International Standards for Payment Systems

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INTRODUCTION

Payment systems are an important part of the financial infrastructure, and safe and efficient payment systems are essential to the smooth functioning of the financial system. Within the last 10-15 years, the central banks of the G-10 countries have driven the trend for greater focus on the risks associated with payment systems. This development is to a large extent a result of the increasing volumes traded in the systems, and the rapid pace of technological development, both of which have led to a significant increase in the potential risks entailed by the systems. G-10 and the European Monetary Institute (EMI, now the European Central Bank, ECB), amongst others, have published reports with recommendations and standards for payment systems. The latest report on the subject, Core Principles for Systemically Important Payment Systems (Core Principles), from the Committee on Payment and Settlement Systems of the G-10 central banks, was published on 15 January 2001.

The article outlines what a payment system is, as well as the various types of payment systems, followed by the two key requirements for payment systems: safety and efficiency. A description of the risks associated with payment systems is also included. The role of the central banks in connection with payments and settlements is discussed in the light of previous reports from G-10 and EMI/ECB in particular. Finally, the standards contained in the Core Principles are outlined.

RISKS AND EFFICIENCY OF PAYMENT SYSTEMS

The majority of payments in Denmark are made electronically via payment systems, i.e. IT systems for the transfer of funds. Typically, funds

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1 G-10 comprises the ten largest industrialised countries and Switzerland.
2 The report can be downloaded from BIS’ Web site: www.bis.org.
3 BIS has defined payment systems as “systems that comprise a set of instruments, procedures and rules for the transfer of funds among system participants” (Core Principles, page 4).
are transferred from the payer's account with a bank to the recipient's account with another bank or the same bank. Both cheque payments and Dankort (debit card) payments involve the transfer of funds between bank accounts.

If the recipient does not have an account with the same bank as the payer, the payment is typically part of a transfer between the two banks' accounts with the Nationalbank. A typical customer payment via the banks thus involves two layers: transactions to and from the customer accounts, and a transfer between the two banks' accounts with the Nationalbank via an interbank payment system. However, the largest volume of turnover in the payment systems does not relate to customer transactions, but to interbank trading in the money, securities and currency markets.

Box 1 describes some of the main characteristics of various types of payment systems.

Considerable amounts pass through the payment systems. For instance, the daily turnover in the Bank of England's RTGS system, Chaps, is close to 180 billion pounds sterling, the daily turnover in the American payment systems, Chips and FEDwire, exceeds 2,500 billion dollars, and the daily turnover in the global currency market is estimated to be in the region of 1,500 billion dollars.

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**PAYMENT SYSTEMS**

In general terms, there are two types of payment systems. The system used depends partly on the size of the payment.

Large or time-critical payments are typically made via real-time gross settlement systems, RTGS. The payments are effected instantly and finally to the banks' accounts with the settlement bank – in most countries the central bank. RTGS systems are used mainly for interbank settlements and large payments for corporate customers.

For smaller payments, banks in most countries have established systems which calculate the net position of each participant vis-à-vis the other participants, instead of settling each payment separately and immediately. This is called netting. At set times of the day these net positions are exchanged via the banks' accounts with the settlement bank – in most countries the central bank. Net settlement systems are typically used for e.g. retail payments such as Dankort transactions (in Denmark), direct debit and cheques.

In recent years, hybrids of these two types of systems have also emerged.

Denmark has two real-time gross settlement systems: DEBES in euro and the DN Inquiry and Transfer System in kroner. These systems will be replaced by the Nationalbank's new system, KRONOS, which is expected to be completed in the fourth quarter of 2001. Sum clearing and securities settlement are examples of net settlement systems.
The daily turnover in the Danish payment systems is considerable. The average daily turnover of the Danish RTGS system, DN Inquiry and Transfer System, is around kr. 90 billion, which is more or less equivalent to the total shareholders’ funds of the Danish banking sector at the end of 1999, viz. kr. 94.4 billion. The daily turnover in the sum clearing net settlement system is approximately kr. 15 billion, while the daily securities settlement trading volume is around kr. 90 billion. In view of these large volumes, the potential risks faced by the banks are considerable.

Payment systems entail several types of risk, cf. Box 2. For example, if a bank explicitly or implicitly grants a customer credit before final receipt of a payment, or a bank executes its part of a financial transaction before the counterparty has executed its part, the bank runs a credit risk. If a bank counts on using liquidity from payments received from other parties in order to execute its own payments, the bank runs a liquidity risk. The structure and workings of the payment system itself impose operational and legal risks on the participants.

All of the above types of risk can involve systemic risks. Since problems experienced by one participant in a payment system may affect the other participants directly and rapidly, payment systems could potentially transfer problems from one participant to the others. If one participant is unable to fulfil its obligations, or the payment system is down, it can be difficult for other participants to meet their obligations. Such domino effects can lead to extensive credit and liquidity problems, which can be spread from the participants in the system to other parts of the financial system.

Needless to say, systemic risks are greater in systems with high volumes and/or large individual transactions. Payment systems which could potentially cause problems or spread them to the domestic or international

**PAYMENT SYSTEM RISKS**

Box 2

Payment systems involve several types of risk:

*Credit risk*: The risk that a participant in the system goes into liquidation or is otherwise unable to meet its full financial obligations at the expected time or later.

*Liquidity risk*: The risk that a participant in the system does not have sufficient liquidity to meet its financial obligations at the expected time – although the participant in question may be able to meet its obligations at a later time.

*Operational risk*: The risk that operational factors, e.g. system downtime or operational errors, result in or amplify credit or liquidity risks.

*Legal risk*: The risk that an inadequate legal basis for the system results in or amplifies credit or liquidity risks.

*Systemic risk*: The risk that one participant’s difficulties in meeting its financial obligations spread to other participants in the system or to other areas of the economy.
financial system are referred to as systemically important payment systems. These are typically systems where the total turnover or the size or nature of the individual transactions might give rise to this situation.

As stated above, there is increasing domestic and international awareness of the inherent risks of payment systems. This awareness is presumably one reason for the fact that it is difficult to find examples of financial crises originating in payment systems.

Safe payment systems are thus essential to the smooth operation of the financial markets and to the economy in general. In addition, payment systems must be efficient\(^1\).

Traditionally, safety and efficiency are seen as contradictory objectives. For example, the two key types of payment systems, RTGS systems and net settlement systems, cf. Box 1, both present advantages and disadvantages in relation to security and efficiency.

In an RTGS system, where the payments are final immediately after the payment order has been given, the credit risk applies to a shorter period than in a net settlement system, where payments are not final until clearing and settlement have taken place – typically at the end of the day. On the other hand, the liquidity requirement, and thereby the costs, of a net settlement system are lower. A bank which both sends and receives three payments, each of kr. 50 million, within a day will not need liquidity in a net settlement system, whereas it might require kr. 150 million in a gross settlement system. On the other hand, the legal risks are greater in a net settlement system. Finally, the costs of an RTGS system are higher since such a system requires on-line monitoring and bookkeeping, liquidity and risk management, etc.

Overall, RTGS systems must be considered the more safe of the two, but also the more expensive. An important parameter when deciding which system to use is the size of the transaction. When security is weighed against efficiency, large payments, where the risks are most decisive, are often executed via RTGS systems, whereas smaller payment are typically executed via net settlement systems. For example, the average size of transactions in the DN Inquiry and Transfer System is kr. 55 million, whereas the average size of a sum clearing transaction is kr. 5,000.

However, safety and efficiency can also be complementary objectives in that, for example, improved system design or technological progress can lead to improvement in both. Moreover, the systems must be efficient if they are to be used at all. Even the most safe payment system cannot contribute to financial stability if the costs or encumbrance of

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\(^1\) Payment system efficiency relates particularly to the costs of using the system, but other aspects are also important, e.g. transaction time, ease of use, etc.
using it are so great that market players are forced to use other, less safe systems.

The role of the central banks in payment systems
The role of the central banks in electronic payment systems is twofold.

Firstly, the central banks are bankers to the banks. In many countries the central banks play an operational role in payment systems as the operator of certain systems and also as the settlement bank for other systems. For instance, payment settlements in the Danish payment systems are effected via the accounts of the banks and mortgage-credit institutes with the Nationalbank. There are several reasons for this. Typically, the central bank is the only institution with which all credit institutions have an account, and is thus the natural choice for such operations. Only the central bank can provide liquidity to the banking sector as a whole, since liquidity in fact comprises safe claims on the central bank. In addition, the central bank is neutral in terms of competition.

The second part of the role of the central banks in relation to payment systems is to contribute to the safety and efficiency of the payment systems. This is partly related to the operational role of the central banks and partly to the central banks’ general task of helping to ensure financial stability. Furthermore, the central bank is interested in an efficient money market and in maintaining confidence in the national currency. Finally, liquidity support in the event of a crisis typically involves the central bank.

Most central banks worldwide share co-responsibility for maintaining financial stability. The stability of payment and settlement systems is typically considered to fall within the central bank's authority, as an important tool in ensuring financial stability, cf. Box 3.

This role is generally referred to as oversight. The Bank for International Settlements, BIS, defines oversight as "a central bank task, principally intended to promote the smooth functioning of payment systems and to protect the financial system against possible 'domino effects' which may occur when one or more participants in the payment system incur credit or liquidity problems. Payment systems oversight aims at a given system (e.g. a funds transfer system) rather than individual participants".¹

Previous efforts to reduce payment system risks
In February 1989 BIS/G-10 published a Report on Netting Schemes (the Angell report), which was the first report to focus on the risks related to

payment systems and the central banks' role in this respect. Since then BIS and EMI/ECB have published several reports on payment system risks. The best known is Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries (the Lamfalussy Report, BIS (1990)).

The Lamfalussy Report is probably the most significant report on the topic so far. Although its scope was originally cross-border net settlement systems, it has proven to be a valuable guide in a much broader context. It is used as a basis for assessing payment systems in most parts of the world and is a benchmark for the objectives to be pursued by central banks when overseeing net settlement systems.

The report sets up 6 standards to be met by net settlement systems for large payments, including a sound legal basis, an understanding of system risks among participants and operators and that the latter have procedures to handle such risks, and that the system must be able to carry out netting even if the largest debtor in the system goes into liquidation. In addition, the report defines a set of principles for the oversight of systems operating in several currencies or across international borders.

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In November 1993, the EMI published *Minimum common features for domestic payment systems*. This report lays down 10 minimum requirements of payment systems within the EU. The aim is to avoid payment systems or their participants becoming established in the countries with the least regulation (regulatory arbitrage), to solve the legal problems related to remote access whereby the participant and the system are in different countries and subject to different legislation, and to avoid unfair competition where central banks subsidise their own systems. The principles refer to 6 areas identified as key areas: access criteria, risk management, legal basis, technical issues, pricing policy and opening hours.

The principles state *inter alia* that the systems must comply with the Lamfalussy Standards, that pricing must ensure full recovery of costs, and that the central banks may only extend credit against full collateral. Principle 6 emphasises that in connection with their oversight responsibilities the central banks must assess the risks of all interbank payment systems and seek to minimise these risks.

**CORE PRINCIPLES**

The Asian and South American crises in the second half of the 1990s sharpened the focus on financial stability and triggered initiatives in a large number of areas. In 1997, representatives from the G-10 countries and the emerging market economies set up an ad-hoc working party on financial stability in countries with high growth and whose financial systems are undergoing fundamental changes. The aim of the work was to develop a concerted international strategy to promote the establishment, adoption and implementation of sound principles and practices needed for financial stability.¹ The strategy has the following major components:

- Development of an international consensus on the key elements of a sound financial system.
- Formulation of norms, principles and practices within areas such as accounting, payment systems, and supervision of banks, securities markets, insurance business and financial conglomerates.
- Use of market discipline to provide incentives for the adoption of sound supervisory systems, better corporate governance and other key elements of a robust financial system.
- Promotion by multilateral institutions such as the IMF, the World Bank and the regional development banks of the adoption and implementation of sound principles and practices.

In continuation of the above work the G-10 central banks in 1998 decided to set up a working party to develop standards for the design, operation and oversight of payment systems worldwide. The standards were to be based on international consensus and were to be flexible enough to handle the fact that economies and institutional set-ups vary from country to country.

The work was based on the Lamfalussy Standards, but their scope has been extended, e.g. by involving a broad range of members comprising 26 institutions from countries at very different development stages.

The report sets out ten Core Principles for systemically important payment systems, six of which are based on the Lamfalussy Standards. These Core Principles can also be used as guidelines for assessment of systems subject to lower systemic risks.

The report concentrates on payment systems, but an equivalent report has been prepared for securities settlement systems, cf. below.

The Core Principles are widely supported by central banks. More than 100 central banks have explicitly supported the work, and both the IMF and the World Bank will promote the implementation of the principles.

The 10 Core Principles are listed in Box 4 and discussed below.

**The ten Core Principles**

The objective of Core Principle 1 is to minimise legal risks. The agreements and procedures of the systems must be enforceable under the applicable jurisdiction. This raises special issues if the system involves cross-border elements such as participation of foreign banks, settlement in several currencies, etc. Elements of a sound legal basis include legislation on the provision of collateral, legal validity of net settlement in the event of a participant going into liquidation, contract law, etc.

Core Principles 2 and 3 are closely linked. Core Principle 2 prescribes that the system’s rules and practices should be clear and easily understandable to the participants. To be able to assess and control the risks they incur participants must naturally understand the risks. Core Principle 3 emphasises that the system should include procedures for managing these risks, and that all participants should have the necessary incentives to contain them. Procedures for controlling risks might include bilateral or multilateral limits on credit lines, agreements on the distribution of losses and agreements prescribing early remittance of payments. It is also important that participants are regularly supplied with the necessary information on the operation of the system.

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1 The individual standards are discussed in more detail in part 2 of the Core Principles report: Implementing the Core Principles.
The longer the time span from issue of a payment order to final settlement, the longer the participants will be exposed to credit and liquidity risks. Consequently, Core Principle 4 prescribes that this span of time should be as short as possible and that final settlement should take place no later than at the end of the day of value.

In net settlement systems there is a time lapse from the issue of a payment order to the final settlement. During this interval the participants build up positions against each other. This can cause special problems and expose the other participants to unexpected credit and liquidity risks if one participant is unable to meet its obligations. Core Principle 5 therefore prescribes that as a minimum net settlement systems
should be capable of ensuring the timely completion of daily settle-
ments in the event of an inability to settle by the participant with the
largest single settlement obligation. This can be done by ensuring that
the necessary resources are available to take over the participant’s posi-
tion, e.g. by the participants paying in contributions to a pool of collat-
eral for this purpose, combined with upper limits on the obligations of
each participant.

There are no credit or liquidity risks related to central-bank assets, and
therefore claims on the central bank can easily be transferred to other
financial institutions. Core Principle 6 prescribes that assets used for set-
tlement should preferably be a claim on the central bank. When other
assets are used, they should carry little or no credit risk and little or no
liquidity risk. The issuer should have a high credit rating, and the in-
strument should be easy to convert into other financial assets.

The purpose of Core Principle 7 is to limit the operational risks. The
systems should be secure and operationally reliable, and the necessary
contingency and recovery procedures should be in place. The exact con-
tent of this standard will be adjusted to reflect technological advances
and market trends.

The above Core Principles relate mainly to payment system risks, but
efficiency is also an important target. An innovative aspect of the Core
Principles in relation to the central banks’ previous work in this area is
the report’s explicit focus on the need to weigh up security against
efficiency when designing payment systems. Core Principle 8 empha-
sises that the system should be practical for its users and efficient for
the economy. In other words, all countries need not necessarily de-
velop RTGS systems, but the type of system should be adjusted to
match national conditions. In a country with a less developed banking
sector and a relatively low number of financial transactions, the pay-
ment system can for example to some extent be based on manual
routines.

Fair and open access to payment systems – the content of Core Princi-
ple 9 – promotes competition and thereby efficient and cost-effective
payment services. On the other hand, the system should be secured
against participants who would pose extraordinarily high risks. However,
limitation of system access should be based on objectivity and relevant
risk criteria.

Effective and transparent governance arrangements, as prescribed in
Core Principle 10, are important to all private and public institutions.¹
This also applies to payment systems, particularly in view of the fact that

¹ See, e.g., Jens Verner Andersen, Corporate Governance in the Danish Financial Sector, Danmarks
Nationalbank, Monetary Review, 4th Quarter 1999.
systemically important payment systems can potentially influence the rest of the financial sector.

Effective governance arrangements encourage managements to develop systems in the interests of the system, the participants and the general public.

**The four principles governing central banks' responsibility**

Compared to previous reports on payment systems, the Core Principles focus more explicitly on the role of the central banks – the oversight role. The report lays down four principles governing the responsibility of the central banks in connection with the implementation of the Core Principles. The four principles are presented in Box 5 and discussed below. The background is outlined above.

Operators of and participants in payment systems should have a clear understanding of the central bank's objectives, as well as the key elements of its policy in the area. This will make it easier for them to contribute to meeting these objectives. Publication may be more or less formal, ranging from speeches to publications, press releases or the Internet, to specific wording in the legislation on central banks. The contents of Responsibility A correspond to the transparency requirements in the IMF's *Code of Good Practices on Transparency in Monetary and Financial Policies*.

It is relatively difficult to translate the objectives and main elements of an oversight policy into concrete measures. Central banks worldwide are currently working on this. Among those that have made the most progress is the Bank of Canada, cf. Box 6.

The central banks of most countries operate at least one systemically important payment system, typically RTGS systems. Responsibility B states that the central bank must ensure that such systems comply with the Core Principles.
The ultimate responsibility for the structure and functionality of the systems lies with the developers and operators. Under Responsibility C the central bank should oversee that systems it does not operate comply with the Core Principles. The central bank should also have the ability to carry out this oversight. This may vary depending on the traditions and legal and institutional structure of the country. Some countries have specific legislative clauses and regulatory provisions, while others rely on cooperation with the financial sector and moral influence.

Usually the central bank is not the only public authority interested in safe and efficient payment systems. Under Responsibility D it should therefore cooperate with other relevant domestic and foreign authorities. This will typically be domestic supervisory bodies whose interests coincide with those of the central bank. On an international scale it might be other central banks and supervisory bodies in countries whose banks participate in the domestic payment systems, or whose payment systems include domestic banks as participants.

Finally it should be mentioned that safety and efficiency are not the only objectives public authorities can require for payment systems. Other objectives relate to consumer protection, competition issues, money laundering, etc., but these issues are governed by other public bodies than the central bank, e.g. the competition authorities, consumer ombudsman, etc.

**Securities settlement systems**
Although the Core Principles have been prepared with "pure" payment systems in mind, they can to some degree be extended to the payment
element of systems where other types of financial assets are exchanged against payment, e.g. securities settlement systems. However, such systems present special security and efficiency problems. In January 2001 the central banks of the G-10 countries, in cooperation with IOSCO\(^1\), submitted a draft report for consultation, i.e.: Recommendations for Securities Settlement Systems, a counterpart to the Core Principles for payment systems.\(^2\)

The overall objective of the report is to contribute to the safety and efficiency of securities settlement systems and to safeguard investors against losses. The report includes 18 Recommendations for the design of securities settlement systems. The Recommendations are aimed at both national and international systems and apply regardless of the type of securities settled in the systems. For the same reason the wording of the Recommendations is very general.

Apart from Core Principle 3 relating to clear procedures for the management of credit and liquidity risks, all Core Principles, and the 4 principles relating to the role of the central banks, are found in the Recommendations. The other Recommendations reflect areas where payment and securities settlement systems differ. The Recommendations cover the entire period from the conclusion of a trade to its final settlement, and even though the report focuses on the same risks as the Core Principles, these risks vary at different points in the trading process.\(^3\)

The Recommendations relate to the systems' legal basis, risk management procedures for pre-trading risks, settlement risks, operational risks and storage risks, as well as other aspects (provisions concerning management, fair and open access, efficiency and requirements of clear and comprehensible rules and procedures).\(^4\)

**CONCLUSION**

As a result of such trends as the rapid global growth in the turnover of payment systems, the last decade has seen increasing focus on the design and functioning of the systems. In January 2001 the central banks of

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\(^1\) International cooperation between authorities responsible for supervising securities markets, including the Danish Financial Supervisory Authority.

\(^2\) As early as 1992, G-10 described the extent to which its recommendations for net settlement systems (the Lamfalussy standards) may also be applied to securities settlement systems. The conclusion was that the standards are applicable to securities settlement systems, but that the concrete use must reflect the potential systemic risks in the system in question.

\(^3\) Depending on the institutional set-up in various countries the Recommendations may be relevant for securities centres, securities settlement systems, stock exchanges, central counterparties, etc.

the G-10 countries issued a report containing standards for systemically important payment systems. The aim is to contribute to the safety and efficiency of the systems, two objectives which are both contradictory and complementary.

Central banks all over the world have contributed to and support these standards, and many of them will use them as the basis for their future oversight activities.

In the year which lies ahead the Nationalbank will continue its work on implementing the standards in Danish payment systems.