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Transforming Payment Systems

Meeting the Needs of Emerging Market Economies

Setsuya Sato
David Burras Humphrey

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FOREWORD

Until very recently, interest in payment system issues has often been of secondary importance in the financial sector development agenda. This reflected a view that the payment system is essentially a mechanical process and that nothing more than an automation of commercial banks' back-office support function is required to achieve the goal.

Today, there is a growing perception in both the World Bank and its client countries that such a limited view underestimate the role payment systems play in the process of sound financial market development. Hence, payment systems modernization is becoming one of the priorities that needs to be addressed at an early stage to eliminate constraints for the later stages of financial sector development.

The Bank's experience in several transitional and developing countries, both successful and unsuccessful, sheds light on what need to be addressed and answered in payments projects, why and how. These valuable experiences must be effectively translated into an improvement in other payment systems projects. This paper by Mr. Setsuya Sato and Professor David Humphrey is one such effort. It was originally prepared to be presented at the World Bank Program on "Payment Systems in Financial Sector Development," which was jointly organized with the Federal Reserve Bank of Richmond under the initiative of the Financial Sector Development Department in April 1995. Given the positive response to this paper, and the ensuing debate it provoked, we decided to publish this paper to a wider audience.

We are sure this paper will prove to be of great interest to those who specialize in payment systems issues, as well as those with a broader interest in financial matters during transition and development.

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Director
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ABSTRACT

Market economies rely on the payment system to facilitate trade and exchange among enterprises and between enterprises and consumers in product markets. At the same time, the payment system is also used to transform domestic and international savings flows into productive investments through financial markets. Emerging market economies face the difficult task of attempting to simultaneously promote the development of product and financial markets, improve the efficiency of production, and mobilize domestic savings. These and other tasks are made easier when a cost-effective payment system exists which is responsive to user needs.

The primary issues associated with transforming and improving payment systems in formerly centrally planned and emerging market economies are discussed in this paper. Emphasis is placed on meeting the payment needs of consumers and enterprises, as users of payment services, and on the role played by the banking system and the central bank as supplier and/or regulator of payment services. The indirect role of country size, banking structure, and institutional framework are also discussed. These influences are illustrated by outlining the evolution of payment arrangements in various market economies.

The essential differences in payment systems between centrally-planned and market economies are outlined and both short-term and longer-term methods to improve these payment systems are noted. Distinctions among various payment instruments are made clearer by modeling the payment cycle and choices regarding alternative suppliers of payment services and the tiering of payment processing arrangements are discussed. Market needs in an evolving payment system are outlined by illustrating the different paths taken in Europe and the U.S. in the evolution of their payment systems. The benefits and costs of paper versus electronic payments, the role played payment pricing and float, and the interplay between commercial banks and the central bank in this process are also discussed. The paper ends with a survey of the many issues needing to be raised –from payment instrument design to cost recovery– to provide users with an effective payment system.

INTRODUCTION

One of the challenges faced by transitional and developing countries is to transform and improve, both structurally and behaviorally, their payment system in order to meet the needs of emerging market economies. Financial institutions and markets rely on the payment system to cost-effectively mobilize, allocate, and transform domestic and international savings flows into productive investments. The payment system also transfers value from households and enterprises when goods and services, produced by these investments, are consumed. The efficiency of both of these tasks is highly dependent on the existence of a convenient, cost-effective, and low risk means of delivering payment information and transferring value from one entity to another, point-to-point, i.e., a payment system. The three essential elements of a payment system are:

(i) the initiation of instructions by a debtor to make a payment to a creditor (by check, bank or postal GIRO, debit or credit card, telephone call, or some other means);

(ii) the transfer of payment information (by post, courier, or electronic means) among banking institutions enabling the payor's institution to debit the payor's account and the payee's institution to credit the payee's account; and,

(iii) the settlement of the transfer of funds between banking institutions, usually through accounts held by banks at the central bank.

The purpose of this paper is to outline and discuss the major issues associated with transforming and improving payment systems in emerging market economies. A nation's payment system is intimately related to the development of money and capital markets and the implementation of monetary policy. In this sense, a payment system is somewhat analogous to an effective internal transportation system where the layout and connections between roads, highways, and other transportation modes in a country has a profound effect on the future pattern of trade and development in an economy. This is why a payment system project is regarded as a policy matter, not a simple technology issue.

Our goal is to provide a framework in which the basic elements important to transforming a payment system are explained (for the novice) and their interrelationships shown (for the informed reader). In this process, a number of questions are in effect posed and answered, such as:

- What are the main problems raised in transforming a payment system in formerly centrally-planned economies?
- How similar or different are payment systems in different market economies?
- What are the main risks in making large value, inter-enterprise payments and how can they be minimized?
- What are the specific steps taken when making a payment with different payment instruments and how can this process be improved?
- How have payment systems evolved in developed countries and what does this imply for emerging market economies?
- Why might electronic payments be favored over paper-based non-cash payments?
- What information is needed to properly plan for payment system improvements?

In what follows, the broad, major differences in payment systems between centrally-planned and market economies are first outlined and ways to improve the functioning of the payment system in transitional economies are noted. Although the example of payment systems in centrally-planned economies is used to contrast this difference, the problems identified are applicable to developing countries as well. Second, to gain a deeper understanding of some of the more complex payment system issues faced by transitional economies (as well as developing countries), a detailed model of the payment cycle is presented. With such a model, choices among alternative access, communication, and security arrangements become clearer and it is easier to see where and how different payment instruments fit into the national payment cycle. Third, the needs of an evolving and market-driven payment system are outlined. The importance of a country's legal and institutional structure is illustrated by contrasting the different evolutionary paths taken by the U.S. and European payment systems over time. The paper ends with a discussion of the many issues needing to be raised –from payment instrument design to cost recovery– to provide users with an effective payment system. Lastly, an Appendix provides a summary checklist of information needed to adequately plan for payment system change.

I. DIFFERENCES IN PAYMENT SYSTEMS IN CENTRALLY-PLANNED AND MARKET ECONOMIES

Transitional economies are moving from being centrally-planned to being market-directed. To appreciate the structural and behavioral changes that payment systems in transitional economies face, it is necessary to first have a basic understanding of how payment systems actually operate in both centrally-planned and market economies. While there are some similarities in payment system operation between centrally-planned and market economies, the differences are more numerous. These differences, of course, are where the problems lie for transitional economies.

1. The structure and operation of payments in centrally-planned economies

Central planning in a government-owned mono-banking system. Centrally-planned economies have a single or mono-bank structure. While superficially it may appear that many different banks exist –with some focusing on providing agriculture credits, others focusing on raising domestic savings, and still others handling import and export transactions– these banks are all government owned and controlled and do not compete with one another.

The primary purpose of banks in a centrally-planned economy is to monitor the plan. The plan assigns production and output goals across state enterprises in a balanced manner. The separate goals are made internally consistent through the application of input-output techniques. Given a set of planned final demands, consisting of planned levels of production of all goods and services for consumer, military, government, investment, and export use, input-output models determine the level of state enterprise outputs needed (directly and indirectly) to satisfy the plan.

The plan determines the allocation of all of the output produced to the sectors of final demand and also plans the use of labor, physical capital, and materials inputs by state enterprises. Thus the plan embodies virtually all of the production and distribution decisions that would have been made separately by individual firms and households interacting in a market economy.

While the plan monitoring, allocation, and performance functions could be performed in physical terms, and indeed were historically, it is easier to perform these functions in value terms. Once prices are developed and assigned to all the inputs and outputs in the physical or quantitative plan, a duplicate financial plan in value terms is obtained. Not only is monitoring simplified, but this procedure also permits some choice regarding input mix in

production and output mix in consumption. While many prices are set to approximate scarcity, and thus true costs, many others are set to achieve certain social goals (such as providing low cost housing or inexpensive basic foodstuffs).

The role of the payment systems: monitoring the plan. The primary responsibility for monitoring the financial plan is vested in the banking system. Each enterprise is allowed only one (zero-interest) account with the state bank through which all of its transactions are made. A **gross settlement** system is employed whereby each transaction is settled separately as it occurs. Thus the payment system provides a comprehensive record of all enterprise transactions. Each transaction can be traced and compared to the financial plan and deviations from the plan, once identified, lead to corrective action to ensure compliance. (**Box 1** contains a brief discussion of payment clearing versus settlement and an illustration of gross versus net settlement.)

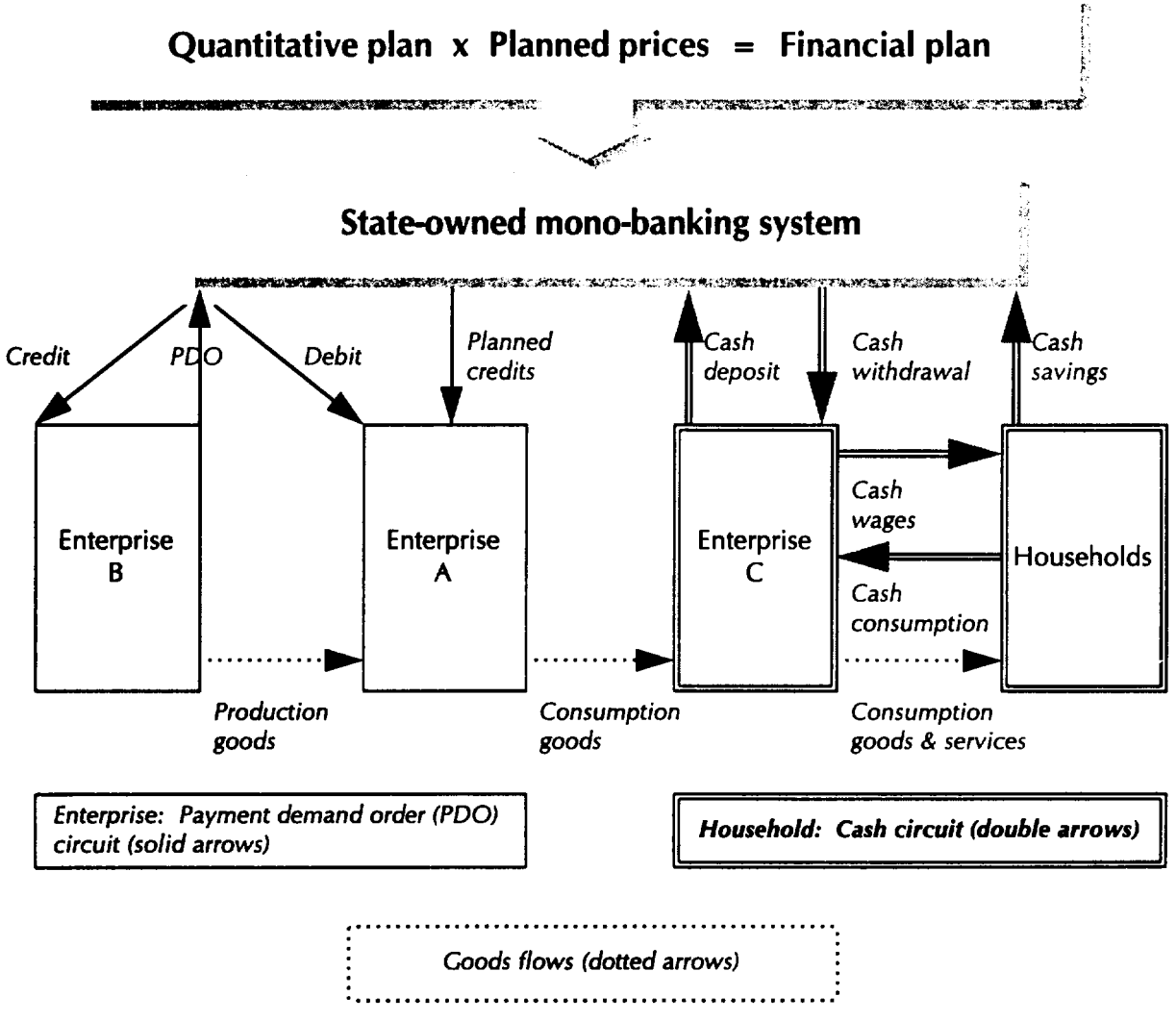
Two separate payment circuits are contained in the financial plan: non-cash credits and debits for enterprises and cash payments for households. These two payment circuits are illustrated in **Figure 1**.[1/] Following the non-cash circuit of the financial plan (solid arrows), banks create and issue credits to the state enterprises. Enterprises use these credits to purchase physical capital for investment, pay for labor employed, and compensate other state enterprises for the portion of their output used as an intermediate input to produce the planned output.

Only when enterprises are making wage payments to labor are cash withdrawals allowed. This initiates the cash circuit of the financial plan (double arrows) used by the household sector. The cash received by labor is by far the primary payment method used by this sector in consumption and saving transactions. However, cash transactions are not easily monitored. Conformity to this circuit of the financial plan is ensured by monitoring the non-cash transactions between state enterprises producing output for the household sector (Enterprise A) and those enterprises responsible for distributing this output to households through retail or other outlets (Enterprise C). Thus household use of cash is indirectly monitored by the flow of goods and services.

The two payment circuits of the financial plan rely on paper payment instruments: households use cash while enterprises use paper-based payment demand orders (PDOs). A PDO is a debit-based instrument similar to a check except that it is initiated by the receiver of the funds (the payee) not the sender (the payor). Thus a PDO is the paper equivalent to an electronic direct debit in a market economy. (As background, **Box 2** *(see page 8)* outlines the difference between a debit transfer and a credit transfer.)

[1/] *See page 5.*

Figure 1: Two payment circuits in centrally-planned economies



Box 1: Payment clearing and gross and net settlement

*Payment **clearing** is the process by which payment information is transferred among banking institutions so that the payor's account is debited and the payee's account is credited. This includes the initial processing of the payment request by a bank, its physical or electronic transfer within or between banks that are involved in the transfer, and the debiting and crediting of the payor's and payee's accounts. Although accounting entries have occurred, funds have not really moved between the payor's and payee's accounts until **settlement** occurs.*

*Settlement involves the actual movement of funds among banks, usually in the form of balances held by banks at the central bank, to extinguish the payment obligation. **Gross settlement** occurs when each transaction is settled separately (in real time) as it occurs and is bilateral in nature. Consider the following four sequential transactions for various payors and payees of Banks A, B, and C:*

1. *Bank A owes Bank B $150 million;*
2. *Bank B owes Bank A $75 million;*
3. *Bank B owes Bank C $10 million; and*
4. *Bank C owes Bank A $150 million.*

*With gross settlement, each of the four bilateral payments are settled in the order that they are made. Under a **net settlement** arrangement, the number of settlement transactions is reduced by settling all four payments simultaneously as a group, rather than separately. Here only the net position among all participants needs to be settled. The net position is determined by adding up all the credits to a bank– no matter who they are from –and subtracting all the debits– no matter who they may go to. In this sense, net settlement represents a multilateral payment arrangement, not a bilateral one. Considering all four payment transactions, the total credits, total debits, and the net position would be:*

Banks	*Credits*	*minus*	*Debits*	*equals*	*Net position*
A	*75 + 150*	*-*	*150*	*=*	*75*
B	*150*	*-*	*75 + 10*	*=*	*65*
C	*10*	*-*	*150*	*=*	*-140*

To effect net settlement, C's account with the central bank would be debited by $140 million and these funds would be placed temporarily in a special settlement account. Only when all the net debits have been placed in the settlement account would this account itself be debited to generate the net credits of $75 million and $65 million, respectively, for A's and B's accounts with the central bank. Since all payments are settled simultaneously under net settlement, it is necessary to wait until all payments are known before net settlement occurs. Thus, unlike gross settlement, net settlement incorporates a risk that a bank in a net debit position (Bank C above) may fail sometime during the day before settlement occurs. The risk associated with a settlement failure is discussed in more detail in the text.

PDOs represent a request for payment and are directly tied to inter-enterprise trade. Once goods have been received by a purchasing enterprise (Enterprise A –the payor), the supplying enterprise (Enterprise B –the payee) deposits shipping documents, title of ownership, and a multiple copied PDO at its branch of the state bank to initiate the payment transaction – debiting the payor's account (A) and crediting the payee's account (B). The payee's branch will typically extend 85% of the amount being collected in the form of an interest free loan to the payee (B) prior to the actual transfer of funds. The loan is extinguished and the remaining 15% of the transaction value is obtained after the funds have been transferred to the payee's branch, after which the title of ownership passes to the purchasing enterprise (A).

Each party to the payment transaction has to approve and retain a copy of the PDO –from the initiating enterprise, to the various branches of the state bank involved in the transaction, to the receiving enterprise. As well, all enterprise transactions are elaborately coded. Coding is used to determine the precise source and purpose of the credits created by the state bank for the enterprise as well as the purpose and nature of payments made by the enterprise in drawing down these credits. In effect, the payment system not only transfers value but also records and retains the equivalent of bank loan and firm product invoicing information of a market economy.

State guarantees: no credit risk for payment receivers. Under the financial plan, credit creation, enterprise payments, and banking system viability are all essentially guaranteed by the state. Credit creation and its allocation to enterprises is dictated by the financial plan and thus is not constrained by the availability of domestic savings or household deposits in the banking system. The credit created by the banking system is used by enterprises to pay other enterprises and inject cash into the household sector. Since all enterprises are owned by the state, inter-enterprise payments merely represent a transfer of credits from one part of the state to the other. Such an arrangement is similar to an intra-firm transaction in a market economy. Thus inter-enterprise payments are intra-state payments. Intra-state payments pose no real risk of loss for payment receivers nor for the banking system that is transferring credits from one state account to another.

As well, with gross settlement of enterprise payment transactions, one account is debited before another account is credited. If credits in the account to be debited are insufficient, extra credits are often made available by the state bank, reducing the incidence of enterprise liquidity problems.

Box 2: The difference between a debit and a credit transfer

*Non-cash payments can be either **debit transfers** or **credit transfers.** The conventional way to distinguish between them depends on who –the payor or the payee– is actually initiating the transfer of funds from the payor's account to the payee's account. However, a second important distinguishing characteristic concerns whether or not the payment being made is provisional (and therefore subject to reversal) or is final when made. A common debit transfer instrument is the paper check while a common credit transfer is a paper or electronic GIRO payment. Debit and credit transfers are illustrated in **Figures A** and **B** below.*

*As shown by the arrows in **Figure A**, a **debit transfer** involves going from the payor who writes a check, to the payee who receives the check, to the payee's bank where the check is deposited, to the payor's bank who finally pays the check if there are sufficient funds in the payor's account. If the funds in the payor's account are insufficient, then the check is returned by reversing the path it took to be collected and presented for payment.*

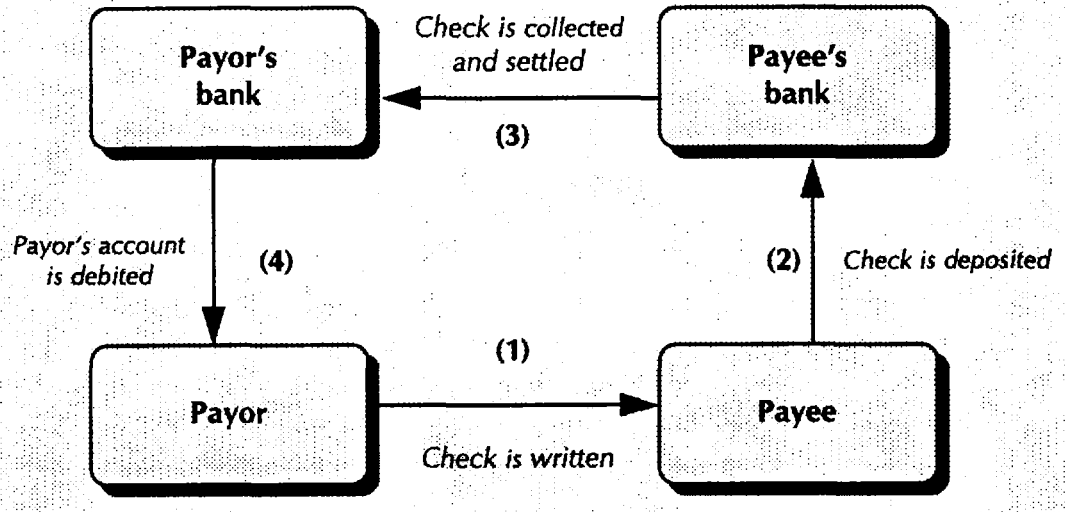
While the payor writes a check to initiate the payment cycle, it is the payee (or its agent bank) who is actually initiating the transfer of funds from the payor's account to the payee's account. The payee is in effect saying "debit the payor's account" which starts the funds transfer process, so a check is a debit transfer instrument. Importantly, there is risk to the payee in accepting a check as payment: the payor's bank may refuse to pay the check if the funds in the account are insufficient to cover the debit. Thus a check is only a provisional payment instrument which can be returned unpaid.

*A **credit transfer** follows a different route. As seen in **Figure B**, a payor instructs his GIRO to transfer funds from his account to the payee's account. The payor is in effect saying "credit the payee's account" to start the actual funds transfer process, so a GIRO payment is a credit transfer. If the funds in the payor's account are insufficient, the transfer never takes place. Thus return items do not exist within a GIRO framework. As a result, when funds are received in the payee's account, they are good and final funds (not provisional).*

With a GIRO payment, the entire transaction occurs within a single organizational structure –the postal or bank GIRO– so the funds transfer and settlement process is both simpler and less expensive than with a debit transfer system where interbank payment and settlement is the rule. A paper-based check (debit transfer) system is both more costly and contains more risk of fraud and loss than does an electronic-based GIRO (credit transfer) system. However, a GIRO system requires either an aggregated banking system and/or a great deal of cooperation among banks to work properly. Countries with a highly disaggregated banking system and little cooperation (such as the U.S.) have not been able to develop an effective GIRO system and thus rely on checks.

Figure A: Illustration of a debit transfer

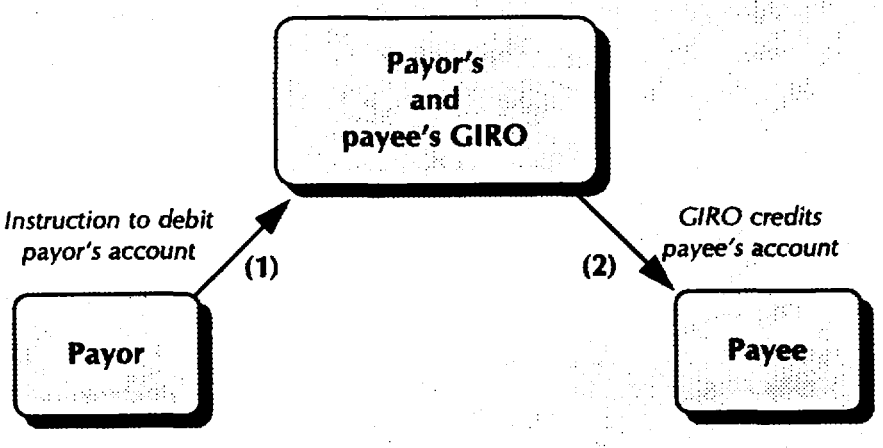
Check: A debit transfer



Solid line: Route of forward collection, Point 1 to Point 4.
Route of returned items, Point 4 to Point 1.

Figure B: Illustration of a credit transfer

GIRO: A credit transfer



Solidline: Route of forward collection Point 1 to Point 2. There are no return items.

Time insensitivity of payments. Enterprise balances are held in state bank accounts that pay no interest. Thus there is no incentive to reconfigure the auditing function of the payment system so that this need is met while also providing for timely payment and settlement of enterprise transactions. As well, no important penalty is imposed when enterprises fail to make payments in a timely manner. For these reasons, payments are not viewed as being time-critical and the notion of a time value for money is undeveloped. Consequently, large value payments among enterprises, or between an enterprise and a foreign supplier, can take days to complete. While such a system is acceptable in a centrally-planned economy where no interest is paid and funds essentially move from one state agency to another, such payment delays would place an unacceptably large opportunity cost on payment receivers in a market economy where money has a time value.

Limited need for comprehensive legal, accounting, and communications infrastructure. As enterprise payments are transfers from one state agency to another, there is only a limited need for payment laws and regulations that determine the rights and liabilities of the parties to a payment transaction. This need is limited because there is really no credit risk or time value of money involved in a payment transaction. If credit risk existed and money had a time value, the legal structure would have to be expanded to spell out the conditions under which payors and payees, respectively, would be liable for losses due to enterprise failure or delayed payments.

In monitoring the financial plan, the separate branches of the state bank are relied upon to individually collect, account for, and report enterprise payment information to a central agency. In this capacity, each branch office effectively operates as if it were a separate bank since enterprise accounts are not centrally managed and controlled. Thus there is little need for a communications infrastructure that could rapidly process and transmit payment or other information among branches of the state bank. Indeed, payment information is in paper form and physically transported between branches using the post office and other non-time-critical transportation methods. Domestic commercial airline flights or even dedicated motor courier, common in a market economy, are not used.

Cash-based retail payments. Currency is the primary method of payment for the household sector and is supplied through cash wage payments by enterprises. Since enterprise output allocated to the household sector is determined by the plan, any excess of currency in circulation over the assigned value of the output supplied to this sector is absorbed as forced savings. Although households can deposit excess currency in banks and earn an interest return, this return is controlled by the plan and no short-term money market instruments exist which could pay a higher rate.

The reliance on cash as virtually the only means of payment for the household sector means that alternatives to cash payments have not developed in centrally-planned economies. Payment systems which are predominantly cash-based often are associated with low crime rates and/or fundamental weaknesses in the banking system. This includes the existence of inefficient, costly, or unreliable non-cash payment instruments, negative real deposit rates, or depositor fear of government taxation or appropriation measures. If crime rates are low, inflation is controlled, and currency is available in large denominations, then use of cash for all household transactions may be safe and not too inconvenient. However, if these conditions are not met, then alternatives to cash for payment transactions can be quite useful. This is especially true for larger-value payments. Here the transaction cost related to cash use, for both the banks and consumers, can be quite high. This is due to the expense of cash storage, counting and verification, and the physical shipment (under guard) in order to effect payment, along with the opportunity cost of holding non-interest-earning cash balances. When inflation is not adequately controlled, this opportunity cost will dominate the other cost influences associated with the use of cash.

2. Payment systems in market economies

Support of real and financial markets. The purpose of the payment system in market economies is to provide low cost, timely, and secure payments for both enterprises and households. The overarching goal is to support trade and exchange –among enterprises, among households, and between households and enterprises. This encompasses both real (goods and services) and financial markets. As enterprises and households engage in transactions that differ in frequency, value, and place, a broad range of both paper-based and electronic payment instruments have been developed to accommodate these different needs. The accounting and monitoring functions of a payments system –the primary goal in a centrally-planned economy– is basically separate from payment transactions in a market economy. Efforts to more completely integrate these two functions –through electronic business data interchange (EBDI)– are in their infancy.

While market economies often contain both privately-owned and government-owned banks, privately-owned banks are dominant. Government-owned banks may provide loans only to politically favored sectors of an economy (e.g., agriculture) or, like commercial banks, loan to all sectors. As well, government agencies may guarantee privately-provided loans to favored groups (e.g., small business, students, homeowners). Although exceptions exist, specifically in the form of the government-owned GIRO, in most market economies privately-owned banks typically provide the majority of transaction, savings, and loan services to both the household and the (privately-owned) enterprise sector.

The banking industry in market economies is usually concentrated, with the largest

10 banks holding 90% or more of all deposits or assets. The U.S. is an anomaly as it would take 3,000 banks to achieve this level of concentration. Differences in banking concentration, geographic distance, and antitrust policy, as well as (centralized) post office provision of savings and transaction accounts, have helped to determine the range of non-cash payment instruments that can be cost-effectively supplied. As discussed below, these differences have led the U.S. and Canada to rely on paper-based debit transfer instruments, such as checks, while Europe and Japan have focused more on paper and electronic credit transfer instruments, such as GIRO payments. (The word GIRO is derived from the Greek and reflects the flow of funds around a ring, making a circle.) Although the focus may be on one payment instrument, all developed countries offer both to users.

While individual banks, or the post office, provide for the processing, collection, and transfer of funds among themselves, the central bank typically provides for the final, same-day, net settlement of the multilateral net debit or net credit positions among these institutions. Thus government guarantees for the payment system usually only apply to the gross or net settlement component of the payment cycle, with privately-owned banks being responsible for risks in the other components.

Private responsibility for credit needs and risk assessment. The credit needs of enterprises are not determined by the government but rather by the assessment of individual enterprise owners regarding their ability to earn a "normal" or market return on invested capital. Invested capital is supplied by the enterprise owners, either personally or through a stock market, or from internally-generated cash flows –retained earnings– in the course of business (one source being the depreciation of physical capital). However, the government can and does influence the overall money supply and the business cycle and so indirectly influences both the supply of and demand for credit in a market economy.

Credit is granted to the enterprise and household sectors through the banking system based on an assessment of the risks and returns involved. While some credit is guaranteed by the state (usually for a small fee) or can be privately insured, the banking system has the primary responsibility (monitored by bank regulators) of assessing credit risk in making loans or in providing payment services. This process is information intensive and is guided by legislation (bankruptcy, rights and liabilities of payors and payees), regulations (loan limits to single borrowers, depositor access to funds), and case law (loan contracts, ownership of collateral, bank fees).

Enterprises, in general, face two payment risks when supplying goods or services: (1) they may never receive a non-cash payment; and (2) the payment instrument they receive may not lead to good funds being transferred. Both risks exist for checks while only the first can occur with a GIRO. Receivers of a credit transfer (GIRO) payment face no credit risk because

the payment would not have been sent if the payor's balance (or the payor's credit agreement with the GIRO) was insufficient to cover the funds transferred to the payee's account. Thus GIRO payments, once received, will not be reversed and thus are **final payments.**

A similar assurance does not exist with a debit transfer (check) instrument. In the U.S., 1% of the 60 billion checks received by payees (600 million) are returned each year, even though a fee of from $15 to $25 is incurred by payors for each returned check. Items are most often returned because of insufficient funds in the payor's account, but returns also occur because a check is drawn on a closed account or there is no payor signature or the date is too old. Thus check payments, once received, can be reversed and thus are **provisional payments.** Bank credit is often extended to business payees to cover the time gap between receipt of a check and its final settlement. Japan and France have addressed their return item problem by simply removing banking privileges for enterprises and individuals when checks are returned unpaid. In general, payment instrument use is determined by the convenience, cost, and finality of the different instruments available within a country and the perceived trade-offs among these attributes for both payors and payees.

Payment float and incentives for timely payment and settlement. The time it takes between when a payment instrument is received as payment and when the payee actually has access to good and final funds is termed **payment float**. Depending on the instrument used, the availability of funds can be immediate (for cash), to less than one day (for large value, electronic wire transfers), to the same or next business day (real-time debit card point of sale, credit card, GIRO, checks drawn on a local bank), to two business days (non-local checks).

As interest is paid on deposited funds, and even higher returns may be obtained through purchasing short-term money market instruments (overnight interbank funds or highly liquid government securities), the principle that money has a time value is well-developed in market economies. Correspondingly, there exists a strong (private sector) incentive to minimize payment float and invest in methods that will provide timely payment and settlement. While this investment is "unproductive" from a social point of view, since float is a transfer payment and little or no real output is being produced, there are significant distributional effects from either expanding or contracting float. Indeed, in some countries the banking system captures much of the float benefit and so will be required to look for alternative revenue sources if float is reduced.

Float reduction can be achieved by purchasing high speed paper processing machinery and dedicated motor and air courier collection systems for checks. For debit and credit card payments and automated clearing house (ACH) transfers, float reduction occurs by having an extensive network of card-reading terminals, computer to computer hookups, and a sophisticated electronic communication infrastructure for electronic payments. Payments made

over large value wire transfer networks are typically cleared and settled within the day they are made and so usually do not create any (overnight) float.[2/]

Cash, check, GIRO retail payments, and electronic large value transfers. Cash is the most used of all the payment instruments. This holds for both centrally-planned or market-driven economies. For countries where estimates have been made, cash transactions account for more than 75% of the total. The stock of cash held per person, an approximate indicator of cash use across countries, is shown for 11 developed countries in **Table 1**. Countries with low crime rates, an aversion to credit use, or a history of holding savings outside of the banking system all tend to hold large amounts of cash.

Table 1. Value of currency and coin per person (1992, 11 developed countries)

	Value in U.S. dollars	Transactions: cash/total*
Swtzerland	2,748	–
Japan	2,739	–
Germany	1,534	86%
Sweden	1,467	–
Netherlands	1,354	78%
Belgium	1,239	–
Italy	1,023	–
France	828	–
Canada	652	–
U.S.	465**	83%
U.K.	446	90%

Source: BIS, December 1993.

* *Various sources*

** *($1,167 total reported) x (estimated .40 inside the country) = $465 per person*

2/ *For a discussion of the technology used in processing electronic payments, see Sendrovic (1994).*

The use of four types of non-cash payment instruments for the same 11 countries is shown in **Table 2.** Countries that have a high use of cash (Switzerland, Japan, Germany, Sweden, Netherlands, Belgium, and Italy in **Table 1**[3/]) tend to have the lowest incidence of check use, choosing instead to concentrate on credit transfers (GIRO) and direct debits (a payee initiated electronic debit to a payor's account). Thus intensive use of one type of final payment (cash) is positively correlated with two others (credit transfers and direct debits), to the detriment of checks (a provisional payment instrument). However, in some other countries (India, Korea, Australia, and South Africa in **Table 3**[4/] check use in non-cash payments is as high or higher than that of major check users among developed countries (U.S., Canada, France). While different developed countries rely on different mixes of non-cash payment instruments, the one common theme is a continuing shift away from paper-based to electronic payments.

Table 2. Non-cash payment use in developed countries (1992, percent)

	Use of checks	Use of credit transfers	Use of cards	Use of direct debits
Switzerland	4%	81%	12%	3%
Japan*	8	32	14	46
Germany	9	50	2	39
Sweden	9	77	9	5
Netherlands	12	61	3	24
Belgium	19	56	16	9
Italy**	40	42	4	4
France**	51	15	15	10
Canada	63	4	29	4
U.S.	81	2	16	1
U.K.	45	21	19	15

Source: BIS, December 1993.

* *Estimated from BIS and other sources.*
** *Excludes other payment transactions (electronic bank receipts and bills of exchange.)*

3/ *See page 14.*

4/ *See page 16.*

Table 3. Non-cash payment use in other countries (1991 or 1992, percent)

	Use of checks	Use of credit transfers	Use of cards	Use of direct debits
India	99%	0%	1%	0%
Korea	74	16	5	5
Australia	60	20	16	4
South Africa	60	6	19	15
Thailand	26	7	65	2

Source: Datt and Shanmugham, 1994.

The primary method for making large value enterprise and government payments within market economies is through highly secure electronic wire transfer networks, such as Fedwire and CHIPS in the U.S., BOJ-NET in Japan, CHAPS in the U.K., SAGITTAIRE in France, and SIC in Switzerland. To control for the possible systemic risk associated with one institution's failure to settle real time or end-of-day net positions on these different networks, risk control procedures have and are being adopted. The purpose is to prevent a possible domino-like series of settlement failures or the risky extension of credit by the central bank. Risk control procedures involve one or more of the following items: net debit limits, private loss-sharing agreements (common in stock and commodity markets), the posting of liquid collateral, larger payment clearing balances, or rejection of a payment request if the balance is insufficient.

3. Improving the payment system in transitional economies

The banking and payment system in centrally-planned economies was good at what it was designed to do –namely to closely monitor enterprise performance relative to the financial plan and, in that capacity, provide cash for personal transactions and payment orders for inter-enterprise payments. It is thus not surprising that, when the goals are altered– as they are in a transitional economy, a number of problems arise. Six important issues needing to be addressed are outlined in **Table 4**.[5/]

[5/] *See page 17.*

Table 4. Summary of payment system charateristics and problems for transitional economies

	Centrally-planned economy	Market-driven economy	Problems of transitional economies
Structure	State-owned mono-bank	Privately-owned multiple banks	Expand legal structure to accommodate private ownership
Purpose	Monitor the plan	Speedy value transfer	Improve time sensitivity of payments
Enterprise payments	Paper-based	Paper and electronic	Develop electronic payment and communications infrastructure
Guarantees	State guarantee (no credit risk)	Private obligation (credit risk)	Improve credit risk assessments
Settlement	Gross settlement (all transactions through one account)	Gross settlement, net settlement with collateral (many accounts)	Develop same-day settlement for large value payments
Retail payments	Cash-based	Cash, GIRO, check, electronic (debit/credit cards)	Expand retail payment alternatives

Structure. The shift from a state-owned mono-banking structure, to one where there is more than one bank and each is privately owned, means that the legal structure underlying both the banking system and the payment system has to be considerably expanded for non-cash payments. This involves property rights (for private ownership), bankruptcy law (because banks can fail), and a legal/regulatory structure which clearly spells out the rights and liabilities of payors and payees in the payments chain.[6/] In this process, it is important that these laws and regulations permit new and cost-effective payment instruments to develop and evolve if they meet better the payment needs of households and enterprises in a market economy. The old procedure, where the government decides, in isolation, what payment arrangements should be permitted and then tightly controls all aspects of a payment cycle, will not achieve the desired results: household, enterprise, and banking needs should be given a large weight when the payment system is being restructured. This is more important for inter-enterprise and interbank payments, which typically rely on non-cash instruments, than it is for households which will generally rely on cash for most of their personal transactions.

Purpose. Transitional economies recognize that there is a time value to money. This recognition, and the fact that the payment system is no longer an enforcement control device for the financial plan, means that the payment system will have to be adjusted to serve two purposes: the accounting purpose of providing an audit trail for inter-enterprise and other

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[6/] *A good description of legal issues in a payment system is provided by Bhala (1994).*

transactions plus the timely value transfer purpose to minimize the enterprise and household float costs associated with transactions.

The costs of untimely payments can be substantial. In Russia, it has been estimated that upwards of one-third of the increase in the money supply has been absorbed and used only to clear payments. Because of credit risk and fraud, the PDO (a debit transfer instrument initiated by the payee (see **Figure 1**)[7/] has been outlawed. In its place is the payment order –a credit transfer– initiated by the payor. While in the past a payment transaction was usually completed in a matter of days, currently in Russia weeks can elapse from the time when an enterprise account at a bank is first debited to when the credit finally enters another enterprise's account and can be used. This time gap is the result of increased lags in processing, collecting, and settling payments within the banking system as well as increased delays by enterprises in making requested payments (evidenced by rising inter-enterprise arrears).

The cost to enterprises of delayed payments is either: (a) the cost of borrowing working capital to cover the time needed to collect and settle payments which, if received earlier, could have been used as working capital; or (b) if working capital reserves are sufficient, the lost interest revenue which would have been earned on collected funds if these funds were collected earlier. In addition, the cost of (b) is increased, while the cost of (a) is reduced, when interest rates do not fully reflect inflation and the reduction in purchasing power which results. When payment transfers are speeded up, these enterprise costs are reduced. However, if the proportion of the money supply tied up in the payment system falls, the proportion in the hands of the public rises. This change is equivalent to a rise in the money supply and needs to be coordinated with the monetary authority.

Enterprise payments. Paper-based enterprise payments may be adequate when values are small but are expensive when values are large. In the short-run, the timeliness of paper-based enterprise payments can be greatly improved through the development of machine-readable MICR encoding for checks or payment orders and processing these items using high speed reader-sorters. Collection times can be markedly reduced by switching from the post office to dedicated motor couriers, domestic commercial airlines, and even dedicated air couriers. In the longer-run, particularly within and between major domestic trading centers, it will be cost-effective to develop a personal computer or mainframe-based telecommunications infrastructure that will accommodate enterprise, money market, and international large value payments on a same-day basis.

Guarantees. As payments are no longer from one state-owned enterprise to another, the state no longer guarantees either the viability of the banking system nor the credit-

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7/ *See page 5.*

worthiness of enterprise payments. Private ownership comes at the cost of a loss of state guarantees for the payment system. Thus receivers of payments need to develop procedures to assess the credit risk of the counter-party they deal with in transactions. This is not a simple process, even in a market economy: it requires information on a counter-party's credit history, its financial viability, and a thorough understanding of the rights and liabilities of all parties in different types of payment transactions. When the legal underpinnings of the payment system is itself uncertain, as it can be in a transitional economy, credit risk is even more difficult to judge. In this event, it is quite important to have personal knowledge of the counter-party and his credit history prior to engaging in trade.

Settlement. With the breakup of a mono-banking structure into numerous privately-owned banks, enterprises may have more than just one account and deal with more than just one bank. In market economies, the central bank provides for inter-bank settlement of large value payments using either **real-time gross settlement** (RTGS), where each transaction is settled when sent over a large value network, or **end-of-day net settlement**, where only the multilateral net position of an entire day's series of large value transactions is settled. To reduce systemic risk, net settlement networks limit the net debit exposures of bank participants using real-time net debit caps, develop loss-sharing agreements allocating the cost of a settlement failure, and/or require the posting of liquid collateral to cover the single largest possible net debit in a settlement failure. These and other payment risk-reduction procedures have been developed by G-10 central banks under the auspices of the Bank for International Settlements (referred to as Lamfalussy standards).

On a RTGS network, adequate balances are held to clear all payments at the time they occur. However, the opportunity cost of holding idle payment clearing balances exceeds the expense of positing liquid collateral (which can earn an interest return). Thus net settlement of large value payments backed by liquid collateral is a lower cost alternative to RTGS and can be structured to be just as free of systemic risk. But systemic risk is only one problem. As noted above, same-day (or even next-day) payment and settlement of enterprise large value transactions should be an important goal to reduce payment float.

Retail payments. Retail payments can be made more convenient and safer if many household payments that previously relied almost entirely on cash were expanded to permit check or GIRO payments and perhaps even electronic point of sale debit or credit cards. While cash will likely remain the dominant payment instrument in terms of the number of transactions (e.g., **Table 1**[8/]), larger value household transactions and transactions where face-to-face contact is either inconvenient or unnecessary represent areas where alternative payment instrument use is likely to arise.

8/ *See page 14.*

An important side effect of a reduced use of cash for larger value household payments is a corresponding reduction in the future growth of seigniorage benefits to the government. When the government issues currency, it gives itself a long-term "loan": the newly issued currency is used to purchase real goods and services for the government (the value of which far exceeds the actual cost of printing the currency) and the public may never redeem the currency (although there will be recurring costs of currency replacement over time). While the stock of currency in circulation need not fall as households develop and use alternative non-cash payment instruments, the rate of growth of currency –and hence the benefit from seigniorage– should slow over time. As seigniorage creates revenue for the government, alternative sources of revenue must be developed.[9/] An expansion of central bank credits to government enterprises is not the answer. Although rapid growth in either cash or central bank credits can create an inflation "tax" on the economy (since the real value of debt is reduced), cash represents a "loan" from the public to the government that is unlikely ever to be repaid (seigniorage) while central bank credits to government enterprises represents a loan that if not repaid, reduces government purchasing power in the future.

[9/] *The seigniorage issue is discussed in more detail in Humphrey (1995).*

II. THE PAYMENT CYCLE: STRUCTURE AND CHOICES

In order to illustrate in more detail the payment choices facing transitional economies, it is useful to develop a conceptual model of the payment cycle. With such a model the choices among alternative access, communication, security, and settlement arrangements become clearer and the implications of new payment instruments for a nation's payment system are more easily identified.

1. The structure of the payment cycle

A conceptual model of the payment cycle. Although stylized and simplified, **Figure 2**[10/] illustrates the major components of a typical non-cash payment cycle. Non-cash transactions –such as check, GIRO, debit card, credit card, direct debit, and wire transfer– require clearing and settlement in order to transfer value between payor and payee. In contrast, cash transactions transfer value directly between payor and payee outside of the banking system and thus do not require clearing and settlement. This also holds for many pre-paid instruments, such as pre-paid railroad (Japan), telephone (most developed countries), and subway (U.S., Japan) cards issued by the commercial firms providing these services. However, pre-paid instruments such as postal money orders, travelers checks, and bank cashiers checks enter the payment cycle as a (pre-paid) check instrument.

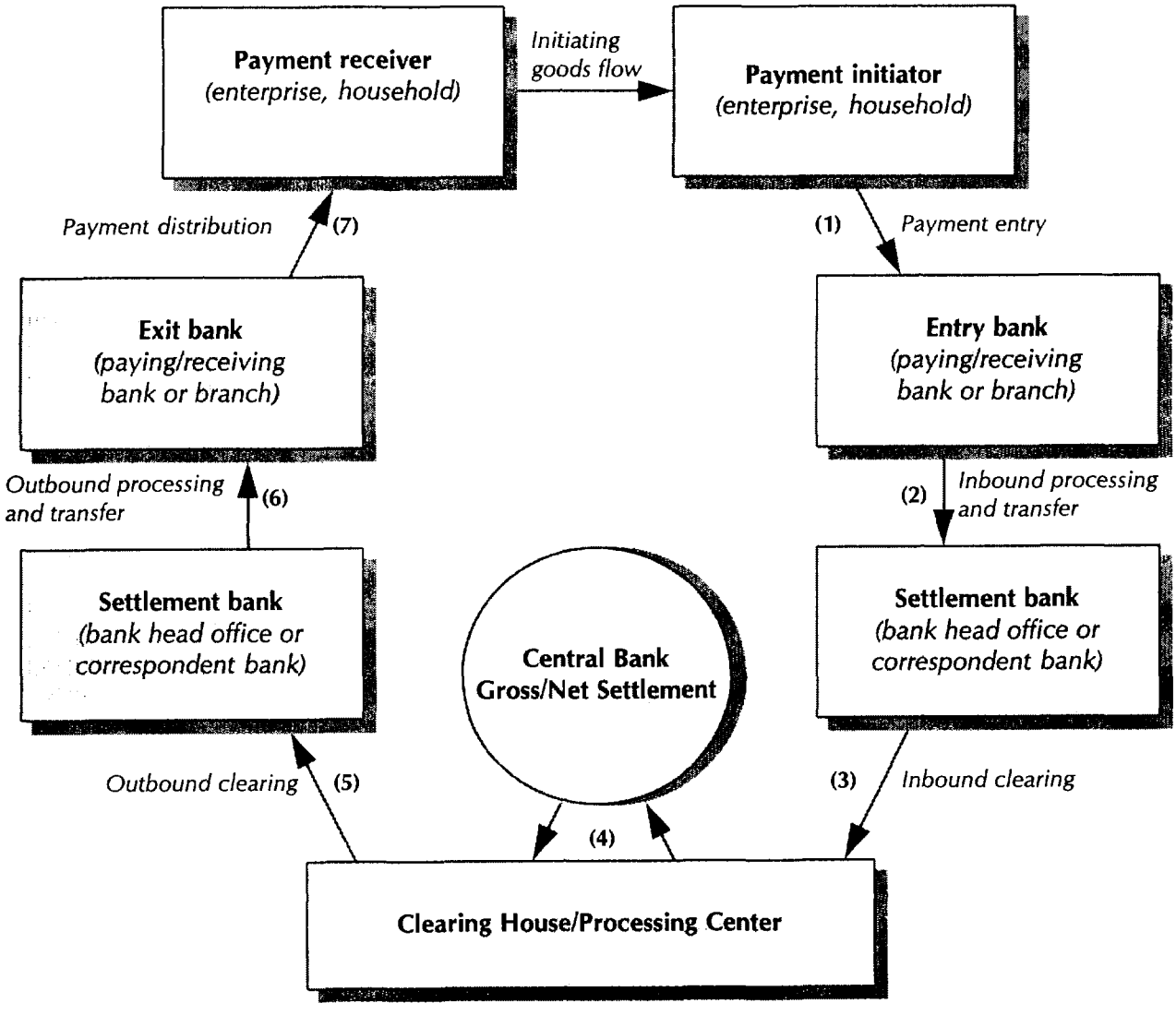
The payment cycle starts at the top of **Figure 2**[11/] with an enterprise or household providing some good or service to some other enterprise or household, who then must transfer value. The seven steps in the payment cycle are:

(1) Payment entry
(2) Inbound processing and transfer
(3) Inbound clearing
(4) Settlement (gross or net)
(5) Outbound clearing
(6) Outbound processing and transfer, and
(7) Payment distribution.

[10/] *See page 22.*

[11/] *See page 22.*

Figure 2: Payment cycle for non-cash payments



Payment entry–Step 1. Entry into the payment cycle can occur when the enterprise or household needing to transfer value –the payor– initiates, through its entry bank or branch, a credit transfer (GIRO payment or wire transfer) for the behalf of the receiving entity –the payee. Alternatively, if the payee has an instrument or agreement for a debit transfer (check or direct debit) from the payor, the payment cycle is initiated by the payee through the payee's entry bank. Depending on the instrument used, either payor or payee may initiate the payment cycle. In either case the goal is the same: to transfer value from payor to payee.

Entry may be paper-based (checks or paper GIRO instructions) or electronic (ACH, electronic GIRO, debit or credit card, wire transfer). Entry may also occur using telex or telephone instructions or a computer-to-computer interface with the entry bank. Specific message formats have to be followed for electronic entry into the payment cycle.

Regardless of the type of payment instrument used, the information necessary to enter the payment cycle includes: (a) the name and account number of the payor (in order to debit the correct account); (b) the name and account number of the payee (to credit the correct account); (c) the value to be transferred; (d) the date of the transaction and/or the date the value is to be transferred; and (e) an authorization to initiate the transaction. The authorization may be the signature of the payor for check and paper GIRO payments, a code number read by a terminal at the point of sale for debit and credit card transactions, a written agreement pre-authorizing a payee to debit a payor's account (a direct debit), a test key or sequence number for telex transactions, and password, call-back, test key, and dedicated computer-to-computer interface for large value wire transfers.

If the payor and payee happen to have accounts at the same entry bank or postal GIRO, then the processing, clearing, and settlement of the payment is entirely internal to the entry institution. This is a "on-us" transaction and clearing and settlement is deemed to have taken place when the entry bank's internal accounting cycle is completed, usually during the evening of the day the payment instruction was received. If branch office accounts are centrally integrated and controlled, then the more concentrated is the banking industry, the higher will be the proportion of payments that are on-us rather than "on-other". If intra-bank accounts are not centrally integrated then each branch of a bank effectively acts as a separate bank and an on-us transaction continues through the payment cycle as if it was an on-other payment.

Inbound processing and transfer–Step 2. The entry bank or branch initially processes the inbound paper or electronic payment instruction by checking the payment information, applying appropriate security procedures (when necessary), and debiting/crediting the appropriate accounts. The payments are then sorted into numerous on-other categories and forwarded to its settlement bank using courier physical delivery, off-line telecommunication (telephone, telex, facsimile), or on-line electronic computer interface. The inbound settlement

bank will either be the head office of the branch that acted as the entry point or it could be an separate correspondent bank that has agreed to act as a settlement agent in the clearing process. Use of a correspondent as a settlement bank is common when many banks exist, there are numerous centers of trade and production, and/or the country is large geographically.

Inbound clearing–Step 3. Clearing takes place when the inbound settlement bank forwards the paper or electronic payment to a (local, regional, or national) clearing house or processing center. If the processing center relies on real time gross settlement, then the payments are settled immediately as they arrive. Such an arrangement so far applies only to large value payments over certain wire transfer networks (Fedwire in the U.S., SIC in Switzerland, and a subset of payments over BOJ-NET in Japan). Much more common is net settlement where the net position of a whole series of inter-bank transactions are settled at various times of the day: morning for ACH, debit card, credit card, and direct debits functioned the previous evening; mid-day for checks processed and sent overnight to clearing houses; or end-of-day for many wire transfer networks (CHIPS in the U.S., BOJ-NET in Japan, CHAPS in the U.K., and others in Europe).

Gross or net settlement–Step 4. Settlement is almost always performed through the central bank who irreversibly debits and credits clearing or reserve requirement balances of the settling banks. Gross settlement is bilateral, as each transaction between two banks involves an immediate and separate settlement. Net settlements are usually multilateral. In a multilateral settlement, the set of all bilateral transactions is netted down to a single net debit or net credit for each participant. The debits occur first and are all posted to a special settlement account. The funds in this settlement account are then distributed as credits to the remaining banks and the net settlement is complete. While alternative settlement arrangements exist that rely on correspondent balances held with a settling bank, rather than the central bank, this alternative can be time-consuming and costly if there are many bank participants. As well, because a settling bank may fail, the preferred settlement arrangement is through the (government backed) central bank.

Outbound clearing–Step 5. Once settlement occurs, the clearing house or processing center informs the outbound settlement bank that the transaction is complete. While settlement by the central bank is final and is not reversible, the payment cycle for a provisional payment, such as a check, may be reversed. If the check writer has insufficient funds at the exit bank to cover the value of the check written, then the check is returned as an entirely new transaction which effectively reverses the original transaction. Returned checks do not invalidate the original settlement; they just become a payment instruction in the opposite direction requiring additional processing and clearing as well as a new settlement.

Outbound processing and transfer–Step 6. After the settlement bank makes the

appropriate accounting entries, it forwards the payment information to the exit bank. This process uses the same paper or electronic method that was used for the inbound part of the payment cycle (step 2).

Payment distribution–Step 7. If the transaction was a debit transfer, the exit bank compares the debit with the customer's balance and will reject the transaction (or provide a short-term overdraft loan at positive interest) if the balance is insufficient. If the balance is adequate to cover the debit, the exit bank forwards the transaction information to the enterprise or household whose account was debited. If the transaction was a credit transfer, the exit bank credits its customer's account and provides the payment information to the account holder.

Except when paper items are truncated or translated into electronic terms, exit from the payment cycle is the same as the method of entry and can be paper-based (check, paper-based GIRO) or electronic (ACH, electronic GIRO, debit or credit card, or wire transfer). Voice instructions over the phone or computer-to-computer linkages are used for large value transactions. For small value transactions, account holders are informed of payment debits or credits through monthly account statements mailed to customers or, if desired sooner, upon customer inquiry.

The main differences in the payment cycle for check and GIRO payments concerns payment entry, inbound clearing, settlement, and payment distribution. In summary form, these differences are:

	Check	***GIRO***
Payment entry	*Payee receives check from payor and initiates collection*	*Payor initiates GIRO payment to payee*
Inbound clearing	*Clearing is on-us or on-other institutions*	*Clearing is typically on-us*
Settlement	*Effectively, only provisional net settlement*	*Typically, final gross settlement*
Payment distribution	*Check can be returned to payee unpaid*	*No returns*

Debit and credit card payments, because they usually are handled at the point of sale in a real-time mode or are compared against a negative file which is constantly updated, do not involve return items. Settlement between the account holder's bank and the payee's bank usually involves net settlement.

Float and payment finality. In developed countries, large value payments can complete the payment cycle in a matter of minutes while most lower value payments are completed on a next-day basis. The longer it takes to complete the payment cycle, the larger is the float cost of the payment system.

Almost all payment cycles offer **sender finality** which does not permit the payment sender to reverse the transaction once the payment has been sent, even if it is in error. Errors are reversed by convincing the payment receiver to initiate a new transaction which reverses the one in error. Central bank controlled large value payment networks (Fedwire, BOJ-NET, SIC) and many privately operated large value networks (the two largest of which are CHIPS and CHAPS) which settle through the central bank, also provide for **settlement finality.** Settlement finality is where settlement can not be reversed even if there is a failure by a bank participant to settle its net debit position. The central bank, by lending funds to a settling participant for a fee (Fedwire), liquidating collateral posted by participants (CHIPS, CHAPS), or by having previously rejected transactions where balances were insufficient (SIC, certain BOJ-NET transactions), all provide for the finality of settlement.[12/] Alternatively, settlement finality may be provided when payment network participants with net credits lend funds to participants with net debits (most of BOJ-NET transactions).

Lastly, there is **receiver finality** where the exit bank, upon completion of the transaction, would irrevocably credit a customer's account with good and final funds. No payment network has receiver finality, largely because banks wish to reduce credit risk by having the option to use funds received on behalf of the customer to cover any of the customer's defaulted loans or net debits in other accounts at the same bank.

2. Clearing financial market transactions

Clearing and settlement for financial markets: clearing houses. Financial markets mobilize savings, allocate investment, and provide derivative instruments that (when properly used) reduce enterprise risk from fluctuating interest rates, foreign exchange rates, and raw material or commodity prices. Financial market transactions include interbank overnight borrowings, bank large value certificates of deposit, government debt securities, enterprise equity and (short and long-term) debt securities, as well as a whole host of futures, options, and other derivative instruments related to money market securities, foreign exchange, and commodities. All transactions in financial markets have to be cleared and settled, just like transactions that occur among enterprises or between enterprises and consumers.

[12/] *A fuller discussion of these and other issues regarding the operation of various large value payment networks is provided in Horii and Summers (1994).*

Financial market transactions are typically large value transactions and there are two primary ways they are cleared and settled.[13] The most common method is to set up a clearing house that only clears a particular type of financial instrument, such as only government securities (for a government debt market) or only enterprise equity securities (for a stock market). Once the direct and indirect parties to a financial market transaction have been notified by the clearing house what the net positions are that they owe after each day's trading, the payment and settlement of these transactions is then handled through the banking system and the central bank, essentially following the payment cycle outlined for non-cash payments in **Figure 2.**[14] The second method for handling financial market transactions involves a specialized depository which immobilizes the security being traded and, as discussed below, integrates the clearing house function with the payment transaction (called **delivery against payment**).

Financial market clearing houses centralize purchase and sale information, perform multilateral netting of contracts to buy and sell, and notify market participants of the net positions they owe one another. If participants are trading for their own account, they then notify their respective banking institutions to make payments –typically using electronic wire transfers– to participants' banks to complete the transaction, with physical or book-entry delivery of the securities occurring with a lag that differs among markets. Settlement of these interbank payments is either immediate (on a RTGS network) or end-of-day (on a net settlement network). Additional payments and delivery are required if participants are acting as an agent in the transaction for enterprises, banks, or other types of financial institutions (who may be the ultimate purchaser of the security). The payment cycle for financial market transactions follows that shown in **Figure 2.**[15] As shown in the figure, payments are initiated by purchasers of financial instruments through an entry bank, which then may go to a settlement bank, to a processing center (e.g., wire transfer network), to the receiving bank (typically also the exit bank), and finally to the payment receiver (which can be the clearing house acting as an agent for the seller of the financial instrument). Settlement is through the central bank.

While settlement of financial market transactions is timely, clearing may not be. The efficiency of the clearing process is a function of the number of participants, the trading volume, and the extent that the trading information is computerized. Only recently in the U.S. has the time lag for many stock market transactions and their final settlement moved from 5 to 3 days. This time lag generates risk.

If the participant selling a security fails prior to settlement, two types of risk may occur. First, payment may have been made before the securities were delivered to the

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[13] *Greater detail is provided in Parkinson, et al. (1992).*

[14] *See page 22.*

[15] *See page 22.*

purchaser, in which case the purchaser is now a creditor of the failed participant. Alternatively, if no payment or delivery of securities has occurred, then the purchaser faces the (likely smaller) risk that the price of the security may have risen and the purchaser will now have to pay more for the security than before. These risks are reduced by (a) reducing the time lag between when a financial transaction occurs and when the transaction is settled and (b) instituting loss-sharing agreements among participants in the clearing house (thereby internalizing the risk and providing an incentive to carefully screen and control the risky behavior of clearing house members). A major problem with the clearing house approach has been that some participants are members of many different specialized clearing houses, reflecting their trading in different financial instruments, so that a failure of one participant in one clearing house may affect the solvency of participants in clearing houses where the failed participant was not even a member (creating systemic risk). Greater consolidation and coordination among clearing houses can reduce this problem but a more effective solution –at least for certain types of financial market instruments– is the establishment of a depository.

Payment cycle for immobilized or book-entry securities in depositories. Financial transactions involve promises to pay (debt securities, futures, options) or ownership rights (equity securities). In those cases where the promise to pay or ownership rights are highly valued by the market, because of the creditworthiness of the institution making the promise or the solvency of the institution being owned, it is possible to immobilize the security being traded in book-entry form within a centralized depository and use it to collateralize the underlying transaction. If the purchaser (new owner) of the security fails to pay for the security, the security (collateral) can be returned to the original seller (who is unpaid) or it can be liquidated in the market with the funds then transferred to the seller. This arrangement substantially reduces the risk of loss from the failure of a financial market participant and thereby also reduces the possibility that the failure of a participant in one market will cause problems for participants in other markets in a systemic manner.

Depositories also further reduce risk by adopting rules and operating procedures that permit delivery against payment, which is when ownership of the underlying security is not transferred until, and simultaneously with, the actual receipt of the payment (over a RTGS wire transfer network). This eliminates the time gap between when a transaction occurs and when payment and settlement takes place. In effect, delivery against payment goes one step further than a (credit transfer) GIRO payment since the transaction does not even occur until the security being purchased is in fact paid for in final funds.

Figure 3[16/] illustrates the payment cycle for financial transactions within depositories. In the U.S., depositories currently handle U.S. government debt securities, mortgage-backed securities, and enterprise commercial paper, bonds, and equities (but not

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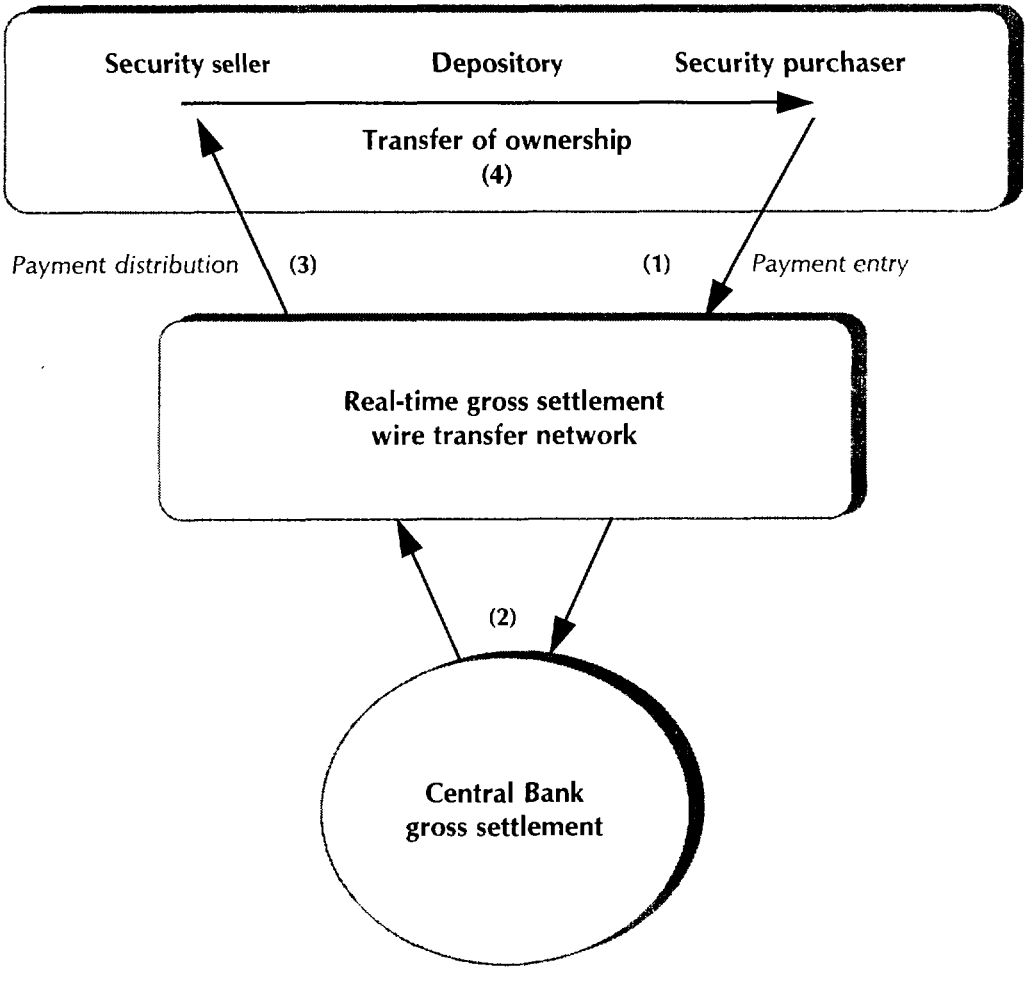
16/ *See page 29.*

futures, options, or foreign exchange transactions). In depositories without delivery against payment, there is an initiating financial transaction between the purchaser and seller of the security. The depository, acting as a clearing house, clears the trade and notifies the purchaser who then initiates the payment (through its bank or through the depository if it acts as a bank) over a RTGS wire transfer network. The wire transfer network settles each transaction separately as it occurs through the central bank and distributes the payment to the security seller's bank or to the depository (for the seller's account). The actual transfer of ownership of the securities need not be simultaneous with the receipt of the payment. Only in depositories with delivery against payment will the ownership to the securities occur simultaneously with the receipt of payment, thereby eliminating almost all of the payment risk in the financial market transaction.

Figure 3: Payment cycle for financial market transactions in depositories



3. Choices in the payment cycle

Supplier and ownership choice: banks versus the post office. The payment cycle merely transfers value from payor to payee. The operation of debiting one account and crediting another can be done within a single state-owned mono-bank (in a centrally-planned economy), within a single state-owned post office system (as occurs in Europe and Japan), or among various privately-owned banks (as in all developed countries).

In general, the smaller is the number of separate payment suppliers in a country, the greater will be the proportion of on-us payments. As an on-us payment can be truncated so that the payment cycle occurs entirely within the entry institution, on-us payments are typically performed at a lower cost with lower clearing and settlement risk than are payments that require processing and collection through more than just the entry institution.

The lower cost of on-us versus on-other transactions means that, other things being equal, postal GIROs should be able to provide payment services at a lower cost than can be obtained through a less than completely aggregated banking system.[17/] In turn, an aggregated banking system (as exists in Europe, Canada, and Japan) should be able to provide lower cost payment services than a banking system that is highly disaggregated (as exists in the U.S.). Although complete bank aggregation is achieved under a mono-banking system, where all payments are on-us transactions, this arrangement is costly because payments are paper-based and accounts at branches of the state-owned bank are not centrally managed (so each branch is treated as if it were a separate bank). While we do know from various studies that electronic payments in developed countries are cheaper than paper-based payments, the presumption that payment costs are lower for more aggregative banking systems is logically based on the fact that an on-us payment is cheaper to process than is an on-other transaction.

An additional factor influencing payment costs is private versus state ownership. In some transitional (and developing) countries, the central bank is de facto the only nationwide bank and the sole provider of payment services. While exceptions such as this exist, the incentive for private gain in a competitive market for payment services can lead to lower costs than when the same payment services are provided through a state-owned supplier. However, the benefit of lower cost need not be realized by users of the payment system if a privately-owned banking system becomes too aggregated. At some point, depending both on the ease of entry into the industry and a country's antitrust policy, the incentive to lower costs to improve returns to owners and managers shifts instead to raising price. This consideration, along with

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[17/] *If enterprise deposit transaction accounts paid close to a market interest rate, then some interbank payment transactions –those for overnight, enterprise cash concentration purposes– would not be necessary, reducing somewhat the demand for on-other transactions.*

cost savings from on-us payments, affects the choice between banks (which are often privately-owned) versus the post office (which is state-owned) as payment system supplier.

Local, regional, or national processing and settlement. In small countries, with only one or a few closely-located trade centers, all clearing and settlement can be centralized. However, in large countries with multiple money or trade centers, payment processing and settlement has many tiers in order to minimize collection costs. Transfers of funds between payors and payees located close to one another are cleared locally with settlement handled electronically through the regional office of the central bank. Payments between parties more distant from one another may require multiple handling, in either paper or electronic form, with inter-regional settlement among central bank offices.

A tiering of payment processing and collection functions between local, regional, and national payments exists today in the U.S. and will be the model followed in Russia. The U.S. has local clearing houses for local check payments and local electronic networks to clear and process local debit card payments. Of the two major bank credit card issuers, one processes all payments at a single central location while the other has chosen a regional configuration.

In general, payments requiring regional clearing are handled both by networks of correspondent banks and the 36 regional (24 branch and 12 head) offices of the central bank. Payments between regions are cleared by moving payment information between these regional centers through regional correspondent banks or among the 12 head offices of the central bank. Settlement is effected either through the movement of commercial bank balances at and within one of the 12 head offices of the central bank (for both local and regional payments) or through the movement of these balances between the 12 head offices (for national payments). In both cases, settlement effectively takes place using the central bank's nationwide large value wire transfer network with entry points at each of the 12 head offices. At present, there is no need to centralize the holding of commercial bank payment clearing and settlement balances because the U.S. does not yet have nationwide banks, although this will change in the near future and likely lead to such centralization.

The distinction between local, regional, and national payments in Russia parallels that of the U.S. for the simple reason that it too is quite large geographically and does not yet have nationwide banks. In Russia, there are 1400 local offices of the central bank to process and clear local payments and disburse cash. Regional and interregional payments are handled at 71 regional processing sites (equivalent to the 24 central bank branches in the U.S.) and 10 super regional centers (similar to the 12 regional head offices in the U.S.). A centralized national processing center will clear interregional and national payments (similar to Fedwire, the central bank's wire transfer network in the U.S.)

The tiering of processing and settlement in the payment cycle –associated with country size, banking aggregation, and the proportion of on-us payments– dictate the number of inter-bank communication links needed for payment system operation. The timeliness, cost, and security of different types of links will determine whether communication will be paper-based or electronic.

Private bank versus central bank processing. Privately-owned banks, or their agents, perform the vast majority of the clearing and processing of payments in developed countries. Consequently, central banks in these countries essentially provide only settlement services for the payment system. The U.S. central bank is the main exception to this division of responsibility as it provides settlement services as well as about one-fourth of all check processing and over one-half of all ACH and wire transfer processing services. This occurred for a number of specific historical reasons, involving recurrent banking crises, the failure of privately-operated clearing houses, a desire to improve payment timeliness by eliminating non-par checking, and restrictions on bank branching which prevented the development of nationwide (or even regional) banking with a high level of on-us payments.

To the degree that these specific problems are not experienced in transitional economies and a viable private sector can provide adequate clearing and processing of payments, the central bank should probably limit itself to providing only settlement, not clearing and processing. Usually, the profit incentive is sufficient for the private sector to more fully and cost-effectively meet the needs of payment users than may be possible for the central bank, which typically lacks a profit incentive.

Settlement can be in net terms, as occurs with bulk processing of a series of payments with end-of-period settlement, or it can be gross where each payment is settled in real time when it occurs. As noted earlier, net settlement can be structured (using collateral and other risk reduction procedures) to be as risk-free as RTGS. If this is done, then the lowest cost settlement method –which is net settlement– can be chosen for the payment cycle.

Access and security choices. Access to the payment system has historically been limited to the banking system. The major exception is the postal GIRO whose payments were initially all on-us transactions, and therefore required no interaction or settlement between banks and itself. In certain instances, where there are a large number of transactions among commercial firms, inter-firm payments are netted outside of the banking system prior to entry into the payment cycle to be settled. Such arrangements exist in the airline, petroleum, and trucking industries (where airlines have exchanged customer flight tickets when customers change flights, oil firms have traded oil shipments, and trucking firms have netted freight fees when they heavily use each other's services in completing shipments).

Attempts by commercial firms to bypass banks and obtain direct access to the payment system, and thus the low-cost and risk-less settlement service provided by central banks, have been rejected. One reason is that in most countries, banking and commerce have always been separate (going back over 300 years). As well, commercial firms have a higher earnings variance than do banks, yielding a greater probability of bankruptcy. Keeping banking and commerce separate serves both to limit disruption of the money supply and the payment system as well as restrict access to a country's (usually subsidized) deposit insurance fund and central bank discount window loans. Although stringent "firewalls" could be built to separate banking and commercial activities within a single firm, much as the trust activities of a bank are separated from the rest of the bank, the solution adopted in almost all countries has been to limit or prohibit the ownership of banks by commercial firms and vice versa. Thus both direct and indirect access to the payment system by commercial firms is severely limited and banks, relying on their monopoly access to central bank settlement, remain the predominant supplier of payment services.

Payment system security needs are directly related to the value of the payments being processed. Low value (check, GIRO, credit and debit card) payments do not use the more expensive procedures involved in large value electronic ACH, GIRO, or wire transfer payments. Large value payments typically use dedicated communication lines, passwords, test key, and message encryption. These networks also have developed back-up facilities in the event of message interruption (from power outage, natural disaster, or even terrorist attack). A useful criteria in deciding whether or not to adopt a particular security procedure is to compare the amortised cost of adopting the procedure with the estimated cost of insuring against the expected loss if it is not implemented.

Participant liabilities and error resolution. Although an adequate legal structure should contain a comprehensive list of payor, payee, and agent bank rights and liabilities for different payment instruments under numerous failure conditions, this does not always occur (even in developed countries). Thus there is a need for additional, and often more specific, bank supervisor or central bank rules and regulations covering these and other aspects of the payment cycle (like payment instrument standards, customer access of deposited funds, and conditions for providing settlement). In addition, participation in clearing houses is governed by rules concerning bank deposit deadlines, when settlement occurs, and the resolution of errors. Typically, errors are resolved by initiating a new payment which reverses the original error. If the value of the error is large, the correction process includes an interest payment. Errors unidentified within a stipulated period of time are not subject to reversal or compensation.

Settlement of cross-border payments. Because there is no "world central bank" and no common currency, cross-border payments between enterprises in two different countries are typically performed using correspondent accounts at one or two banks in one of the

countries, usually the country where the enterprise receiving the payment is located (enabling the enterprise to receive payment in domestic currency). Cross-border payments rely on a **message transfer** network, such as SWIFT (Society for Worldwide Interbank Financial Telecommunication), to transmit payment information which tells the receiving correspondent bank to debit one of its correspondent balances and credit another. The two correspondent balances may be within the same bank (an "on us" transfer settled within the bank) or at another bank within the same country (with settlement provided by the central bank). Thus SWIFT transmits the message, the correspondent bank transfers the funds, and the bank or the central bank provides the settlement.

Correspondent balances used for cross-border settlement are replenished by buying foreign exchange and liquidated through debits or withdrawal denominated in domestic currency units. Although clearing and settlement of cross-border payments is more cumbersome than clearing and settlement within a country, the SWIFT arrangement is cost-effective compared to other alternatives (which, historically, involved the actual physical movement of gold or a reserve currency between countries).

III. MARKET NEEDS AND CHOICES IN AN EVOLVING PAYMENT SYSTEM

The payment system of a transitional economy need not evolve in a pre-determined way. Indeed, different countries have at times chosen to rely upon different payment instruments for non-cash payments. They have also sometimes allocated payment system functions and responsibilities differently between commercial banks and the central bank. The proximate causes of these differences are more historic and political than economic and are best illustrated by noting the differing evolution of the payment systems of the U.S. and Europe. The choices facing transitional economies in improving their payment system are outlined and their interrelationships noted. Issues important to this process, particularly in letting market needs influence the payment arrangements permitted and developed, are discussed. A summary checklist of information needed to adequately plan for payment system change is presented in an Appendix.

1. Payment system choices in market economies: the U.S. and European experience

Centralized versus decentralized supply of savings and payment services. With 81% of all non-cash transactions made by check (**Table 2**),[18/] the U.S. is the heaviest user of this payment instrument among developed countries. (Check use in India, at 99%, is even higher–**Table 3**.[19/] Check use is associated with a disaggregated banking system, a large geographic area, and a historical reliance on a privately-owned banking system for safekeeping of savings for the general public.

Most countries in Europe, in contrast, rely upon GIRO payments rather than checks. Although European banks are aggregated, while U.S. banks are not, this difference is not the main reason for Europe's relatively low use of checks. The primary reason is that, until recently, banks in Europe did not focus on providing savings or transaction services to the general public: this task has historically been the purview of the centralized and publicly-owned post office. This historical reliance on a centralized non-bank provider for savings services, and the fact that most countries in Europe are relatively small geographically, made the shift from cash payments to non-cash GIRO payments easy in Europe but impossible in the U.S. Instead, the historically cost-effective way to make payments in a disaggregated banking system within a large country has been by check.

[18/] *See page 15.*

[19/] *See page 16.*

Paper versus electronic payments. The same reasons that have determined the use of different payment instruments in the U.S. and Europe have also influenced the shift from paper to electronic payments. European countries have been much more successful in implementing electronic payments than has the U.S. for at least four reasons. Europe has: (1) a centralized postal GIRO and an aggregated banking system; (2) a system of nationwide postal and banking offices; (3) a greater emphasis on explicit pricing of payment services to users; and (4) a government/banking system policy of directing payment instrument use toward the most cost-efficient methods. The first two reasons lead to a high proportion of on-us payments so that electronic payments are a natural outgrowth of shifting from paper to electronic accounting within each bank or the post office. The last two reasons –explicit pricing and direct intervention in the market for payment services– has been more evident in Europe and helped to shift users from more to less costly payment alternatives.

Importantly, once a country is in the position of relying heavily on a paper payment instrument, it is very difficult to change that reliance even when new electronic instruments are developed which have demonstrably lower average costs. This is because the appropriate cost comparison is essentially between the average variable cost of the paper instrument and the average total (fixed plus variable) cost of the new electronic instrument. Only variable cost is relevant for the paper instrument because the fixed expenses have already been made –they are sunk costs– and, typically, the only new fixed expenditures are for replacement of fully depreciated capital and training of new workers. Since none of the fixed expenses of the new electronic instrument have yet been made, average total cost needs to be covered if the electronic instrument is adopted. Thus a new electronic payment instrument will only be adopted if its average total cost is less than the variable expenses of the existing paper instrument, which is a more difficult hurdle to surmount.

Non-bank competition in supplying payment services. In Europe today, both banks and the post office provide payment services. If one supplier offers a more desired instrument, their market share and payment revenues rise. Competition between bank and non-bank providers of payment services has been a factor in promoting the shift from paper to electronics.

A similar incentive does not exist in the U.S. as banks are (effectively) the only suppliers of both paper and electronic payment services. Shifting a customer from check use to electronic payments merely succeeds in shifting transaction business from one part of the bank to another. Market share and revenues are little affected as electronic payments cannibalize check volume. Even so, a redistribution of payment business within a bank would be in a bank's interest if strong scale economies existed for electronic payments. Although there is some evidence of such scale economies, banks have not priced their check and electronic payment products in a manner to make these cost differences evident to their

customers.

Payment pricing and payment float. The price of different payment instruments should reflect their underlying cost so users, given their needs, can choose the lowest cost alternative. In the U.S., the per transaction cost of using cash, a check, or the equivalent of a GIRO payment is estimated to be, respectively, $.04, $.79, and $.29.[20/] In terms of real resources, cash is cheapest while checks are more expensive than GIRO (or even debit card) payments. However, once float costs/benefits are included, the user costs –real resource cost plus float– becomes $.09, $-.04, and $.29. When float is not charged for, checks are usually cheaper for users than is a GIRO or a debit card payment. But these cost differences, especially for non-cash payments, will not be clearly "seen" by users when banks charge for payment services by requiring a minimum balance to be held and/or pay a below-market interest rate on transaction deposits. Here the marginal cost of payment instrument use seen by the user is effectively zero, not positive and differentiated as it would be if a direct fee were assessed for different non-cash payment instruments. Without an explicit fee on payment instrument use, there is no real incentive for users to demand the lowest cost instrument. Although relative bank costs may favor electronic payments, as in the U.S., users have to see this cost difference reflected in the relative prices they pay in order to demand the low cost service. Because of distortions associated with check float and bank pricing policies, resources are wasted and payment costs to users are higher than what they would otherwise be. This illustrates the result that an efficient payment system can only arise in a market economy when payment services are properly priced so that users can correctly choose the lowest cost service.

Commercial bank and central bank payment functions. In principle, all of the functions of a payment system –user interface, clearing, settlement, and regulation– could be provided either entirely by commercial banks or by the central bank. In practice, these functions are divided. Commercial banks perform the user interface function and typically provide for all of the transfer of payment information needed to process, clear, and account for the payments being made. Central banks provide for the final settlement of interbank payments and control the vast majority of the regulatory function. This is the typical division of payment functions for all but large-value payments in most countries. Because of their importance for the smooth operation of commerce and financial markets, central banks often own and/or operate large-value payment networks themselves –and thus directly provide these specific payment processing and clearing services– rather than leave this function solely to commercial banks.

When there is a major difference in payment functions provided by commercial and central banks, it concerns the payment processing and clearing function for low-value consumer and enterprise payments. In the U.S., the central bank processes around one-fourth

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[20/] *More detail is supplied in Humphrey (1995), Chapter 2.*

of all check payments and competes with commercial banks. This is the direct result of having a highly disaggregated banking system (with over 11,000 banks), which was due to a long history of politically motivated geographical restrictions preventing the development of a small set of very large, truly national banks that exists in virtually all other developed countries. When the banking system is concentrated and truly national in scope, commercial banks typically provide all of the processing and clearing of low value payments, postal GIRO payments excepted. The greater the concentration, the larger is the percentage of payments which can be cleared internally. With a national branch network, payments drawn on other institutions can often be presented for payment at the local office of other large banks rather than needing transportation to the (possibly) non-local office where the payor's account is actually located. In this event, payments drawn on other institutions can be cost-effectively collected using a bank's own resources rather than those of competing correspondent banks (or the central bank). This is the arrangement that currently exists in Canada.

2. Market needs in transitional economies

Payment system evolution: transitional economies. Transitional economies are moving from a paper-based mono-banking system with local/regional clearing and settlement. The transition is accompanied with a shift from state to private ownership, the disaggregation of the mono-banking structure, serious legal uncertainties, a rise in credit risk, and expanded payment float which significantly affects enterprise trade and the money supply (see **Table 4**).[21/] These and other problems are addressed by simultaneously: (a) expanding the legal structure to support private ownership and payments; (b) speeding up the processing and settlement process for existing paper-based payments; (c) developing a same-day or next-day payment network restricted to enterprise and international large value payments; and (d) determining the degree that the banking and payment system will be automated and centralized in the future. This is an exceedingly complex undertaking and it is helpful to have a list, such as that provided in **Table 5**,[22/] of the various issues one should be aware of in this process.

Points of excessive payment delays should be identified and the value of float estimated. Relatively low-cost procedures can be implemented to alleviate this problem in the short-run. Existing "off-the-shelf" payment technology can usually, with some modification, be adapted to local conditions and perform with similar effectiveness in most environments. Overall, payment system change should be evolutionary rather than revolutionary; successful improvements to a payment system depend to a large degree on identifying important unmet market needs and working closely with users to find solutions they can accept. These conditions

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[21/] *See page 17.*

[22/] *See page 39.*

for success recommend proven payments procedures rather than the newest technology. Indeed, it would not be an exaggeration to say that all short-run and long-run changes to a payment system in a transitional economy can be more than adequately handled with current technology and procedures: the newest technology is not needed and will not be cost-effective if used.

Table 5. Issues to address in restructuring a payment system

USER NEEDS	***SYSTEM REQUIREMENTS***
Enterprises	Volume forecasts
Consumers	Capacity
Banks	Processing speed
Central bank	Timing (clearing/settlement)
Government	Costs
Non-bank financial	Reliability
Intra-regional	Controls/oversight
National	Inter-network interfacing
International	Type of settlement (net/gross)
PAYMENT INSTRUMENT DESIGN	***OWNERSHIP AND CONTROL***
Paper	Private versus public
Electronic	Degree of aggregation
Cards (debit/credit/ATM/pre-paid)	Access to clearing/settlement
Hybrid (truncated paper)	Performance standards
Credit/debit transfer	Standardized formats
Final funds (high value)	
Provisional funds (low value)	***COST RECOVERY***
Batch processed	
On-line processed	Direct fees/balances
	Full/partial (subsidy) recovery
	Price control (market/government)
RISK CONTROL DESIGN	***OTHER ISSUES***
Settlement risk	Legal/regulatory requirements
Fraud risk	Technology (off-the-shelf versus state-of-the-art)
Clearing house failure	
Security risk	
Bank failure	

Source: Adapted from Listfield and Montes-Negret, 1994.

User needs and payment system design. A detailed knowledge of how payment systems in developed market economies are structured and operate is quite helpful to accurately identify areas where payment systems may be improved in emerging market economies. A properly structured payment system should have a number of attributes, driven by enterprise and household need for acceptability, timeliness, and reliability. After this comes safety, efficiency, and ease of use. In restructuring a payments system, the goal is to look for effective ways to improve these attributes for both current and future users.

The initial step in improving a payment system should be to accurately determine user needs which, in turn, will form the basis for appropriate payment system design, system requirements, legal structure, and risk controls. An Appendix provides information needed for this task. This involves an assessment of the current physical, legal, and information infrastructure, a knowledge of the structure and technology of the financial system, an inventory of currently used payment instruments and how they are processed, and the existence of incentives to guide payment use toward the most cost-effective outcomes.

Enterprise needs for payments primarily concern the ability to quickly and safely transfer large values among firms distant from one another within and between countries. As well, enterprises require financing which is typically obtained by issuing debt and equity securities in financial markets. This also requires the transfer of large payment values. These enterprise needs are largely met through the development of a single secure electronic large value transfer network which connects a country's major trading centers and ties into existing international funds transfer arrangements. Such a network may be publicly owned and operated if the private sector is insufficiently developed to handle such a task. In any case, settlement can be most cost-effectively handled through the central bank. Risk is minimized with RTGS using either idle or interest-earning balances or posted liquid collateral. Fees should be set to fully recover costs and the legal rights and liabilities of the various parties to the payment transaction should be clear and enforceable.

While most consumer needs for payments are largely met through the provision of cash for smaller value retail transactions, this is usefully supplemented with noncash payment instruments which allow for larger value consumer payments both at and away from the point of sale (e.g., for bill payments). In relatively aggregated banking systems, which is the typical case, this can be cost-effectively realized through a centralized paper-based or electronic GIRO system developed, owned, and operated either by the banking system or some government entity. GIRO payments, once made, are final payments and settlement is internal (so central bank settlement is not needed). A check-based system is really only a viable alternative when the banking system is highly disaggregated and when there are effective institutional, legal, or communication infrastructure barriers to electronically connect large numbers of institutions to a centralized clearing house. Also, checks cost more than GIRO payments to process, clear, and

settle and, because of return items, represent a provisional rather than a final funds transfer.

The issue of what entities –banks, non-bank financial institutions, or enterprises– may have direct access to the payment system is the same one faced in most countries. The typical outcome has been to allow direct access to the payment system, and hence to central bank settlement, almost exclusively to banks and other types of deposit-based financial institutions (savings banks, credit unions, co-operative banks, etc.) Direct access is not usually given to non-deposit financial institutions (insurance companies, securities firms) or to enterprises and their financial subsidiaries. Although the payment access issue has never been adequately investigated and seemingly rests on a desire to separate risky commercial enterprises from less risky banking activities, scale economies are likely realized at the clearing house and payment network level when the number of direct payment participants are small rather than very large.

Ownership of payment processing centers and payment networks is usually in the private sector. The exceptions are the U.S. where about one-fourth of all payments are processed by central bank offices (due to a disaggregated banking system) and various countries' GIRO centers (owned by the postal service). The ownership issue is tied in with how payment services are priced. If the private sector owns these facilities, then pricing should cover all costs, including a reasonable return on invested capital. When a central bank owns and provides these services, they have been either been subsidized (as in the U.S. prior to the 1980s) or priced as if they were privately owned where all costs are covered (the U.S. currently). In general, resource allocation is enhanced if payment services are priced to recover all the costs of their production.

APPENDIX

PLANNING FOR PAYMENT SYSTEM IMPROVEMENTS

Adequately planning for possible improvements in a country's payment system first involves stock-taking –knowing where you are to begin with– and forecasting likely payment system growth –knowing where you might be in the future. A summary list of quantitative information useful for this task is shown in **Table A1**. Stock-taking concerns the development of benchmark information regarding a country's infrastructure (communication/transportation, legal, and informational) its financial system (banking system structure, distribution, and technology), its existing payment system (instruments used, types of processing, and clearing arrangements), and its incentive structure and user needs. If data do not already exist, surveys can be developed to collect sample data on these elements. All of these elements have been touched on or discussed in the text and thus represents a useful summary of payment issues raised in this paper.

Although not explicitly listed in the table, the data collected should include estimates of current volumes and values of payment flows by major types of payment instruments, focusing on flows both within and among a country's major trading centers. With this data, projections of likely payment growth can be approximated by tieing payment growth --by type of payment– to the expected growth in production and trade. Information on current and projected payment volumes is crucial in order to properly design the major components of all types of payment systems, including large-value networks, clearing houses for small-value payments, and the interbank and bank-central bank communications infrastructure that ties them together.

Table A1. Information needed for stock-taking

Infrastructure analysis	Financial system	Current payment system	Incentives and user needs
PHYSICAL	***STRUCTURE***	***INSTRUMENTS***	***COSTS***
Communication	Central bank	Debit	Relative prices
Transportation	Commercial banks	Credit	Float
Mail system	Post office	Paper	Availability
Country size	Money markets	Electronic	Subsidies
Trading centers	Concentration	Non-bank	Seigniorage
LEGAL	***DISTRIBUTION***	***PROCESSING***	***USER NEEDS***
Laws/rules	Local/nationwide	Batch	Timeliness
Contracts	Bank size	On-line	Interest rates
Judicial system	Proportion on-us	Automation	Large value payments
Enforcement	Settlement access	Inter-network	convenience
Supervision	Tiering	Network access	Security
INFORMATION	***TECHNOLOGY***	***CLEARING***	***COMPETITION***
Acounting system	Paper-based	Bilateral	Intense
Reliability	Electronic	Multilateral	Weak
Timeliness	Decentralized	Correspondents	International
Institutions	Centralized	Settlement type	
Backup	Security	Risk controls	

Source: Adapted from Listfield and Montes-Negret, 1994.

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