Developments in retail payment systems

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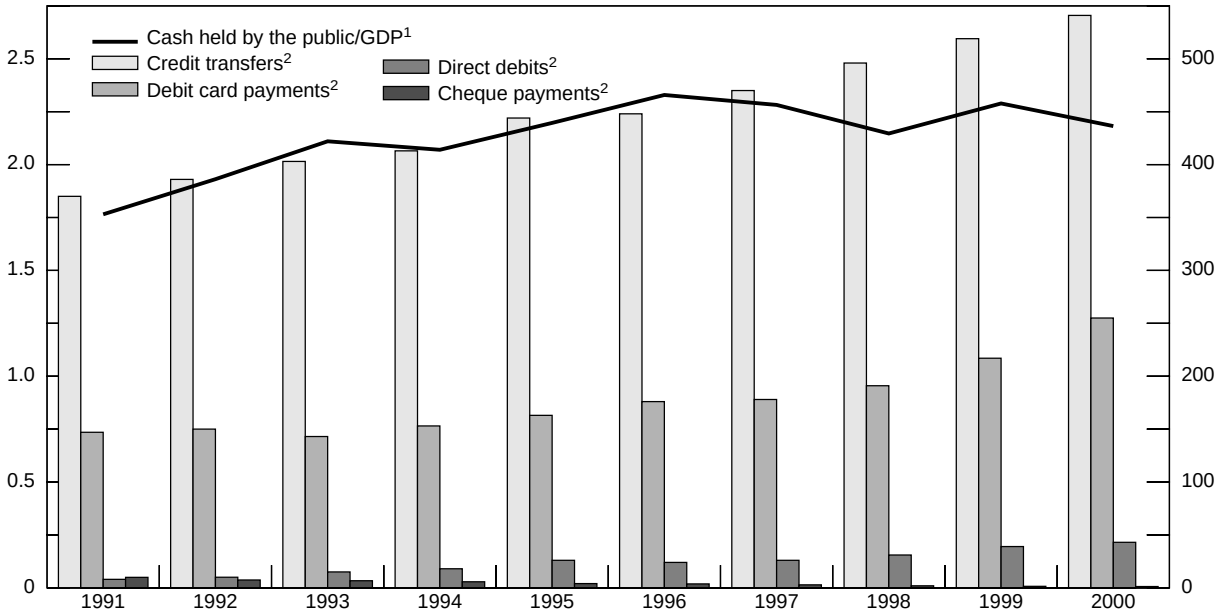
1. Introduction

Banks face three notable challenges in developing retail payment systems: integration of bank and customer systems, use of new technologies to improve the efficiency of payment systems, and international standardisation and integration of banking systems.

Retail payments - routine settlement of invoices and purchases by consumers and firms - are clearly the dominant type of transaction handled by payment systems in terms of numbers of transactions. On the other hand, wholesale payments, ie money market, securities system and interbank settlements, are considerably more important in terms of aggregate value.

Graph 1

Retail payments in Finland



[1] Left-hand scale, in percentages. [2] Right-hand scale, in millions of payments.

Source: Finnish Bankers' Association.

In recent decades, retail payments in Finland have shifted from cash towards giro transfers and debit cards (Graph 1). The use of cheques has essentially vanished. This trend is driven by the practicality and cost-effectiveness of new payment instruments. Functions once performed manually and based largely on paper are now completely automated. For customers, the switch makes things easier and affords a small reduction in forgone interest earnings, as compared to the use of physical cash. Finnish banks usually charge lower fees for executing payments based on self-service than for those requiring staff assistance.

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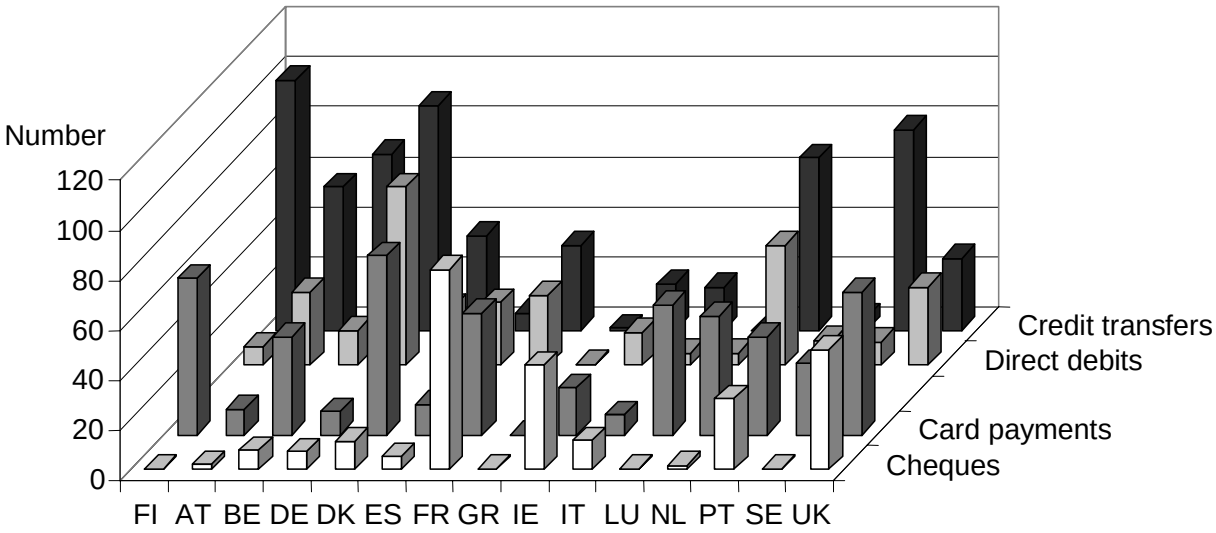
2. International situation

Finland is a pioneer in advanced payment systems (Graph 2), and today electronic banking services are widely used. In other countries, national systems have developed with different emphases and at different speeds. Thus, while all countries rely on the same basic payment modes, their relative importance and technical sophistication may vary considerably. This inconsistency arises from differences in the organisational structures of banking sectors, the prevailing payment arrangements,

Graph 2a

Payment practices in EU countries

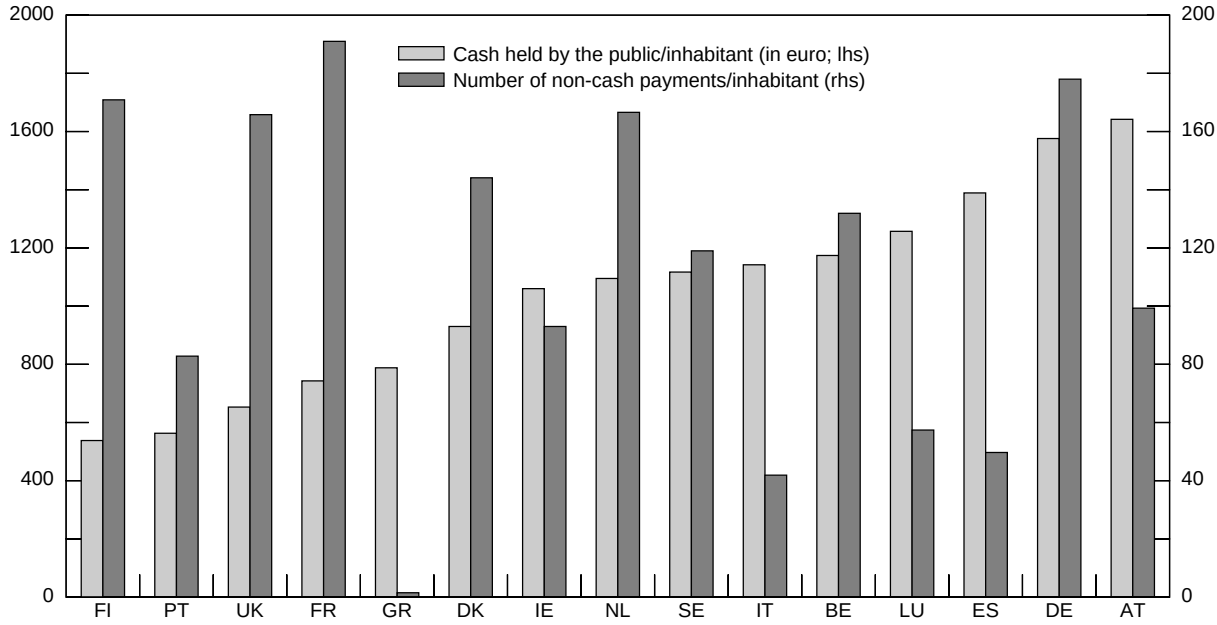
Number of payments per EU-area resident, 1999



Graph 2b

Cash balances and the number of non-cash payments in EU countries

Per inhabitant, 1999



Source: European Central Bank.

the willingness of customers to accept change, the prevalence of IT, regulatory issues and the technical infrastructure itself. Such national differences currently constitute the main obstacle to achieving efficiency in international payments. Indeed, clear international standards and practices have only been established for credit card payments.

3. Development trends and future challenges

Electronics-based solutions and integration with customer systems have recently been the dominant themes in the development of payment systems. There has also been a notable shift from physical storage media (eg hard copy records and magnetic tape) to entirely network-based transactions. Moreover, the significance of international payments has grown along with global integration. In Finland's case, stage three of EMU implies a high degree of international integration in the coming years. Increasing use of the internet is reinforcing this trend. The internet already takes little note of national borders, which may eventually lose their significance for electronic commerce. The role of the internet in electronic commerce, trading systems and associated payment transfers continues to steadily increase.

The main challenges ahead in the development of retail payment systems are:

- effective integration of customer systems with bank payment systems;
- exploitation of new technologies to improve the efficiency of bank payment systems;
- international standardisation and integration of banking systems.

Box 1. Will wireless devices revolutionise payment systems

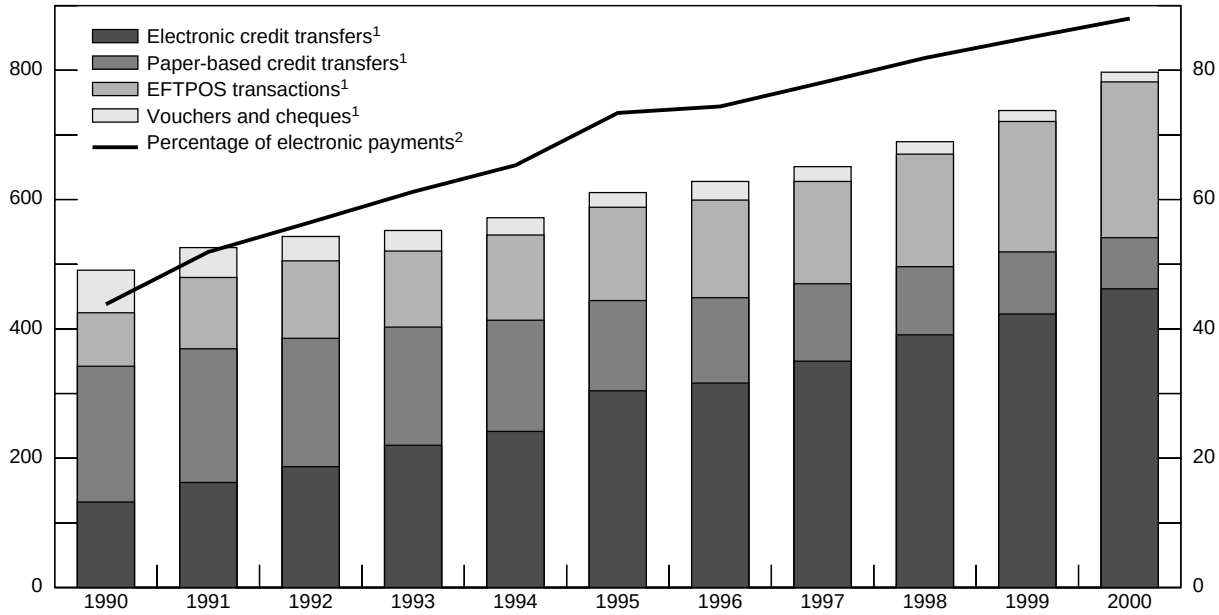
Will new payment systems arise with the convergence of technologies? Today we see the emergence of powerful chips with built-in secure identification, strong encryption and data handling possibilities, as well as industry initiatives such as Bluetooth, which seeks to allow fast radio-frequency communication over very short distances (eg room-to-room) among all sorts of electronic devices. Moreover, there is the ever greater presence of digital mobile devices that incorporate a user-activated chip, a keypad and a display, and operate in wireless networks with ever increasing capacity and speed. There is also wide agreement on international mobile standards. Indeed, the typical GSM handset includes features that already allow it to function as a debit card or as cash if the services are available. What could be easier and more secure than pulling out your phone and letting it communicate with the checkout computer to see a total or itemised bill? All you would do is push a button on your phone to approve the payment. With web-enabled phones, you can go online, find a hotel in another country and pay for the reservation all in a single transaction and for the cost of a local call. You could also use your phone to repay a small loan from a friend by selecting the payment function on the mobile phone and keying in your friend's bank account number and the amount, and pushing "pay". All this is technically feasible today. But is the threshold to wide acceptance too high? Are the benefits too minor to justify abandoning traditional payment methods?

4. Effective integration with customer systems

Finnish banks are among the world's leaders in integration with customer systems. All large, medium-sized and even most small corporate customers handle payments automatically with their bank over networks. An ever increasing number of private customers also handle their payments online via home PCs or even mobile phones. The automation level in Finland is probably the highest in the world (see Table 1 of the overview paper in this volume). 88% of banking transactions are handled in self-service mode, mainly via the internet (Graph 3).

Graph 3

Total bank-intermediated payments in Finland



[1] Left-hand scale, in millions of payments. [2] Right-hand scale.

Source: Finnish Bankers' Association.

The main technical factors in integration with customer systems are:

- uniform and clear data communication standards;
- universal messaging standards that enable direct transmission of messages from customer systems to banks in electronic form;
- universal messaging standards for payment receipts that can be transmitted directly into company accounting systems (eg in Finland the bank statement also serves as an accounting record);
- payment identification data, ie a reference code whereby invoice issuers/customers can reliably identify transfers in their own systems;
- standardised security systems that ensure protection of customer-to-bank and bank-to-bank transactions.

Finnish payment systems[2] already incorporate these features and, in conjunction with effective marketing campaigns and good support from customers, they have played a productive role in developing effective payment arrangements in Finland.

Internationally, however, the degree of integration with customer systems is much lower. Perhaps the greatest challenge to the banking industry is how to achieve an international standard that supports further integration with customer systems. Major benefits in payment systems can clearly be realised through effective, wide-ranging customer integration.

[2] Details and statistics on Finnish payment systems can be found at the Finnish Banking Association's website (www.pankkiyhdistys.fi).

5. Effects of technology

The application of technology to payment systems constantly generates new opportunities: multi-purpose smartcards, sophisticated encryption and identification systems, a growing selection of services available on wireless devices, and higher network speeds. Based on these new technological possibilities, we are seeing a range of experiments with new payment modes, eg e-cash and payment by e-mail and by mobile phone.

New technologies enable all parties to a transaction to be instantaneously and simultaneously available, regardless of the physical distances that separate them (from a few centimetres to thousands of kilometres). The key to all this is a secure network. Payments should be executed without delay, because in a real-time environment all delays generate costs.

Even though the requisite information for making a payment remains the same, inputting the data for the transaction continues to be simplified. But advanced payment systems must also ensure that the customer's money is available to her. This, in turn, requires that the security of the payment system be sufficient to ensure absolutely that the customer (and no one else) always has access to her own funds. The principle of account-to-account funds transfers does not change with new technologies, since monetary value is still transferred from the payer's to the receiver's account. This concerns all payment service products (eg giros, debit cards, direct debiting). In an electronic environment, all money is account-based and all computer accounting (from chip cards to mainframes) involves determining how many monetary units are in a particular account.

Internationally, customers seeking to pay for something online typically must turn to a major credit card issuer such as MasterCard or Visa. The increase in the use of the internet and online shopping challenges banks' position as significant providers of payment services.[3]

6. International standards for payment systems and convergence

Compared to the relatively sophisticated national-level systems, international giro transfers are still surprisingly inefficient, often involving manual operations and data conversion to different formats at several stages. There is still no internationally accepted account numbering system; transfers are usually routed on the basis of the recipient's name, address and bank branch. There is also no standardised international reference (standardised remittance) data; in fact, only a few countries even have domestic reference systems. There are no common standards - electronic or paper-based - for sending or receiving customers' international payment orders or invoices.

Several standards have been proposed, but none enjoy sufficiently wide support to gain broad international acceptance. The leader, perhaps, is the SWIFT network and SWIFT standards, which are generally used in international payment traffic between banks. These standards are relatively loose and still require several manual (or semi-manual) steps when a customer payment order is transmitted from sender to receiver. The interbank settlement method currently used for cross-border payments is quite intricate. Future systems will need to be more efficient and uniform. (See Leinonen (2000) for a more thorough review.)

The creation of standards has a great deal to do with technical development. Standards make interconnection of systems feasible, they allow software providers to develop off-the-shelf solutions, eg for accounting and payroll programmes with payment system interfaces, and they create synergies in the marketing efforts of different organisations and suppliers. The wider the acceptance of common standards, the more effectively customers and banks are served in international and domestic payment operations.

A good example of creating effective standards that take advantage of new technologies, such as embedded microprocessor chips and security solutions to support payment via the internet, is the joint international effort of credit card companies and bank debit card issuers.

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[3] For further information on developments in payment systems and payment via internet and mobile phone, see the websites of Finnish banks, Avant, SWIFT, MasterCard, Visa, Nokia and Sonera.

The objective should be to develop standards at bank-to-customer and bank-to-bank levels so that these interface seamlessly with each other.

Box 2. Key elements of international standardisation

An ***international account number*** is needed for efficient routing of payments. For example, IBAN (International Bank Account Number) is a standard currently being implemented within Europe. It is based on an international prefix and the domestic bank account number. When the user inputs the IBAN, a bank directory can automatically provide other basic bank-related information. This represents a major advance over the current international situation: where routing is weak and remains comparable to earlier clerk-assisted transfers by phone, where calls were routed based on the name and address of the receiver.

An ***international reference number*** is needed for automatic identification of payments in customer systems. This is the most important piece of information for integration with customers.

The basic payment messages (for sending and receiving payments) between customers and banks and standardisation of the information they contain create a basis for a uniform network-based customer interface and thus increase the opportunities for the customer to input most of the transaction himself. New standards need to be based on the latest internet technology and to combine the presentation of information in a visual format with data fields. Payment standards based on Extensible Markup Language (XML) include the Open Financial Exchange (OFX) solution promoted by US developers and the Electronic Payment Initiator (ePI) standard under development by the ESCB's European Committee for Banking Standards.

Bank-to-bank messaging (SWIFT MT103+) in international payment transfers is currently being implemented. These payment messages are more precisely defined than hitherto and support automated processing.

7. An efficient approach to developing infrastructure

Payment transfers require a common infrastructure that combines systems, structures and service providers to create an overall functional payment system. When developing a new infrastructure, it is difficult to evaluate which new approach is the most promising or how difficult it will ultimately be to implement it. Furthermore, every solution and standard comes with proponents arguing that their own idea is superior.

Promoters of new payment systems also face scale effects and the classic "chicken and egg" conundrum. Obviously, the more widely used the payment mode, the more advantageous it is. In the initial phase, however, it is difficult to get a novel payment technology to market precisely because it is not used anywhere, and this in turn makes it hard to sell to potential users. Moreover, because nobody uses it yet, potential payment receivers remain reluctant to invest in the system.

There is a natural resistance to change. First, there are the transition costs of changing while maintaining redundant, overlapping systems. Moreover, when banks introduce more efficient systems, there are investment costs at the same time that fee income from customers is normally shrinking. Finally, those who benefit most from the old system's existence can be counted on to defend their positions.

The challenge then is to create a development process efficient enough to implement an infrastructure that takes into consideration the constraints imposed by the need to foster cooperation among individual banks and customers, to give suppliers competitive opportunities and to meet the reliability demands set for the system. As a rule, systems should be both open and standardised. The pricing of every step in the processing of a payment should be transparent. A decision process is also needed to guide the implementation of the new infrastructure, so that it promotes full use of the new technology and ensures adequate commitment among all parties. In addition, there are the technical requirements: a functional network, a transaction routing mechanism, security systems and an interbank settlement method for concrete transmission/transfer of payment transactions. As internet technology changes many aspects of payment transmission, top priority should be given to improving the development process itself to ensure effective development over the long run.

Box 3. Core elements of infrastructure development

A ***decision-making body*** that resolves which standards will be used, as well as processing rules and infrastructure components. This organisation would also work to ensure commitment from all parties and coordinate implementation of new features and solutions. This may also be a group of decision-making bodies handling tasks appropriate to their designated areas.

A ***payment system network*** through which payments are transferred directly between banks on the basis of a common international account numbering system. The payment system network should be open to all parties authorised to engage in payment transfers. Such a system could be established by extending SWIFT's new SWIFTNet interactive communication services.

One promising solution that allows ***identification*** of parties, ensures the authenticity of payment orders and protects users from system abuse and fraud is the open public key infrastructure for secure business-to-business internet transactions. Such secure systems require, however, a transaction authorisation unit/centre that grants authorisations and administers the system.

An ***interbank settlement system*** that transfers funds (settlements) to cover payments between banks in a real-time network environment. Central banks are likely to play a major role in developing real-time settlement systems.

8. The role of the central bank and other authorities in developing systems and services

If for any reason (eg a lack of competition or cooperation) failures occur in the development of payment systems, society pays the price. The pressure on officials to promote effective development is greater, the further that existing systems lag behind desirable and feasible developments.

Officials have a duty to oversee the state of payment systems, and to support and study the possibilities of new alternatives. They need to publish their findings, make recommendations and set development targets for the market. On the other hand, there need to be substantial deficiencies in the market mechanism before authorities will undertake to issue guidelines and regulations or draft legislation. Further, they need strong justification before they intervene in an effort to improve the situation.

Central banks have played a major role in offering payment services, in providing the processes that support the use of physical cash, and in establishing interbank settlement systems. All these functions need to be developed in accordance with evolving market needs. Authorities can also act as venture capitalists in promoting new infrastructure when other market participants lack the wherewithal or interest to make the initial investment. The creation of a common payments infrastructure that supports the European Union's single market and electronic commerce requires cooperation from all sides - and possibly a more active role on the part of authorities - to launch the next stage of development.

9. Alternative paths of development

Development seems likely to happen in waves as pressures for change reach a certain level and overcome the forces holding to the status quo. In such situations, we can expect significant and rapid shifts that may result in substantial changes in the division of labour in respect of payment systems. Traditional service providers unwilling to avail themselves of the possibilities of technology will have difficulties in maintaining their positions against aggressive newcomers. For example, digital watches and calculators caused a major change in market shares in the 1970s. If banks wish to continue to act as parties to payment transfers, they must be ready to exploit new technological opportunities. Central banks will also need to develop and more effectively implement new technologies in their services.

Over the next few years the following three scenarios seem most likely:

- the banking sector reaches a common understanding on developing payment systems and creates a new payment systems infrastructure based on banking services and new technology;
- bank cooperation fails to produce a new infrastructure and competitors create a new payment system infrastructure that wins official approval;
- development driven by market forces is too slow and social pressures force officials, particularly central banks, to create a new and more effective payment systems infrastructure, partly by using their regulatory power.

Development is rarely so straightforward. It seems reasonable to expect a combination of these three scenarios with shifting focus and pace.

Reference

Leinonen, H (2000): "Re-engineering payment systems for the e-world", *Bank of Finland discussion paper* 17/2000, (www.bof.fi).