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Managing Payment System Risk During the Transition  
From a Centrally Planned to a Market Economy

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Abstract

The objectives and functions of payments systems in centrally planned economies are described and analyzed. These are compared to those of payments systems in market economies and to the characteristics of an ideal payments system. The dominant role of the state in the centrally planned economies meant that the state underwrote virtually all payments risk. With the withdrawal of the state, however, participants became exposed to credit, liquidity, and operational risks. In the transition, the central bank has a key role to play in payments systems. Areas where rapid improvements are possible are: accounting, clearing, settlement, netting and standardization.

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### Summary

This paper reviews the objectives and functions of payments systems in centrally planned economies and provides a framework for managing payment risk as these economies move toward market-based systems. It focuses on the payments systems of a number of centrally planned economies, where risks that had not existed under the previous regime came into play as the economies started to liberalize. The older arrangements for clearing and settlement still existed but were no longer adequate for monitoring new risk, particularly credit and liquidity risk.

Essentially, a payments system is a set of rules governing the clearing and settlement of payments. An ideal payments system should be reliable and sound, efficient, and fair; these qualities can serve as guidelines for the specific rules, which must be widely accepted if the system is to function.

In market economies, commercial banks have typically developed the rules and penalties so as to facilitate their own payments. In many of the centrally planned economies, banks in the private sector are just beginning to function as profit-maximizing entities and face a major restructuring of their operations. Even where the private banks have the financial and operating capabilities, as well as the desire, to lead the reform, the central bank should play a vital role overseeing the risk management of the system, expediting agreement on the rules that will govern the payments, and ensuring that the rules are fair.

This paper argues that a clear distinction should be drawn between short- and long-term strategies for dealing with payments problems. Although, in the short term, there is no alternative to the existing arrangements, they can be significantly improved precisely because little attention was paid to efficiency or reliability under the previous regime. The paper outlines specific recommendations in accounting, clearing, settlement, netting, and standardization.

A long-term strategy for reforming and modernizing the payments system should be developed jointly by users, commercial banks, and central banks. The central bank should establish a small team to be responsible for designing and implementing payments reforms. This team will liaise with the commercial banks, ideally in the framework of a national payments council, and help formulate the long-term strategy. Because of the large number of participants, the heavy demand for resources, and the need to gain familiarity with payments in a market system, the transforming economies should allow at least a year to develop the long-term strategy.



## I. General Characteristics of Payments Systems in Centrally Planned Economies 1/

### 1. Introduction

In traditional centrally planned economies, the dominant role of the state and the subsidiary role of the financial sector meant that payments risks differed radically from those in market economies. The state underwrote virtually all credit and liquidity risk. Institutions rarely, if ever, had consolidated accounting systems, let alone risk management systems, that would allow them to identify or control credit exposure. Neither the system (state bank or other central institution) nor the other participants needed to protect themselves against credit or liquidity risks, as there were none.

The objectives of payments systems in traditional centrally planned economies differed radically from those in free market economies. The financial sector was not used to allocate resources, but for measuring performance in the real sector relative to the central plan. Payments systems were seen by the authorities as a way of monitoring economic agents' performance relative to the central plan, and not as system for the exchange of value. In addition, to limit the risk of fraud, many systems were geared to survey individual transactions and to track them until completion.

The dominant role of the state and the absence of bankruptcy procedures meant that credit risk was not a factor in payments systems. In some countries, there was essentially only one bank, which was a state bank. In other countries, the financial institutions other than the state bank were either state-owned or state-run, as were all major companies. While arrangements differed among countries, the state bank would provide credit for banks or even firms unable to cover their payments. This meant that participants did not have to manage clearing balances or liquidity as banks and firms do in market economies.

Payments systems in centrally planned economies did not put as much emphasis on time or the speed of processing payments as do developed economies, because the length of time it took a payment to settle did not affect its riskiness. 2/ Moreover, with controls on interest rates and the subsidiary role of the financial sector, there was essentially no time value for money. Without short-term investments that entities could utilize, the benefit of receiving prompt payment was much less than it would

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1/ This section draws on a number of reports on payments systems in individual countries prepared by the Monetary and Exchange Affairs Department's advisory missions.

2/ Beyond a certain point, however, the length of time may increase the likelihood of errors and the difficulty of reconciling differences. Yet, to the extent that all parties involved are "related," the allocation of differences is less important.

be in an economy with active money markets. Thus, there was little incentive to move payments rapidly. Final settlement, which is extremely important for payments in market economies, was not well-defined and could occur as infrequently as once a year in some cases.

In part reflecting the minor role of the financial sector, little attention was focused on payments system policies in centrally planned economies. There was a wide variety of payment instruments and little standardization. Attention was hardly given to households, which relied on cash, while enterprises used both credit and debit transfers. The lack of standardization increased the margins for error and slowed the clearing process, but with no interest penalties, this was not a matter of concern to participants.

## 2. Financial structure

State banks were not central banks in that they did not set or implement monetary policy. Their main functions were to service the state, administer the budget, monitor progress against the plan, provide back-office support for financial institutions, and distribute and replace currency. 1/ The key decisions were made in the real sector, with the financial sector acting as a type of accounting and monitoring agency used to identify deviations from the plan.

Generally, there were two distinct and independent payment circuits, one for households and one for enterprises and the state. 2/ In many countries, the savings banks or cooperative banks serving households were not under the direction of the state bank and operated independently of any banks servicing enterprises, thereby tending to complicate efforts to develop uniform payments standards within one country. One of the challenges in moving to market-oriented economies is to eliminate this segmentation and create a level playing field for all institutions and economic agents.

The financial sector in some of the countries in transition was based on a monobank system in a strict sense. 3/ However, even for other countries where specialized financial institutions existed, such as those for foreign trade or agriculture, the payments systems functioned more like a monobank system than like a two-tier banking system, with commercial banks

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1/ In a few cases, state banks also undertook foreign exchange transactions for the state. Back-office support means providing accounting services; usually through a network of computer centers. Payments and accounting systems are not separated as they are in market economies.

2/ See Baliño, T. J. T., Dhawan, J., and Sundararajan, V., (1992), for background on financial structure.

3/ From this point we will be referring to the enterprise sector, and leaving aside the financial institutions that served households; that is the savings banks and similar organizations.

and a central bank. The other institutions generally did not operate as an integrated whole. Quite often each branch of a bank was treated separately and not as part of a network of branches with common objectives. In a few cases, ad hoc arrangements allowed one branch to move funds to another to cover shortages, but in general the focus was on each branch by itself.

One result of this structure was that there was little or no distinction between interbank and intrabank transfers. Even where there were other financial institutions besides the state bank, they would not have a unified network of branches. Inter and intrabank transfers went through the same circuits because intrabank networks, accounting, and communications were not developed.

In contrast to the decentralization of intrabank operations, with each branch of one bank having its own account with the state bank, the back-office functions were often centralized. Sometimes the state bank, sometimes a separate body, would be responsible for the accounting and general ledger functions of financial institutions other than the state bank. These entities would have a network of local computer processing offices and a central computer center. In some countries these local offices would do all of the accounting for the local branches of the banks. Payments between local regions could be cleared local office to local office, passing it through a central computer for control, or the clearing (transmission of payment instructions) could be done directly between the bank branches, by mail for example. In Hungary, for example, large enterprises and banks all had their accounts with the computer system in Budapest and any updating had to be done by the central system. Thus, the existing financial institutions did not even have an independent platform to start building their networks when modernization started. This mixture of centralization, usually for the automated support, and decentralization, as individual branches operated more or less independently of each other, complicates the introduction of modern payments systems.

Computerized systems introduced under the previous regimes focused on individual transactions and on the individual branches of an institution, not on the overall situation of each bank. There was no way to monitor credit risk or liquidity risk in the systems. Processing, however, was in batch form and the use of magnetic tapes meant that the systems were still dependent on the physical delivery of payment information. Lower per item cost was important, but, lacking the discipline of markets and without a clear time value of money, speed was not a priority.

### 3. Clearing

Clearing, the transfer and recording of payment instructions, took many forms in the traditional centrally-planned economies. <sup>1/</sup> Although processing and data transmission was usually done on a batch basis, there was no concept of netting. Reflecting the focus on individual transactions for surveillance purposes, payment instructions and payments were considered to be on an item-by-item gross basis. Shifting to a net clearing and settlement system means a radical change in the treatment of individual items and their risks.

The most noticeable weakness found in all of the countries in their clearing process is communications and the actual transmission of payment information. This is not solely a matter of technology; it also reflects lack of incentives to expedite payments under the old regime. In addition, the emphasis on control also slowed processing. On the positive side, this means that significant improvements may be possible based on existing technology. Interim methods of speeding clearing through telex or telephone are possible, but great care must be taken to manage the risks. However, in the longer term, improvements in telecommunications are needed so transmissions can be more reliable.

A centralized computer service plays a major part in clearing payments in Bulgaria, Czechoslovakia, Hungary, Poland, and Romania. (In Hungary, the National Savings Bank also performs bilateral clearings for approximately 25 to 30 smaller banks). In each case, a state bank or related entity operates a network of local centers through which payment orders pass. A central computer is used to monitor the overall flows. The systems run on mainframe computers, not the latest models and not easily modified. Typically, for an interdistrict transfer, the credit order is sent to a local bank which sends it to the local computer center. From there it goes to the central computer and out to the second local computer center and on to the bank of the payee. The method of sending the orders differs considerably across the different systems.

In Hungary, and to a lesser extent Czechoslovakia, all payments orders, advices and instructions flow through the central network. Thus, after a bank enters a credit order in the regional center in Hungary, the clearing is executed entirely within the Hungarian National Bank's system. Since payments information is transported by train in the form of magnetic tapes or floppy disks between the regions and the central office, a payment can take three days to clear. Czechoslovakia's clearing of interbank transfers is similar, with regional concentration points and a "typical" three-day clearing period. However, because each of the two republics have their own

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<sup>1/</sup> Clearing is used in this paper in a broad sense, including a wide range of arrangements. Clearing in the context of clearing houses refers to an exchange of payments instruments and the calculation of mutual positions within a group of participants.



linkages into the central computer system, inter-republic transfers take longer. Also, other types of payments, such as direct deposit, require that the payer directly sends a tape with detailed information to the payee's bank in addition to a payment order for the gross amount.

In Bulgaria, Poland, and Romania some payment information, advices or instructions flow outside of the centralized system. In Bulgaria, the payments demand (a debit transfer) required over nine days for various communications by mail before an order was even entered into the central system. This was to confirm that the creditor agreed to the transaction. 1/ In Poland, a payer in a credit transfer sends a payment advice to the payee's bank, who then enters the transaction into the local office of the computer center. The advice may be sent by ordinary mail, by expedited mail in some situations, or by local physical exchange. At the recommendation of the Fund, Poland introduced a telex transmittal service for high value payments two years ago. In Romania, although the payment goes through the National Bank of Romania's network, the transmission is by mail. Information sent to the central office is for control purposes and significantly slows clearing.

Clearing in China and Mongolia differs from that in the other countries. At one extreme, Mongolia is in the process of moving from a monobank system to a two-tier system. All accounting had previously been intrabank. A clearing and settlement system is currently being established in Ulaanbaatar. A key issue has been distinguishing between interbank and intrabank transfers. China, on the other hand, has a decentralized payments system, with the central bank playing a minor role in inter-city transfers. These transfers are cleared through the banks themselves. The People's Bank of China, however, is working towards an automated inter-city payments system that will settle on its own books, an important step forward in ensuring monetary control.

#### 4. Settlement

In the centrally planned economies settlement was less important than in market economies, where final settlement is crucial. 2/ In market economies, settlement is the actual transfer of value, usually on the books of a bank, that discharges a payment obligation. When settlement is final, neither party has any risk associated with the payment transaction, either credit or liquidity. In the centrally planned economies the lack of credit risk and of time value of money meant that little attention was given to settlement, to the timing of accounting entries, or to the finality of payments. As a result of this and the idiosyncracies of clearing, large and variable float, both debit and credit, was routinely generated in most

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1/ This instrument is being discontinued.

2/ Final settlement is the settlement of obligations between two parties by irrevocable transfer of credit across their accounts at a settlement institution.

centrally planned economies. In Hungary, where float was not so much an issue, the system of queuing payments until cover was available tended to create gridlock. 1/

In Bulgaria, Hungary, Poland, and Romania, settlement occurred on the books of the state bank, although the controls were geared to individual transactions and the individual branches of banks. The state banks would automatically grant credit to cover overdrafts, although Hungary is planning to discontinue automatic cover for settlement in the near future. Even if the state bank charged for the overdraft, the charges were not punitive. Thus, there was little incentive for the banks to manage their clearing balances or liquidity and if they did so it was primarily at the individual branch level. In other countries, the absence of a time-value of money and infrequent settlement meant that liquidity was not a factor in payments systems.

Debit and credit float was common in virtually all the payments systems in centrally planned economies. 2/ This reflected a lack of attention to the timing of the posting of accounting entries together with deficiencies in the communications systems. Even though the accounting system was centralized in a number of countries, the debit and credit entries for a single transaction were not systematically made simultaneously or on the same day. In many systems, settlement was at an individual branch level and this meant that the entries for a single transaction between branches in different areas would be posted on different days, thereby hampering efficient accounting practices.

In Czechoslovakia in the pre-reform period, settlement occurred through a network of bilateral mutual accounts, concentrating on two "settlement" banks and not involving any accounts on the books of the state bank. There were no limits applied to commercial bank balances in their clearing accounts with the two settlement banks. Very large fluctuations in interbank settlement positions resulted. In effect, there is no demand for reserves in such a system and it is impossible to implement a uniform monetary policy. Czechoslovakia has, however, moved to an interim system, settling on the books of the state bank.

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1/ Gridlock can occur because of the interdependence of payments. Let us assume A is to pay B \$110 and B to pay C \$50 and C to pay A \$50 dollars, if A has only \$80 he cannot pay B and so no payments can be made. With many payments between a limited group of banks and low balances, gridlock is a definite possibility.

2/ Float is the amount of credit added to (credit float) or subtracted from (debit float) the reserve base, or deposit base, as a result of payments being made. It arises from the lack of synchronization in the crediting and debiting of accounts, either on the books of the central bank or on the books of commercial banks.

Mongolia is still in the beginning stages of establishing some eight new banks that were formerly part of the state bank, which has itself become the Bank of Mongolia (the central bank). Under the monobank system, there was no need for an interbank clearing and settlement system. The central bank has recently initiated an interbank clearing and settlement system that settles on the books of the central bank. The central bank does provide credit for settlement, but at a progressively higher penalty rate.

## II. Payments Systems in Market Economies

### 1. Payment risk in market economies

In moving to a market-oriented economy, the state withdraws as central planner and underwriter of risk. Decisions on investment and savings are henceforward made primarily in the financial sector. Credit evaluation becomes essential because economic entities are subject to the discipline of the market and to bankruptcy. This radically alters the risks faced by economic entities in the countries in transition, particularly in regards to payments systems. The financial sector no longer has a subsidiary role, but must stand on its own.

Participants and central banks need to understand the objectives, functions, and risks associated with payments systems in market-oriented economies. The principal objective of the payments system is to support the country's economy. It is a set of arrangements for the transfer of monetary value among individuals, firms, banks, and the government in order to discharge payments obligations created each day among them. 1/ The system allows companies and individuals to focus primarily on their own business and not on payment risks.

Unless the transfer of value is instantaneous, there exists a period during which a payment obligation remains outstanding. One of the counterparties is at risk, exposed to the failure of the other. Until value has been finally transferred, the participant cannot be sure if the funds are "good" and can use them only at his/her own risk. Credit risk can only be avoided in systems such as the Swiss Interbank Clearing where controls exist that do not allow payments unless there is sufficient value in an account. 2/ In most other systems some form of credit is needed, and participants should be able to evaluate, track, and control credit risk in the payments system.

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1/ The value transferred can be in a variety of forms, cash, claims on commercial banks (checks, credit transfers) or claims on the central bank.

2/ Participants must hold non-interest bearing clearing balances in the SIC system so there is a cost. If the balances as a whole are too low, gridlock can develop, causing the entire system to halt. There is consequently a trade-off between efficiency and cost as well as between efficiency and safety.

Time is particularly important in payments systems in market economies. The longer it takes for a payment to be settled, the longer a participant is exposed to the chance that his counterparty will become bankrupt. In addition, the time value of money means that the cost of payments is higher the longer the period between origination and final settlement. Users of the system will want access to their funds as rapidly as possible. This drives systems and participants to improve efficiency and encourages participants to give customers good funds on the basis of provisional credit.

Confidence in a payments system is also crucial in a market economy. Just as a key characteristic of money is that it be generally accepted, so a payments system and its instruments must be accepted. A payments system must be used and consequently the behavior of the users should be taken into consideration in the design and implementation of a payments system. That behavior, in turn, depends on the users' experience and on the risk/reward profile of the environment. In some countries, such as Egypt and Sri Lanka, it is virtually impossible to collect on a dishonored check and consequently people do not take the risks involved in accepting checks.

The financial and operational credibility of the participants in a payments system is one element determining the acceptability of that system. Most payments systems rely heavily on the banking sector, with claims on banks, or claims on the central bank, being important payment instruments. Without financially and operationally strong banks, individuals and companies will not use the payments system. Companies may find other ways to make payments, intercompany accounts being one approach, while individuals will use cash. Building confidence in the financial sector also leads to more efficient and reliable payments systems.

There are many types of payment instruments in market economies, but all represent either credit or debit transfers. In a credit transfer the originator instructs an intermediary to transfer value from the originator's account to the payee, possibly through other intermediaries. The payment instrument, instruction to pay, flows in the same direction as the value, from payer to payee. Payments over Fedwire or CHIPS are examples of credit transfers. 1/

In a debit transfer, the originator is the payee, who enters the debit transfer into the system, through which it is presented to the payor or payor's bank. At this point, the payor's bank decides whether to accept the debit order. If it does, the payor bank starts transferring value, often

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1/ Fedwire is an electronic facility operated by Federal Reserve Banks for credit transfers among banks on the books of the Federal Reserve Banks and for the transfer among banks of book-entry U.S. government securities on the books of the Federal Reserve Banks. Clearing House Interbank Payments System (CHIPS) is a private sector credit transfer mechanism for large-value transactions operated by the New York Clearing House.

through a net settlement process, to the payee. There is usually a period within which the payor's bank can return the debit order, for insufficient funds, or because of an error. The payment instrument, debit order, flows in the opposite direction as the value, from payee to payor. Checks are perhaps the best-known example of a debit transfer.

Both credit and debit systems generate credit and operational risks, as well as the risk of fraud. 1/ In addition, net settlement systems, which net payments during a certain period and require a transfer of value only for final settlement, can cause systemic risk. Systemic risk is the risk that the failure of one or two participants in a payments system will cause the failure of other participants and generally jeopardize the orderly continuation of business. This occurs primarily in large-value systems, where the final net settlement positions are large relative to the participants' capital. Measures to reduce or control systemic risk are outlined in the section on net settlement.

During the transition to market-oriented economies, payments systems will be exposed to most of the risks mentioned above. 2/ The mixture of old practices and institutions and new procedures and technology is likely to pose new risks and increase the opportunities for fraud. The new control systems are not yet in place, yet the liberalized interest rates and new technology create incentives for participants to take advantage of the slow clearing process. 3/ Credit risk appears before participants have time to develop their credit assessment capabilities.

Fortunately, there will quite often be room for significant improvements in payments systems in the short term, precisely because there was virtually no attention given to credit risk or to expediting payments under the previous regime. Changes in the rules governing payments and procedures, as well as better organization of existing communications and processing technology can both reduce payments risk and increase payments efficiency during the transition. Given the relatively weak position of the private sector in the early transition, there is clearly a role for the central bank to develop the knowledge and skills to improve existing procedures and to reduce the opportunities for fraud during the transition.

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1/ Operational risk is the risk that a payment item is altered or delayed because of an unintentional error. See Appendix for comparison of risk characteristics of credit transfers with those of debit transfers.

2/ It is doubtful whether systemic risk will demand immediate attention in many countries in transition, because the first priority will be to get a workable system operating.

3/ During the transition period much of the infrastructure is missing, adversely impacting the payments system. In general, the incentive structure governing payments systems should be closely examined and monitored. For an analysis of incentives in general, see Dooley and Isard (1991).

## 2. Characteristics of an ideal payments system

Although it is difficult, if not impossible, to make recommendations concerning the design of payments systems in the abstract, it is possible to identify three general characteristics that a payments system should have. These characteristics can help guide central banks in formulating long-term payments policy. In addition, this section can provide a rationale for establishing specific payments procedures and rules and a rationale that can help participants understand the reasons for particular measures.

The three characteristics flow from the main objective of payments systems, to support a country's economy. First, a payments system should be reliable and robust (able to withstand serious shocks and continue functioning). People should be able to transact their everyday business without being disrupted by breakdowns or collapses in the payments system. Second, it should be efficient, allowing a rapid and accurate flow of transactions. Resources used to operate the system should be used efficiently. Standardization of payment instruments and related documents is also an important factor, as it allows more rapid processing and can reduce errors. Third, the system should be equitable and fair; entities meeting the necessary qualifying criteria should be able to participate. If losses can occur, due to a participant's failure to settle, for example, there should be prior agreement on a fair allocation of losses. Losses should be shared based on an agreed-upon formula. Access should be open to qualifying institutions.

### a. Reliability and soundness

Regarding reliability and soundness an ideal payments system must:

- i. Be able to withstand the failure of at least the largest one or two participants. The system should be able to settle without direct central bank assistance and without interruption.
- ii. Have equipment, personnel, and plans in place to deal with a breakdown in computer hardware. Contingency plans should also be in place to deal with software problems.
- iii. Have contingency plans in the event of disruptions in communication lines.
- iv. Have security measures to prevent fraud and limit its effect if it occurs.
- v. Have adequate safeguards to reduce errors to a minimum, and to allow the correction of errors.

b. Efficiency

Payments systems for retail and wholesale markets have different requirements and are often separate. <sup>1/</sup> Typically, the retail market does not require the same degree of efficiency, speed, and irrevocability as does the wholesale market. As a practical matter, institutions in most countries have not devoted the resources to payments systems at the retail level that would allow immediate finality, or even same-day finality. The wholesale markets usually have more rapid movements of payments. The desired degree of efficiency depends in part on the type of transactions and economy that the payments system is supporting. In general, it does not make sense to devote the amount of resources needed to speed up retail payments to the same pace as those of the fastest wholesale system. The following conditions should be taken into account in assessing the efficiency of a payments system:

- i. A payments system should be efficient enough to support the flow of transactions generated by the country's economy. As volumes increase, more efficiency is needed, hence the introduction of new technology is encouraged by the growth of financial markets and associated transactions; and
- ii. A payments system should be efficient enough to avoid gridlock. Efficiency is relative to liquidity in the system, whether in the form of outright deposits with the central bank, or some guaranteed credit line. Without liquidity, the interdependence of multilateral payments can lead to gridlock.

c. Fairness

The third quality needed by a payments system is fairness. A payments system is a key element of any modern-day economy and denying institutions or individuals access to it, either on a direct or indirect basis, will put them at a serious disadvantage. As a matter of public policy a system of such importance to the economy should be fair. Moreover, as noted above, a payments system must be used to be "successful" and perceived unfairness will discourage participation. Key conditions to consider in looking at the fairness of a payments system are:

- i. Access to the system should be based on publicly announced criteria and should be open to all qualified institutions. The qualifications are needed to assure the previously mentioned qualities, reliability and efficiency, as well as fairness. Operational and financial capability are important, as well as experience;

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<sup>1/</sup> In a retail market the principal participants are individuals or households, while in a wholesale market the participants are institutions and firms.

- ii. Any losses should be shared on an equitable basis. Participants should be able to monitor and control their own risks, know what these risks are, and know what share of any loss they will be expected to bear. One approach is to structure incentives such that participants know that they will have to bear the cost of their own behavior. Another approach is the mutualization of risk where all participants share the loss, regardless of their individual positions vis-à-vis the failing participant. The key to success in this area is a thorough understanding of the mechanics of the sharing, agreement on the method and explicit consideration of any moral hazard problem; 1/ and
- iii. All rules, regulations and procedures, including those to be taken in the event of a failure should be publicized and made available to all participants in a system. Transparency puts participants on an equal footing and is essential.

There are many ways to design a system to meet any one of the conditions mentioned in the preceding section. For example, systems can be designed in different ways to assure that the failure of the largest participant would not disrupt the system. How this is done can interact with many other conditions. Thus, limiting access to a large-value system to participants with a minimum level of capital relative to their exposures in the system could increase the reliability of the whole system.

Moreover, to the extent that the primary function of a payments system is to support a particular sector or all of a country's economy, the desirable characteristics will vary according to the country and/or sector of the economy in question. The differences between retail and wholesale systems have already been alluded to, but there are many others. Quite often payment habits are deeply ingrained in a country and it may be easier, less costly, and even safer to take these as given than to try to change them. A well used but idiosyncratic payments system may be preferable to a perfectly designed system that is not used.

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1/ Moral hazard occurs when economic agents act to maximize their own utility to the detriment of others, in situations where they do not bear the full consequences of their actions due to uncertainty and incomplete contracts which prevent the assignment of full damages to the agent responsible (see The New Palgrave A Dictionary of Economics). If participants in a payment system guaranteed by a central bank generate exposures larger than their capital, the assignment of full damages in the event of a participant's failure would be an example of moral hazard in a payments system. Since the participant's capital would not be sufficient to cover the losses generated, it is uncertain who will bear the remaining losses and other participants will not have clear incentives to reduce or manage their own exposures.



Finally, there is often a trade-off between the desired qualities of a payments system or between different desirable conditions. The safety or soundness of a system can usually be increased by reducing its efficiency. For example, while it would be technically possible to eliminate daylight overdrafts on Fedwire, such a change would almost certainly have an adverse impact on the flow of payments during the day. Judgment is needed in determining the specific safety/efficiency combination and various countries may well decide on different combinations. However, in the case of the core payments system, which typically includes the interbank market and all large-value systems in a country, the cost of a breakdown in the system should not be underestimated. These core markets, and the linked money and capital markets are of great importance, particularly from a public policy perspective. As E. G. Corrigan, President of the Federal Reserve Bank of New York said in a speech at a payments system symposium, "judgments about what is adequate [adequate safeguards] should be made with a cautious and conservative bias that realistically takes account of the dangers and consequences of default." <sup>1/</sup>

### III. Key Problems in the Transition to Market-Oriented Payments Systems

#### 1. Overview of the role of the central bank in payments reform

The transformation of payments systems in centrally planned economies is, even under the best circumstances, a major undertaking requiring considerable time and resources. The commercial banks, central bank, and users must all make significant changes in their behavior. Accounting practices, internal procedures, regulations, as well as technology must be changed for all institutions participating in the payments system. The interdependence of the payments system and the rest of the economy virtually guarantees that a complete reform will be a long-term project.

The central bank has a vital stake in the stability and efficiency of the payments system so that determining its role in the payments system is one of the most important decisions to be made in the transition period. <sup>2/</sup> The central bank should have the responsibility and powers to supervise participants in the payments systems and the systems themselves. The central bank will have lender of last resort responsibilities over the

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<sup>1/</sup> In The U.S. Payment System: Efficiency, Risk and the Role of the Federal Reserve, in "Luncheon Address: Perspectives on Payment System Risk Reduction" pg. 139, Editor David Humphrey, Kluwer Academic Publishers, 1990.

<sup>2/</sup> Other concerns of a central bank regarding payments system are: the relation between the payment system and the execution of monetary policy; the stability of the financial system; and the efficient operation of the payments system. These areas are considered in greater detail in an article by Bruce Summers, "Clearing and Payment Systems; the Role of the Central Bank" Federal Reserve Bulletin, pages 81-90, February 1991.

period and should be able to oversee the institutions that it will be expected to assist.

Central banks in market economies play different roles in the payments systems. <sup>1/</sup> Some are closely involved in the actual operations of the systems, while others oversee the private sector, which takes the lead in designing and implementing payments systems. There are strong arguments in favor of a leadership role for the central bank in payment matters in the countries in transition. In most cases, the long-term large-scale nature of the transition to a market-oriented system, the scarcity of resources in both public and private sectors, the shortages of skilled personnel, lack of experience in the private sector, and the potential costs of lagging behind other aspects of the reforms all support a major role for the central bank.

On a practical level, the relative operational and financial capabilities of the central bank and the commercial banks will be important in determining the central bank's role. If the banking sector is relatively strong, it may be desirable to take advantage of its credit evaluation capabilities and closeness to users and to give it more responsibility in designing and implementing systems. Even if the private sector takes the leadership role in establishing a clearing house, the central bank should be active on both the practical side (operational) as a major participant in the systems and on the policy side, in formulating payments systems policy. The organization of the central bank should reflect these responsibilities.

The first step is to establish a team in the central bank focusing on payments system reform. The team should report directly to a senior official of the Bank and its members should have practical knowledge of how the system worked under the centrally planned economy and should learn how payments systems work in market economies. Similar units should be established at the commercial banks.

A National Payments Council should be formed, including representatives from the commercial banks and the central bank. The Council should assist in the implementation of payments reforms and should mobilize support for the reforms. If such a National Council is not practical, the national or even local banking association could play a similar role. Such associations could not only assist in design and surveys, but could also undertake pilot programs or make proposals for retail payment instruments. In time, as the private sector gains experience, the payments council could make proposals for changes and modifications in the payments systems to the central bank for its approval.

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<sup>1/</sup> For more information see: BIS (1989) Payment Systems in Eleven Developed Countries and BIS (1990) Large-value Funds Transfer Systems in the Group of Ten Countries.

The National Payments Council should provide a forum where the country's strategy for payments reform can be discussed. Some of the most important areas to cover are:

- The establishment of well-defined accounting procedures for payments;
- Standardization of payments instruments and practices;
- Regulations defining the rights and obligations of participants in the payments system;
- A Survey of users and potential users of the payments system to assist in designing a new system;
- The integration of intrabank accounting systems;
- Efficient and fair procedures for resolving disputes in payments;
- Improved processing capabilities of the commercial banks and central bank;
- Improved communication networks; and
- Introduction of a clearing house, determination of ownership and control of clearing house.

In managing payments systems during the transition to market-oriented economies, a central bank should have both a short-term strategy and a long-term strategy. On the one hand, it is essential to plan for the long-term development of the payments system and to decide on the ultimate objectives, but it is equally important to manage an orderly transition, particularly in an uncertain environment. Immediate crises can and do jeopardize the implementation of long-term projects. An overview of the entire process is essential because of the interaction of the payment system and the rest of the economy. The short-term and long-term strategies must be coordinated. At the wholesale level, enterprises, commercial banks, the central bank, and other financial institutions are all vitally affected by the operations of the payments system. None of these institutions can safely be ignored in the reforming of a payment system. Under a market economy, payments systems have a macroeconomic role, because of the importance of monetary policy, systemic risk, and the importance of the general stability of the financial markets.

In the long term each country is likely to need: a safe and efficient wholesale payments system, supporting the financial markets and the real economy as well as allowing the implementation of monetary policy; a safe and efficient payments system for households; legislation governing payments; a framework for formulating and implementing payments policy; and

a sound financial sector, including financially and operationally sound banks. While the details of how each ultimate payments system works will differ from country to country, the above-mentioned elements are sure to be part of it.

The central bank should not wait to begin work on policy formulation for payments systems at a national level. An overall policy is needed, at least for large-value payments systems, because of the central bank's lender of last resort responsibilities and its general responsibility to promote orderly financial markets. This policy can be viewed as making specific steps toward creating payments systems that have the following characteristics; reliability (soundness), efficiency, and fairness (see Part II, Section 2). This policy formulation is essential because it will determine the timing of the different phases of the payments reform and the phasing in of different systems.

For example, all countries will have a large-value wholesale payments system, probably supported by sophisticated computer and telecommunications systems. One danger is that the decisions about the technology, the configuration of the computers, the procedures, etc., will be taken without adequate input from the payments policy side or users. The technology available today can support many different types of systems, and it is preferable not to let one of the desirable characteristics of a payments system, efficiency, overshadow the other two. In the past, technology has often driven payments systems. In the case of Fedwire, the electronic wire system supported by the Federal Reserve System, it was only after the system had been running for a number of years that the Federal Reserve recognized the large risks of intraday overdrafts and started to take measures to control them. <sup>1/</sup> Central banks in the market economies have made significant gains in understanding and managing risks in payments systems. One lesson has been to carefully examine risk management in a payments system before committing to a particular configuration or technology. In light of this and the central bank's responsibilities for payments systems, it makes more sense to develop the payment policies first and then to find the optimal technological support.

Well designed rules and regulations governing payments are the single most important tool that the central bank has to reduce and control payment risk. Rules are much more important than technology or communications because they establish the incentives for participants to manage or not manage their risks. In addition, rules, particularly if in the form of laws, can be very difficult to change, in contrast to technology which is malleable. Payments systems should be reliable, efficient, and fair. These characteristics should be taken into account in drawing up rules to optimize

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<sup>1/</sup> See Juncker, G., Summers, B., Young, F., (1991) for more information on payment systems in the United States. Also Board of Governors of the Federal Reserve System, "A Strategic Plan for Managing Risk in the Payments System," and "Controlling Risk in the Payments System," 1988.

a given payments system. However, if the rules are deficient, disputes can end up in court, setting undesirable precedents.

Rules governing payments should be clear and understood by all participants. In most cases rules should be jointly set, by banks, users, and regulators. Rules that are not seen as fair are likely to be ignored or circumvented, which is not in the public interest. The rules should also be consistent with the actual processing of payments. For example, a bank should not be required to grant access to funds to a customer receiving a payment unless the item has been cleared and settled. The rules should help make a system reliable, as participants know they must meet certain deadlines in order for their payments to be good. Agreement on procedures for resolving disputes is also essential. In the United States, for example, groups of banks agree to specific compensation rules in the event of errors or misssent items.

Rules concerning the allocation of liability during the payment process are particularly important as they set incentives for the participants. One approach is to assign liability in the case of an unauthorized payment to the party able to prevent the act at the least cost. The adherence of a participant to particular security measures, authentication, physical control, and dual personnel control, 1/ could also be taken into account in assigning liability. Participants that followed the indicated procedures would be protecting themselves. A designated person or group of people could be responsible for deciding on specific cases, using the rules as guidelines. Rules governing loss-sharing are particularly important in net settlement systems and will be discussed in the net settlement section.

For the rules to be effective, there must be some form of enforcement. In the case of a clearing house or similar payment organization, observance of the rules is often a condition of membership. The importance of membership outweighs the gains that might occur from not observing the organization's rules. As mentioned earlier, banks may enter into compensation agreements to deal with routine errors. In automated clearing houses in the United States, the rules are based on contracts and adherence is largely due to peer pressure. Penalties in the form of fines may also be used. However, these must be seen to be fair and not unduly onerous. The main objective is a smoothly functioning payments system, not the punishment of offenders.

In the transition period, it is preferable to use rules or regulations to govern payments rather than laws. Rules are more flexible and easier to change and the transition period, almost by definition, will be a time of change and experimentation. Legislation could well end up being mistimed, even if otherwise well drafted. It would be preferable to accumulate a

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1/ This refers to the practice of requiring that the person who actually makes a payment, enters it into an electronic system for example, is not the person who authorizes the payment to be made.

certain amount of experience with payments in the financial sector before passing laws to govern payments. If a specific need arises or if the position of the central bank vis-à-vis the private sector needs to be strengthened, then legislation could be drafted to cover those particular needs.

The central bank can also change the payments system through modifying its own behavior. For example, it can limit the private sector's access to its credit. However, to the extent that in many countries the central bank previously underwrote virtually all risk in the system, its withdrawal from this earlier function should be orderly and coordinated with the introduction of a financial infrastructure that will allow private financial institutions to identify and manage their own risks. The central bank can also encourage banks to consolidate their accounts at the central bank and to use these for final settlement. In many countries, each bank branch would have an account with the local branch of the central bank. This was inefficient and banks should be encouraged to develop accounting and information systems in order to generate consolidated reports on a daily basis and to conduct asset and liability management.

There is currently a large selection of technologies for payments systems. Efficiency and cost are the key factors in deciding on the actual hardware and software because rules can be drafted to make the system safe and fair. <sup>1/</sup> It is important not to become locked into a particular technology, eliminating the possibility of taking advantage of new and more efficient possibilities. In general, the movement is away from mainframe computers, with more systems being based on minicomputers and personal computers. Local Area Networks (LAN), allowing parallel processing on personal computers, are one of the more promising new areas, being low cost, efficient, and robust. Decisions on technology should involve both participants and users.

## 2. Managing payment risk in the short-term

Although the setting of long-term objectives and general payments policy logically comes first, in practice, the need to manage and contain risk in the existing and still functioning payments system will often be more urgent. In fact, it can be argued that the first priority of the central bank should be to create a breathing space, a period of time when the central bank and other financial institutions can focus on designing and implementing the long-term strategy. This means a close examination of the risks in the current payments systems and determining interim measures that will, in a sense, stabilize these systems. Unless care is taken in managing the risks during the transition period, the entire reform may be seriously delayed, complicating an already serious situation. This breathing period

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<sup>1/</sup> This assumes that the rules are developed before the operational aspects of the system, the hardware and particularly software, are finalized.

is also needed for the central bank and other financial institutions to learn how the new markets are to work and what is salvageable of the past practices.

In the short term the most urgent need is often for the central bank to make changes in rules and procedures to stabilize the financial sector and to facilitate the implementation of monetary policy. The three main areas of specific interest in regard to payments systems, to some extent interrelated, are: reducing and managing float; creating a structure where the demand for reserves will be relatively stable; and making changes to build confidence in the financial markets, particularly reducing the opportunities for fraud and for manipulating the system. In general, the movement is away from a system lubricated by automatic credit from the central bank to a structure where banks use balances at the central bank for clearing and settlement, with the central bank acting only as lender of last resort. In addition, the whole process must be made more efficient, as delays will now be costly because participants will be foregoing the returns available in newly developed short-term money markets.

The following sections cover the payments areas where problems are most likely to arise in the short term. The importance of problems in different areas will differ across countries. Some examples of different types of risks and problems are discussed, as well as different approaches taken by the authorities to manage the risk.

a. Accounting

Accounting practices can pose problems in a number of ways in payments systems in countries in transition. At a basic level, countries with monobank systems lack experience with the basic accounting for interbank clearing and settlement. The set of accounts, "due to" and "due from" for example, and procedures used, need to be introduced along with the procedures for exchanging payments documents.

When new commercial banks are spun off from the state bank, it is essential that the new banks have current accounts with unencumbered clearing balances at the new central bank. If the new banks are borrowing from the central bank initially, as is quite likely, this should be accounted for separately and dealt with apart from the operations of the current account. The latter should be used primarily for settling payments and for holding reserves. Ideally it should not be allowed to go into overdraft. In a number of countries where new banks have been created, the lack of an unencumbered current account has impeded the development of an interbank market.

In many countries, banks did not consolidate the accounting of their own branches and this meant that inter and intrabank transfers flowed through the same network, usually supported by the state's computer systems. Each bank branch had an account with a branch of the state bank, intrabank

payments went through the central accounting system. Liquidity was managed at a branch level, if at all. This led to large excess reserves, or balances, being held during the transition period, and undermined the stability of the demand for reserves.

In the transition period, banks need to consolidate both their own accounting systems and their relationship with the central bank. The savings available from operating with lower clearing balances is one incentive for the banks to consolidate. High costs for intrabranh transfers using telephone lines also encourage movement in this direction. In addition, the central bank could gradually increase the charge for administering accounts for the commercial banks. In Poland, for example, banks are scheduled to consolidate their accounts with the National Bank of Poland in 1992. In addition, there is a question whether the banks should continue to use the common systems for intrabank transfers. That is, should payments from one branch of a bank to another of the same bank be directed through the central banks or a central system. In many cases, however, there is no short-term alternative.

It will take time for the banks to build their own systems, up to five years for a bank with 30 to 40 branches. However, the use of a common system does weaken each bank's control over its own accounting. In some cases virtually all of the accounting is done for the commercial banks by the central computers, in a sense making it unrealistic to hold the commercial bank responsible for its own accounting.

In the centrally planned system, accounting tended to be viewed as a simple updating process where the timing of credits and debits was not important. In the transition period, however, credit, liquidity, and operational risk are generated, depending in part on how the accounting is done, when items are posted, and when, or if, returns or adjustments are permitted. Thus, the timing of accounting for payments should be identified and analyzed in light of the possible default of any of the parties involved. (See also clearing and settlement.)

b. Clearing

In the short term there are three ways to improve the efficiency and safety of the clearing process: (1) simplify the flows of payment documents or instructions; (2) improve or establish rules governing the treatment of unauthorized or erroneous payment orders; (3) develop special circuits to expedite the transmission of payments information.

In a number of countries, the flows of payment-related information is excessive, often because of the emphasis on central surveillance of individual items. In Bulgaria, it took over 10 days for a payment demand to be cleared, largely because of an initial confirmation process using the mail. In Romania, a control loop through the central computer could add three days to the clearing time. In Czechoslovakia, in collections two



messages are sent for one payment, while for direct deposits the gross payment order is separate from the detailed instructions. Either through the elimination of one part of the process, as in Romania, or through shifting to other payment instruments, as in Bulgaria, significant reductions in the length of the payment process can be achieved.

The rules and/or practices governing clearing should be closely examined and designed so as to create incentives for participants to monitor and control their own risks. If participants think they can put off losses on others, they will pay less attention to managing their own risk. Also, incorrectly judging from the previous system, they may not recognize the risks that they are running. The treatment, for example, of unauthorized or erroneous payment orders should be closely examined. The rules in force should encourage the use of security procedures. This can be done by assigning the risk of loss on the basis of whether a security procedure has been followed. 1/ Regulation should encourage parties to use sound procedures consistent with the nature of the payments transfer (manual, electronic, mail, telex, etc.,) and thereby minimize losses due to fraud and error.

Rules or regulations governing the availability of funds are particularly important because of their risk implications. In some countries, such as Poland, during the early part of the transition immediate availability for checks deposited was granted by the central bank. The banks also gave immediate availability, although in theory they were not obliged to do so. The immediate availability made the payment system more attractive to users, but in the context of a slow clearing process, it opened the door for abuse and manipulation. In the event, the availability rules were modified and an expedited confirmation process was instituted in Poland (see below).

Finally, even with existing technology, participants in a payments system can often expedite payments transmission. Thus, participants could pool their efforts to establish a network of trucks dedicated to payments delivery. Such an approach could reduce time spent for clearing when compared to the use of ordinary mail. Significant reductions in the time required for check clearing in the United States have been achieved through such organizational approaches, hub and wheel structures, and other non-high-tech methods. Another approach, for large-value payments, above a certain threshold, would require confirmation by telephone or telex. This approach has been adopted in Poland and a number of other countries (e.g., Romania) are considering "hot line" interbank systems using telephone lines until full-scale modernization is in place.

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1/ Authorization is one security procedure as is the requirement that the person actually entering a payment order into the system not be same as the one authorizing the payment. For a detailed discussion on this approach see French (1990).

c. Float

Float is one of the major areas of concern in payments systems in countries in transition. <sup>1/</sup> Implementation of monetary policy can be undermined by large and unpredictable fluctuations in float. Such fluctuations distort monetary statistics and complicate monetary projections. Moreover, the way in which payments have been structured in centrally planned economies tends to generate large amounts of float unless countermeasures are taken.

In general, there are two types of float; credit float that adds reserves to the banking system and debit float that subtracts reserves. A credit float, for example, occurs when, in a debit transfer, the payee's account or the payee's bank's account is credited before the payer's account, or his bank's account has been debited. Until the payer's account has been debited the reserve base is increased by the amount of the debit transfer. A debit float occurs when, in a credit transfer, the payer's account or his bank's account is debited before the payee's account or the payee's bank's account is credited. The deposit base is reduced by the amount of the credit transfer until the credit is posted. Debit float is a hidden tax on credit transfers and should be discouraged as a matter of public policy. Float may be on the books of the central bank, or it may be on the books of commercial banks, affecting the size of the deposit base.

Many factors can generate float, but in the end it is created by a lack of synchronization in the accounting for transfers of monetary value. Value is subtracted from one account before it is added to another account, thereby reducing the deposit base, or, if the entries are on the books of the central bank, monetary base. Alternatively, value may be added to one account before it is subtracted from the other. When the amounts of the float, debit, credit, or both, are large relative to the base, the base itself becomes less meaningful and estimates of the demand for reserves are greatly complicated. Limited use of telecommunications, the large share of payment items sent by mail, the delay in their receipt owing to inefficient mail service, lack of consistency and clarity in accounting practices, and inadequate rules governing clearing and settlement are the principal factors generating float in countries in transition. In the centrally planned economies, the lack of a monetary policy and the absence of a time value for money meant that float was not considered important. For a particular country, a close examination of the transmission of payment items and the timing of accounting entries is needed to identify how float is being generated and how it could be reduced.

Float has been a matter of concern in a number of the countries in transition, including Bulgaria, Czechoslovakia, and Poland. Countries that have computer systems supporting the financial sector should be able to

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<sup>1/</sup> See Baliño, T. J. T., Dhawan, J., and Sundararajan, V., (1992) for a more complete analysis of float and the implementation of monetary policy.

address some of the concern about float through reprogramming and modifying the timing of accounting entries. To some extent, this depends on how centralized the computer system is. In theory, in a centralized system, one should be able to post corresponding debits and credits simultaneously. This approach could be taken in Bulgaria, for example. In countries where there is a network of local computer bases that is not closely linked, as in Poland, this approach would require replacement of the existing equipment.

In Poland, problems with float and interbank settlement during the transition period have had an adverse impact on macroeconomic policy. Large and variable amounts of both debit and credit float were created by credit transfers and interbank settlement of checks. In the case of debit transfers (guaranteed checks written on the customer's accounts) the payee and his bank were credited before the payer and his bank were debited. Under the practices at that time, the central bank immediately credited the payee bank with good funds and the bank was also required to immediately credit its customers on presentation of the check. Meanwhile, the check traveled by mail to the paying bank generating a credit float until the paying bank's reserve account was debited. This long delay in the final settlement provided incentive for financial frauds, which were not uncommon in mid-1991.

The large fluctuations in float in Poland, resulting from delays in clearing and a lack of synchronization of settlement, had implications for macroeconomic policy. The credit float, adding reserves, increased the net domestic assets of the banking system because the float was included in the balance sheet of the banking system under the "other items" category. The debit float, on the other hand reduced the "other items" category. Any change in the stock of interbank settlement float from one period to another has a direct impact on the variation of net domestic assets. When these assets are used as a performance criteria, special attention needs to be paid to fluctuations caused by changes in float.

The large size of the float and of the daily changes, of as much as two or three trillion zlotys, also complicated the daily implementation of monetary policy by the National Bank of Poland. Such variations made weekly liquidity forecasts of the banking system extremely difficult. It has also generated uncertainty in the demand for and supply of excess reserves in the banking system, complicating the management of the central bank's credit facilities. This calls into question the wisdom of having this type of monetary management until accounting and payment anomalies have been resolved and efficient asset and liability management techniques have been developed in commercial banks.

A number of measures were taken to reduce the float and the opportunity for fraud. The duration of the clearing process was drastically reduced and bank crediting policies for checks were modified. In the summer of 1991, the National Bank of Poland sent an order requiring that all interbank clearings associated with check transactions be handled by

telecommunications methods. The debit and credit operations should be completed in two days and as a result the high cost of telecommunications should in the future encourage in the future the creation of a clearing house. The National Bank of Poland also issued a regulation permitting banks to withhold credit for checks deposited with them until they receive good funds through the collection process. As in the case of Poland, in general reducing float is a matter of synchronizing the accounting entries for payments and making sure that the rules governing availability of funds take into account the timing of the actual processing of payment items.

d. Settlement

In market-oriented economies, settlement is an extremely important event in the payment process because it terminates the risks associated with that process. Settlement is the actual transfer of value to a deposit account at the payee's bank based on the payment instruction. The settlement is final when the transfer of value is irrevocable. Final settlement terminates all risks associated with the payment. Before final settlement, if a counterpart fails during clearing, one may not be paid or may suffer a loss depending on how the system is structured. After final settlement, it does not matter from a payments perspective if any participant fails; all payment obligations have been discharged.

In the centrally planned economies, on the other hand, the virtual absence of risk meant that settlement was relatively unimportant. It was often not well-defined and occurred infrequently in a number of countries. Consequently, settlement needs to be closely examined in countries in transition, and in some countries it will need immediate attention. In some cases the structure of settlement will need to be changed, e.g., by opening accounts on the books of the central bank for settlements.

Rules to govern settlement and the irrevocability of transactions should be established. In general, a well-defined and complete set of rules should establish the framework within which participants in a payments system can manage their risks. Participants make explicit credit judgement as part of their everyday business and should bear the consequences of those judgements; however, there should be no uncertainty about the rules governing the payments system. The rules should establish incentives that encourage and enable participants to manage their own risk. To do so the rules must correspond with the actual processing of payments and the existing technology. The rules should also reduce uncertainty in the payments system per se. Finality rules are one way of reducing uncertainty. For example, with sender finality, the sender of a credit transfer cannot revoke that order after a certain, well-defined point; when it is received by the receiving bank, when it is entered into a terminal according to specific rules, and so on.

The optimal rules will vary according to actual practices, financial structure, and technology in different countries. In general, the goal is

to establish a payments system that has the three characteristics discussed above: reliability (soundness), efficiency, and fairness, and the rules should reflect this goal. Each rule should be tested against these characteristics and in addition the incentives implicitly or explicitly created by the rule should be examined. Sometimes a rule will generate undesirable incentives. In Poland, for example, the central bank's policy of giving immediate credit on items presented to it eliminated most of the incentive for banks to speed up their collection process. In general, it reduced the urgency of improving the efficiency of the payments system.

As mentioned above, there may be changes required in the financial structure. At a minimum, there should be facilities for an interbank settlement on the books of the central bank. In countries that had monobank systems, such as Albania and Mongolia, this means establishing unencumbered current accounts at the central bank and rules governing overdrafts, the functioning of credits and debits and the irrevocability of transactions. The central bank provides the ultimate finality in the payments system because it is the final source of good funds.

Czechoslovakia provides an example of a system that did not settle on the books of the state bank, but on the books of two clearing banks. At the beginning of the transition period, banks in Czechoslovakia used to settle interbank transfers through a complex network of bilateral mutual accounts. The Commerce Bank and the General Credit Bank were the clearing banks and settlement took place on their books. The state bank had clearing accounts with each of the clearing banks, but they did not have accounts with the state bank. The clearing accounts were credited and debited more or less automatically during the clearing. Under this arrangement it is not clear whether or how settlement was final. There was no reserve base on the books of the state bank and hence no demand for its reserves. An interim solution was introduced in 1991 with final settlement on the books of the state bank.

e. Net settlement

Net settlement systems are popular because of their efficiency. They economize on the use of clearing balances, needing balances only for the net amounts at the end of the day. In a gross system, unless overdrafts are allowed, participants must maintain fairly high clearing balances if they want to avoid gridlock. In a net settlement system, the participants grant each other credit during the day, and this credit (intraday in the case of CHIPS) functions like balances. However, just as they are granting each other credit, they are exposed to each other, often for very large amounts. To the extent that each payment depends on the settlement being executed in order to be final, the system is provisional. If settlement is assured, then the uncertainty is reduced.

All countries in transition will be establishing some kind of an interbank market and a payments system to support it. While the system may not be limited to large-value payments, it will include these. The

limits. <sup>1/</sup> Thus, the participants make their own judgements about how much risk they want to bear. In addition, participants may have to put up or segregate collateral to cover all or part of their open positions.

In theory, the central bank could guarantee that settlement would occur, but this would create a moral hazard. Such a guarantee would eliminate the incentives for the participants to reduce and or manage their own risks and could also interfere with the implementation of monetary policy. Without incentives to limit risks, risk would tend to build up in the system, until at some point the central bank was forced to step in and cover the losses. Putting aside the desirability of a system characterized by periodic crises, it is doubtful whether such a use of public funds to bail out large institutions that had been undertaking risky transactions would be desirable. Settlement on the books of the central bank makes sense, but guaranteeing settlement does not.

Some payments systems have had an unwind provision to try to assure settlement. Thus, if a participant fails to settle, the clearing house would recalculate all of the day's (or whatever the clearing period is) orders excluding the failed participant's orders. However, such a recalculation affects the other participants in unpredictable ways, creating even more uncertainty. Various scenarios run in the mid-1980's on transactions in CHIPS showed that an unwind would create large debits for participants, even for some that had limited dealings with the failed participant. The interdependence of the payments and the netting does not allow participants to anticipate or protect themselves against such sudden demands as would occur with an unwind. Unwinding a settlement and recalculating positions is consequently not a reliable way of assuring settlement, and as such does not reduce or control systemic risk.

It is essential to make rules and take measures that will assure settlement, even if one or two of the largest participants fail. Loss-sharing and finality rules can be designed to assure settlement. Loss-sharing rules allocate the loss based on each participant's exposure to the failing participant, encouraging all participants to monitor and control their exposure to others. There are a number of variations of loss-sharing, one of which is used by CHIPS. In CHIPS, participants explicitly agree to make up any shortfall due to a failing participant on the basis of their exposure to that participant. They are then free to seek recompensation from the failing participant in the courts.

Finality rules allocate risks among participants by specifying when a payment is considered irrevocable by each party. These rules seek to reduce risk by encouraging participants to manage their own risks thereby tending to assure settlement. Such rules internalize the costs of settlement failure and specify with certainty where the costs of failing to settle will

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<sup>1/</sup> See Federal Reserve Bank of New York (1991), "The Clearing House Interbank Payment System," for a more detailed discussion.

implications for risk management. <sup>1/</sup> Under some arrangements netting may actually increase both credit and liquidity risk. Some types of netting are bilateral, while others are multilateral. Some types of netting rely on the netting of financial positions ("position netting"), but do so in a way that parties remain liable for the settlement of the gross amounts. Other netting arrangements contain provisions, that, if legally enforceable, would make participants liable for the settlement exclusively of the netted amounts ("netting by novation"). In another type of netting arrangement, a clearing house or central organization substitutes itself as counterparty to deals submitted to it by participants, in order to create a binding multilateral netting among participants ("multilateral netting by substitution and novation").

Many netting schemes are driven by a search for efficiency and the legal status of the netting may be unclear, even to participants. In the case of position netting, the participant's credit and liquidity exposure is to the gross obligations. There is no change in participants' contractual obligations and the credit risks between the parties are unchanged by the netting. In practice, the danger is that the netted amount will be treated as the actual credit exposure. Moreover, if a counterparty fails, its receiver may be able to select only those gross payments in its favor and ignore the rest.

The drafting of a netting arrangement that is legally binding can be done in many ways depending on the particular legal system. Netting by novation is an alternative that does provide significant reductions in credit risk compared to position netting. A key requirement is that the arrangement be legally valid and enforceable. Without such arrangements, participants will be uncertain or mistaken about their potential liabilities within the system and will be unable to take appropriate preventative measures.

Drafting rules and procedures to assure settlement in a net settlement system is as much an art as it is a science. Ideally, one would like to reduce the systemic risk without distorting market forces and without creating a moral hazard, where participants implicitly or explicitly rely on the central bank to step in and cover any losses. Some of the main approaches to designing such a system have been noted, various types of rules, particularly for loss-sharing and finality, with or without collateral. It is likely that many systems, like CHIPS, will have a combination of rules and collateral to reduce and manage systemic risk.

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<sup>1/</sup> See Bank for International Settlements (1989). Report on Netting Schemes, for a discussion of risks associated with netting.

As the economies started to liberalize, lifting controls on interest rates and transforming the state banks into central banks, risks that had previously not existed came into play. The older arrangements for clearing and settlement still existed, but were no longer adequate for monitoring or controlling the new risks, particularly credit and liquidity risks. The vital importance of payments for the economy, in particular for the implementation of monetary policy, for the development of interbank and money markets, and the role of the central bank as lender of last resort meant that the central bank would play a key role in the modernization of the payments systems.

This paper examines and analyzes the payment problems faced by central banks during the transition to market economies and seeks to develop an approach for dealing with the problems. The first task of the central bank is to select a small team that will be responsible for designing and implementing payments reforms. A senior official of the bank should head the team and have clearly defined authority to prepare payments regulations and rules. The team should review the existing payments arrangements and start developing a transition strategy and a long-term strategy for reform. The transition strategy should focus on immediate measures, including changes in rules and communications, that can be accomplished with existing technology. At least a year should be allowed to develop the long-term strategy, particularly so as to bring existing and potential participants into the process of design.

The second step is the establishment of a national payments council, including all of the major commercial banks and the central bank. The central bank's payment team could provide the impetus and framework for such a council if the commercial banks do not take the leadership in the early stages. The council will advise the central bank on payments policy and practice and could also have some decision-making powers.

A joint approach to payments systems reform involving the financial community and the central bank is essential for a number of reasons. The success of the payments systems will depend on the users, in particular the banks, and unless they take part in the design of the systems there is a good chance that the system will not meet their needs. This is even more true of the implementation. In addition, in most countries moving to market economies there is a shortage of resources and it makes sense to make the best use of existing resources and even to pool resources, e.g., for a joint messenger service. Finally, a joint effort is more likely to build and strengthen the public's confidence in the financial system. The precise organization of the joint effort will probably differ from country to country, but without it the whole reform runs the risk of being delayed, if not derailed.

The central bank should play a major role in the payments reform, at a minimum developing oversight capabilities and offering settlements services to commercial banks. Deciding upon the role of the central bank in payments



many cases, the newly formed commercial banks do not even have their own internal accounting and communications systems, making liquidity management virtually impossible. As a practical matter, the central bank may need to continue providing considerable credit during the transition period. There, should, however, be an explicit commitment to the phase out the automatic provision of central bank credit for settlement purposes.

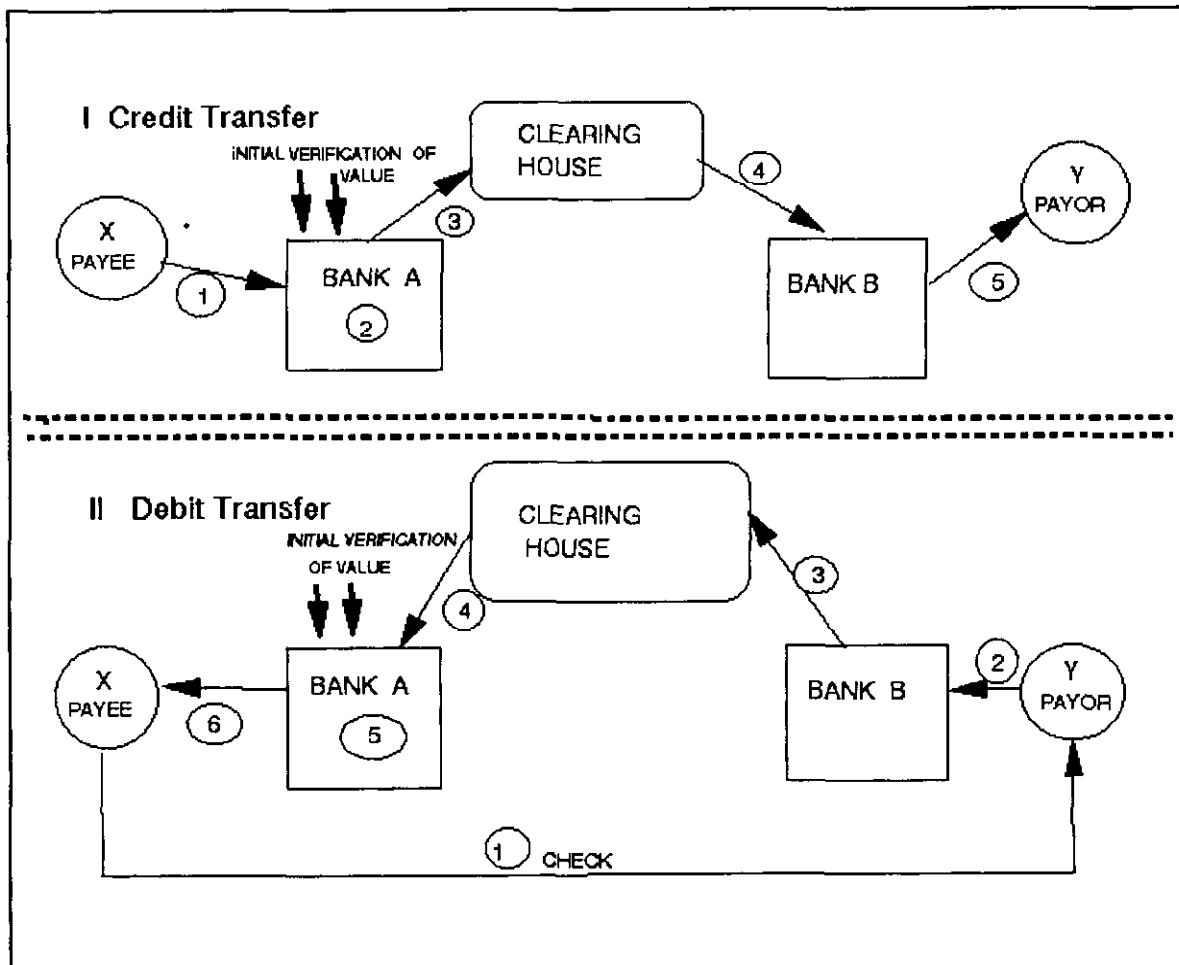


Figure 1 Comparison of Credit Transfer and Debit Transfer

bank in anticipation of settlement of a debit transaction would not be, because it would depend on what happens in the payment process. However, in a debit transfer, a feedback loop is needed, lengthening the time needed to complete the payment. To speed up the process, credit tends to be granted during the clearing and/or settlement increasing the counterparty risk compared with a credit transfer system.

In spite of these risk differences, debit transfer systems can work quite well in practice for certain types of transactions and given appropriate safeguards. A debit system, as for checks, tends to be better suited to small value transactions than to large-value ones. It is likely that more safeguards, rules and regulations would be needed for a debit transfer system to obtain the same or comparable efficiency and safety as for a credit transfer system. To do so would also likely require more credit and/or float.

Environmental software

The vendor supplier software system (includes operating system, data communications and database system) that application programs are run in.

Fault-tolerant systems

Systems that include redundant hardware and environmental software designed to ensure that service to the customer is not interrupted by hardware failures. Fault-tolerance can also be extended to the environment software itself which usually entails that the software will recover itself from failures. The above aspects of fault-tolerance yield high availability. The system may also handle software upgrades without shutting down the system--a feature needed for 24 hour/7 day per week operation.

Final settlement

Settlement of the obligations between two parties by irrevocable transfer of monetary value. This can be transferred across their accounts at a defined settlement institution.

Float

In the case of check transactions, it is the free credit to the bank on which the check is drawn. Float arises from the lack of synchronization in the crediting and debiting of accounts on the books of the central bank.

Function

A task or piece of work performed by an electronic-wire system.

Gateway

A computer that connects two different kinds of communications networks together. It performs the protocol conversion from one network to the other. It could connect a personal computer LAN to a centralized mainframe network.

Interoperability

The property of a computer programs and other vendor products that allows them to be flexible enough to exchange data and files with systems with different operating environments.

Liquidity risk

The risk that settlement of an obligation will be made not on the due date, but on some unspecified date thereafter.

Local Area Network (LAN)

A communication network connecting various hardware devices together, usually within a department or building, by means of a continuous cable.

**Obligation**

A contractual duty to deliver (or receive) a defined asset (foreign currency, securities, etc.) on an agreed date.

**Off-line bank**

A central bank-wire participant with no on-line connection to the central bank-wire system.

**Online bank**

A central bank-wire participant with an online connection to the central bank-wire system.

**Operating system**

An operating system is a master control program that controls the hardware and acts as a scheduler of services requested by other software. It is the first program loaded into the computer's memory after the computer is turned on, and the central core, or kernel, of the operating system must reside in memory at all times.

**Order-giver**

The bank receiving the benefit of a credit transfer and whose account at the central bank will be credited.

**Outsourcing**

A process for shifting data processing tasks from inhouse personnel or computers to staff or data centers managed by external service providers. It is typically undertaken as a cost cutting strategy or to obtain a level of service that cannot be provided by an organizations's own resources.

**Parallel processing systems**

Systems that simultaneously process more than one event or task. It usually refers to various internal design techniques that provide overlapped processing within a single computer. As these systems mature, they will significantly improve the price/performance for many data processing functions.

**Participant**

An institution that maintains an account at the central bank and who is eligible to be an order-giver or order-taker.

**Payment**

the satisfaction and discharge of an obligation by the debtor's (irrevocable) provision of an unconditional claim on a third party acceptable to the creditor. Payment results in the discharge of an obligation to perform on a contract with cash or a payment order leading to a transfer of bank balances.

Settlement risk

The risk that a party will default on one or more clearing obligations to its counterparties or to a settlement agent.

Systemic risk

The risk that the inability of one institution within a payments system, as in the financial markets generally, to meet its obligations when due will cause other participants or financial firms to be unable to meet their obligations when due.

Terminal module

The micro-computer hardware, environmental software and application software installed at the central bank and at participating commercial banks to input transactions to and receive output from the central module. Participants with terminal modules are online banks; those without are off-line banks. Also referred to as an input/output terminal.

Transaction

An instruction input to the central bank-wire system to cause a function to be performed.

Uninterruptible power supply (UPS)

A source of power, usually provided by batteries, that ensures that a computer is provided power when public power supplies are interrupted. UPS may be provided simply to assure an orderly shutdown or to continue operations for several hours. When high availability is needed UPS is usually further backed up by locally installed emergency generators.

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