. The so-called eSEPA refers to a SEPA in which service providers make use of advanced information and communication technology when offering prepayment, payment and/or post-payment services based on the common set of payment instruments that have been implemented for SEPA.

The ECB, in close cooperation with the national central banks (NCBs) in Europe, conducted several surveys on retail payment innovations in 2004, 2005 and 2006. The last survey was held in 2010. One of the survey's objectives was to better understand the innovations developed and deployed in Europe. The questionnaire's addressees were PSPs such as banks and telecommunication companies that were identified by the NCBs.

The outcome of the survey suggests that:

- There are many innovations in retail payments that have a similar purpose or function. A large share of the reported innovations have been developed and designed only for the domestic market. SEPA might change this landscape in the future.
- Retail payment innovation is a dynamic process. Many innovations are in an early stage of development, and have high potential for growth.
- Most innovations are owned or controlled by banks. However, especially in mobile payments, a relatively large share of the reported innovations is owned by non-banks.
- Many innovations are related to the entire payment process (prepayment, payment and post-payment).
- Most innovations reported in the payment process aim to facilitate online purchases.
- Computers and mobile phones play a crucial role as access devices in most reported innovations. The internet seems to be the main access channel.
- The share of the reported innovations related to remote payments is far more significant than that of proximity payments.
- Both payers and payees benefit from innovations in terms of ease of use, speed of transactions and security.

Cooperation among the different stakeholders and/or interoperability of systems are crucial for the success of innovations. However, the balance between cooperation and competition is also important.

Section 3: Characteristics of the retail payment market

3.1 Special features of the retail payment market

The special features and microeconomics of retail payment markets that influence the costs and benefits of payments help frame the analysis of drivers and barriers in payment innovations. The concepts of economies of scale and scope in production are central to this analysis, as are the concept of two-sided markets and the theory of network effects.

The economics of retail payments are, to a large extent, similar to the economics of information processing, which today involves computer hardware and software as well as telecommunications and internet infrastructure. However payments may be initiated, they are typically cleared and settled in the form of electronic transfers between accounts in one or

two account-holding institutions, often involving the use of third-party communications infrastructure and technology services.

3.1.1 Economics of payment production: economies of scale and scope

Significant supply side economies of scale and scope apply to the payment infrastructure used to process payment information. Such economies are achieved when the average cost of producing a payment service decreases with the quantity produced (scale), or if the joint production of two or more products on the same infrastructure reduces the cost or improves the quality compared with producing them independently (scope).

In the short run, economies of scale can be quite substantial in electronic payments because the cost of producing just one more payment transaction (ie the marginal cost) may be close to zero on systems operating below capacity. If a system is growing, however, then existing infrastructure may need to be expanded or replaced as volumes rise. During expansions, the average cost of a payment may increase temporarily until the fixed investment costs are absorbed.

Economies of scope are common in payment intermediation because the infrastructure used to process one type of payment can often be used to process another type. For example, automated clearing houses (ACHs) often process several different kinds of payments on the same platform (eg cheques, credit transfers and direct debits).

Economies of scale and scope are important in evaluating the costs and benefits of payment innovations. On occasion, the benefits of multiple systems can outweigh the cost savings from maintaining just a single platform. For example, competition between payment systems can keep prices lower than if a monopoly existed. Further, different types of payment instruments may not be perfect substitutes, allowing them to satisfy different needs. Also, while a low-cost payment service is desirable, it may delay the entry of innovative payment methods until the new method can become cost-effective enough to compete with existing methods.

3.1.2 Economics of payment consumption: network effects, platform competition and two-sided markets

Alongside economies of scale and scope, network effects, externalities and demand side scale economies are also prominent characteristics of payment services markets. Like other information technology networks, the basic payment network effect derives from the fact that each additional user increases the value of the network for each of the existing users, ie adding one more node in the network creates a positive externality or “spillover” for all other nodes. A classic example of network externality takes place in the telephone network, where the value of holding a telephone for each user increases with the number of users accessible via the network. Because of high fixed costs, payment networks often need to sign up a minimum number of users, often referred to as the “critical mass”, in order for the total value of the network to exceed the operating costs.

So that networks can link them together, the nodes must be compatible. This is generally achieved by using a common platform. The network externality often leads to the dominance of one platform, as users receive more benefits from interconnecting with a large network than with a small one.

The roadblock to innovation that the need to reach a critical mass represents can sometimes be overcome by creating incentives to join the network or by cutting the cost of doing so. If a payment network operator can seek out higher-value users, such as early adopters, then it can sometimes try to capture this consumer surplus and use revenues from that group to help achieve critical mass by subsidising lower-value users (ie new ones). Often this means that startup payment businesses require extra capital to subsidise users until the network is

large enough to support its own costs. Incumbent networks may therefore be at an advantage when introducing innovative new products because they do not need to expand the network to reach critical mass.

The kind of network effect described above is found in "one-sided" markets where sender and receiver are both part of the demand side of the service. Examples of such payment services are P2P or B2B services and the interbank RTGS payment systems typically used for large-value payments.

Critical mass issues are even more complex in a two-sided market where two distinct types of users are involved, such as consumers and merchants. In two-sided markets, the challenge of achieving critical mass is sometimes compared to the so-called chicken-and-egg dilemma, recognising that unless both sides of the market adopt the innovation at the same time (ie unless a critical mass is reached on both sides of the market), the innovation will most likely fail because no side of the market has incentives to adopt it unilaterally.[24] A prominent example of a two-sided market is the market for card payments: consumers only want a card if their card is accepted for payment at a sufficient number of merchants, and merchants only want to accept cards if enough consumers use them. Therefore the major challenge for a two-sided market lies in achieving a critical mass of users on both sides. In the early stages at least, one way to overcome this problem may be a pricing strategy that lets the less price-sensitive side of the market subsidise the more price-sensitive one.

3.1.3 Economics of club goods

Many retail payment systems involve sharing information about users, entailing at minimum the identification of the source and destination account numbers for the funds transfer. Many payment systems also require information-sharing for authentication and fraud prevention. The ability to share information is thus an asset to PSPs. At the same time, privacy concerns and the risk of data breaches make information security imperative. In systems that require cooperation between different entities, more than one party may have access to the same user data.

Some payment systems (eg card networks) may be thought of as a "club good", in that membership is controlled.[25] Once in the system or "club", some aspects of the system can be like a "public good" among the members because use of the information within the system by a member does not diminish its availability to others. By the same token, damage to the system caused by one member, such as a failure to secure card user information that leads to a data breach, can damage the system's value for the rest of its members. Thus, PSPs have incentives to monitor standards and to impose rules on members, because a data breach can destroy confidence in the payment system or its reputation.

3.2 Innovation in retail payment markets and social welfare

A payment system/market consists of the arrangements that create exchange of payment information and transfer of money (eg paper currency or account balances, between two parties). Money and, by extension, payment arrangements facilitate trade by solving the "double coincidence" of wants problem.[26] Different forms of money achieve this in different

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[24] See Box 6 for examples of unsuccessful innovations.

[25] See eg C Monet and W Roberds, "Optimal pricing of payment services", *Journal of Monetary Economics*, vol 55, no 8, 2008, pp 1428–40.

[26] In an economy without money, a trade can only successfully occur if both parties to the trade offer exactly the commodity that the other party to the trade requires. If A offers apples in return for grain, a trade can only proceed if B offers grain in return for apples. Otherwise, no trade can occur.

ways and with different costs and benefits. Most people just want their payments to be safe, convenient and cheap, and their money to be liquid. Depending on the payment choices available and the motivations of payer and payee, it is sometimes necessary to sacrifice one of these attributes in favour of another in order to complete a transaction.

Payments are used as inputs to economic transactions and may thus be thought of as having costs and benefits. However, unlike ordinary goods and services, they have no independent worth except for their ability to support commercial activity and exchange. Economists therefore consider costs and benefits associated with the payment system to be transaction costs[27] that have a significant impact on economic behaviour. Different payment methods have different effects on such costs, meaning that the choice of payment instrument may be highly dependent on the types of economic transaction buyers and sellers want to make.

Innovations usually lead to changes that reduce costs or produce benefits. In this regard, the benefits provided by payment innovations may be regarded as a reduction in the costs that would otherwise be incurred by the parties involved (or society as a whole) in the absence of the innovations. In most cases, the net benefits to social welfare include more cost-effective processing methods that let resources to be reallocated to more productive uses or provide better trading opportunities for users. Innovations can arise through several channels: through the efforts of firms trying to make a profit or gain an advantage over competitors; through industry-level private or private-public cooperation; through a government mandate; or even through grassroots efforts by members of society (eg via social networks or open-source software projects).

Payment innovations can help to cut transaction costs through lower fees, increased convenience, improved services, or mitigated risks etc. They may also open up payment services to people who do not have or cannot qualify for a bank account or credit card (ie financial inclusion). For example, prepaid cards, which can be purchased over the counter and require minimal identification and credit evaluation, give the unbanked or underbanked access to purchases where those prepaid cards are accepted. Hence, prepaid cards can help their users avoid potentially costly alternative payment arrangements that may imply higher prices, longer waiting periods or extra trips, or they can allow goods or services to be bought where alternative payment instruments cannot be used.

Innovations in retail payments have developed along with innovations in the broader economy but must be studied in a framework that accounts for their specific features. As discussed by Berger, Hancock and Marquardt (1996), innovation in the payments system can be usefully analysed in a risk-cost frontier framework.[28] Risks include the counterparties' credit and reputation as well as the security and reliability of a payment system or solution. Costs include not only fees but also implicit features of a payment instrument (such as costs related to providing convenience to users), real resource costs and financial costs.

As depicted below (see Figure 3), payment innovations shift the "social payment technology frontier" towards the origin (from point a[29] to b), allowing society to select a different mix of payments that allows a reallocation of resources in the economy to a situation with lower

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[27] Transaction costs include fees charged by a financial intermediary, as well as time, effort and money spent on gathering information and on bargaining and enforcing contracts.

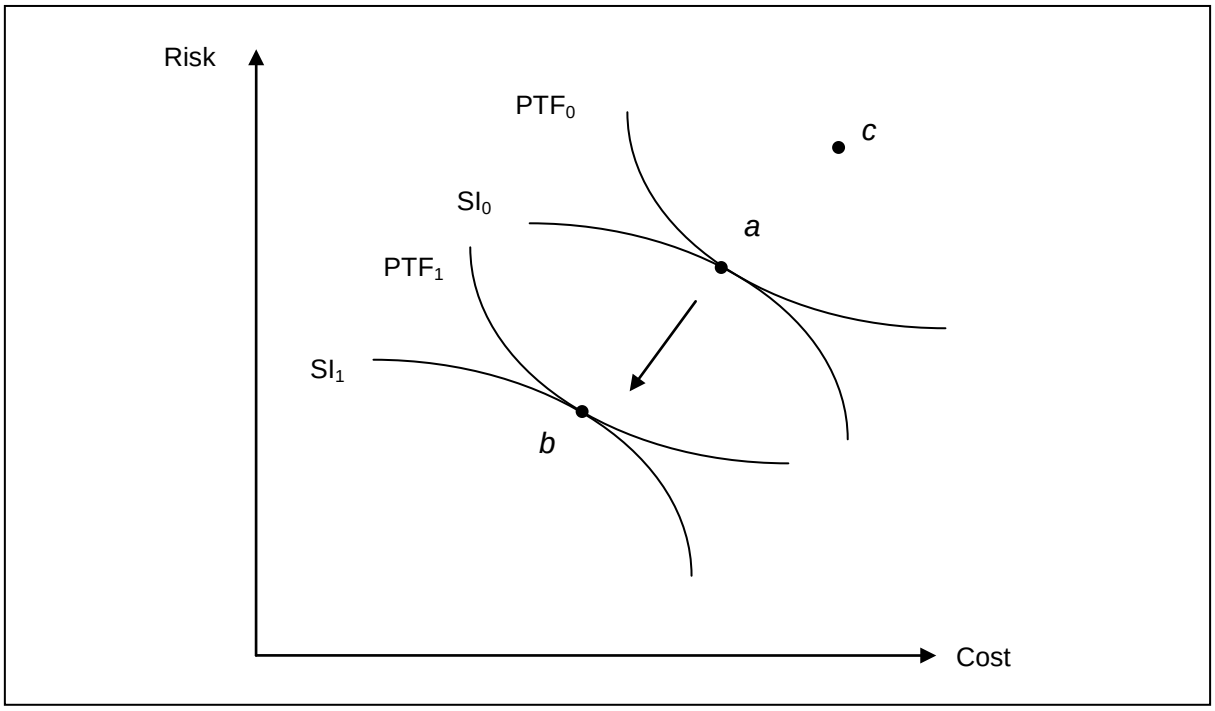
[28] A Berger, D Hancock and J Marquardt, "A framework for analyzing efficiency, risks, costs, and innovations in the payments system", *Journal of Money, Credit and Banking*, vol 28, no 4, 1996, pp 696–732.

[29] This point shows the social choice before an innovation. It is at the point of tangency of the efficient payment technology frontier (PTF_0), representing the social best practice from a technology, financial techniques and regulatory environment point of view, and the social indifference curve (SI_0), which represents the highest level of social utility that can be achieved given this frontier.

cost, lower risk or greater convenience. On the other hand, barriers to achieving optimal choices can prevent the social optimum from being achieved, and feasible but inefficient outcomes with higher risks and cost may also exist (as depicted at point c).

Figure 3

Social payment technology frontier



PTF = payment technology frontier; SI = social Indifference curve.

Source: Working group.

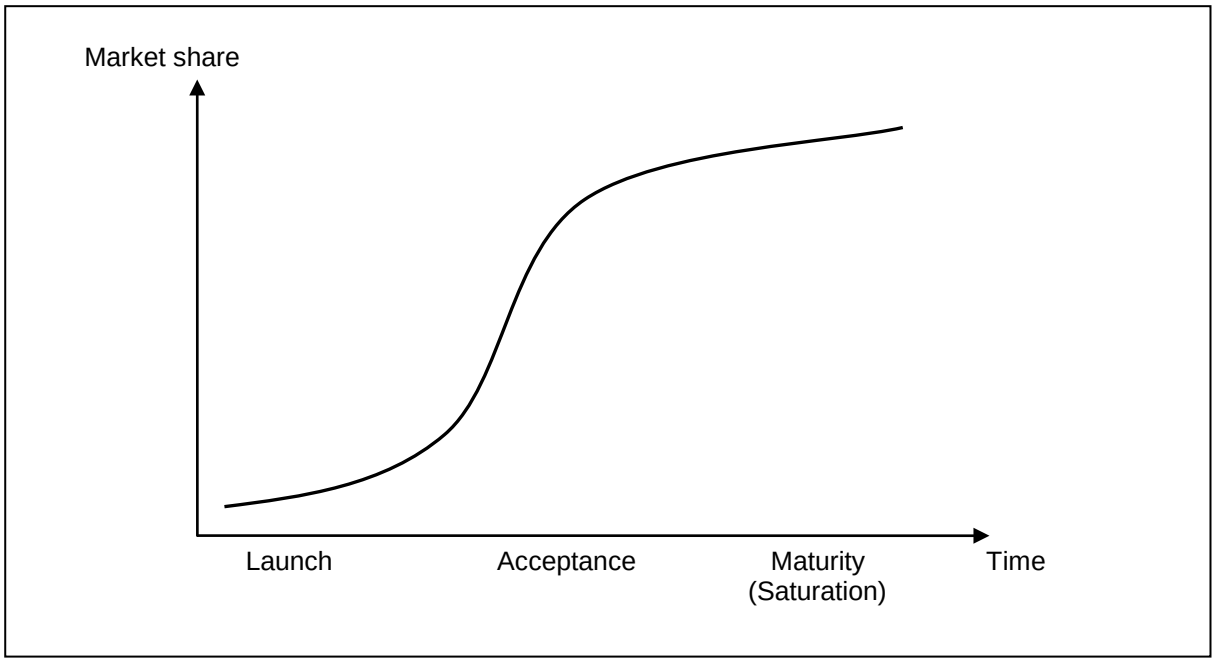
Despite the reduced risk and cost that payment innovations can provide, consumers may take a long time to make widespread use of them. Immediate adoption is slowed by a variety of transition costs and risks, such as lack of familiarity, barriers created by scale and network economies or delays from coordination problems. Such problems may take time to resolve.

Among others, Rogers has studied how technology adoption is spread over time, a process commonly referred to as diffusion.[30] In a typical case of a new technology that becomes successful, the adoption rate for innovations often follows an "S" or logistic curve (see Figure 4), which reflects consumers' differing appetite for adopting the new technology. As shown in the curve, a relatively small number of early movers typically adopt a new innovation when the product is launched. If the product is successful and reaches the acceptance stage, then the rate of adoption typically accelerates. As the innovation matures, the rate of adoption growth slows, as demand for the innovation reaches a saturation point. Market share at maturity varies depending on how universally applicable the innovation is, and on the definition of the market.

[30] E Rogers, *Diffusion of innovations*, fifth edition, 2003, The Free Press of Glencoe, New York.

Figure 4

Adoption of innovations by consumers



Source: Working group.

Box 4

Example of adoption and penetration of new payment instruments: debit cards in the United States

In the United States, debit cards are now the most widely used non-cash payment instrument. Debit cards are an example of a successful payment innovation taking hold over the past several decades, most notably as a substitute for a significant number of cash, cheque and credit card payments at the merchant point of sale and in remote payments initiated over the telephone or internet.

Debit cards for use on the shared ATM networks and credit card networks, and which accessed transaction accounts at deposit-taking institutions, first became available in the mid-1970s.[1] At the same time, merchant terminals that could accept these cards began to appear. Purchases by debit cards were relatively rare throughout the 1980s, but grew to about 1.4 billion in 1995, 8.2 billion by 2000 and almost 38 billion by 2009.[2]

It appears that critical mass for the debit card market was achieved in the mid-1990s when deposit-taking institutions began to widely offer signature network-branded cards to consumers, driven in part by the higher fees available through the credit card networks. On the merchant side of the market, a rapid period of growth in terminals, including those with both PIN and electronic signature-acquiring capability, began around 1995. After 2003, growth in the number of physical terminals stabilised, while at the same time growth in remote payments over the internet was expanding. In 2009, more than 60% of debit card transactions did not require PIN authorisation, and were authorised using either a signature or other means.

Survey information on US households suggests that while, by the 1980s, typical households owned bank-issued debit cards and might have been using them as ATM cards or "cheque guarantee cards", most were not using them to make debit card purchases.[3] In 1992, only 7% of households in the United States (corresponding to about 8.6 million households) said they used a debit card to make a purchase but, by 2001, some 42% (about 50 million households) were using them for this purpose, perhaps encouraged by the expansion of merchant terminals. By 2007, the proportion had increased to about two thirds (78 million households). Consumer adoption of debit cards thus probably did not reach a saturation point before 2008, and public information on debit card payments suggests that growth levels leading up to 2009 have been sustained through 2011.

It should be noted that, even several decades after debit cards were introduced, growth rates for this payment instrument in the United States have continued at a double-digit rate, illustrating the long transition that is often observed in the adoption of payment innovations.

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[1] During this period, debit cards also became available to access "money market accounts", offered by some stockbrokers.

[2] Estimates of debit card volumes exclude prepaid card volume and are from the *Federal Reserve Payments Study* (http://frbservices.org/communications/payment_system_research.html). Prepaid cards, a recent innovation, are considered debit cards in the US, and general purpose debit and prepaid cards offered by banks and non-banks use the same infrastructure.

[3] Estimates of consumer adoption of debit cards are from the *Survey of Consumer Finances* conducted by the Federal Reserve Board.

The network externalities that arise in retail payments have a strong impact on the incentives for adoption and the ultimate diffusion of technology.[31] The net social welfare of adopting a given technology often includes substantial transition costs. Consequently, the usefulness of incremental innovations cannot be ignored for dealing with the lock-in effect that might arise as a result of the network externality. Innovations that complement an underlying product

[31] See A Milne, "What is in it for us? Network effects and bank payment innovation", *Journal of Banking and Finance*, vol 30, no 6, 2006, for details of network effects and their impact on bank payment innovation.

innovation can often help spur growth by targeting certain barriers to adoption. Recognising transition costs as an important part of the social welfare analysis of a payment innovation also causes the timing of a transition towards a new innovation to be viewed as an important factor for maximising social welfare. Where payment solutions, systems and markets rely on technological infrastructures, improvements in technology can have a direct impact within the payments industry.

Innovation in retail payments adds to the set of payment options for consumers, allowing them to choose the most efficient and convenient way of paying and increasing competition. This, in turn, might result in savings for society as a whole. According to Humphrey et al (2003),[32] as a general rule of thumb, electronic payments[33] cost between a third and a half as much as paper-based payments. The authors conclude that moving from a wholly paper-based payment system to a nearly all-electronic system may save more than 1% of a country's annual GDP once transition costs have been absorbed. The Australian government (2006) commissioned a study of the impact of migration to electronic payments in Australia. They looked at five key areas of change and estimated that greater use of electronic payments could potentially save some USD 2 billion each year, which was equivalent to an increase of 25 basis points in GDP.[34]

The net aggregate societal cost of making payments is a recurring topic in the economic literature, and a significant number of contributions have tried to shed light on this debate.[35] One major theme is the persistence of paper currency despite advances in electronic technology and the increasing presence of the internet and electronic devices in developed and developing countries. The cost studies help to raise a general awareness of the cost of payments for different stakeholders. In general, they show that the total costs for making payments in a society generally have the potential to be reduced and individuals' choice of any payment method often generates costs for someone else. Empirical studies on the costs and benefits of payments provide evidence that electronic payments are usually the most cost-effective or even the optimal choice compared with paper-based payments.

Section 4: Drivers for and barriers to retail payment innovations

Based on the trends observed from the fact-finding and the economics of retail payments, this section classifies into exogenous and endogenous factors the different drivers for innovations and barriers to them. Exogenous factors relate to those that are determined

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[32] D Humphrey, M Willesson, T Lindblom and G Bergendahl, "What does it cost to make a payment?", *Review of Network Economics*, vol 2, no 2, 2003.

[33] The term "electronic payments" refers to payments that are wholly or partly processed electronically.

[34] Centre for International Economics and Edgar, Dunn & Company, *Exploration of Future Electronic Payments Markets*, report prepared for the Department of Communications, Information Technology and Arts (DCITA) and industry sponsors, 2006.

[35] A comprehensive survey and discussion of payment cost studies can be found in Bank of Portugal, "Retail payment instruments in Portugal: costs and benefits", 2007; National Bank of Belgium, "Coûts, avantages et inconvénients des différents moyens de paiement", 2005; M Bergman, G Guibourg and B Segendorff, "The costs of paying – private and social costs of cash and card", *Sveriges Riksbank Working Paper Series*, no 212, 2007; H Brits and C Winder, "Payments are no free lunch", *Netherlands Bank Occasional Studies*, vol 3, no 2, 2005; O Gresvik and G Øwre, "Costs and income in the Norwegian payment system 2001 – an application of the activity-based costing framework", *Central Bank of Norway Working Papers*; no 8, 2003; D Humphrey, M Willesson, T Lindblom and G Bergendahl, "What does it cost to make a payment?", *Review of Network Economics*, vol 2, no 2, 2003; K Takala and M Viren, "Efficiency and costs of payments: some new evidence from Finland", *Bank of Finland Research Discussion Papers*, no 11, 2008; and A Turján, "Costs of retail payment habits of the public sector", Magyar Nemzeti Bank, 2011.

outside the payment's ecosystem, notably technical developments, user behaviour and regulation. On the other side, endogenous factors are determined inside the payment's ecosystem, ie cooperation, standardisation, price structure and security. This classification is meant to be neither exhaustive nor mutually exclusive.

4.1 Exogenous factors for retail payment innovations

4.1.1 Technical developments

Technology is one of the fundamental catalysts for new or improved payment services and, consequently, the new business models that allow an innovation to be brought to the market. In retail payments over the past decade, the rapid growth in e-commerce has led, for example, to the creation of new payment methods aimed specifically at e-commerce and online P2P transactions. Moreover, higher penetration of mobile phones and smartphones, together with the associated infrastructure, has turned mobile phones into new access channels both for executing traditional payments (eg credit transfers) and for entirely new payment schemes. At the same time, NFC technology could make proximity payments even faster and more convenient.

Box 5

The diffusion of information and communications technology within the payments system

The Bank of Italy has recently surveyed firms and governmental entities on the use of electronic payments. The most frequently cited reasons for operating online are expectations of lower costs and enhanced operating efficiency. Less frequently cited reasons, except by firms that operate both domestically and abroad, are market-related factors and the aim of reaching new customers. The main remaining obstacles are the need for direct contact with the counterparty, the low number of online counterparties and the uncertainty as to counterparties' trustworthiness.

The survey also shows that, to increase the use of online banking services, firms consider the following factors important: clear trustworthiness of counterparties, standardised services, clear rules, saving of time, the modest organisational changes required in order to conduct transactions, and the strong incentives offered by banks.

The survey responses from government entities indicate that a good portion of the innovations in the public sector continue to be the result of legislative requirements.

4.1.2 The influence of user behaviour

The demand for certain types of services is the basis for a valid business case, either through the utilisation of potential revenues or through the realisation of economics of scale and scope in producing the services. Therefore, user behaviour is probably the most important driver for innovation. As the fact-finding shows, innovations in the area of retail payments are strongly driven by end users' need for payment instruments that are more secure, efficient and convenient. For example, (i) growth in e-commerce has resulted in growing demand for innovative payments; (ii) end users are continuously looking for more convenient ways of making payments; and (iii) growing security concerns among end users have pushed service providers to develop and implement enhanced security measures. In contrast, a misleading evaluation of user behaviour is likely to deter users from taking up an innovation (see Box 6 on lessons learned from unsuccessful innovations).

Every payment instrument has different security, convenience and efficiency characteristics. These are often perceived differently by different players. However, merchants and consumers generally prefer to accept or choose payment instruments that deliver the most

benefits, and they are unlikely to change such preferences in the absence of some significant expected advantages.

From a consumer perspective, the relevant factors include:[36] (i) ease of use (convenience); (ii) speed of the payment process; (iii) protection against the default of parties involved in the payment process and against security breaches;[37] (iv) acceptance by merchants; (v) lower costs; and (vi) enhanced data privacy[38] and anonymity. In general, individual behaviour can be explained by the following four factors:[39]

- The peculiarities of specific payment instruments.
- Demographic factors, eg age, education, income level.
- Transaction characteristics, ie transaction amount, type of goods, location.
- Financial incentives, ie transaction charges, discounts, reward programmes.

The use of payment instruments can be considered a complex but rational process. Consequently, behavioural changes might only be expected in the following cases: (i) new opportunities eg created by new technologies; (ii) different strategies on the part of payment service providers and merchants; and (iii) positive learning effects, benefiting from experiences in new environments (eg e-commerce).

In the same way, merchants may decide to offer a variety of payment options according to various criteria, such as speed, cost, convenience and security. Additional factors include the access channel through which the transaction occurs, eg at the POS, via mail, telephone or internet, and the main customer group and the number of customers actively using the payment instrument. With regard to costs, substantial differences might be identified depending on the scale of the merchant's business. Moreover, adoption costs, such as the need to upgrade terminals to accept new payment instruments, might play an important role in the decision-making process. Customer preferences might be reflected mainly in the relative intensity of use. Therefore, the more consumers use a specific instrument, the more it is valued by merchants.[40] Owing to the two-sided nature of the payment market, merchants may also adopt a more costly instrument if they believe that customers will prefer its use.

In the case of e-commerce, buyers and sellers may have no face-to-face or other contact. In addition, the relationship between buyer and seller is often short-lived. Moreover, unlike for proximity purchases, there is a difference between the points in time (i) when the order is placed by the buyer, (ii) when the payments are made, and (iii) when the goods are delivered to the buyer. To reduce the risk of not receiving the ordered goods or the money, customers would ideally prefer delivery before payment, while merchants would prefer payment before delivery. In addition, merchants will prefer solutions that offer interfaces to their existing applications, thereby keeping integration costs low. Innovations may provide new

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[36] See eg Deutsche Bundesbank, *Payment behaviour in Germany – an empirical study of the selection and utilisation of payment instruments in the Federal Republic of Germany*, 2009.

[37] A survey by the French Observatory for Payment Cards Security in 2010 showed that new authentication systems would encourage about one fifth of the consumers that responded to the survey to make more purchases.

[38] A survey by the Reserve Bank of Australia in 2010 showed that the survey participants considered improved privacy to be a fairly important factor that could encourage them to make more payments online than currently.

[39] See also A Kosse and D Jansen, "Choosing how to pay: the influence of home country habits", *Netherlands Bank Working Papers*, no 528, December 2011.

[40] See C Arango and V Taylor, "Merchant acceptance, costs and perceptions of retail payments: a Canadian survey", *Bank of Canada Discussion Papers*, 2008-12.

opportunities by better balancing the interests of consumers and merchants in such an environment. Furthermore, an increase of cross-border e-commerce might stimulate the development of new or improved payment products. Some studies indicate that, due to a different range of accepted payment instruments and differences between domestic and cross-border consumer demands (ie regarding safety and security), the payment solutions currently offered for cross-border online shopping often do not satisfy consumers' needs.[41] Closing this gap might be an interesting business case and therefore a driver for innovation.

Box 6

Lessons learned from unsuccessful retail payment innovations

During the mid- to late 1990s, a large number of card-based electronic money products were launched in various countries, many of which have either been terminated or have lost momentum. Some of these have been reported by the working group members as failures, and these give valuable insights on the success factors for innovation.

One example is a stored-value electronic money card that was co-badged with a leading international debit card brand and could be loaded at most ATMs in the country. Despite such factors catering to the convenience of cardholders, the card had some disadvantages for the consumer. The stored value on the card did not pay any interest and was irrevocably gone in case of a card loss. Merchants were required to install a separate electronic money terminal to accept the card – a disadvantage that may not have justified the expected benefits. Consequently, merchant acceptance of the card remained low relative to other payment instruments. Moreover, the card option could not be used at most payment points where the card could have had a clear comparable advantage (in convenience) over coins.[1] Hence, the use and acceptance of the card remained low.

Another example is a standalone electronic purse scheme aimed to offer a product that would save time and lower risks for both merchants and consumers, cut costs for merchants, and reduce the need for cash management. However, merchants doubted the benefits from this scheme, and most of the large merchants did not accept the card on the grounds that they did not believe in the product. Given this, few small or medium-sized merchants were willing to subscribe to the scheme. The scheme was also burdensomely slow to use and badly integrated into the merchants' payment infrastructure. After some initial experimentation, consumers could see no advantages vis-à-vis classic payment methods and soon stopped using the card, and shortly thereafter the scheme was abandoned.

Several lessons can be learned from these and other examples. First, products that do not fulfil a specific demand from both consumers and merchants, or fail to meet their expectations, will most likely fail to achieve a critical mass on either side of the market. As a result, neither accepting merchants nor consumers can benefit from positive network externalities that are common in prospering two-sided markets. Nor will they benefit from scale economies. Finally, innovations launched by incumbents in the payments market face the same disadvantage as a new player in that they may find themselves competing against the incumbents' own well established products.

[1] For example, unmanned sales points such as parking meters and ticketing or vending machines where consumers need to produce the correct amount of coins for a purchase and where consumers do not have an alternative to cash.

The following sections on demand for real-time or near real-time payment processing, public transport and financial inclusion could be considered as a dimension of user behaviour, but these topics deserve to be covered separately owing to their specific importance.

[41] See N Jonker and A Kosse: "Towards a European payments market: survey results on cross-border payment behaviour of Dutch consumers", *Netherlands Bank Occasional Studies*, 1-2008.

4.1.3 The demand for real-time or near real-time payment processing

Real-time or near real-time payment processing represents one example of a successful implementation of a demand-oriented business case. Most retail payment instruments involve a certain processing time that results in settlement lags. Settlement lags give rise to counterparty credit risk and liquidity risk. For example, a merchant who has sold a product to a customer paying with credit transfers faces the risk that the transaction amount will arrive in his/her account either late (liquidity risk) or not at all (counterparty credit risk). Speeding-up of payment processing can mitigate these risks. It also gives financial intermediaries less scope for exploiting liquidity caused by processing delays (bank float) at the expense of the users. Speeding-up of processing may also increase cost efficiency by (i) shifting customers to more efficient access channels for initiating payments (eg from paper to internet); (ii) modernising and consolidating the payment infrastructure (eg establishing economies of scale); and (iii) facilitating straight through processing (STP), thereby cutting processing costs, especially if the use of cash is reduced. In recent years, some public authorities have intervened to foster faster payments.[42] It should be noted, however, that the business case for the speeding-up of payment processing is not universal. Many payments are made, for example, on a periodic basis to parties with whom there is an existing relationship and very low risk. Moreover, faster payments might involve higher processing costs or greater operational risk. The fact-finding shows that three approaches are commonly used to increase the processing speed of retail payments.

(i) The use of RTGS systems

Many countries use RTGS systems to settle aggregated interbank obligations arising from the clearing of retail payment systems, but such systems are not geared towards settling individual retail payments (especially very low-value transactions). Nevertheless, in some countries, RTGS systems do play a prominent role in settling retail payments (see Box 7).

[42] See also B Summers and K Walls, "Emergence of immediate funds transfers as a general-purpose means of payment", *Economic Perspectives*, Federal Reserve Bank of Chicago, Third Quarter, 2011.

Box 7

Use of RTGS systems for retail payments

Mexico

In 2004, the Bank of Mexico launched a new RTGS system (Sistema de Pagos Electrónicos Interbancarios or SPEI) with liquidity-saving features that run multilateral netting every few seconds. Over time, this system has come to be used more as a system to settle retail payments between private persons than large-value payments related to financial market transactions.[1] In the process, SPEI has significantly helped to improve efficiency in the Mexican payments system by replacing cheque payments.[2] In the last five years, the population of internet banking users has grown by 19%, helping to boost the number of SPEI transactions. In 2011, SPEI settled an average of about 400,000 transactions per day, of which more than 85% were for amounts of less than USD 8,270.[3]

SPEI ensures the timely processing of retail payments. The relevant rules state that SPEI participants must (i) ensure that payer banks send payments to SPEI within 30 seconds after accepting an instruction from a customer; and (ii) ensure that payee banks credit beneficiaries' accounts within 30 seconds after receiving SPEI's settlement notification. Non-bank financial institutions are allowed to participate in SPEI.

Switzerland[4]

In Switzerland, almost 90% of all payments settled in the RTGS system (Swiss Interbank Clearing or SIC) were for amounts of less than CHF 5,000.[5] Over the past decade, most automated clearing houses in Switzerland have been phased out, and these payments are now settled on a gross basis in SIC. These developments were supported by (i) improvements in information technology (enhancing processing capacity); (ii) more efficient settlement mechanisms, including liquidity-saving features; and (iii) a fee structure that encourages the overnight settlement of smaller payments. In Switzerland, the integration of retail payments into the RTGS has (i) allowed substantial economies of scale (reducing the average settlement cost in SIC to less than CHF 0.05); (ii) eliminated credit risk in interbank clearing by providing real-time finality for all payments; and (iii) streamlined operations, since banks need only one interface for all Swiss payments.

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[1] See J Negrin, D Ocampo and A de los Santos, "Recent innovations in inter-bank electronic payment systems in Mexico", *IFC Bulletin*, no 31, July 2009.

[2] The share of SPEI payments in all non-cash interbank transactions increased from 1.2% in 2005 to 9.1% in 2010, whereas the share of interbank cheques went down from 34.6% to 13.4% in the same period.

[3] USD 1 = MXN 12.0918 (average of the exchange rate published by the Bank of Mexico between 1 January and 11 October 2011).

[4] See P Haene, "Retail payments in large-value payment systems – towards a coherent strategy", *SPEED*, vol 5, no 3, 2011.

[5] CHF 1 = USD 0.908 on average in November 2011.

(ii) Improving or creating a new retail payment system that settles in real time or near real time

Retail payments are often processed by dedicated retail payment systems, such as ACHs. Typically, these systems have not provided same day settlement. However, retail payment systems have been enhanced in a number of countries to include same day settlement cycles. In Hong Kong SAR, for example, the same day bulk settlement run offered by the clearing house has moved more than half of the interbank settlement from T+1 to T+0.

Moreover, some countries have even introduced more frequent same day settlement cycles during the day. In the Netherlands in 2001, the ACH changed its clearing and settlement

cycle from twice a day to every 30 minutes.[43] In India, the National Electronic Funds Transfer (NEFT) system processes retail payments throughout the day with settlement on a near real-time basis (facilitated through 11 hourly settlements in the day).[44]

Furthermore, some countries have developed new retail payment systems that work in real time or near real time. Examples of these systems include the Faster Payments Service in the United Kingdom (see Box 8) as well as similar services in China, South Africa and Sweden (forthcoming). Setting up a new retail payment system settling in near real time or real time in addition to an RTGS system may contribute to competition in the payment systems market but may also require public authorities to play a catalytic role due to the significant investments required.

Box 8

Faster Payments Service in the United Kingdom

The Faster Payments Service (FPS) is an automated clearing and settlement system for sterling-denominated credit transactions in the United Kingdom. FPS clears transactions in near real time through deferred multilateral net settlement and offers 24/7 clearing with settlement over Bank of England (BOE) accounts performed three times a day on bank working days. The key innovations offered by FPS are that it operates on a 24/7 basis, and that the settlement cycle time is reduced from three days (as is the case for the Bankers' Automated Clearing House (BACS) and the Cheque & Credit retail schemes) to a few hours. FPS was introduced following concerns raised by the Cruickshank Report and the Office of Fair Trading (OFT) Payments Systems Task Force (PSTF) on the efficiency of retail payment provision in the UK.

End users are household and corporate customers, making payments by phone or over the internet. Currently, payments are subject to a limit of GBP 100,000 per transaction, although this may be increased in the future. Settlement banks submit payments to the central infrastructure, which are then passed on to the receiving bank for authorisation/acceptance. Once accepted, the net balances of the sending and receiving banks are updated. At the end of each cycle, multilateral settlement takes place across settlement members' accounts held with the BOE's RTGS system. Net balances are communicated between members, the central infrastructure and the BOE via SWIFT messages.

In each settlement cycle, members' net balances are subject to Net Sender Caps, limiting the credit risk taken on by the other members during each cycle. The cap is calculated using a formula based upon past volumes of transactions, and varies from member to member. Members are notified if they are approaching their cap limit in a particular settlement cycle, and they cannot send any further payments once their limit has been reached (if payments are received, the net balance is reduced and they can therefore recommence sending payments). Under the default arrangements, all member banks commit liquidity and pledge collateral held at the BOE that is sufficient to cover the single largest cap in the event of a member default.

(iii) New solutions by PSPs

PSPs offer some new solutions that provide real-time or near real-time payments between end users. These solutions are either (i) services based on electronic money, often provided by new players in the market, or (ii) services offered by a bank that allow for real-time transfers only between its account holders. Both solutions are "closed" systems, since payment transfers can only be executed among the respective service users or account holders. For electronic money-based services, it is important to note that electronic money

[43] Operation hours are from 07:30 to 17:00.

[44] The system also provides a seamless interface for transferring funds from one bank account to another, where funds transfer on a customer-to-customer basis generally takes around two hours. In addition, it facilitates one-way outward remittances to Nepal, and has also been put into operation in Bhutan recently.

generally does not provide liquidity that can instantly be used outside the electronic money scheme. For this purpose, electronic money funds may need to be transformed into cash or into deposits that require additional time for clearing (generally much more than one day).

4.1.4 Public transport as a trigger for innovation

With the introduction of smartcards at the end of the 1990s, public transport companies started to implement smartcard payments and ticketing solutions with a view to achieving a more efficient payment and ticketing process. The pioneer was the Octopus Card in Hong Kong in 1997. It was followed by the SmarTrip in Washington DC in 1999, Suica in Tokyo and EZ-link card in Singapore (both in 2001), the Oyster Card in London in 2003, the T-Money in Seoul in 2004 and OV-Chipkaart in Rotterdam in 2006. Now, the use of smartcards is becoming increasingly common in public transport systems worldwide. However, from the payment instrument perspective, most of these public transport smartcards are single-purpose, ie limited to use on public transport. Only a few have evolved from single-purpose into multipurpose cards that are accepted for a range of different payments beyond public transport. This type of evolution could respond to a user need for more convenient and faster payments. For the transport companies as well as merchants operating in and around stations, the incentive is to benefit from scale economies through larger payment volumes, which feed through into lower costs or higher revenues. Public transport companies, for example, may try to boost their core business (eg to bring in more passengers) by making the smartcards available for purchases at merchants operating in and around their stations.

However, even though smartcard payment and ticketing solutions are very attractive for public transport companies, the question arises why they have not led to the introduction of multipurpose payment instruments in most cases. One explanation might be that successful multipurpose payment instruments seem to benefit from high-density metropolitan areas, since this supports the utilisation of network effects. Moreover, the lack of cooperation between different ticketing solutions could severely hamper such evolutions. In addition, merchants and consumers might prefer transport companies to adopt existing card schemes, such as credit and debit card schemes. For example, major credit and debit card schemes are under consideration by the Washington DC and New Jersey transportation authorities as payment methods for train and bus fares. Other issues that need to be considered by public transport companies intending to make their smartcards multipurpose include the following: (i) related stakeholders may need to be brought into the governance structure of the electronic money card scheme, thus reducing the transport companies' influence over the scheme; (ii) the transport companies may need to introduce technical standards that are unattractive or not cost-effective for them; and (iii) they may become subject to supervision by authorities since the regulatory requirements for card schemes can differ between single-purpose and multipurpose instruments.[45]

[45] In Japan, the transport companies were obliged to increase the customer protection measure of prepaid multipurpose cards beyond the level required for cards that are used solely to pay for public transport.

Box 9

Octopus Card in Hong Kong SAR

Issued by Octopus Card Limited (OCL), the Octopus Card scheme is owned by the five major transport operators in Hong Kong SAR. It started out as a single-purpose public transport card. With its growing popularity, OCL obtained a special-purpose deposit-taking company authorisation from the Hong Kong Monetary Authority (HKMA) in April 2000 to formally expand its business scope to retail payments. Over the years, OCL has introduced various add-on services to help bring more convenience to its cardholders and further expand its customer base, including the Automatic Add Value Service and the Octopus Rewards programme. In 2010, there were more than 21 million Octopus cards in circulation, with over 11 million transactions worth a total of more than HKD 100 million per day.[1] Around 40% of OCL's transaction value came from non-transport-related payments.

A number of factors have contributed to OCL's successful transformation of its transport cards into multipurpose instruments. First was its ability to build a critical mass from the start – around 3 million cards were sold within the first three months of launch. Given Hong Kong's small market size, the Octopus Card's extensive coverage has made it easy for OCL to establish a business case for expanding its usage beyond the transport sector. Second, the popularity of the Octopus Card and its fast processing speed helped attract retailers and, at the same time, improve their efficiency at the cash desks. Third, consumers considered the Octopus Card to be more convenient than cash or credit cards for low-value payments at the POS. Last but not least, OCL was able to build public confidence in the Octopus Card.

Following its success in Hong Kong SAR, OCL is looking to expand its business to cross-border payments. In 2011, more than 35 outlets in neighbouring Shenzhen accepted the Octopus Card. Moreover, OCL signed a framework agreement with GDPass Payment Network Co Ltd in August 2011, aiming to jointly develop and issue a co-named two-in-one card that can be used for both retail and transport offered by the two companies in Hong Kong SAR and selected Guangdong cities in 2012.

[1] The Hong Kong dollar is pegged to the US dollar at approximately USD 1 = HKD 7.8.

Multipurpose payment instruments do not necessarily have to start out in a single-purpose format. In Japan, mobile phone operators and large retailers, for example, have successfully established multipurpose electronic money schemes without evolving them from single-purpose instruments. Specifically, large retailers can take advantage of lower costs in cash management as well as offering loyalty programmes with a lock-in effect on potential customers. In effect, merchants can use electronic money to boost their core business, thus offsetting the lack of scale economies during the early stages of card diffusion. As the number of accepting merchants increases, the pace of penetration speeds up. This, in turn, widens the scope for using electronic money. Interoperability of terminals among electronic money schemes is also on the increase, which helps to further popularise the use of electronic money.

4.1.5 Innovation and financial inclusion

This section touches on the issue of demand for payment services, but one that the market has often failed to meet.

Significant segments of the population either have no access to banking services or can deal only with informal community-based financial service arrangements that are typically

inefficient.[46] It is for these "unbanked or underbanked"[47] segments of the population that financial inclusion aims to improve access to financial services.[48] For example, financial inclusion seeks to help wage-earning adults who need to remit money to family members in their home country (ie remittances[49]). For the government, financial inclusion improves the efficiency of social benefit distribution (eg health-related payments, unemployment benefits, pensions and scholarships) to the unbanked or underbanked.

Table 2

Selected banking infrastructure and access metrics

Region	Household penetration: deposit accounts (%)	Deposit accounts per 1,000 adults	Bank branches per 100,000 adults	ATMs per 100,000 adults
High-income countries	91	2,022	32	94
East Asia and Pacific	42	1,756	15	11
Europe and Central Asia	50	1,330	18	50
Latin America and Caribbean	40	1,140	14	31
Middle East and North Africa	42	818	17	28
South Asia	22	317	7	4
Sub-Saharan Africa	12	163	3	5
All developing countries	nav	737	10	29

Source: Consultative Group to Assist the Poor and World Bank, *Financial Access 2010*.

Although there is a huge demand for such financial services, payment services to the unbanked or underbanked generally do not present an attractive business case to PSPs for the provision of traditional payment instruments requiring access to a bank account. First, payments made by the unbanked or underbanked tend to be irregular and/or of small value. Second, this market sector will not bear substantial fees or allow large minimum balances to be maintained. Third, in some cases, solutions for the unbanked or underbanked would

[46] See D Collins, J Morduch, S Rutherford and O Ruthven, *Portfolios of the poor – how the world lives on less than $2 a day*, Princeton University Press, 2009.

[47] The composition of the unbanked or underbanked population varies from country to country. It typically comprises low-income groups, residents of certain geographical areas of the country and specific groups such as (internal) migrants, refugees and ethnic minorities.

[48] The United Nations Department of Economic and Social Affairs and the United Nations Capital Development Fund (see *Building inclusive financial sectors for development* (the *"Blue Book"* (2006)) define financial inclusion indirectly by defining an inclusive financial sector as one that provides access to everyone who is eligible. The United Kingdom's Treasury Committee defines financial inclusion as the ability of individuals to access appropriate financial services and products. India's Rangarajan Committee on Financial Inclusion defined financial inclusion as the process of providing affordable financial services to all eligible sections of society.

[49] The term "remittances" refers to cross-border P2P payments of relatively low value. In practice, the transfers are typically recurrent payments by migrant workers.

require PSPs to comply with "know your customer" (KYC) requirements or anti-money laundering/financing for terrorism regulation. A more promising business case could be created by innovative developments aimed at providing cheaper and/or simpler services. Such developments could include: (i) special bank accounts and/or prepaid accounts; (ii) the use of business correspondents/agents; and (iii) new means of initiating and authenticating transactions. A combination of some or all of these innovations[50] has been used to meet the needs of the unbanked or underbanked. The major advantage of these developments is the scope for conducting payments and transferring money in the non-cash sector without the need for customers to maintain a bank account.

The unmet demand for financial services from the unbanked or underbanked part of the population is a driver for innovation in that it constitutes a potential business case. However, it is not guaranteed that the market can provide such solutions. A poor business case, or market failure or regulatory obstacles, might prevent the market from realising such developments. In such situations, there might be a role for government if it aims to increase welfare (see also Section 3.2). To address these issues, efforts are needed from both public authorities and the PSPs or other stakeholders. Financial inclusion can thus be a driver for public sector innovation.

(i) Special limited-service bank accounts or prepaid accounts with non-banks

To address the relatively high cost of a standard bank account, banks have developed limited-service bank accounts that offer payments-only services without chequing facilities or overdrafts. In some jurisdictions, non-banks can offer prepaid accounts. These are structured as bank accounts where a customer prefunds the account and can draw on it up to the balance deposited there.

Both the limited-service and prepaid accounts have simpler KYC requirements than traditional bank accounts and thus reduce account maintenance costs for customers. However, they do not necessarily represent a viable solution for banks and non-banks, as the balances and transaction levels of such accounts could be low.[51] For customers, moreover, limited-service bank accounts do not address the issue of indirect costs for accessing payment services.

(ii) Business correspondents/agents

Business correspondents/agents[52] have existed in some form for many years, but innovations have made it possible for them to equip themselves with appropriate tools and products to better serve both their principals and their customers. Business correspondents/agents are individuals, local businesses or corporations that can cost-effectively interact with customers at a designated place. They provide the principal entity with an alternative to a traditional branch, or to retailers' ATM and POS terminals.

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[50] The People's Bank of China addressed the problem through a coordinated action together with banking institutions to give more people in rural areas access to a bank account. Local government departments could send payment orders to a third-party service provider, which uses a specialised network to link the departments to the banking institutions involved. These measures are intended to improve benefit flows.

[51] See S Thyagarajan and J Venkatesan, *Cost-benefit and usage behaviour analysis of no frills accounts*, Institute for Financial Management and Research, India, 2008.

[52] Business correspondents/agents, for the purpose of this report, are defined as entities that provide payment transaction services on behalf of a principal, typically a bank. These transaction services often include cash withdrawals from and deposits into an account maintained with the principal, loan disbursement and repayment, and bill payment services. In many countries, the terms "business correspondents" and "agents" are used interchangeably.

(iii) New means for transaction initiation and authentication

As devices and channels for accessing special bank accounts or electronic money, mobile phones and mobile networks are a convenient tool for both customers and business correspondents/agents as a means of initiating transactions. Customers can use the mobile phones[53] they already have, while business correspondents/agents can use them as a substitute for POS terminals. Innovations in the field of biometric authentication can help overcome low-literacy issues, while smartcards can support offline authentication, thus obviating the need for costly real-time online communication infrastructure.

[53] Depending on the type of product, a new SIM card or application may need to be installed in the mobile phone.

Box 10

Solutions for the unbanked or underbanked – two examples

M-PESA in Kenya

In March 2007, M-PESA was launched in Kenya as a joint venture between Vodafone and Safaricom (a Kenyan mobile operator) backed by Commercial Bank of Africa. M-PESA gives the unbanked or underbanked population access to basic banking services without the need for its customers to hold an actual bank account. Currently, M-PESA has more than 15 million registered customers and over 35,000 agents in Kenya. This exceeds the reach of any other financial service in Kenya. Reasons for the broad adoption of M-PESA include the urbanisation of the Kenyan population, economic development and a drive for financial inclusion.

Based on SMS technology, M-PESA lets users make four basic types of transaction: (i) P2P transfer; (ii) P2B transfer; (iii) cash deposits and withdrawals at designated outlets; and (iv) loan receipts or repayments. Individuals register with M-PESA using an official form of identification. Cash deposits are converted into a commodity called "e-float" that is denominated in the same units as the domestic currency. Agents facilitate the conversion of cash to e-float and vice versa. M-PESA users can then use their mobile phone to transfer money to another mobile phone user, regardless of the recipient's mobile operator.

M-PESA was later implemented in Tanzania, Afghanistan, Fiji and South Africa, with country-specific functionality. These schemes are run by Vodafone through its subsidiaries in the respective countries and supported by a domestic commercial bank. M-PESA users must be in possession of the country-specific SIM (Subscriber Identity Module) card from the local Vodafone subsidiary to use the service. In most of these countries, mobile phone coverage far exceeds the banking industry's footprint, making it a viable option.

Business correspondents in Brazil

Business correspondents play a unique role in providing access to financial services to the unbanked or underbanked, improving financial inclusion in Brazil. When business correspondents first appeared in the 1970s, they were only allowed to engage in the recovery of securities and the execution of payment orders on behalf of the contracting bank. In 1999, they were allowed to expand their services to include: (i) receiving and referring applications for opening demand, fixed-term and savings deposit accounts; and (ii) taking receipts and payments for demand, fixed-term and savings deposit accounts, as well as investments in and redemptions of investment funds. At first, these new services could only be delivered by business correspondents in areas without bank branches, but this restriction was removed in 2000, which has led to a dramatic improvement in access to financial services and also added competition in the market. In February 2011, business correspondents were allowed to engage in foreign exchange business up to a limit of USD 3,000 per transaction or the equivalent in other currencies.

Since 2002, every municipality in Brazil has had access to financial services. The number of business correspondent service points has grown steadily over time, and every region has better access to financial services. Business correspondents have thus become the most used access channel for credit transfers and the payments of public utility and other bills. They are also used by government agencies to pay social benefits.

Business correspondents play a particularly important role because they allow banks to expand their services without adding branches. However, it should be emphasised that these services are the sole responsibility of the principal banks. Moreover, the principal bank is required to inform customers that an affiliated business correspondent is acting on its behalf, ie the bank continues to be liable for the transactions carried out by its business correspondents.

4.1.6 The role of regulation

Regulation may affect the potential demand for payment innovations or their expected production cost. This may expand or reduce the set of potential business cases for new

services. In that respect, regulation might be considered as either a driver for or a barrier to innovation.

There are two prominent rationales for regulating the payments market. First, regulators wish to ensure that the market is secure, since payment services need to be trustworthy in order to be accepted. [54] For example, in some countries regulations allow only banks to offer payment services. Second, regulators aim to increase market efficiency. For instance, (i) as payment markets tend to be oligopolistic, regulators may try to open them up to new suppliers by easing the requirements on suppliers or, (ii) as the redistribution of costs and revenues between various stakeholders may be perceived as inefficient, regulations may intervene in fee arrangements such as interchange fees.

Recent experience has shown a tendency for regulators to place a stronger emphasis on payments efficiency, notably by tasking innovation (see Annex 4 for major regulatory developments in the CPSS countries). This has entailed:

- *Improving competition by opening up the payments market to non-banks.* In many countries, the entry barriers to the payments market were lowered. In the European Union, a new type of non-bank institution[55] can provide payment services. In Japan, non-banks are allowed to provide funds transfers. In India, non-banks are permitted to offer prepaid payment solutions, such as cards and mobile payments. In South Africa, non-banks can become designated clearing system participants and have full access to the clearing system provided that they meet the central bank's requirements.
- *Government as a direct promoter of innovative payment services.* In Korea, the government has supported innovative payment services by introducing new rules for electronic payments and a registration system for using EBPP services for tax payments. In Brazil, after a central bank initiative to identify inefficiencies in the payments market, the private sector introduced EBPP and a new national debit card scheme, and the establishment of bank agents was encouraged.
- *Financial inclusion as a driver for innovative payments.* The objective is to better integrate unbanked or underbanked people into the financial sector. In Mexico, requirements were relaxed for opening and using certain types of low-cost deposit banking accounts that have monthly deposit limits to avoid money laundering and balance limits according to the level of the customer's identification. In Russia, "payment agents" were introduced to extend the cashless payment infrastructure to people in rural areas. In both countries, legislation paved the way for these developments.

Two approaches using regulation to promote innovation can be observed. The first is a proactive ex ante approach. One example is the first version of the E-Money Directive adopted by the EU in its Directive of 2000. In hindsight, however, this measure has turned out to be a barrier to innovation by setting overly strict legislative hurdles. Consequently, the directive was revised in 2009 to allow for less stringent requirements. Alternatively, regulators can adopt a more cautious wait-and-see approach, taking necessary action only after specific developments have been identified. Both approaches have advantages and

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[54] Examples of regulations include licensing and/or registration requirements, capital requirements, operational requirements, anti-money laundering requirements, and reporting requirements for PSPs. PSPs are normally subject to examination or inspection by authorities, and to users' rights and obligations.

[55] According to the Payment Services Directive (2007/64/EC), it is possible for payment institutions and electronic money institutions to offer payment services. They are subject to less restrictive licences and need to meet a lower regulatory burden than institutions with a full banking licence.

drawbacks. On the one hand, it is difficult for regulators to predict the future consequences of their decisions. Moreover, such an approach might lead to a higher regulatory density. On the other hand, in the case of the second approach, regulators might not be able to react swiftly enough once certain developments have occurred. In both cases, it seems necessary to monitor the regulatory framework at certain intervals to assess whether it is still appropriate for the retail payment market. In either case, the speed of innovation is a major challenge for regulators as it makes the payments market a moving target.

4.2 Endogenous factors for retail payment innovations

4.2.1 Role of cooperation

Innovations often require substantial fixed investment costs, although there is no guarantee that the new product or process will attract sufficient demand or establish itself vis-à-vis competitors over the long term. Cooperation could help to overcome this obstacle, by helping to reduce costs (eg through shared investment or economies of scale and scope) or by ensuring sufficient demand (eg by increasing the pool of potential customers or through integration of additional services). Moreover, innovation in retail payments often involves many participants. Thus, cooperative arrangements may be the only way to make progress. In this respect, a distinction can be made between horizontal and vertical cooperation.

Horizontal cooperation. To achieve scale economies, cooperation between competing parties might be needed eg between mobile network providers or card schemes to achieve interoperability of terminals. However, in many such cases, these issues cannot be solved by the respective mobile network providers or card schemes alone. Instead, all relevant PSPs and related parties must be involved in removing technical obstacles and developing a harmonised security certification framework.[56] Other examples of horizontal cooperation include the setting of common standards in order to allow interoperability among individual systems or the joint development and operation of retail payment systems to share costs and increase returns.

[56] The European Payments Council (EPC) cooperated with relevant stakeholders – for example, in creating a pan-European certification framework that contributes to greater security and efficiency in the card market.

Box 11

Cooperative efforts in the Netherlands: iDEAL

The introduction of iDEAL

In October 2005, three major Dutch banks decided to collectively issue and acquire one bank account-based online payment solution for online purchases. As a result, all consumers with internet access to a bank account at one of the three participating banks could pay via the iDEAL solution. In 2006, the three banks decided to transfer the ownership of the iDEAL standard to Currence, the scheme owner of all national payment instruments in the Netherlands, and soon the other Dutch banks also joined iDEAL.

Cooperation as an important factor of success

Since its introduction, iDEAL has rapidly grown into a widely accepted means of payment. Its familiarity, safety and ease of use for payers and the immediate payment confirmation and guarantee for payees have contributed to its success. However, the most important success factor to note is that iDEAL was set up as a scheme in which all major banks in the Netherlands participate. This helped to remove the chicken and egg dilemma following the scheme's startup. It is worth noting that a similar standard had been previously launched by a single bank in 2003. At that time, however, the standard did not really take off, mainly because the potential customer base was limited to customers of this one bank. By contrast, iDEAL is an example of individual banks joining forces to adopt a single standard aimed at increasing network effects. As a result, iDEAL can be used at all Dutch online stores, and by any Dutch bank customer, regardless of which bank the customer holds his/her account at.

Vertical cooperation. The greater complexity of innovations increases the need for cooperation among all stakeholders in the payments chain (ie vertical integration). For example, innovative payment solutions used at the POS require cooperation between parties such as NFC chip and terminal manufacturers, mobile phone manufacturers, mobile network operators, application providers and PSPs. The mobile network operators, for example, provide access devices and channels and are experienced in providing subscriber acquisition and authentication, but they lack the financial and risk management expertise to handle payment services. In order to leverage each party's expertise, extensive cooperation becomes essential. However, this also creates challenges. First of all, the complex negotiation process among the various parties involved may cause the market to fragment, and this may hamper mass adoption. For example, the fact that both PSPs and mobile network operators can be providers of innovative card payments has made the ownership of customer relations an issue, ie who will benefit from the direct relationship with the customers. Moreover, a coordinator might be needed to bring the individual parties together by creating a common ground for cooperation. For mobile payments in Europe, the European Payments Council (EPC) and the GSM Association (GSMA) have collectively defined and published requirements and specifications for the different roles among various players in the mobile payment market and for the position of a "Trusted Service Manager" (see Box 12).

Box 12

The role of a Trusted Service Manager

Many pilots have been conducted worldwide to test the technical and economic feasibility of proximity payments at the POS using mobile phones. Many of them have demonstrated the need for an independent party, the "Trusted Service Manager" (TSM) that manages the distribution and communication between banks, mobile operators, merchants, consumers and others. The TSM brings together all relevant parties and allows each of them to select, accept or support their own preferences.

The notion of TSM was first introduced by the GSM Association (GSMA). Subsequently, the European Payments Council (EPC) and the GSMA agreed to jointly work on defining requirements and specifications regarding the role of a TSM that would interface with banks and mobile operators. In October 2010, having consulted the market, they collectively published a report on the different roles of the parties involved in mobile phone payments at the POS and within the TSM.

The EPC-GSMA report comprises the following requirements and specifications:

- The secure element on the Universal Integrated Circuit Card (UICC or SIM card) is owned and issued by the mobile network operator.
- Banks control the payment applications on the UICC and the financial data, using the mobile network operator's network.
- The mobile handset may contain a wide range of mobile contactless payment services, and customers will be in full control of which ones they subscribe to.
- The TSM facilitates the distribution, configuration and activation of the bank's payment application on the UICC within the customer's NFC handset on behalf of the bank and/or the mobile network operator.
- The exact scope of the TSM's responsibilities depends on its bilateral agreement(s) with the bank and/or mobile network operator.
- To ensure freedom of choice, mobile network operators and banks should be able to select one or more TSMs.

These requirements and specifications allow interested parties to develop and offer services in the TSM role and may eventually lead to shared solutions supporting the establishment of commercial relationships between banks, mobile network operators and TSMs.

The importance of cooperation in retail payment innovation is clearly reflected in the fact-finding results. More than half the reported innovations involved some kind of cooperation between different parties. Cooperation between banks and non-banks is the most prominent model, with a strong focus on internet payments, mobile payments and EBPP. Cooperation between banks only is the next most prominent model, while cooperation between non-banks only is the least reported. More than half the reported innovations with some cooperative arrangements were estimated to have a medium to high impact on the retail payment market, which is a higher degree of impact than that of innovations without such cooperation. Achieving this level of cooperation can be challenging: not only can it involve gaining agreement between competitors, but it must also comply with relevant competition regulations.

It is worth mentioning that cross-border cooperation (in some cases led by public authorities) is also becoming more important, thanks to increased efforts towards global standards. Examples of cross-border cooperation include: Directo a Mexico, which is an international

funds transfer service between the United States and Mexico;[57] the West African Economic and Monetary Union (UEMOA), which consolidates the market and tries to establish a common currency across several countries; the Southern African Development Community (SADC), which is a model for financial market integration; and SEPA.

4.2.2 The role of standardisation

In the retail payments industry, where activity is based on networks of numerous players, standardisation plays a crucial role in developing the agreements needed for technically efficient communication. It is considered an essential driver to innovation, as it increases the business case by exploiting economies of scale and scope. Standardisation can be achieved by creating open or proprietary standards. Open standards are freely available and are developed and maintained via a collaborative and consensus-driven process. They facilitate interoperability and data exchange among different products or services and are intended for widespread adoption.[58] In contrast, proprietary standards are privately owned and are generally not approved by an independent standardisation body. They are adopted by the industry typically because of the owner's market power. Standard-setting bodies can take a long time to establish a standard, and often develop standards on the heels of a leader that has successfully imposed a proprietary platform.

Standardisation affects innovation in a number of ways:

- It facilitates the achievement of critical mass. In contrast, insufficient standardisation can lead to a proliferation of incompatible payment instruments or systems, each of which remains too small to grow into a widely used solution.
- It can create stable ground for new players to come into the market, allowing them to keep upfront investment low. In this way, standardisation encourages competition on the basis of common standards, rather than of competing standards. By contrast, a lack of common standards could reinforce the dominance of an existing platform.
- A lack of common standards could impede innovation because of the uncertainty and risks attached to an early market entry or to the costs involved in overcoming the lack of standards. Moreover, the additional revenue gained by standardising processes lets successful players funnel more resources into developing new products.
- Players operating in many countries are likely to benefit from broader and more open standardisation.

Mobile payments illustrate the issue of insufficient standardisation.[59] Although it is a crucial factor for the long-term viability of mobile payments, the standardisation process has so far advanced only at a slow pace. One possible explanation is the absence of efficient cooperation between the main stakeholders, ie financial institutions and mobile network operators. The existence of various groups[60] with heterogeneous interests has led to a

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[57] Established in 2003, this service is provided jointly by the US Federal Reserve Bank and the Bank of Mexico. It allows funds to be transferred from the FedGlobal® ACH Payment Service to the Mexican real-time gross settlement system (SPEI) operated by the Bank of Mexico. Directo a Mexico has processed more than 2.5 million payments, worth more than USD 1.1 billion.

[58] The definition is based on the one proposed by the International Telecommunication Union (www.itu.int).

[59] This illustration is based on R Boer and T de Boer, *Mobile payments 2010: market analysis and overview*, Innopay, November 2009; and A Lim, "Inter-consortia battles in mobile payments standardization", *Journal of Electronic Commerce Research and Applications*, vol 7, issue 2, 2008.

[60] For example, the Mobile Payment Forum, the Mobey Forum, Simpay, PayCircle, the GSMA, the NFC Forum, EMVCo, the European Committee for Banking Standards and the EPC.

proliferation of different standards. As a result, different types of mobile payment models have evolved, using different standards and creating incompatible solutions that are often limited to market niches, raising questions about their viability.

Box 13

Standardisation for electronic invoicing in the European Union

The European Commission (EC) is working closely with member states and relevant stakeholders to make electronic invoicing (e-invoicing) the predominant method of invoicing by 2020. E-invoicing may not only be more efficient than paper-based invoicing, but also has the potential to support the development of the European Single Market, especially the greater integration and harmonisation of practices between European enterprises.

While most large European enterprises use e-invoicing, it has not yet penetrated to small and medium-sized enterprises. Also, the degree of market penetration varies significantly from country to country. To foster market uptake, the EC is promoting a standard data model for e-invoicing. All private and public actors in the market were encouraged to comply with the UN/CEFACT Cross-Industry Invoice (CII), which should be adopted as the common reference standard. It is worth noting that the ISO recently produced a financial invoice content standard that is based on the ISO 20022 message standard and is also consistent with the UN/CEFACT CII data model, with the addition of support for linking invoices to the financial supply chain.

To promote standardisation, the EC recommends establishing multi-stakeholder forums on e-invoicing with a wide participation of various stakeholders at both the national and European levels to facilitate information exchange and identify best practices for interoperable solutions. Since e-invoicing and payments are closely related processes, the standardisation of e-invoicing and SEPA is mutually beneficial, particularly with respect to the payment and reconciliation processes associated with the dematerialisation process.

However, standardisation might also have some negative effects on innovation:

- Being an early mover into an innovative market where standards are either non-existent or multiple can be a competitive advantage. Thus, imposing a standard can diminish the incentive to innovate since it could lower the value of a privately developed network.
- Standard setting can, in specific circumstances, also restrict competition, eg by excluding certain technical innovations or restricting new business models. Also, competition might be endangered if certain parties are excluded from the standard-setting process or if they lack access to the result of the standard-setting process.[61]
- The existence of obsolete but established and widely used standards may impede evolution in the industry.[62] Obsolete standards often persist because the costs of developing or adopting new standards outweigh the perceived advantages of change. And if market participants expect that new standards will replace the current ones in the foreseeable future, they may choose to delay the introduction of new products until the new standards are available.

[61] European Commission, *Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the EU to horizontal co-operation agreements*, 2011/C 11/01.

[62] This was true of the X.25 communication protocol, which is incompatible with XML and does not support the ISO 20022 standard. Where X.25 communication is widely used, it could act as an impediment to the adoption of ISO 20022.

Ideally, to avoid impeding innovation, standards should be sufficiently flexible to adapt to new needs. One recent development is the payments industry's greater reliance on the International Organization for Standardization (ISO), the international standard-setting body that makes standards freely accessible to any participant (eg the IBAN standardised bank account numbers). This has led to a situation in which standardisation in the field of payments cannot be isolated from standardisation in the underlying technologies that support it. For example, the ISO 20022 format for financial messaging uses the XML language, which in turn needs standard communication protocols. For the payments industry, this means that standardisation is not fully an endogenous factor. Rather, the industry has to apply standards that have been implemented in other fields, particularly in the area of information and communication technology.

Other examples of successful standardisation include SWIFT, an industry-owned institution that develops standardised message types and formats for its worldwide users. The credit card industry has also developed and adopted EMV (Europay, MasterCard and Visa) standard to ensure the security and interoperability of integrated circuit (IC) chip-embedded cards. Since standardisation is critical if innovations are to be successfully implemented, the role of cross-border cooperation in achieving global standards deserves further investigation.

Box 14

ISO 20022 and retail payments

The global open standard ISO 20022 is the standard for financial services messaging. It has been developed and is continuously being improved by the financial services industry. The objective of ISO 20022 is to create consistent message standards across all the business processes of the financial industry. ISO 20022 is used in various retail payment markets, for example:

- In Australia, there are industry initiatives under way to develop an ISO 20022 framework. The issue of standardisation is also being considered by the Payments System Board within the framework of the Strategic Review of Innovation in the Payments System.
- In Europe, the EPC took the decision to adopt ISO 20022 for the SEPA project, meaning that the vast majority of European banks have implemented it or plan to do so. However, the scope of ISO 20022 is much wider than the instruments used for the current SEPA payments (SEPA direct debits and credit transfers). It is generally accepted that the adoption of ISO 20022 for SEPA might create a significant incentive to apply this standard to various new SEPA-wide payment solutions and for non-SEPA-related activities as well, even beyond the EU's borders. For example, there are plans to implement ISO 20022 for payments in Swiss francs and Swedish kronor. In the latter case, the standard might extend to a Nordic payment area with a single payments system for all participating countries.
- In India, steps are afoot to replace the existing RTGS system by adopting the latest technology, including an XML-based messaging system conforming to ISO 20022. Since all the large retail payment systems settle in the RTGS system, this development would be crucial in handling increasing transaction volumes and in meeting user expectations.
- In Japan, the Zengin Data Telecommunication System, an interbank clearing system for domestic transfers, introduced the XML format (ISO 20022) as an option for exchanging messages among banks in November 2011.
- In Singapore, the Singapore Clearing House Association is planning to upgrade its eGIRO electronic funds transfer infrastructure, for which ISO 20022 will probably be used.
- The International Payments Association defines rules, standards and an operating framework for simplifying non-urgent cross-border credit transfers by leveraging existing payment networks and international standards such as ISO 20022. It supports interoperability between domestic and regional non-urgent payment systems and banks.

4.2.3 Pricing and price structure

Pricing strategy may play a role in the success of an innovation, since prices set by the PSP must be both competitive and raise sufficient revenue in order to support the business case. Therefore, prices may play a twofold role in innovation: if PSPs can set the right incentives, they are a driver for innovation. In the opposite case, however, prices can turn out to be a barrier. Difficulties in price-setting can arise from a number of factors affecting a PSP's choice of pricing strategies, including: (i) the cost structure and market power of the players involved; (ii) the type and magnitude of the eventual network effect; and (iii) the regulatory environment.

The provision of payment services typically involves high fixed costs and low marginal costs. To cover these costs and make a profit, PSPs often use a two-part pricing structure consisting of fixed periodical fees plus transaction fees. The transaction fees are usually set low to stimulate usage and hence improve the end user's valuation of the service. The periodical fees that give access to the service are then used to capture much of this end user valuation. However, the level of the fixed fees and the transaction fees will depend on the market power of the various players involved and the elasticities of demand and supply. In this context, factors such as the alternative payment services available and the size of the players are of great importance.

The fewer the competitors and the larger the players, the lower the influence of price on the demand for the service and hence the less likely it is that price can become a driver for innovation. On the other hand, the ability to set prices also provides for solid new business cases, which may act as a driver for innovation. The network effect[63] that payment services typically exhibit is another factor that influences pricing. Since individual users do not take this into account in their own decision-making, a PSP faces challenges in setting fees that can gain sufficiently broad acceptance by users, and thus achieve a viable scale for the business. This may, for instance, include an initial subsidy to new customers (eg no annual fee for using the service in the first year).

Moreover, in a two-sided market, such as the market for card payments, the pricing strategy becomes more complex, as the ways in which it affects the incentives of both merchants and consumers need to be considered. One approach that has been used to address the network effect in card payments is the use of interchange fees, although it is noteworthy that many examples exist of payment networks in two-sided markets that operate without these fees. Such interchange fees are generally paid by the acquirer (ie the merchant's bank) to the issuer (ie the cardholder's bank) separately from any fees paid by the merchant or the consumer. They are thus used to redistribute the costs between the acquirer and the issuer of the card, with a view to creating incentives for both issuer and acquirer to participate in the card scheme and to promote the service. In this case, interchange fees create an incentive for issuers to encourage cardholders to participate in the card scheme. On the other hand, depending on the extent to which acquirers are able to pass the fees on to the merchants, merchants may be less willing to participate in the scheme unless there are clear benefits for themselves, such as higher customer retention or revenue.[64] Interchange fees may play a role in bringing both sides of the market on board for the establishment or growth of a new payment service.

The regulatory environment is another factor that may influence the pricing strategy. Regulation typically aims at promoting competition, efficiency and/or stability in retail payments, eg by: (i) restricting certain payment card interchange fees to a certain level, for

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[63] For details of network effects and positive externalities in retail payment markets, see Section 3.1.2.

[64] In a mature market, merchants may feel obliged to participate in the scheme.

instance in Australia (see Box 15), in the EU[65] and in the United States;[66] (ii) requiring PSPs to charge the same price for comparable domestic and cross-border transfers in euros;[67] and (iii) allowing surcharging to permit merchants to charge customers transaction fees.[68]

Box 15

Interchange fee regulation in Australia

The Reserve Bank of Australia's Payments System Board (PSB) has regulated to reduce interchange fees in the MasterCard and Visa credit card systems, the Visa debit system and the domestic debit card system (referred to as eftpos). The PSB had concluded that differences in interchange fees were resulting in pricing to cardholders that did not properly reflect the relative resource costs of different payment systems, leading to inefficient use of the payments system as a whole. For instance, many consumers had a negative cost when making a credit card transaction (eg through the receipt of reward points and an interest-free period), but faced a positive cost when making an eftpos transaction, despite the fact that credit card transactions had a significantly higher resource cost than eftpos transactions. In addition, the PSB was concerned that there was a tendency for competition between card schemes to drive up interchange fees in order to provide additional incentives for issuers to promote each scheme. Overall, interchange regulation has resulted in lower interchange fees and a significantly smaller differential between the fees in the various systems.

One of the main effects of the regulations has been an improvement in price signals. For credit card transactions, lower interchange fees have resulted in a reduction in the value of reward points and higher annual fees, increasing the effective price of credit card transactions faced by many cardholders. At the same time, the fall in interchange fees has been fully passed on to merchants through reductions in merchant service fees. For eftpos transactions, fees charged to merchants have risen somewhat, while reduced costs to issuers have been reflected in them offering customers unlimited free eftpos transactions with a transaction account (with a fixed monthly fee applied for all account services).

During the eftpos system's development, the unusual direction of its interchange fee helped to encourage the rollout of terminals, given that card ownership was already widespread for the purposes of accessing the ATM system. MasterCard and Visa have also occasionally used the level of interchange fees for particular transaction types to encourage uptake of new technology. Nonetheless, there appears to be little evidence that the reduction in interchange fees as a result of regulation has affected the pace of innovation, either negatively or positively. Indeed, the MasterCard and Visa systems, which have experienced the greatest reductions in interchange fees, have been among the more innovative payment systems in Australia in recent years. For example, MasterCard and Visa have introduced chip cards and PIN authorisation at the POS, and are now rapidly rolling out contactless payments considered to be among the more effective rollouts globally.

All the above factors can potentially alter the incentives of different participants to innovate in the payments system. Moreover, changes in incentives for one group of participants may be offset by changes in incentives for another group. It is therefore difficult to determine the overall effect of a pricing strategy on innovation beforehand. The impact is also highly dependent on the payment service and the market in which it operates and must often be evaluated on an empirical or case by case basis. So far, there is little to be found in the theoretical and empirical literature that sheds light on the relationship between interchange

[65] For certain credit and debit card transactions.

[66] For debit card transactions.

[67] EU Regulation (EC) No 924/2009 and (EU) No 260/2012.

[68] For example, the EU Payment Services Directive (2007/64/EC) gives each EU member state the option of allowing surcharging.

fees and innovation. The scarcity of literature dealing with the impact of interchange fees on innovation suggests that further research is needed.

4.2.4 Security aspects

Insufficient security and safety, whether real or perceived, could erode public confidence in a new payment solution and hence its business case. Technical advances and faster processing generate new opportunities in retail payments, but they also increase the likelihood of security breaches. PSPs anticipate possible security breaches by continuously striving to enhance the security level of their products, making security an important driver for innovation. In the context of this report, security issues are considered mainly as endogenous since they are addressed by PSPs with the aim of making innovations inherently secure and widely accepted.

Moreover, PSPs or other stakeholders (eg merchants) can benefit from reducing the cost of fraud if innovations can replace older payment instruments with inferior security. Important security aspects that should be considered in innovative retail payments are listed below by product category.

(i) Card payments

The shift to chip and PIN (EMV) technology allows for certified cryptographic methods for the authentication of both the card and the terminal. EMV is considered one of the most important innovations in card payments. Nevertheless, players involved in card payments in multiple countries face issues such as the harmonisation of standards, certifications, approval processes and industrial agreements across borders.

(a) Card-not-present transactions

Remote card payments entail the transfer of data via an open network and their storage in PCs or systems managed by merchants or their PSPs. These processes introduce new risks arising from client authentication and data integrity.

Card-not-present transactions highlight the need for stronger authentication procedures to prevent fraud from illegally obtained card data. Some innovative security solutions allow the cardholder's identity to be authenticated as part of the payment transaction via the internet,[69] making these transactions less prone to fraud. The deployment of two-factor authentication based, for example, on a dynamic, one-off password (either sent by SMS or generated by a card reader) is currently perceived as the most efficient measure against card-not-present fraud via the internet. Hardware-based certificates or tokens, using PIN codes, are equivalent in terms of security, using both what users know and what they own to protect them from security breaches. Alternative solutions, also reported as innovations, are virtual cards designed to replace static card data (notably primary account numbers, ie card numbers) with one-time dynamic card data for online transactions.

Card data can also be captured during transmission or while stored in payees' systems, thus necessitating the use of secured protocols such as HTTPS, which nevertheless require

[69] Of these solutions, 3D-Secure is now being deployed on a massive scale. Developed and licensed by Visa and further adopted by MasterCard, JCB and American Express etc, this protocol connects buyers to their issuing bank during the payment process, allowing them to authenticate their identities by entering (preferably) a one-time password previously sent by their bank through a different channel.

adequate awareness to prevent frauds such as phishing[70] or measures[71] that could otherwise enhance the security of one-click payment methods.[72]

(b) Contactless card payments

Contactless card payments have the inherent risk of transactions being carried out without the knowledge of the cardholder. This can lead to an attack known as "tele-pickpocketing", which consists in capturing personal data using distant communication means. The risk of such "tele-pickpocketing" attacks can be prevented by restricting the distance between the contactless card and the terminal or by storing the card in a case that can block radio frequencies. Moreover, as for mobile phones, the risk can be mitigated by implementing a proper control mechanism for activating the contactless payment application. To prevent fraudulent use in cases of loss or theft, contactless devices can be locked or blocked. In addition, fraud losses can be reduced by setting limits on the size and/or number of transactions for which no PIN is required.

The components embedded in these devices are to be submitted to independent third-party certification programmes.

(c) Prepaid cards

Prepaid cards store their value on a physical medium (such as a chip on the card) or on the issuer's server. The risks involved and the measures required differ depending on how the value is stored and whether or not the medium is rechargeable.

Value stored on card: this type of card is vulnerable to theft, since it is not usually PIN-protected due to the small value stored. The risk is higher when the card is rechargeable. For such cards, it becomes essential to implement KYC procedures that allow the cardholder to be authenticated when reloading and making payments. Restricting anonymous cards to small amounts is an alternative approach.

Value stored on the issuer's server: since the value is held by the issuer, it is crucial that the issuer properly authenticates the cardholder's identity (using a PIN or other strong authentication method).

(ii) Internet payments

Internet payments can make use of traditional bank accounts or electronic money accounts. For internet payments that use traditional bank accounts, (i) PSPs can facilitate the entry of payment instructions on the online banking website, while their customers retain overall control of the authentication process; or (ii) alternative providers, better known as "overlay payment service providers" (OPSPs), can connect to the online banking site on behalf of the customer, in some cases having previously requested the customer's static log-in credentials. In both cases authentication of the payer's identity could be at stake, and in the latter one these alternative providers may add legal and security issues.[73]

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[70] Phishing is a fraudulent attempt to acquire personal sensitive information by masquerading as a trustworthy entity in an electronic communication.

[71] An example would be PCI DSS measures that are designed to protect the entire acceptance and acquisition process. They provide broad coverage of data contained on cards, ie both embossed data and data stored on stripes or chips. The aim is to combat all threats to security by taking account of the various ways in which different payment channels use card data.

[72] One-click payments are designed to simplify the act of making a purchase and speed up the process by keeping some of the sensitive customer data for later use.

[73] These issues are addressed by EU regulators in the more global context of the access to bank accounts by non-bank parties.

For internet payments that use electronic money accounts, the accounts or cards are typically prefunded using traditional payment instruments, which should benefit from adequate security measures.

Finally, since online payments can imply a connection to the online banking environment, the latter should be adequately protected when customers enter the website and proceed with payment orders.

(iii) Mobile payments

Mobile payments are made using dedicated payment applications loaded on mobile phones and the mobile network. To prevent cross-contamination of mobile applications, they must be adequately isolated, especially if they store sensitive customer data and allow for one-click payments, as seen previously. Specific certification processes aim to provide the assurance that applications are sufficiently secure in this respect.

(iv) EBPP

EBPP involves both the electronic transmission of documents and a connection to online payment facilities. Since these documents can contain sensitive data, they require adequate protection measures if they are to be transmitted via open networks or stored in PSPs' systems or on users' PCs. The main issue is the mutual recognition of digital signatures. If the signing of legally binding documents is based on recognised and interoperable standards, all payers have a reasonable assurance that the invoice's issuer is properly authenticated and was not altered during transmission.

(v) Improvements in infrastructure

Improvements in infrastructure relate mainly to: (i) processing transactions for retail payments (which encompass clearing and settlement services); (ii) dematerialising costly paper-based payment methods, such as cheques; and (iii) introducing bank agents.

Operating an infrastructure requires an adequate governance framework and efficient internal control tools covering the whole payment process. If the infrastructure uses open networks, data confidentiality and integrity need to be protected using adequate encryption methods (including authentication protocols) that prevent data from being compromised during transmission.

Improving infrastructure for faster payments can increase the risk of funds being stolen before the payer detects a fraud. This increases the importance of payment authentication and notification methods (eg SMS notification), particularly if payments involve a bank account where large amounts can be deposited.

The use of banking agents can reinforce authentication mechanisms based on face-to-face controls but, on the other hand, new vulnerabilities arise, since decentralised processes can be involved that need to be properly controlled.

It is important for both PSPs and users to take responsibility for security. PSPs should in their own interest play a more proactive role in promoting a secure environment for the user, offering technical support, advising and providing assistance where security incidents occur. On the other hand, users are responsible for their own security and should have adequate skills to manage it. Raising public awareness is also important, as this could lead to the implementation of better safeguards and ultimately encourage the adoption of retail payment innovations.

Section 5: Outlook

Given the fast-evolving nature of the retail payment market and the complexity of its technical ecosystem, predictions about the direction that new developments will take are somewhat hazardous. That said, a few pointers as to what can be expected over the next five years can be gleaned from the underlying economics of payments as well as the drivers and barriers identified in this report.

(i) Technical developments will blur product categories

As already explained in Section 2.3, innovations have become increasingly difficult to classify unambiguously. The reason is that the most recent developments allow for payment products to be set up in a more flexible way. Consequently, access devices as well as access channels are becoming interchangeable, eg both mobile and internet payments can be made using a smartphone. At the same time, data processing advances are causing processes for electronic payments to converge so that they access information stored in databases on remote servers rather than on the payment instrument itself. From a user's perspective, this means that different products – notably credit transfers, card payments and electronic money transfers – will be increasingly substitutable.

(ii) Near Field Communication: potential for future growth

A number of factors underpin the view that contactless payments will evolve into a successful payment method within this decade. The technology is driven by the demand for increased convenience from consumers and merchants alike, since it provides for faster payment processing, in particular via faster payment initiation. It targets mainly the market for low-value payments, which is still dominated by cash in most countries. Hitherto, take-up has been hampered by the relatively small number of NFC-enabled payment cards or mobile phones as well as compatible POS terminals. However, there are clear signs that NFC equipment will become more broadly available in the medium term, eg global players are committed to issuing compatible cards and phones and to promoting their use. Another supportive factor is that NFC is often just an add-on to an already established access device, such as a card or mobile phone. Ultimately, though, the success of NFC technology will depend on its added value as perceived by the users, ie its speed, reliability and security.

(iii) E-commerce: a key future driver

In many economies, e-commerce continues to grow rapidly. However, many consumers still rely on traditional instruments such as credit transfers and credit cards to pay for internet transactions. Thus, considerable potential for internet payments seems to exist. First, current payment methods do not always meet the efficiency or security needs of users.[74] New innovations might also be tailor-made for specific purposes, such as micropayments, or could preserve anonymity during the payment process. Second, the importance of e-commerce is still growing, and the saturation point might not yet be reached. Third, the market holds potential for cross-border payments, for which the current range of efficient payment instruments is still limited and again not always in line with user needs.[75] However,

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[74] See Netherlands Bank, *Payment of cross-border online shopping: behaviour, perceptions and desires*, 2011.

[75] Although the internet has made borderless communications easier, cross-border e-commerce has not developed as much as domestic e-commerce. This may have to do with barriers such as language and differing consumer and merchant preferences as well as divergent technical specifications and legal issues between countries. This also indicates that common payment instruments may be a necessary but not sufficient condition for greater volumes of cross-border e-commerce. See EC, *Report on cross-border e-commerce in the EU*, Commission of the European Communities Commission Staff Working Document SEC(2009) 283 final.

traditional payment methods may continue to play an important role because consumers are familiar with them. Meanwhile, new solutions may face difficulties in achieving a critical mass on both sides of two-sided markets. Moreover, the future landscape, especially in the cross-border e-commerce domain, will be influenced by how far standardisation and cooperation hurdles can be overcome.

(iv) The role of globally active players might increase

Generally, domestic PSPs face various challenges when attempting to extend their services within the domestic market and beyond. These include the need to win the confidence of new user groups, or tackle technical and legal barriers when seeking to cooperate with other PSPs. In this respect, globally active players, such as international card schemes, global mobile operators or internet enterprises, may have the advantage in leveraging their coverage and market power when offering innovative payment solutions across borders, possibly in a flexible manner responding to concrete local needs.

(v) Innovations in retail payments: large leaps or small steps?

Whether innovations in retail payments represent a large leap or only small steps may vary from country to country. In many cases, small steps may be more likely because (i) many innovations represent only incremental improvements to existing and established payment services; (ii) users' payment habits usually change only at a slow pace; and (iii) the specific economics of the payments market result in rather long transition periods. Nevertheless, past examples of rather large developmental leaps do exist, such as the replacement of cheques by innovative payment cards or alternative instruments (such as debit cards in several countries). Moreover, developing countries with an underdeveloped payment infrastructure may have a higher potential for introducing innovative payment solutions from scratch, thereby leapfrogging some of the usual developmental steps for retail payment instruments or infrastructure (eg M-PESA in Kenya; see also Box 10).

(vi) What could be possible game changers in payments?

Even in countries where innovation will only have an incremental effect, more distinct changes cannot completely be ruled out. Factors that could potentially trigger such changes are listed below.

First, new payment schemes, such as virtual currencies, that are currently mostly single-purpose and/or only accepted in the respective virtual community may become multipurpose and widely accepted.[76] Social networks have grown dramatically over the past few years and already have a large base of customers who are familiar with new technologies and hence predisposed to adopting innovative payment solutions. These solutions should be carefully monitored because of the potential risks associated with the rapid growth of those unregulated solutions.

[76] Virtual currencies are currencies that are created and circulated within a particular virtual community. Virtual currencies have their own denomination system and are mostly used for exchange of goods and services offered within their community. By looking at how they interact with real currencies, they can be classified into the following three types. *Type 1: Closed virtual currency scheme*. In these schemes, there is almost no relation between the virtual currency and the real currency. Users usually pay a subscription fee and then earn virtual money within the virtual community. The money is used only for the purchase of virtual goods and services within the virtual community. *Type 2: Virtual currency schemes with unidirectional (in-) flow*. In this scheme, real money can be converted to virtual money, but there is no exchange in the reverse direction. Users have to spend this money within the virtual community, eg on virtual goods and services. *Type 3: Virtual currency schemes with bidirectional flow*. In such schemes, the virtual currency can be exchanged to real currency and vice versa (ie there are two exchange rates involved, buy and sell), and it can thus be used in a similar way to any real currency.

Second, given the strong core competencies of banks in payments in a number of countries, it is likely that non-banks will first continue to seek cooperation with the banking sector as a means of entering the market and to benefit from the expertise, reputation and/or customer base of their partners. However, it cannot be ruled out that, over time, non-banks will develop more independent strategies and will no longer need to ally themselves with banks.

Third, authorities might induce substantial change in payments by altering the regulatory framework. In markets where insufficient progress is observed, regulators might try to directly address factors they consider as barriers to innovation. Moreover, regulators might tackle security issues in order to preserve public confidence in new payment methods.

(vii) Significant differences between regions will continue to exist

Although technology will lead to more convergence in payments at the global level, significant differences between regions are likely to continue. In Africa and some parts of Asia, for example, several mobile money schemes have been successfully launched, each with more than a million users. These schemes focus mainly on the market for domestic money transfers and bill payments.[77] However, in Japan mobile phones are used mainly as a contactless access device at the POS for electronic money payments and as an access device for online banking.[78] In other regions with established banking sectors and relatively high volumes of cashless payments per capita, internet payments could play a prominent role in future payment innovations. All in all, the future development of retail payments in the various countries will strongly depend on socio-economic factors, such as urbanisation, emigration, computer literacy, availability and penetration of banking infrastructures as well as on how the identified drivers for and barriers to innovations will work in the specific context. Therefore, an innovation that is successful in one country will not necessarily perform as well in other countries

Section 6: Issues and challenges for central banks

To foster the security and efficiency of retail payments, central banks typically: (i) address legal and regulatory impediments to market developments and innovation; (ii) provide for competitive market conditions; (iii) support effective standards and infrastructure arrangements; and (iv) make available their own services in the manner that is most efficient for the relevant market.[79]

However, significant differences can also be observed between central banks, which often mirror particular circumstances in the respective countries, such as the institutional and regulatory environment. These could arise from different legal mandates, objectives, policies and instruments (see Annex 6). Thus, the impact of innovation in retail payments on central bank activities may well vary from country to country.

Nevertheless, a number of common elements could be observed in the information provided by working group members on how innovation in retail payment influences central bank actions:

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[77] See Mobile Money Tracker (www.wirelessintelligence.com/mobile-money).

[78] Recently, domestic and international funds transfer services using mobile phones have been launched in Japan.

[79] See CPSS, *Policy issues for central banks in retail payments*, March 2003, p 2.

- Central banks generally attach great importance to innovations in retail payments, owing to their potentially huge impact on the retail payment system. This trend is likely to continue and even strengthen in coming years.
- Central banks promote the use of efficient and secure payment methods. Many central banks seek to encourage the use of innovative payment instruments and a shift towards cashless retail payments. While also aiming to improve efficiency in payments, other central banks choose to follow a more neutral approach with regard to the use of payment instruments.
- In a number of working group member countries, reforms of the payments oversight function have been initiated to take account of the new developments in retail payments.
- In recent years, increasing attention has been directed towards non-banks involved in retail payments. This is likely to continue to be a significant issue.
- In many countries, new regulation has been enacted with regard to innovations and non-banks. However, this has mainly been carried out by authorities other than central banks or, in some cases, jointly by central banks and other authorities.
- A large number of central banks that are operationally involved in retail payments have changed their payment systems or introduced new systems in order to promote innovation.

In their respective roles as catalysts, overseers and/or operators of the payments system, central banks can both influence the payments market and be influenced by innovation and market developments. It is important to take this interdependency into account when central banks define their stance on innovation. The sections below outline a number of challenges for selected central bank tasks and policies that are related to retail payment innovation. It should be noted that the relevance of each issue and challenge will differ among central banks, depending on each institution's role in retail payments, and it does not seem appropriate to assign a general priority ranking, as each central bank might need to assess individually which of these issues it regards as relevant and critical. Notwithstanding, almost all central banks deem it important to monitor and assess the relevant developments (Section 6.1) as well as to ensure an effective oversight (Section 6.4), including cooperation with other authorities.

6.1 Monitoring and assessing the relevant developments

Nearly all central banks consider it important to monitor and assess new developments in payments. A lack of statistical data might cause the importance and possible consequences of innovations to be over- or underestimated. Recognising the importance of understanding users' needs and market complexities, a number of central banks have stepped up their research in the light of innovative market developments in retail payments. These studies often focus on aspects such as user preferences, the cost of payment instruments or the implications of innovations for the security, efficiency, availability and accessibility of retail payment services, but also on identifying possible risks for the safety and continuity of the payments system as a whole. To assess the risk profile of innovations, central banks need to have a thorough understanding of the underlying technology and business process. Given the potential trade-off between security and efficiency, a balanced approach is required, but individual central banks may differ over which aspects are more important.

Main challenges

- As some central banks have to rely on the voluntary cooperation of market players when collecting statistical data or use public sources, it may not be always possible to collect the data they need.

- In the light of the continuing developments in retail payments, central banks might benefit from periodically reassessing the adequacy of their statistical surveys. Furthermore, it may be necessary for central banks to adapt their methods for data collection to account for the state of the art in information collection techniques. A detailed understanding of the retail payment market is indispensible, and the use of sufficiently precise and harmonised definitions is important. However, an overly high reporting burden for new players in the payments market might hamper innovation.
- As innovations tend to be small at the outset and may not go beyond a pilot phase, it can be difficult for central banks to assess a priori the potential of new products or processes as a basis for deciding on work priorities.
- Changed risk profiles pose a key challenge for central banks and require them to investigate, to evaluate and possibly also to fill potential regulatory gaps, especially with regard to security and fraud.
- One important factor for assessing the risk of innovations is the impact of technology. However, technology per se is not considered a core competency of central banks. In this respect, there might be a need to enhance central banks' own expertise or to rely more heavily on collaboration with authorities that monitor or oversee relevant technological components of innovative products or on external consultants with the required expertise.
- Resource issues are involved in effectively keeping track of new developments, and in assessing their impact on the efficiency and security of retail payments.

6.2 Communication, publication and transparency

To ensure transparency and to provide guidance to the market, central banks seek to communicate their objectives, views and research results. Such guidance may also include their policy stance and work regarding new developments in retail payments. A variety of communication tools are used, ranging from the publication of regular reports[80] to public consultations[81] and strategic documents.[82] In addition, central banks may undertake educational efforts and organise nationwide communication campaigns on specific issues, such as fostering public awareness of security issues.[83]

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[80] These reports are often based on central banks' analyses and assessments of the current status of retail payment developments in their countries and may also outline the extent to which the central banks' main objectives in this regard have been achieved or to which they consider corrective actions necessary. Examples are the Australian Payments System Board's Annual Report or the Eurosystem's progress reports on SEPA implementation.

[81] For example, as part of the Reserve Bank of Australia Payments System Board's strategic review of innovation in the Australian payment system, a public consultation was undertaken, calling for views from all stakeholders, including payment system participants, small and large businesses, consumers and government.

[82] These documents often provide information on the major steps planned by the central bank during the coming years as well as its expectations of future market developments. Examples include the National Payment System Framework and Strategy documents published every five years by the South African Reserve Bank or the Payment System Vision Document published by the Reserve Bank of India.

[83] The Monetary Authority of Singapore makes educational efforts to promote greater acceptance and use of electronic payments.

Main challenges

- When central banks formulate policy objectives that are derived from their legal mandate, they may consult with relevant stakeholders in order to understand the specifics and details. It may be difficult to balance the views of all market participants, especially those of incumbents and new market players.
- Central banks might face reputational problems if their communication efforts are not successful (eg if stated expectations are not followed by the market), or if their assessment and guidance are proved wrong.

6.3 Interoperability and interconnectivity between different payment systems

Most central banks consider the standardisation and interoperability of systems as issues of great importance. Innovations in retail payment markets can raise new questions regarding standardisation and interoperability. To foster efficiency, central banks promote the interoperability of different retail payment systems by opening up the markets to newcomers. To facilitate the dialogue between different stakeholders, central banks might participate in different forums and interest groups, organise meetings with stakeholders or publish policy messages.

Main challenges

- Interoperability as a policy goal might be considered necessary to create open market access for PSPs. However, this aim might increase overall risks if an innovative service provider has a higher risk profile. To balance interoperability and risk is the main challenge for central banks.
- Pressures are mounting for standardisation on a global as well as domestic level, in particular for underlying technical standards. For central banks, the challenge is to ensure an appropriate level of involvement in such activities.

6.4 Effective payments oversight and cooperation with other authorities

(i) Reviewing existing oversight frameworks

Some central banks are reviewing their existing oversight frameworks so that they can respond appropriately to innovative developments.[84] First, central banks might find it important to have an explicit legal mandate in order to improve their oversight. Second, they might consider adjusting their current oversight policies and practices – for example, by extending their scope by explicitly including specific non-bank PSPs in their oversight. Third, they might consider introducing new oversight tools that also cover innovations.

(ii) Cooperation with other authorities at a national and an international level

As the role of non-banks is increasing and cooperation among various market players is gaining importance, central banks are, in most cases, no longer the only authorities with an interest in payments. To achieve a balanced approach between the different regulatory dimensions (oversight, supervision and other market regulators) and the different objectives (security, solvency of providers, efficiency, innovation and financial inclusion), cooperation

[84] For a comprehensive evaluation of the oversight role of central banks, see CPSS, *Central bank oversight of payment and settlement systems*, May 2005.

between all relevant authorities in the financial and relevant non-financial sectors is needed. In this respect, the protection of funds held at non-banks deserves specific attention.

Setting up more formal arrangements or memoranda of understanding for cooperation between the relevant entities could be essential: to ensure that all authorities are mutually informed on relevant developments in their own responsibilities; to ensure that all authorities have a sufficient understanding of new services; to achieve a common view of the risks incurred, in particular if new, more complex business models are used; to avoid inconsistencies in the regulatory approach; and to reduce any potential duplication of efforts, and thereby the regulatory burden for the respective providers, scheme owners and operators.

Although the fact-finding exercise seems to reveal that innovative activities currently focus primarily on domestic markets, some innovations seem to call for increased international cooperation between central banks. This may be the case where innovations affect or facilitate cross-border retail payments or depend on global providers. Apart from a need to strengthen cooperative oversight, cooperation on oversight standards might also turn out to be essential for facilitating innovations in cross-border payments. Moreover, central banks may have an interest in harmonising security requirements, such as common minimum standards, in order to prevent regulatory arbitrage.[85]

Main challenges

- Retail payment systems are likely to be much more complex in the future, due to the increasing diversity of products and suppliers. A consistent oversight approach by central banks might require a broader focus to include legacy and new payment instruments as well as all relevant providers, be they banks or non-banks.
- The tools that can be used by central banks to initiate changes in retail payments might, depending on their legal mandate, be rather restrictive and may therefore need to be reconsidered. However, some central banks may only have a "moral suasion" approach at their disposal.
- Another challenge is to determine when to apply oversight or regulations to a particular innovation. If applied too early, oversight might choke off innovation; if applied too late, it may subject the system to the related risks.
- At the same time, a balanced regulatory approach is necessary to prevent inconsistencies between regulatory requirements already established for different providers and industrial sectors. Furthermore, a level playing field for banks and non-bank providers is essential to avoid competitive distortions.
- The accelerating convergence of objectives and tools between oversight and supervision could risk stimulating competition between regulators rather than encouraging cooperation. The same could be true of international cooperation where divergent legal and oversight frameworks are an issue. By contrast, an example of efficient cooperation between oversight and supervision bodies is provided by the recent forum on the security of retail payments (SecuRe Pay) at European level.
- Owing to the variety of the parties involved, the process for adapting the legal framework for regulation may not be flexible enough to respond quickly to innovative developments. This might hamper the effectiveness of the oversight

[85] In this case, systems or providers choose to incorporate in countries with less demanding requirements, while also making their services available in others.

function of central banks and finally affect the overall safety and security of the payments system.

6.5 Impact on the operational activities of central banks

Innovative developments might affect the services offered by central banks for retail payment systems. Central banks might therefore need to assess the potential effects – for example, of faster payment processing – especially on liquidity and operational risk. Furthermore, improvements in central bank-owned systems might establish the basis for private sector providers to develop further innovations or might help to achieve a higher service level.

Main challenges

- In particular, the trend towards near real-time and real-time processing might blur the boundaries between large-value and retail payment systems. If privately owned retail systems become near real-time, (customer) payment volumes might move away from the RTGS systems, thereby affecting the aim of cost recovery for some central banks.
- Central banks that operate retail payment systems need to consider in a timely manner whether to accommodate new technical changes in their own systems to support innovative developments. They might need to lead by example in terms of interoperability and interconnectivity.
- Central banks might want to reconsider their operational involvement in the light of new developments. They may consider providing operational support to PSPs. However, they should avoid the potential crowding-out of private market activity. If innovations lead to a better service provision by the market, the operational role of central banks might also become obsolete over time.

6.6 Impact on cash

During the past few decades, card payments in particular have led to a shift from cash to cashless payments. Ongoing innovations in retail payments have tended to further reduce the market share of cash, especially in small denominations, and may further affect the use of cash and the role of central banks and other authorities in issuing cash. Several central banks consider the potential impact of some innovations to be high (see Box 16). However, as cash is used mainly for small-value transactions, especially in proximity and P2P payments, substantial substitutive effects can only be expected for innovations that target these areas. Most innovations reported in the fact-finding have so far had only a low market impact, and thus the impact on cash is likely to be limited.[86]

[86] Experience in Japan, as a comparatively well developed market for electronic money, suggests that the significant growth in electronic money-based payments in the last decade has had no substantial impact on coins and banknotes. An empirical study – Y Kitamura, M Oomori and K Nishida, "The effects of electronic money on money demand: time series analysis", *Global COE Hi-Stat Discussion Paper Series*, no 114, Institute of Economic Research, Hitotsubashi University, 2010 – shows that electronic money in Japan has only been substituted for small-value coins, while its impact on the overall demand for coins is minimal. This might also be explained by the fact that scope for using electronic money is still limited, and thus consumers need to hold both cash and electronic money.

Main challenge

- Central banks might wish to investigate how innovative electronic retail payment products will affect the use of cash in their economies. If a reduction in cash usage is observed, central banks could analyse its impact on their seigniorage and on their cash operations, including the processing and distribution of cash as well as on the prevention of banknote counterfeiting.

Box 16

Retail payment innovation and cash usage in Canada

Despite the popularity of debit and credit cards, cash continues to be an important payment instrument in Canada and elsewhere, especially for small-value transactions. More recent innovations in retail payment solutions, such as mobile payments, contactless credit cards and stored-value cards, aim to compete with cash in small-value transactions. Fung, Huynh and Sabetti (2011) study the impact of some recent payment innovations on cash usage using 2009 Canadian survey data comprising a questionnaire and a three-day shopping diary.[1]

For each individual, the total value of cash purchases was normalised by the total value of all expenditures conducted throughout the diary, obtaining a relative measure of cash spending. As a result, the authors find that users of both contactless credit and stored-value cards (innovators) tended to use less cash during the diary exercise than those who did not use these innovations (non-innovators). On average, innovators conducted 12% and 17% of the total value of store purchases using cash, compared with roughly 32% and 37% for non-users of contactless and stored-value cards, respectively. These differences in average cash shares are consistent when comparing individuals across income, education, age and other socio-demographic groups.

However, these results have to be interpreted with caution, since the true direction of causality is unknown – the classic chicken and egg problem. Individuals who would like to use less cash might also be more likely to adopt and use innovative payment instruments as they become available. The presence of an unobserved variable may cause an individual both to select an innovative feature and to use less cash, resulting in a misleading inference regarding the effect of innovation, or what is commonly referred to as selection bias. Specific methods were therefore applied to correct for selection bias.

The overall results of the study suggest that more recent innovations aimed at replacing cash for small-value transactions do have a significant negative effect on cash usage in Canada. The results suggest a reduction in cash usage of 13% for contactless credit cards and 11% for stored-value cards. Looking ahead, if these innovations become more popular in the near future, they could result in a substantial reduction in cash usage.

[1] B Fung, K Huynh and L Sabetti, "Retail payment innovations and cash usage in Canada", *Bank of Canada Working Paper*, forthcoming.

6.7 Impact on monetary policy

How payment innovations might affect monetary policy has been intensively discussed in the context of electronic money.[87] Electronic money is typically issued and stored by non-banks. Electronic money might become relevant from a central bank's perspective when it becomes a very close substitute for central bank money. This impacts the size of central banks' balance sheets, hence their ability to influence short-term interest rates.

[87] See Bank for International Settlements, *Implications for central banks of the development of electronic money*, Basel, October 1996.

However, although electronic money has become more important in some countries, the impact of these developments on the composition of the monetary base is considered negligible thus far. Moreover, even if the usage of electronic money were to expand massively, there would still be various ways in which central banks could preserve a tight link between electronic money and central bank money and to keep control over short-term rates. Most central banks therefore judge that the influence of innovations in retail payments on monetary policy is neutral or of low importance.

Main challenges

- Central banks might wish to closely monitor more recent developments, such as the increasing popularity of virtual currencies offered by social networks or other web-based networks. Owing to the scope and size of some of these networks, their currencies might have a substitution effect on cash or central bank deposits.
- In case of need, central banks should continue to study the implications of these developments for monetary policy operations.

Annex 1:
Total number of transactions based on cashless payments (2010)

	Number per inhabitant	% of total number of transactions				
		Credit transfer	Direct debits	Credit and debit cards	Electronic money	Cheque
Australia	295	27.0[1]	10.3	58.3	nap	4.4
Belgium	219	42.1	10.3	44.7	2.5	0.3
Brazil	104	38.5	21.4	31.6	0.2	8.4
Canada	276	10.6	6.9	72.7	nav	9.7
China	5	15.1	nav	71.7	nap	13.2
France	264	17.6	20.1	43.6	0.2	18.4
Germany	212	33.9	50.2	15.5	0.2	0.3
Hong Kong SAR[2]	nav	0.6	0.8	10.0	86.1	2.5
India	6	4.6	2.4	71.9	nav	21.2
Italy	67	32.7	15.8	40.0	3.1	8.4
Japan[3]	88	12.7	nav	73.0	13.5[4]	0.9
Korea	247	22.0	11.8	58.7	1.3	6.2
Mexico	21	36.1	2.0	43.5	nav	18.5
Netherlands	322	29.6	24.4	42.7	3.3	nap
Russia	34	68.1	3.5	26.3	2.0	0.0
Saudi Arabia	50	0.3	0.1	99.0	nap	0.6
Singapore	506	1.3	2.2	7.9	85.5	3.0
South Africa	44	24.2	25.8	46.5	nap	3.5
Sweden	330	31.9	8.7	59.3	nap	0.0
Switzerland	173	54.2	3.3	41.3	1.1	0.0
Turkey	30	nav	nap	nav[5]	nav	nap
United Kingdom	nav	20.5	19.5	53.2	nav	6.7
United States	347	7.1	10.8	60.8	nav	21.3
CPSS[6]	66	17.5	15.0	52.8	1.2	13.6

[1] Includes BPAY transactions. [2] Indicative figures provided by the Hong Kong Monetary Authority. [3] Figures for 2009 provided by the Bank of Japan. [4] Payments for public transportation are excluded. [5] Revision made after publication. [6] Sum excluding those countries for which data are not available and Hong Kong SAR and Japan. Does not reflect revisions made after publication.

Source: CPSS, *Statistics on payment, clearing and settlement systems – figures for 2010*.

Annex 2:
Description of the reported innovations

This list attempts to cover influential developments in retail payment solutions and schemes in the reporting countries during the past decade. Since various socio-economic factors have a substantial influence on regional developments in payments, the list includes innovations that may be considered innovative in one country but not in other countries. Moreover, it does not aim to cover all retail payment innovations in the respective countries, but rather tries to collect information that would provide a good overview of innovative activities in the reporting countries.

In the following table, "international" means innovations that are reported to have international reach, ie innovations that also provide a service outside the reported country, rather than solely within that country; "pilot" means innovations that are reported to be in the pilot phase; and "pilot (planned)" means innovations for which a pilot is planned.

Country	Name	Description of the innovation
Australia	BPAY	Bill payments initiated via telephone or the internet banking platforms of financial institutions, using a biller code to identify the payee and a customer reference number to identify the customer. Reference information allows payments to be more easily directed by customers, and more easily reconciled to customer accounts by billers.
Australia	Low Value Clearing Service (LVCS)	A switching facility provided by the Reserve Bank of Australia to facilitate the exchange of clearing files for the retail payment streams between participant institutions, including those operating on different networks. New network architecture such as this, with a single point of entry, provides the potential to improve operational efficiency, resilience, and access for new entrants, placing the low-value payments industry in a better position for innovation and development.
Australia	POLi	A retail payment system for debit payments over the internet. POLi redirects the purchaser either from the merchant's website or a biller's bill to the purchaser's internet banking. After the purchaser has logged in, POLi populates a "pay-anyone" transaction with all payment details, allowing the purchaser to complete the payment. POLi enables ease of reconciliation for merchants.
Australia	payclick	Online payment system focused on, but not restricted to, micropayments for digital downloads. Payments can be made from the stored value on a payer's payclick account, or from a linked credit or debit card. Closed-loop system with payments across the system operator's accounts. Funds transferred into payclick by payers are not redeemable for cash. Merchants can withdraw funds received via credit transfer.
Belgium	PingPing	Mobile micropayment platform that allows users to purchase products and services using their mobile phones (SMS or NFC tag) for proximity payments or on the internet for remote payments up to EUR 25.

Country	Name	Description of the innovation
Belgium	m-Banxafe/Pay2Me	m-Banxafe/Pay2Me enables payments between bank accounts via mobile phones, using the same payment processes as debit cards. It can also be used for P2P payments.
Belgium	Zoomit	Electronic billing facility linked to online banking applications. Payers can receive, check and file their bills in their online banking environment.
Brazil	Oi Paggo	Mobile payment solution of the Mobile Network Operator (MNO). The MNO grants a credit line to the "cardholder" and acquires merchants to accept the payments. The merchant is paid 30 days after the transaction, while the "cardholder" pays the scheme 25 days later. If the "cardholder" does not pay, the MNO can take out a loan on behalf of the "cardholder".
Brazil	Correspondentes bancários	Use of non-banks (typically post offices, lottery houses, supermarkets, drugstores and other small retailers) as banks' agents to provide banking services (including payment services) to unbanked or underbanked persons.
Brazil	Payment of government benefits by means of direct credits	Government benefits are paid electronically using a wire transfer from the National Treasury to bank accounts held by the beneficiaries in the CAIXA, a federal government-owned bank. Funds can be accessed via internet, branches, ATM, bank agents etc or through an electronic benefit card.
Brazil	Direct Debit Authorization	EBPP based on standardised bar-coded documents that can be paid electronically at any bank.
Brazil [international]	Remittance payments via International Payments Framework (IPF) [pilot]	Initiative aiming at setting multilateral standards for remittances. Standardisation enables banks to reach more banks worldwide without bilateral agreements and makes clearing and settlement of remittances faster.
Canada	Interac e-Transfer	Transfer of funds through online banking to anyone with an e-mail address or a mobile phone number, and a bank account in Canada. It uses e-mail and text messages for fast notification to the recipient that a transfer has been initiated and payment-related information. Funds can be received at both online banking and non-online banking accounts. The limit on the amount that can be transferred is determined by banks.
Canada	Interac Online	When making online payments, users are redirected to the website of their financial institution, where they log in with their user ID and password for online banking. After confirming the payment, users are automatically redirected to the merchant's website confirmation page where the transaction is completed.
Canada	epost	Free online bill presentment service offered by Canada Post to view, pay and manage selected bills online. Customers can sign up for e-mail notifications when a bill has been delivered. Access via epost website (payment via credit card, electronic funds transfer or online banking link) or the user's online banking website.

Country	Name	Description of the innovation
Canada [international]	Reloadable prepaid cards by Visa and MasterCard	Cardholders can make card payments and withdraw cash wherever Visa and MasterCard are accepted, including online and overseas. Cardholders can load additional funds to their cards online, in-branch and through their telephone bill payment system in selected financial institutions or using cash or direct debit from a bank account.
Canada [international]	Visa PayWave/MC PayPass	Contactless credit card payments using RFID (radio frequency identification) technology. Payments below CAD 50 require no PIN authorisation or siganature.
Canada [international]	Zoompass	Mobile payment service operated by a joint venture of the three major mobile carriers in Canada. Access is by mobile phone or PC. Users can send, receive and request money through their Zoompass accounts, which can be funded via a linked personal bank account or credit card account. Users can also make cross-border money transfers to a person at a Western Union Agent location. Users can use a separate prepaid MasterCard card that is linked to their Zoompass account for retail purchases or cash withdrawals.
China	Cheque Image System (CIS)	Truncation of physical cheques and conversion into electronic images for more efficient processing.
China	Electronic Commercial Draft System (ECDS)	Services for the processing of electronic commercial drafts including acceptance, registering, storage, forwarding and enquiry. Operated by the People's Bank of China, and offered to banks and financial companies.
China	Internet banking payment system (IBPS)	Provides real-time netting and settlement of interbank internet banking payments and real-time notification of processing result to end users. It also provides infrastructural support for online contract signing, interbank internet banking payments, interbank account enquiry and e-commerce payments.
China	Mobile payments [pilot]	There are various mobile payment services with diverse operation models and different technical solutions. Offered by banks and non-banks.
China	Multipurpose prepaid cards	Multipurpose prepaid cards, issued by non-banks, that can be used at POS terminals without PIN. Replacing cash in micropayments, improving convenience and including unbanked persons.
France	Moneo	Contactless electronic money card for low-value payments. Payments do not require a PIN.
France	Nice, territoire d'innovations [pilot]	Contactless payments initiated by cards or mobile phones, using NFC technology. PIN needed for transactions above a certain amount. Additional services (transport etc) provided by NFC-embedded mobile phones.
France	E-card bleue	Generation of one-time card numbers (and CVx2) by an application installed on the user's PC to be used for purchases on the internet. It can be used at any merchant's website accepting card payments, but the cardholder's card number is referred to only within the back-end infrastructure of the card-issuing bank.

Country	Name	Description of the innovation
France [international]	MasterCard PayPass	NFC card allowing for contactless payments. PIN only needed for transactions above EUR 30.
Germany	sofortüberweisung.de	Overlay payment service for online purchases based on the customer's online banking application. In order to initiate the credit transfer, a credit transfer form is filled in automatically and the authentication data for the customer's online banking application are collected by the service provider. Merchants receive immediate confirmation that the credit transfer has been initiated.
Germany	T-Pay – Online-transfer	Overlay payment service for online purchases based on the customer's online banking application. In order to initiate the credit transfer, a credit transfer form is filled in automatically and the authentication data for the customer's online banking application are collected by the service provider. Merchants receive an immediate confirmation that the credit transfer has been initiated.
Germany [international]	Vingado	Biometric authentication system that allows registered customers to pay by fingerprint in all stores linked up to the system.
Germany	m-pass	Online payments authorised by entering the mobile phone number and a PIN, and verified via SMS. There are plans to extend its service to POS using NFC technology.
Germany	Giropay	Online payment system which establishes a connection to the customer's online banking application. Generation of a completely filled-out credit transfer. There is immediate payment guarantee by the customer's bank for merchants. Interoperability with online payment systems in other countries (Europe and worldwide) is under development.
Germany	girogo [pilot]	Europe's largest project for contactless card payments, initiated by German banks and savings banks in 2012. In a first step, the contactless payment function will be available for the German chip-based electronic wallet GeldKarte; in the medium term, contactless payments will also be available for the German electronic cash application on debit cards.
Hong Kong SAR	PPS	A 24-hour bill payment service that allows the holder of an ATM card or credit card with an ATM function to settle bills by phone or internet. PPS is accepted by a wide variety of merchants.
Hong Kong SAR	Cheque truncation system	An industry-wide project initiated by the central bank and provided by the clearing house. Hong Kong dollar, US dollar and renminbi cheques under predetermined thresholds will be truncated, and only the images and clearing data will be submitted to the clearing house.
Hong Kong SAR	Octopus Card	A contactless multipurpose prepaid card that can be used for making micropayments (eg transportation, retail transactions), primarily in Hong Kong SAR.
Hong Kong SAR	Same day bulk settlement runs	A clearing and settlement service offered by the clearing house in Hong Kong SAR to help shorten the clearing and settlement cycle (from T+1 to T) for interbank obligations arising from electronic money transfers.

Country	Name	Description of the innovation
India	Cheque Truncation System	A centralised clearing house for cheques, irrespective of value, to improve operational efficiency. The point of truncation is at the presenting banks' end. Settlement is based on an MICR (magnetic ink character recognition) code line, while images flow to banks in a straight through manner. The introduction of a new cheque standard (CTS-2010) will ensure uniform security features across all cheque forms in the country.
India	Business agents for financial inclusion	Joint ventures between banks and their agents offering innovative payment services based on mobile phones and smartcards to promote financial inclusion and to enable transfer of social benefits.
India	EBPP	Electronic bill presentment and payment system including services/options such as viewing bills online, paying and managing bills, auto-pay options, sending reminders, collection of payments, and funds transfer to merchants/utility companies. It provides online platforms run by banks to facilitate consumers' payments for goods and services, which are then pooled and passed on to merchants/utility companies. Interbank settlements take place on accounts at the Reserve Bank of India.
India	Interbank Mobile Payment Service (IMPS)	Payment system to transfer funds from one bank account to another, initiated by mobile phones. It is available on a 24/7 basis. The system confirms to the payer the successful credit on the beneficiary account.
India	Prepaid payment instruments issued by non-banks	Prepaid payment instruments issued by non-banks to be used for the payment of goods and services over the internet and mobile network. Cash withdrawal and funds transfer between instruments are not permitted (however, recently some relaxation has been allowed for funds transfers subject to certain preconditions and limits). For customer protection, prepaid funds are to be kept in an escrow account at a bank. Further security features include limits for the maximum loading amount, limits for individual transactions, and a validity period.
India	National Electronic Funds Transfer System (NEFT)	Credit transfer system for one-to-one transfers (used by individuals, corporations and governments) with a central clearing house arrangement based on the core banking solutions of banks in India. It supports all kinds of transactions irrespective of transaction value. Transactions are processed on a near real-time basis, with interbank settlements run in hourly clusters and end-to-end movement of funds generally taking around two hours.
Italy	Minibancomat [pilot]	Contactless card for low-value high-frequency payments, issued by the national debit card scheme. The product can be customised in different ways: prepaid, preauthorised in association with a debit card account or with a prepaid account, or standalone.

Country	Name	Description of the innovation
Italy [international]	Tellcardmobile [pilot]	Contactless micropayments that use mobile phones in association with Tellcard (contactless debit card of the VPAY scheme offered by VISA Europe). Cross-border payments are possible within countries that accept VPAY.
Italy	PostePay&Go [pilot]	Prepaid product of BancoPosta. Developed for users of public transport. Two functions are available in one card: an electronic ticket function (chip/contactless) for local transport, and a prepaid card function (magnetic stripe and chip EMV). The prepaid card function supports all transactions that can be initiated at the POS and via the internet.
Italy	SIPAY	Electronic wallet offered by a bank and managed by a credit card company. Allows for funds transfers between SIPAY's electronic wallets. Cross-border payments are in the implementation phase.
Japan	Chip-based electronic money	Prepaid contactless payment instruments based on chip-based electronic money (eg Edy, Suica, PASMO, WAON and nanaco). Prepaid monetary value is recorded on an IC chip embedded in devices such as plastic cards and mobile phones. In most cases, a contactless IC card and a FeliCa IC chip is used. These instruments are used mostly for micropayments of less than JPY 1,000 as a substitute for cash. PSPs utilise their core business in combination with loyalty programmes for customers.
Korea	Internet Giro	EBPP platform that lets customers pay various kinds of bills and taxes via the internet. The payer checks the bills presented on the Internet Giro website and authorises the payment from his/her designated bank account. Payments can also be made via credit card.
Korea	E-promissory Note	Promissory note that is issued, discounted, endorsed, received and honoured electronically and stored on a central platform. The system can be accessed via internet banking or directly via the internet. One day before maturity (D–1), the system automatically requests payment. After that, it clears the transactions and requests net settlement at the Bank of Korea, which takes place at D.
Korea	Mobile banking	Financial service that allows customers to connect to their internet banking system using wireless internet access from mobile equipment such as mobile phones or PDAs (personal digital assistants).
Korea	T-Money	Reloadable prepaid contactless cards for different public transportation systems. The electronic values are stored in plastic card IC chips or the USIM (Universal Subscriber Identity Module) chips of mobile phones etc. The payments are cleared and settled by the service provider.
Korea	Postpaid T-Money card	Credit card with T-Money payment function. There is no need to recharge the card every time the value is depleted, as accumulated fees are paid via the credit card bill.

Country	Name	Description of the innovation
Korea	Cheque truncation	Paper bills, cheques and promissory notes are scanned and converted into standardised digital images. Images can be exchanged between member banks, servicers and the clearing houses and cleared through the cheque/bill-clearing network. Data collection and clearing are conducted by KFTC (the clearing house, Korea Financial Telecommunications & Clearings Institute), which also requests net settlement from the Bank of Korea.
Mexico	SPEI	A hybrid system owned and operated by the central bank. It has frequent clearing cycles with no overdrafts allowed. Participants' retail customers can transfer money in near real time (in a couple of minutes) at a low cost.
Mexico	Corresponsales Bancarios	Corresponsales Bancarios provides services on behalf of a bank. Correspondent banks are able to open special bank accounts, receive cheque and cash deposits, cash withdrawals etc.
Mexico [international]	Tiered deposit accounts	To foster financial inclusion, four account levels are defined by law. The first three levels are considered "low-risk accounts" which have a limit on the deposits that they can receive in a month. The limit varies from around USD 280 to USD 3,800, depending on the level of each customer's identification. By law, all accounts can receive electronic transfers, and electronic transfers can be generated from all accounts except account level 1, which is also restricted to domestic use.
Mexico [international]	Prepaid cards	Until August 2011, prepaid cards were either registered but reloadable with no limit (mainly for social benefit transfers and for domestic use) or anonymous but reloadable up to USD 500. Some cards provide biometric authentication. Promote financial inclusion.
Netherlands	Chipknip	Smartcard-based prepaid instrument (reloadable and non-reloadable) that provides instant and irrevocable offline low-value payment transactions at the POS. It can be used at designated POS terminals for amounts of up to EUR 500. The reloadable type is loaded via a bank account.
Netherlands	Teletik Safepay	Network-based electronic money scheme that allows for the payment of online purchases and for online electronic money transfers between Safepay account holders.
Netherlands	Batch settlement of retail transactions	Settlement procedure introduced by the central Dutch payments processor. Retail transactions are cleared and settled every 30 minutes.
Netherlands	MiniTix/Rabo SMS Betalen	Network-based electronic money wallet for P2P and P2B micropayments linked to a mobile phone number. Payments are made using SMS or via a website or mobile application.
Netherlands	Wallie-card	Non-reloadable prepaid scratch card containing a specific code that ensures security and anonymity for online payments.

Country	Name	Description of the innovation
Netherlands	Park by Mobile	Payment for car parking using a mobile phone, offered by several providers. Parking time is purchased via a phone call, SMS, mobile website or mobile application. Fees are charged monthly via direct debit, credit card or prepaid card.
Netherlands	iDEAL	Online payment scheme for online purchases via credit transfer from a regular online banking application. There is a real-time settlement guarantee for retailers.
Netherlands [international]	Rabo Mobielbankieren	Internet banking application for mobile phone access via mobile website or mobile application. It provides access to regular e-banking services, such as (international) credit transfers, bill payments or confirmation of account balance.
Netherlands	Standaard Digitale Nota	XML standard for sending bills electronically to the customer's online banking environment, where customers can check, pay and file the bill using a regular online credit transfer.
Netherlands	Telegiro New Style	New method to settle urgent payments. Banks deliver their urgent payments directly to TARGET2 or to EURO1/STEP1.
Russia	Yandex.Money	Online payment system based on electronic money accounts and electronic wallets supporting P2P and P2B payments. Reloading and withdrawal of funds are possible.
Russia	Universal electronic card [pilot]	Multifunction smartcard that supports the distribution of social benefits and can contain a bank application that offers access to a bank account. It also contains applications that support eg payments for public transport and the storing of identification and medical treatment records.
Russia [international]	Qiwi	Provides for instant cash payments for eg internet, mobile and TV bills at terminals provided by payment agents. The service is based on contracts between billing firms and payment agents. It also provides for internet and mobile payments from an electronic wallet, issuance of a Visa Virtual Payment Card and money transfers in Russia and to some former members of the Commonwealth of Independent States.
Saudi Arabia	SADAD	Electronic bill presentment and payment system, which offers three different services: Post Paid (for bill payments), Prepaid (eg to reload mobile phones) and the selling of eVouchers that can be used like scratch cards. This system can be accessed via different banking channels.
Singapore [international]	EMV payment cards	Global standard for authenticating credit and debit card transactions. In Singapore, all debit and credit cards from banks are required to comply with EMV standards.
Singapore	Cheque Truncation System (CTS) – Cheque Clearing System	Online image-based cheque clearing system. Cheques are truncated by the payee's bank, and only the images are transmitted throughout the entire clearing cycle, eliminating the delivery of physical cheques to the ACH.

Country	Name	Description of the innovation
Singapore	eGIRO+	Improvement of the existing interbank funds transfer system to include an extended clearing window for the submission of files to the ACH, leading to acceleration of GIRO transaction clearing from T+2 to T+1.
Singapore	Two-factor authentication for internet and mobile banking security	Two-factor authentication is required for internet transactions for bill payments and funds transfers that involve access to bank accounts.
Singapore	NFC adoption for e-payments [pilot]	Electronic wallets stored in NFC-embedded mobile phones allowing for contactless payments at NFC-enabled POS terminals. The wallets can be topped up remotely over the air.
Singapore	Self-Help Kiosk	The kiosks serve as self-service stations for multiple service providers, where payments can be made on a 24-hour basis. They are used mainly for bill payments and can be found in train stations and shopping malls etc.
Singapore	Banks' Combination Card	A type of bank card that combines credit, debit and prepaid features in one card to improve convenience and encourage greater use of electronic payments.
South Africa	Payments via Real-Time Clearing	Real-time EFT interbank transaction that allows customers to transfer funds to the beneficiaries, who gain access to the funds within 60 seconds.
South Africa	The Early Debit Order (EDO) System	A system providing authentication of debit orders and providing tracking information to system users. Developed especially for the microlending sector. This solution expands access to the national payments system to more service providers and consumers, improves the effectiveness of debit order payments and reduces the incidence of returned debit orders.
South Africa	Domestic money transfer systems/M-PESA	Several closed money transfer systems for P2P payments – for example, money transfer between branches of a given retailer or funds transfers via banks. The beneficiary is informed via SMS that money has been sent and can then withdraw funds.
South Africa	Prepaid cards	Various initiatives for signature-based prepaid cards for banked and unbanked or underbanked customers. Used as gift cards, for depositing wages etc.
South Africa	mimoney (virtual payment)	Voucher-based payment method for electronic environments (internet, mobile internet, call centre). A voucher code is sent via SMS to a mobile phone, and payments are initiated via voucher code and mobile number.
South Africa	Cash-back at POS	Banks have enabled some retailers to allow a customer to receive cash-back with their purchase. Cardholders can draw cash (from their bank accounts) as part of their purchases at a retailer. The transaction is processed as part of the purchase.
South Africa	WIZZIT Mobile banking solution	Mobile payment solution that connects the existing banking infrastructure with the mobile network. It provides mobile banking services to the unbanked or underbanked by a non-bank.

Country	Name	Description of the innovation
South Africa	Low-value contactless payments [pilot]	Reloadable low-value payment product designed for services such as transport.
Sweden	BIR – clearing and settlement of retail payments in real time [pilot (planned)]	Retail (ACH) payments are settled in real time backed by central bank money on a 24/7 basis. Banks transfer liquidity to their ACH-administered accounts by making a transfer to a special account held by the ACH in the RTGS system. The settlement media thus have the same properties as central bank money.
Sweden [International]	SEQR [pilot]	SEQR technology (patent pending) is a mobile phone payment and transaction service using QR (quick response) codes on the front end to initiate traditional credit transfers that are cleared in the Swedish ACH and settled in the RTGS system. SEQR is an alternative to card payments at the POS and does not utilise the card payment infrastructure. It can also be used for remote payments, eg for e-commerce.
Sweden	Swish [pilot (planned)]	Real-time credit transfers between bank accounts initiated via mobile phones. The service will use the BIR real-time settlement and be available on a 24/7 basis.
Sweden [international]	iZettle	Allows individuals to accept card payments using an EMV-based device that allows an iPhone or iPad to be used as POS card terminals. The focus is on payments between consumers and between consumers and firms.
Sweden	Payair [pilot]	Contactless mobile payments using the existing card payment infrastructure. A payment is initiated by the use of an application that automatically launches when the mobile phone is held close to a special terminal at the POS.
Switzerland	Post Finance Mobile	Account-based proprietary mobile payment scheme that allows account holders to initiate (mostly small-value) credit transfers to other account holders of the same financial institution by SMS or smartphone applet, or send payments to merchants either by SMS or by calling a specific service phone number. Instant settlement and notification.
Switzerland	CASH	Chip-based electronic money card scheme. Cards can be loaded/unloaded at most bank-operated ATMs.
Switzerland [international]	Easy Cash	Prepaid card issued with the Maestro brand. The card is used by various organisations (eg migration authorities, consumer credit companies, airlines) to credit their beneficiaries with a prepaid card balance instead of cash or cheque. It provides a straightforward, cost-efficient and safer alternative for organisations to reimburse their clients. Thanks to the Maestro brand, worldwide access to the card balance at ATMs or the POS is possible.
Switzerland [international]	Visa PayWave/MC PayPass	Contactless credit card payments. Payments below CHF 40 require no PIN authorisation.

Country	Name	Description of the innovation
Switzerland [international]	Internet Cash	Prepaid card issued with the MasterCard brand. The card can only be used for internet purchases. It supports MasterCard SecureCode. Since there is no creditworthiness check when the card is issued, it provides access to online card purchases for people who would be ineligible for a credit card.
Switzerland	SIX Paynet E-bill	Cooperative EBPP service across accounts at different banks. Billing companies and customers need to register for the service. Bills are directly sent to the customers' online banking account, where a bill payment can be initiated with just a few clicks.
Switzerland	MobileBuy	Mobile phone payment solution linked to a user's credit card. The user can pay by dialling a toll-free number or by sending an SMS with a defined keyword along with a PIN. The payment is charged to the user's credit card. Currently typically used in P2B situations such as for parking meters, in unattended roadside shops or for the purchase of lift passes in ski resorts.
Switzerland	PostFinance E-bill	Proprietary electronic billing scheme for billing companies and customers with an online banking account at the operating financial institution. Bills are sent directly to the customer's online banking account where a bill payment can be initiated with a just a few clicks.
Switzerland [international]	Travel Cash	Prepaid card issued with the Maestro brand. The card is offered as an alternative to traveller's cheques. It can be charged with Swiss francs, US dollars and euros and can be used at all POS and ATMs that accept Maestro. In case of loss or malfunction of the card, prompt replacement is guaranteed or, if cash is needed instantly, an advance cash transfer will be made via Western Union.
Switzerland	PostFinance E-Payment	Proprietary online payment service based on the customer's internet banking application (PostFinance E-Finance). After successful log-in, the payment due to the web merchant appears on the customer's internet banking interface. When it is released, the merchant receives an immediate payment guarantee.
Switzerland	ep2	Standard allowing for an open EFTPOS infrastructure based on international standards (eg EMV chip technology). Wide cooperation for the development of a common standard facilitated interoperability and competition between acquiring services and terminal producers. Merchants are not bound by the terminal infrastructure to one specific acquirer for all accepted card brands.
Switzerland [international]	paysafecard	Electronic money scheme for internet payments. Used for (mostly low-value) purchases in online shops. paysafecard vouchers can be purchased at corner stores, kiosks, vending machines and ATMs currently in 27 countries around the world – in Switzerland also via SMS (in cooperation with PostFinance Mobile).

Country	Name	Description of the innovation
Turkey	Mobile payment	GSM operators' mobile payment service for micropayments via SMS. The expenses are charged as bills for mobile phone subscribers or reduced from the available prepaid balance. Operational procedures for merchants vis-à-vis acquirers and terminal producers are standardised.
Turkey [international]	Contactless payment instruments	Contactless micropayments based on Visa Paywave or MasterCard Paypass.
United Kingdom	Faster Payments Service	Retail payment system allowing payments to be processed on a 24/7 basis, usually within two hours. The system settles three times a day on a multilateral net basis, processing payments input by customers within two hours.
United States	EBPP	Allows individuals to view and pay electronic bills from their online bank accounts. Leverages the existing ACH network for enrolment, presentment and payment of bills, thus reducing processing costs and improving convenience.
United States	Mobile card reader	Allows individuals to accept card payments using a swipe device that connects to their smartphone or tablet computer via an audio input jack. Smartphone and table computer users can accept card payments using their devices as an alternative to traditional POS card terminals. Thus, the need for cash and cheques is obviated for small vendors and P2P payment.
United States	Same day ACH	Offers same day processing for converted cheque payments and internet and telephone payments. It keeps ACH competitive with other forms of settlement (eg truncated cheques) and opens up an alternative to bilateral arrangements between banks that bypass operators. Banks using ACH choose to opt in to this service and thereby may be able to provide faster settlement for ACH users, for some payments.
United States [international]	Internet-based payment networks	Lets users transfer money within the system rather than across bank accounts, without having to share bank and/or card information with one another. The user can accept these payment forms without the cost of acquiring ACH and card reader technology, thus creating another channel for P2P payments and payments to small businesses.
United States [international]	Prepaid cards	Allow the user to make payments using funds from a prepaid, non-traditional bank account. Access to a traditional transaction account is not required. Replacing more and more paper-based instruments in both single- and general purpose applications (eg cash, gift certificates, paper tickets, government transfers). Enable the unbanked or underbanked to have access to a modest level of financial services.

Country	Name	Description of the innovation
United States	Remote Deposit Capture	Paper cheques are electronified and cleared in one of two ways: (i) the paper cheque is truncated into an ACH debit; or (ii) the paper cheque is truncated and turned into an image to be cleared in the cheque system electronically. Used to electronify cheques sent to billers, at the POS, and in merchants' back offices. Some banks also allow account holders to scan cheques and deposit images electronically with special image-acquiring devices, PCs or smartphones. The electronification of cheques speeds up the clearing process and lets bank customers (both business and consumers) deposit cheques in their own time from any location, thus reducing transaction costs.
Luxembourg [international]	PayPal	Worldwide internet-based electronic money scheme. Various ways of prefunding are offered depending on the user's country of residence.
Finland	Checkout	Different online payment instruments provided by different PSPs are bundled; thus an online merchant does not need to contract with each individual PSP. The service provider helps the consumer if there are any issues with the merchant.
Finland	Turvalasku	Escrow service that insures the DVP (delivery of goods versus payment) between the buyer and the seller. The goods are sent to the buyer only after the buyer pays the necessary amount to the escrow account, and the seller receives the money from the escrow account only after the buyer accepts the goods.
Spain	Transfi	New feature for on-us payment transactions offered by a bank. Bank customers can initiate a credit transfer over their mobile phone by providing only the recipient's name and mobile number. Only for transfers within the same bank.
Slovenia [international]	1-2-3 Pay	Mobile payment service for various scenarios, eg online payments, utility bills, payments at retailers. All communication is carried out via the SMS communication channel. A payment request is sent via SMS from the seller to the buyer, where the buyer confirms the payment on the mobile phone with a dedicated PIN. The service enables a real-time mobile payment, either remote or on-site, with the actual transfer of funds from the buyer's bank account to the seller's taking place at a later stage.
Portugal	MB PHONE	Replication of specific ATM functions on a mobile phone (eg prepaid mobile phone recharging, initiation of credit transfer, balance and account enquiry) through calls, SMS and voicemails. The service allows the user to associate up to five bank accounts to each mobile phone number. The service is also available from outside Portugal provided that the mobile operator has roaming agreements.
Malaysia [international]	MOLPoints	Internet-based electronic money commonly used to purchase online game credits at its website, but can also be used to purchase goods and services offered on that website.

Country	Name	Description of the innovation
Malaysia [international]	Mobile Money	Electronic money transactions using mobile phones on electronic money accounts. The account can be loaded via designated CD/ATMs or Mobile Money's reload agents. Transactions can be initiated via SMS or a mobile application. Used for P2P and P2B transactions.
Philippines [international]	Globe G-Cash	An electronic money service that turns a mobile phone into an electronic wallet. This is a micropayment service that lets Globe Telecom's subscribers easily and conveniently send and receive cash electronically as well as pay for goods and services. It can also receive incoming remittances. It can now, in addition, be used to Text-a-Deposit and Text-a-Withdrawal by clients of rural banks.

Source: Fact-finding exercise conducted by the working group, 2011.

Annex 3:
Reported innovations by product group

Country	Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
Australia	BPAY POLi payclick	BPAY		BPAY View (BPAY)	LVCS
Belgium	PingPing	PingPing m-Banxafe/ Pay2Me		Zoomit	
Brazil		Oi Paggo		Direct Debit Authorization	Corresponden-tes bancários Payment of government benefits IPF
Canada	Interac e-transfer Interac Online	Zoompass	Reloadable prepaid cards Visa PayWave/MC PayPass	epost	
China		Mobile payment	Multipurpose prepaid cards		CIS ECDS IBPS
France		Nice, territoire d'innovations	Moneo Nice, territoire d'innovations MasterCard Paypass		E-card bleue
Germany	sofortüber-weisung.de T-Pay - Online-transfer Giropay	m-pass	girogo		Vingado
Hong Kong SAR			Octopus Card	PPS	Cheque truncation system Same day bulk settlement runs

For footnotes, see the end of the table.

Country	Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
India	Prepaid payment instruments issued by non-banks	IMPS Prepaid payment instruments issued by non-banks	Prepaid payment instruments issued by non-banks	EBPP	Cheque Truncation System Business agents for financial inclusion NEFT
Italy	SIPAY		Minibancomat Tellcardmobile PostePay&Go		
Japan			Chip-based electronic money		
Korea		Mobile banking	T-Money Postpaid T-Money card	Internet Giro E-promissory Note	Cheque truncation
Mexico		Corresponsa-les Bancarios Tiered deposit accounts	Prepaid cards		SPEI Corresponsa-les Bancarios
Netherlands	Teletik Safepay Wallie-card iDEAL Rabo Mobielbank-ieren	MiniTix/Rabo SMS Betalen Park by Mobile	Chipknip	Standaard Digitale Nota	Batch settlement of retail transactions Telegiro New Style
Russia	Yandex.Money Qiwi	Qiwi	Universal electronic card		
Saudi Arabia				SADAD	
Singapore			EMV payment cards Banks' Combination Card		EMV payment cards CTS eGIRO+ Two-factor authentication NFC adoption for e-payments Self-Help Kiosk

For footnotes, see the end of the table.

Country	Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
South Africa		Domestic money transfer systems/M-PESA mimoney WIZZIT Low-value contactless payments	Domestic money transfer systems/M-PESA Prepaid cards Cash-back at POS Low-value contactless payments		Payments via Real-Time Clearing The Early Debit Order System
Sweden		SEQR Swish iZettle Payair	iZettle		BIR
Switzerland	PostFinance E-Payment paysafecard	Post Finance Mobile MobileBuy	CASH Easy Cash Visa PayWave/MC PayPass Internet Cash Travel Cash	SIX Paynet E-bill PostFinance E-bill	ep2
Turkey		Mobile payment	Contactless card payments		
United Kingdom					Faster Payments Service
United States	Internet-based payment networks		Mobile card reader Prepaid cards	EBPP	Same day ACH Remote Deposit Capture
Other	PayPal (Luxembourg) Checkout (Finland) Turvalasku (Finland) MOLPoints (Malaysia) Globe G-Cash (Philippines)	Transfi (Spain) 1-2-3 Pay (SIovenia) MB PHONE (Portugal) Mobile Money (Malaysia) Globe G-Cash (Philippines)		1-2-3 Pay (Slovenia)	

[1] Internet payments. [2] Mobile payments. [3] Innovative use of card payments. [4] Also includes systems that only provide electronic bill payment functions. [5] Improvements in infrastructure and security.

Source: Fact-finding exercise conducted by the working group, 2011.

Annex 4:
Summary of the CPSS fact-finding exercise

The two tables below are a summary of the CPSS fact-finding exercise that includes both individual products and stylised product groups. Thus, the summary does not represent a quantification of consistently defined schemes, but only attempts to provide a broad picture of the reported innovations. Central bank respondents used subjective judgment to control for substantial differences between countries. Also, except as otherwise stated, double-counting (same product, but has multiple characteristics or fits into multiple categories) is allowed. Therefore, the tables provide a qualitative assessment, but not quantitative estimates.

Table A

Percentage of the number of reported innovations within the same product category

Features and characteristics			All	Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
Funding type	Prepaid		35	44	38	61	14	9
	Credit		67	68	66	33	93	91
	Debit		25	20	38	30	21	13
Access channel	POS		38	12	34	91	0	22
	Internet		55	100	44	36	93	34
	Other telecommunication network		38	24	84	18	50	19
	Branch/ATM		21	0	13	39	29	22
	Other		6	0	3	0	7	19
Access device	Computer		45	96	31	6	93	38
	Mobile phone		54	72	100	27	43	25
	Telephone		7	8	6	3	29	3
	Card		37	12	25	94	14	19
	Other		9	8	6	6	14	13
Main usage	P2P		43	44	66	18	7	59
	P2B		91	96	88	97	93	84
	B2B		18	4	6	0	43	47
	Government payments		24	12	19	18	29	44
Market impact[6]	High		21	16	6	12	29	44
	Medium		24	20	19	21	43	28
	Low		43	64	56	45	29	19
	Pilot		12	0	19	21	0	9
Access technique	Remote		74	100	81	33	100	78
	Proximity	Contact	24	8	19	55	7	19
		Contactless	26	12	31	61	7	6

For footnotes, see the end of the table.

Table A (cont)

Percentage of the number of reported innovations within the same product category

Features and characteristics			All	Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
Scheme owner[6]	Bank(s)		39	36	22	55	50	38
	Non-bank(s)		33	64	41	27	14	16
	Bank(s) and non-bank(s)		20	0	38	18	29	16
	Central bank(s)		8	0	0	0	7	31
Cooperation[6]	Banks only		21	16	0	27	29	38
	Bank(s) and non-bank(s)		36	36	59	24	50	19
	Non-banks only		5	4	9	6	0	3
	No cooperation		38	44	31	42	21	41
Purpose	Improved security		21	40	9	15	14	25
	Improved efficiency	Reduced use of cash	54	20	66	85	50	38
		Reduced use of cheques	15	8	13	9	29	22
		Lowering of processing costs	34	32	25	21	71	41
		Speeding-up of processing	47	36	22	45	71	72
		Overcoming infrastructural lags	21	20	16	15	14	34
		Inclusion of unbanked or underbanked	21	20	34	24	0	13
		Government payments	8	4	6	9	7	13
		Fostering competition	19	28	22	15	14	16
		Improving convenience	83	96	100	82	100	50
		Other	15	24	13	6	29	16
Focus	Initiation		57	60	63	58	86	34
	Overall processing and clearing and settlement		32	16	19	18	36	69
	Receipt		13	12	19	6	14	13
	New scheme		24	36	38	30	0	3

The figures are calculated by dividing the number of reported innovations by the total number of innovations reported under the respective product category. May not sum to 100 % due to rounding.

[1] Internet payments. [2] Mobile payments. [3] Innovation in the use of card payments. [4] Also includes systems that only provide electronic bill payment functions. [5] Improvements in infrastructure and security. [6] No double-counting.

Source: Fact-finding exercise conducted by the working group, 2011.

Table B

Percentage of the number of reported innovations across product categories that have the same characteristics

Features and characteristics			Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
Reported innovations			18	24	24	10	24
Funding type	Prepaid		23	25	42	4	6
	Credit		19	23	12	14	32
	Debit		15	35	29	9	12
Access channel	POS		6	22	59	0	14
	Internet		33	19	16	17	15
	Other telecommunication network		12	52	12	13	12
	Branch/ATM		0	14	46	14	25
	Other		0	13	0	13	75
Access device	Computer		39	16	3	21	20
	Mobile phone		25	44	12	8	11
	Telephone		20	20	10	40	10
	Card		6	16	62	4	12
	Other		17	17	17	17	33
Main usage	P2P		19	36	10	2	33
	P2B		19	23	26	10	22
	B2B		4	8	0	25	63
	Government payments		9	18	18	12	42
Market impact[6]	High		14	7	14	14	50
	Medium		15	18	21	18	27
	Low		27	31	25	7	10
	Pilot		0	38	44	0	19
Access technique	Remote		25	26	11	14	25
	Proximity	Contact	6	18	55	3	18
		Contactless	8	28	56	3	6
Scheme owner[6]	Bank(s)		17	13	34	13	23
	Non-bank(s)		36	29	20	4	11
	Bank(s) and non-bank(s)		0	44	22	15	19
	Central bank(s)		0	0	0	9	91

For footnotes, see the end of the table.

Table B (cont)

Percentage of the number of reported innovations across product categories that have the same characteristics

Features and characteristics			Internet[1]	Mobile[2]	Card[3]	EBPP[4]	Infra & sec[5]
Cooperation[6]	Banks only		14	0	31	14	41
	Bank(s) and non-bank(s)		18	39	16	14	12
	Non-banks only		14	43	29	0	14
	No cooperation		22	20	27	6	25
Purpose	Improved security		36	11	18	7	29
	Improved efficiency	Reduced use of cash	7	29	38	10	16
		Reduced use of cheques	10	20	15	20	35
		Lowering of processing costs	17	17	15	22	28
		Speeding-up of processing	14	11	23	16	36
		Overcoming infrastructural lags	18	18	18	7	39
		Inclusion of unbanked or underbanked	18	39	29	0	14
		Government payments	9	18	27	9	36
		Fostering competition	27	27	19	8	19
		Improving convenience	21	28	24	12	14
		Other	29	19	10	19	24
Focus	Initiation		19	26	25	16	14
	Overall processing and clearing and settlement		9	14	14	12	51
	Receipt		18	35	12	12	24
	New scheme		28	38	31	0	3

The figures are calculated by dividing the number of reported innovations by the total number of innovations reported under the respective features and characteristics. May not sum to 100% due to rounding.

[1] Internet payments. [2] Mobile payments. [3] Innovative use of card payments. [4] Also includes systems that only provide electronic bill payment functions. [5] Improvements in infrastructure and security. [6] No double-counting.

Source: Fact-finding exercise conducted by the working group, 2011.

Annex 5:
Major regulatory developments

Australia

Since the mid-2000s, reforms of the access arrangements for credit and debit card schemes have focused on promoting competition in payment systems. At the same time, they may have made it easier for new players, with innovative solutions, to enter the payments system. The Reserve Bank of Australia's Payments System Board is currently conducting a strategic review of innovation to identify areas in which innovation in the Australian payments system may be improved through more effective cooperation between stakeholders and regulators.

Brazil

The central bank has taken a rather proactive approach towards regulation of payments since 2005. In order to promote the development of retail payment systems, the central bank conducted an in-depth analysis of the status quo, and then issued reports and directives to address inefficiencies identified in the payments market. As a response, efforts were made by the private sector that led to the introduction of EBPP and a new national debit card scheme.

Canada

The Canadian government is taking a proactive approach. The Code of Conduct for the Credit and Debit Card Industry in Canada (2010) was enacted with an intent to make fees and rates for credit and debit card payments more transparent for both merchants and consumers and to allow merchants to provide discounts for different methods of payment. At present, the results are still difficult to judge. To help guide the evolution of the payments system in Canada, the Minister of Finance launched the Task Force for the Payments System Review in June 2010. In March 2012, this task force published its final report, "Moving Canada into the Digital Age". In order to move towards a digital payments system, it is recommended that the federal government should pass legislation to: (i) define a discrete payment industry and require payments service providers to become members; (ii) create a new public oversight body for the payments industry that will protect the public interest; (iii) encourage the payments industry to create a self-governance organisation to develop and implement strategy and standards; and (iv) reinvent the objects, governance, powers, business model and funding of the Canadian Payments Association. In response, the federal Department of Finance has indicated it will assess the Task Force recommendations and take three immediate actions: (i) establish a senior-level advisory committee to discuss emerging payments system issues; (ii) review the application of the Code of Conduct to emerging mobile payment products; and (iii) review the governance framework for the payments sector.

China

The Directive on Electronic Payments was enacted in 2005, which gave guidance to banks on providing electronic payment services. Measures on processing cheque images (2006) enabled banks to handle cheques electronically through truncating paper-based cheques and transferring cheque images, which improved the efficiency and security of cheque processing and made cheques usable across China. Measures on the administration of electronic drafts (2009) supported the dematerialisation of commercial drafts. In 2010, the Administrative Measures for Payment Services Provided by Non-financial Institutions

became effective, according to which non-financial institutions must apply to the central bank for licences to provide payment services.

European Union

At the turn of the millennium, every national state had its own legal framework for payments. Since the market for cashless payments, as part of the Single Market, should become as efficient and competitive as possible (according to the Lisbon agenda, March 2000), the European Commission (EC) took a new proactive approach towards cashless payment issues. The first legal initiative was the E-Money Directive (EMD)[88] in 2000. This was intended to create legal certainty; help development of electronic money; create a level playing field for electronic money institutions and credit institutions; ensure the stability of issuers; and facilitate cross-border operations. The directive was revised in 2009 in order to bring the requirements into line with the Payment Services Directive (PSD).

In 2007, the PSD was adopted for a harmonised legal framework for retail payment services in the EU. The PSD contains both prudential requirements and civil law provisions pertaining to the various payment service providers and the payment services they provide. To promote competition, a new group of payment service providers, the so-called "payment institutions", has been created. They can offer payment services without being a bank and do not have to cover the entire range of services provided by a bank. In addition, the rules pertaining to the execution of transactions have been clearly defined. For example, the maximum execution time between receipt at the payer bank and crediting to the account of the payee for non-paper-based payments has been reduced from up to three business days to one business day from 1 January 2012.

As the latest effort, the EU has enacted a regulation with the objective to make the major part of the SEPA schemes (ie ISO 20022) mandatory for all PSPs providing credit transfers and direct debits from 1 February 2014. This occurred after years of fostering a self-regulatory approach that did not deliver the expected results.

Hong Kong SAR

In overseeing the safety and efficiency of retail payment system operations, the Hong Kong Monetary Authority (HKMA) has been encouraging the industry to adopt a self-regulatory approach through the issuance of and compliance with codes of practice. In 2005, Octopus Cards Limited, the system operator of Octopus Card, issued a non-statutory Code of Practice for Multi-purpose Stored Value Card Operation. In 2007, a Code of Practice for Payment Card Scheme Operators was drawn up by eight payment card scheme operators with credit or debit card operations in Hong Kong SAR. The codes promote the general safety and efficiency of the multipurpose stored-value card/payment card operation; and through this, foster general public confidence in their operations. The HKMA has endorsed the two codes and monitors compliance with the codes by the respective parties.

In the light of the development of innovative retail payment products and services in recent years, the HKMA is conducting a review of the existing regulatory regime for multipurpose stored-value cards under the Banking Ordinance, with the aim of introducing legislative changes to expand the scope of coverage of the regulatory framework from card-based

[88] E-Money Directive (2000/46/EC, revised version 2009/110/EC): Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking-up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC.

products to other types of stored-value payment instruments (eg network-based or similar) and retail payment systems and services.

India

Recent regulatory actions focus on customer needs, including the rapid processing of large transaction volumes, and the fostering of specific emerging segments such as incoming remittances and domestic money transfers that require faster, cheaper and improved alternatives. Specific measures include allowing non-banks to offer payment products such as prepaid payment instruments including prepaid cards, e-wallets and mobile wallets with certain conditions; facilitating the use of business correspondents for providing cash-out facilities in banks' mobile money transfer schemes; permitting cash withdrawals using debit cards at the POS; and making electronic transactions vis-à-vis paper-based instruments more attractive, in terms of both user charges and settlement time required. Recently, the domestic money transfer guidelines have been further relaxed to allow transfer of funds between domestic debit/credit/prepaid cards subject to certain conditions and limits on daily and monthly transactions.

Japan

The Electronically Recorded Monetary Claim Act (2008) created a new type of payment instrument having functions similar to those of paper-based bills for financing businesses. Since the act came into force, several electronic monetary claim recording institutions have been established by private banks, and the new instrument is expected to have a favourable impact on the efficiency of settlement services. The Payment Services Act (2010) allows non-banks to provide funds transfer services that were previously restricted to banks, with the aim of promoting innovation in the area of funds transfer services. The act also sets consumer protection requirements for providers of payment instruments whose monetary value is recorded on a computer server (server-based electronic money). With improved consumer protection, transaction volumes in these instruments are expected to grow.

Korea

After 1999, a number of laws were passed to promote electronic payment methods. For example, the Digital Signature Act (1999) created more confidence in and greater usage of online banking and e-commerce. A change in the tax collection system (2002) allowed tax payments via EBPP. The Electronic Financial Transactions Act (2007) was introduced for the comprehensive regulation of electronic transaction business in Korea. In 2009, the Financial Investment Services and Capital Market (FSCM) Act was enacted to allow financial investment companies (FICs) that have investment trading or investment brokerage business licences to provide funds transfer services directly to individual customers, where previously they could do so only indirectly through banks.

Mexico

In 2007, the Mexican Congress passed the Transparency and Financial Services Arrangement Act. Under this legislation, the Bank of Mexico is authorised to regulate interchange fees and the commissions and fees banks charge for their services to customers. The Bank of Mexico has taken several measures such as promoting transparency and improving information about interchange and merchant service fees, removing barriers to entry and banning certain discriminatory practices. It has also used moral suasion to influence interchange and merchant service fees. Also in 2007, to promote financial inclusion, the Credit Institutions Act was amended to require banks to offer basic-

service accounts without fees or minimum balance requirements. In June 2011, the Bank of Mexico and other financial authorities issued regulations to simplify requirements for opening and using certain types of deposit account to foster financial inclusion and support a wide range of payment services based on mobile phones and debit cards. The regulation defines some access features and monthly deposit limits for "low risk value accounts". Most of these accounts can be offered through bank agents and linked to a mobile phone and/or to a debit card.

Russia

In 2010, the federal act *On payment agents* came into force to improve the infrastructure for cashless payments. It introduced a new legal entity, the so-called payment agent, that can offer its clients, especially in rural areas, payments via payment terminals and ATMs outside the bank-operated infrastructure. This legislation is considered to be a driver for innovation in retail payments, since it created a clear legal basis for a new player in the market.

Singapore

The Payment Systems (Oversight) Act 2006 (PS(O)A), which came into force in June 2006, sets out the regulatory framework for the oversight of payment systems and stored-value facilities in Singapore. The PS(O)A gives the Monetary Authority of Singapore (MAS) the discretionary power to gather information from operators, settlement institutions and participants of any payment system in Singapore. The Act also allows MAS to implement a risk-based approach by providing for the designation of payment systems that are important for financial system stability or public confidence. Operators and settlement institutions of designated payment systems as well as their participants are subject to MAS regulation.

PS(O)A sets out the MAS policy for stored-value facilities and provides for the liberalisation of prepaid payment instruments in Singapore. Under this regime, multipurpose stored-value facilities with stored values below the prescribed threshold may be issued by any entity. Such facilities do not require the approval of MAS but are required to provide written disclosure to potential users that they are not subject to MAS approval. Where the stored value of a facility exceeds the set threshold, the facility's holder must be approved by MAS, and a bank licensed by MAS must also be approved to be fully liable for the stored value of that facility.

South Africa

In 2007, the South African Reserve Bank acknowledged that non-bank PSPs have an important role to play in the payments system. The Bank published directives in 2007 regulating their participation in the payments system. By the end of 2008, amendments were made to the National Payment System Act to provide the Bank with the mandate to designate non-banks as designated clearing system participants, thereby formalising their participation in the payments system.

United States

In 2004, the Check Clearing for the 21st Century Act became effective, by which collecting banks are allowed to present a legally equivalent paper copy of an original cheque, called a "substitute cheque", if the paying bank requires a cheque to be presented for payment in paper form. The option of providing a substitute cheque gave banks the freedom to truncate and process cheque images electronically, allowing banks to collect cheques faster, and more cost-effectively. Almost all cheques in the US are now collected and presented in

electronic image form instead of paper. This capability has spurred some innovations that allow customers to deposit cheques remotely using, for example, a mobile telephone. The Federal Reserve Board issued a final rule establishing standards for debit card interchange fees and prohibiting network exclusivity arrangements and routing requirements. This rule, Regulation II (Debit Card Interchange Fees and Routing), is required by the "Dodd-Frank Wall Street Reform and Consumer Protection Act" of July 2010. As required by the Dodd-Frank Act, the final rule establishes standards for assessing whether debit card interchange fees received by debit card issuers are reasonable and proportional to the costs incurred by issuers for electronic debit transactions. Under the final rule, the maximum permissible interchange fee that a covered issuer may receive for an electronic debit transaction will be the sum of 21 cents per transaction and 5 basis points multiplied by the value of the transaction. In addition, an interim final rule allows for an upward adjustment of no more than 1 cent to a covered issuer's debit card interchange fee if the issuer develops and implements policies and procedures reasonably designed to achieve the fraud prevention standards set out in the interim final rule. Covered issuers are those that, along with affiliates, held assets worth USD 10 billion or more. When combined with the maximum permissible interchange fee under the interchange fee standards, a covered issuer eligible for the fraud prevention adjustment could receive an interchange fee of up to approximately 24 cents for the average debit card transaction, which is valued at USD 38. The final rule prohibits all issuers and networks from restricting the number of networks over which electronic debit transactions may be processed to less than two unaffiliated networks. All issuers and networks are prohibited from inhibiting a merchant's ability to direct the routing of the electronic debit transaction over any network that the issuer has enabled to process them. The Dodd-Frank Act also created a new agency, the Consumer Financial Protection Bureau (CFPB), and transferred rule-making authority for the federal Electronic Fund Transfer Act and the Truth in Lending Act from the Federal Reserve Board to the CFPB. The CFPB has issued interim final rules that establish its authority and responsibility for the associated regulations.

Annex 6:
Central bank involvement in retail payments

	Operator role			Catalyst role[1]				
	Owner	Operator	Provision of settlement infrastructure	Chairing industry groups (besides SEPA)	Participating in industry groups	Participating in industry groups with focus on innovation	Encouraging the use of innovative retail payment instruments	Promoting interoperability
Australia			x		x	x		x
Belgium		x	x		x			
Brazil		x					x	x
Canada			x	x	x			
China	x	x	x		x		x	x
ECB			x		x	x	x	x
France				x	x	x	x	x
Germany	x	x	x	x	x	x		x
Hong Kong SAR			x	x	x	x	x	x
India	x	x	x				x	x
Italy	x	x	x		x	x	x	x
Japan		x	x		x	x	x	
Korea		x	x	x				x
Mexico	x	x	x		x	x	x	x
Netherlands			x	x	x	x	x	x
Russia	x	x	x	x	x	x	x	x
Saudi Arabia	x	x	x		x	x	x	x
Singapore			x	x	x	x	x	x
South Africa			x	x	x	x	x	x
Sweden			x		x	x	x	x
Switzerland			x	x	x	x		
Turkey		x						
United States	x	x	x	x	x	x	x	x

[1] Includes both regular and ad hoc activities of the central bank.

	Oversight role							
	Scope				Legal basis			
	Retail payment systems	Retail payment instruments	Retail payment services provided by banks	Retail payment services provided by non-banks	Central bank law	Payment system law	Other law(s)	None
Australia	x	x	x	x	x	x	x	
Belgium	x	x			x		x	
Brazil	x	x	x			x	x	
Canada[2]					x	x		
China	x	x	x	x	x		x	
ECB	x	x	x	x	x			
France	x	x	x	x	x	x		
Germany	x	x	x	x	x			
Hong Kong SAR	x	x	x	x		x		
India	x	x	x	x	x	x		
Italy	x	x	x	x			x	
Japan	x				x			
Korea	x	x	x	x	x		x	
Mexico	x	x	x	x	x	x	x	
Netherlands	x	x			x			
Russia[3]	–	–	–	–		x		
Saudi Arabia	x	x	x	x	x		x	
Singapore	x	x	x	x		x		
South Africa	x	x	x	x	x	x		
Sweden	x				x			
Switzerland	x[4]				x			
Turkey	x				x		x	
United States[5]	x	x	x		x	x	x	

[2] The Bank of Canada has the oversight role of systemically important payments system, and so far no retail payments systems in Canada have been designated as systemically important. [3] Cannot provide information on scope due to ongoing legislative reforms. [4] Monitoring only. [5] The scope of the Federal Reserve's oversight and supervisory role will depend on relevant banking supervision and payment system laws and regulations. The Federal Reserve has also published a payment system risk policy that sets out relevant thresholds and expectations.

	Oversight role							
	Empowerment		Tools available					
	Explicit	Implicit, construed in the context of "ensuring the adequate and safe functioning of payments in the country"	Monitoring	Dialogue and moral suasion	Producing and publishing statistics and/or payment system reports	Issuing regulations	Imposing sanctions	On-site inspections
Australia	x		x	x	x	x		
Belgium		x	x	x	x			
Brazil	x		x	x	x	x	x	x
Canada	x	x	x	x	x			x
China		x	x	x	x	x	x	x
ECB	x	x	x	x	x	x	x	x
France	x	x	x	x	x			x
Germany		x	x	x	x			
Hong Kong SAR	x	x	x	x	x	x	x	x
India	x	x	x	x	x	x	x	x
Italy	x	x	x	x	x	x	x	x
Japan		x	x	x	x			x
Korea		x	x	x	x			
Mexico	x	x	x	x	x	x	x	x
Netherlands		x	x	x	x			x
Russia	x	x	x	x	x			x
Saudi Arabia		x	x	x	x	x	x	x
Singapore	x	x	x	x	x	x[6]	x[6]	x[6]
South Africa	x		x	x	x	x	x	x
Sweden		x	x	x	x			
Switzerland	x		x	x	x	x	x	x
Turkey		x	x	x	x	x		
United States[7]	x		x	x	x	x	x	x

[6] Operators, settlement institutions and participants in designated payment systems will be subject to MAS regulations. [7] Authority is explicit where it is derived from the Federal Reserve's role in banking supervision and regulation; the tools available will depend on the circumstances.

Source: Survey conducted by the working group on central bank involvement in retail payments, 2012.

Annex 7:
Members of the working group

This report was produced for the CPSS by the Working Group on Innovations in Retail Payments.

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Bank of Canada	Ben Fung
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Hong Kong Monetary Authority	Sara Yip
Reserve Bank of India	Vasudevan Parameswaran (until August 2011) Charulatha S Kar (since August 2011)
Bank of Italy	Paola Giucca
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Bank of Korea	Kyusoo Kim (until March 2011) Jeonggyu Kim (since March 2011)
Bank of Mexico	Alberto Mendoza Hernández
Netherlands Bank	Anneke Kosse
Central Bank of the Russian Federation	Andrey Slependyaev (until July 2011) Olga Lapkina (since July 2011)
Saudi Arabian Monetary Agency	Husam Al Mahmoud
Monetary Authority of Singapore	Martin Teo Lian Choo Lim (since February 2011) Tze Hon Lau (until February 2011)
South African Reserve Bank	Margaret Olivier
Sveriges Riksbank	Björn Segendorff
Swiss National Bank	David Maurer
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