Payment Systems Reforms

By

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List of Abbreviations

ACH - Automated Clearinghouse
ANOVA - Analysis of Variance
APACS – Association for Payment Clearing Services
ATM - Automated Teller Machine
BIS - Bank for International Settlements
BOE - Bank of England
BOJ-NET - Bank of Japan Net Settlement System
CAPM - Capital Asset Pricing Model
CC - Currency in Circulation
CHAPS - Clearing House Automated Payment System
CHIPS - Clearing House Interbank Payment System
CIT - Countries in Transition
CLS – Continuous Linked Settlement
CPI - Consumer Price Index
DNS - Deferred Net Settlement
DVP - Delivery-Versus-Payment
EBA - Euro Banking Association
EBRD - European Bank for Reconstruction and Development
ECB - European Central Bank
ECS – Euro Clearing System
ECU - European Currency Unit
EDI – Electronic Data Interchange
EFTPOS - Electronic Fund Transfer Point of Sale
EMI - European Monetary Institute
E-money/E-Cash - electronic money/cash
EMU – Economic and Monetary Union
ESCB - European System of Central Banks
EU - European Union
FED - US Federal Reserve System
FI - Financial Institution
FOREX/FX - Foreign Exchange
GDP - Gross Domestic Product
GNP - Gross National Product
IBRD - International Bank for Reconstruction and Development
IFC - International Financial Corporation

IFS - International Financial Statistics

IMF - International Monetary Fund

IT – Information Technology

K-W - Kruskal-Wallis Test

LVTS - Large Value Transfer System

NASDAQ - National Association of Securities Dealers Automated Quotation system

NBY - National Bank of Yugoslavia

OECD - Organisation for Economic Co-operation and Development

OTC - Over-the-counter

PC - Personal Computer, Per Capita

POS - Point of Sale

PPP - Purchasing Power Parity

PVP - Payment-Versus-Payment

RTGS - Real-Time Gross Settlement

S.A. - Shareholders Association

SDK/ZOP – The Yugoslav Clearinghouse

SIC - Swiss Interbank Clearing system

SVTS - Small Value Transfer System

SWIFT - Society for World-wide Interbank Fund Transfers

SWOT - Strengths Weaknesses Opportunities Threats

TARGET - Trans-European Automated Real-time Gross settlement Express Transfer system

UN - United Nations

USD – US Dollar

Y2K – Year 2000

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Declaration of Copyright

To my mother

Abstract

The nineties were a hectic period for many policy makers around the world in respect of payment systems reforms. The increased attention to payment system issues was brought about by the following trends: (i) increased cross-border competition, innovations, and new communication and information technologies; (ii) the financial and political integration and changing processes in European Union and Countries in Transition.

The purpose of this thesis is threefold. Firstly, it seeks to define and critically assess the major payment system developments and problems around the world with a view of advancing the understanding of the payment system matters. Secondly, it presents empirical evidence on payment systems similarities, and differences, across countries. This serves as a basis for recommendations about payment system reforms in Countries in Transition. Thirdly, it emphasises and investigates the institutional aspects of payment systems in different groups of countries.

The research finds that payment systems around the world are different, but there are some universal themes and values that can serve as a basis for countries that are reforming their payment systems. The particular recommendations for public policy relate to need for greater: (i) payment system providers and instruments competition; (ii) payment system and monetary policy co-ordination; (iii) emphasis on financial stability.

1. Introduction

1.1 Requisite for the research

There is currently an increased focus on the payment system issues which reflect both political changes and economic development around the world. For the countries of Eastern Europe and the former Soviet Union, rebuilding the payment systems is of foremost importance for supporting the establishment of the market economies. These countries are interested in fundamental questions of payment system policy and design. The European Union countries are also interested in some basic payment system issues as a result of the efforts being made towards establishing the monetary union. At the same time, central banks in G-10 countries have continued to emphasise the importance of controlling and reducing payment and settlement risks in global financial markets (Greenspan 1996). Furthermore, the development of new electronic banking and payment products, the introduction of electronic cash, payment mechanisms for the Internet, and new versions of home banking are all contributing to the growing world-wide interest in payment system issues.

"A country's payment system is what makes its real and financial markets work... when commodities are exchanged for cash, cheque, giro, credit card, or debit card payments – rather than other commodities - trade expands as transaction costs fall and production specialisation increases" (Humphrey, Pulley, Vesala 1996). An efficient payment system, in which transferability of claims is effected in full and on time, is a prerequisite for an efficient macroeconomy ... similarly, disruptions in the payment system result in disruptions in aggregate economic activity" (Benston and Kaufman 1994). "Payment system is the lifeblood of an economy that carries the essential messages without which our complex economy would break down, just as the human body would cease to function if the circulatory system did not get the oxygen to the right place at the right time" (Rivlin 1998).

In general, payment systems can preserve or undermine the public trust and confidence in financial systems and thus are under a close public policy scrutiny with a view to guarding financial stability.

The stability and efficient working of the banking system is tied to the integrity of the payment system (Blommestein 1993). An efficient payment system is essential for efficient functioning of competitive money and capital markets and monetary control - the prerequisites for the creation of a fully-fledged market-based financial system. Furthermore, the payment system is one of the first places where financial stress is manifested, as firms in financial difficulty fail to meet their payment obligations (Summers 1994). There are, however, very few theoretical and even fewer empirical studies which look at payment system issues in Countries in Transition (CIT), who are trying to restructure their banking and monetary systems.

In the literature on payment system issues, there is no consensus on which settlement systems yield the best trade-off between risks and costs. In addition, there is no conclusive evidence on how institutional factors, such as banking structure and the monetary regime, affect the choice between systems. Related issues concern the questions of government versus private sector in providing credit or liquidity to payment system and the conflict/congruence of interests of central bank and commercial banks. The research agenda for studying efficiency of payment intermediaries is also in its infancy, with almost all of the studies having analysed a single organisation, the US Federal Reserve (Berger, Hancock and Marquardt 1996). Finally, the empirical studies almost exclusively analyse the United States payment system[1] and occasionally payment systems in other developed countries, with little or no reference to less-developed countries. All this makes it difficult to recommend what should be done and implement clear-cut solutions in Countries in Transition and Yugoslavia[2].

CIT payment systems' reforms have been and are being conducted to support new banking and monetary systems in their shift towards market oriented systems. However, the results of the reforms conducted so far are mixed and the reforms are burdened with conflicts and obstacles. Delays in implementation, frequent design changes, incompatibility with monetary policy, conflicts of interests, all regarding the

[1] Due to good data sets available and the possibility to compare two different settlement systems (CHIPS and Fedwire) in one country.

[2] Federal Republic of Yugoslavia, which was proclaimed a sovereign federal state in 1992 and consists of the Republic of Serbia and Republic of Montenegro. In the subsequent sections it will be referred to as Yugoslavia.

payment systems, can be partly attributed to lack of consensus in the theory and practice related to the payment system problems.

The payment system reform in Yugoslavia became a controversial issue, and was reflected in a struggle among different payment system providers about who should run it. However, a debate about which payment system is best suited for the Yugoslav financial system and how to establish it, would seem more appropriate.

In the course of this research the major payment system issues and dilemmas are looked at with a view to establishing a framework for analysis and possible solutions to the CIT and Yugoslav payment systems problems.

1.2 The research design

1.2.1 The approach

This research is focused on payment system reform as a part of monetary and banking system restructuring in transitional countries. The research is aimed at testing theoretical assumptions about payment instrument choice, adequate settlement system and payment intermediaries efficiency in the case of Countries in Transition. It identifies and measures the independent variables that influence the payment system and its relationship with banking and monetary systems. The major payment system issues identified are costs, risks and speed of payments, payment instruments and providers choice, the use of technology and innovations, monetary policy, banking system reform and customer satisfaction. In short, the research examines payment system components that influence the functioning of a modern monetary economy.

A three-step research approach is employed. First, the investigation sets out to evaluate payment systems in different groups of countries through a cross-countries analysis. Second, payment systems in CIT are researched with a view to establishing a background for their improvement, i.e. to suggest a way forward for establishing efficient and effective payment systems in the given environment. Third, the past and current performance of the Yugoslav payment system are presented and the payment system design, and its operation, are placed in a broader context of the Yugoslav banking system restructuring and effective monetary policy.

The main questions the research seeks answers for are:

- What are the major payment systems' characteristics?
- What were the major problems associated with the payment systems in the past and present?
- Which clearing and settlement system would be appropriate for a transitional economy and how to achieve it cost-effectively?
- What role should the government and central bank play?
- What are the implications of payment system design for the banking system and its performance, the monetary policy and transition of the economy as a whole?

The research hopes to explain the issues, define the problems, and discover possible solutions for both the CIT and Yugoslav case.

The approach combines both descriptive and explanatory research into a "problem-solving" approach by means of cross-border comparative analysis, looking at the performance over time and both theoretical and practical achievements in that field in an international context. The research is, therefore, conducted to find the limits or merits of previously proposed generalisations and recommendations for CIT and Yugoslavia, as far as the particular problems are concerned. The recommendations of the research are based on comparative analysis and established best-practice in both developed countries and CIT. Conclusions will be drawn and the generalisations will be made from the results of various tests and illustrations that use empirical data on CIT, developing and industrial countries.

1.2.2 Research propositions

The main propositions, regarding CIT payment systems' reform, investigated in the course of the research are:

Proposition 1: *The best practice and experience of both developed and developing countries should be incorporated in a payment system design and reform.*

The argument is that the lessons from the payment system development in the transitional countries and proven merits and disadvantages of particular clearing and settlement systems that are in place in different developed countries can be used as a base for the payment system development. A difficulty is that the payment system of every single country is different and there is no consensus on solutions for major payment system problems.

Proposition 2: *Overall banking and monetary system reform in a CIT is necessary and payment system design is only a part of it.*

The assumption is that payment system reform on its own cannot significantly improve the efficiency of money flows in a monetary economy as the major payment system's risks and costs are usually banking system borne. For risk and cost reduction related to payment systems to be effected, a prudent and efficient banking system is required. Also, as payment system efficiency is measured against its compatibility with monetary policy, a payment system should be an integral part of a monetary system reform. On the other hand, one should not lose sight of some short-term gains of an autonomous payment system reform and the importance of the initiation of reform processes. Therefore, the emphasis is on the relationship between payment, banking and monetary systems.

1.3 Results and contribution of the research

The research results go in favour of accepting the propositions for Countries in Transition. Thus the experiences of other countries can help countries that have started with the payment systems' reforms or those that need to improve their payment systems further. Nonetheless, country specifics, especially banking and monetary policy environments should be taken into account when deciding on appropriate payment system arrangements. In addition, payment system reform should be co-ordinated with the monetary policy and banking system. On the other hand, financial system restructuring and improvements regarding financial discipline, competition, legislation,

technology and skills are the best guarantees for reducing payment system risks and costs and increasing speed and reliability of payments.

In light of identified deficiencies in the literature and practical aspects of payment system reform in CIT, the contribution of the research is significant in three particular areas.

First, the research draws from the existing theories and practice of developed countries in its investigation of payment systems in transitional countries. The results of the research can, therefore, be used to show whether some of the proposed generalisations about payment systems hold in the different economic environment. These generalisations and recommendations concern payment instrument choice, adequate settlement systems, payment intermediaries efficiency, and the relationship between payment system and monetary system in the different environment. It is anticipated that the research will advance theoretical understanding of payment system as a part of broad monetary and banking systems. It will also illustrate, and provide some empirical evidence for, the payment system/monetary policy relationship.

Second, in light of the little research effort involving payment systems in CIT, the aim of this research is to extend existing ideas and develop new ideas in the literature on payment system reform by analysing the issues and presenting some empirical evidence for CIT. These issues concern new payment technologies and electronic money in CIT, monetary policy implications of payment system reform, and payment system and banking sector relationship. Results of the study can be used for further generalisations about payment and financial system functioning in CIT or as lessons for other countries undertaking the reforms.

Third, the study will present the advantages and disadvantages of various systems and make recommendations about what should be done in Yugoslavia. In particular, the recommendations concern the appropriate settlement system, the role of policy makers and financial institutions in the payment system design and operations, and they place payment system reform in the context of the overall banking and monetary system restructuring.

1.4 Structure of the thesis

The thesis is structured as 9 chapters, the first of which is the "Introduction chapter". The second chapter "Payment System in Theory and Practice" is an overview of the theoretical framework for research, research topics, work conducted on the payment system issues, the unresolved problems, payment systems developments and trends. Both theoretical and practical achievements in the field are presented and then critically evaluated. Also, a section on payment systems in Countries in Transition is presented. The chapter looks at the major payment issues and developments with a view to establishing a framework for payment system analysis.

The subsequent chapter "The Research Framework" outlines the research design, methodology, methods and hypotheses with a reference to the contribution and limitation of the research. The fourth chapter "Payment Systems Cross-Countries analysis: The Bank of England Group" presents a cross-section analysis of payment systems in 70 countries. The particular aspects that are investigated are the differences and similarities across the industrial, developing and transitional countries in respect of their payment systems. The fifth chapter "Countries in Transition payment systems" is the analysis of payment systems in transitional countries which aims to present the systems and to identify their major characteristics, problems and experiences with payment reforms. The emphasis is put on the payment and monetary systems relationship. The payment system in Yugoslavia is analysed in the sixth and seventh chapter. "Yugoslav Payment System: Exploratory and Explanatory Analysis" chapter is the first step in analysing and presenting results on the Yugoslav payment system. The objective of the chapter is to explain the issues, define the problems and suggest possible solutions for the problems. The final analytical chapter "Survey of Yugoslav banks and financial institutions" tests further the proposed recommendations for the Yugoslav payment system put forward in the preceding chapter. The purpose of the survey is twofold. First, it is an additional source of information on the Yugoslav payment system. Second, it provides insights into the desired state of the affairs and future functioning in relation to the payment system, as viewed by the Yugoslav bankers, mangers and payment system experts.

The eighth chapter is "Conclusions and Recommendations". It draws from the summaries and conclusions made in the four analytical chapters and revisits the payment system problems and debate in order to assess the contribution of the research. The recommendations made relate to possible solutions to some payment system problems in Countries in Transition, lessons for other countries undertaking reforms and suggestions regarding the Yugoslav payment system design. The last chapter is "The Appendices", where the four appendices containing data, tests results and survey questions all relating to the analytical chapters are presented. Finally, the last few pages of the thesis contain a list of the literature cited in the thesis.

2. Payment Systems in Theory and Practice

2.1. Theoretical framework

2.1.1. Conceptual framework

Payment system can be broadly defined as the means of conducting transactions in an economy (Bauer and Ferrier 1996). A payment system consists of a set of instruments, banking procedures and, typically, interbank funds transfer systems that facilitate the circulation of money (European Monetary Institute - EMI 1996). More precisely, payment system is a mechanism, or set of mechanisms, which coupled with rules and procedures, provide an infrastructure for transferring money from one entity in the economy to another (Greenspan 1996). That infrastructure links together different banks, giro organisations and other financial institutions, payers and payees with banks, as well as national bank with commercial banks (Bergendahl and Lindblom 1995). A simple payment system mechanism, that of exchanging currency for goods, represents direct real-time payment, which, in light of its straight-forwardness and legal clarity, sets a standard of efficiency against which other payment systems may be compared (Greenspan 1996). Most of the other major payment mechanisms involve the transfer of deposit money or claims, which can be done using paper or electronically. Despite the technical variations between different paper-based and electronic payment systems for transferring deposit money, the goal of all these systems is essentially the same - the monetary claim of the person making a payment is reduced and the claim of the person receiving the payment is increased (ibid. 1996).

The term payment system has been used fairly widely to cover both clearing and settlement of payments. *Clearing* in a payment system involves the transmission of payment information between the payer and payee and between intermediaries, i.e. transmission and recording of the instructions to make a payment. *Settlement*, on the other hand, is actual transfer of money to a payee's account based on payment instructions, i.e. the actual transfer of some medium generally acceptable in fulfilment of the payment instruction. The act of settlement, therefore, discharges obligation in respect of funds or securities transfer between two or more parties. Settlement that is

irrevocable and unconditional is described as final settlement (Bank for International Settlements - BIS 1997a).

There is also a distinction between *large value transfer systems - LVTS* and *small value transfer systems - SVTS.* The former transmit large payments, typically over $1 million, (mainly interbank payments) and the latter refer to the remaining payment methods such as cash, check, automated clearinghouse (ACH) transfer, credit card and debit card which are typically used to make payments of much lower value (Berger, Hancock and Marquardt 1996). Although, as a rule, no minimum value is set for the payments that a LVTS can carry, the average size of payments passed through such a system are usually large and the system is often referred to as wholesale funds transfer system.

The concept of *payment system float* is also important. The balance sheet effects of differences in timing of debit and credit from payments is referred to as the float (Blommestein 1993, Summers 1993). The liquidity impact of float complicates the monetary management of both commercial banks and central bank. If credits are systematically made before offsetting debits, the banking system will be providing liquidity to the economy, and vice versa, if debits are systematically made before offsetting credits, the liquidity will be withdrawn from the economy. In general, an efficient payment system should synchronise, on average, the timing of credits and debits arising from payments, thereby having a neutral overall effect on liquidity (Summers 1993). Related to the concept of float, and often used as a synonym for it, is the term *payment lag* (or settlement lag), which can be defined as the time-lag between the initiation of a payment order and its final settlement. The possible implications of both the payment system float and lag are particularly relevant to the debate on payment system risks, costs, settlement system design and finality of settlement.

2.1.2. Payment instruments

Payment instruments basically convey relevant information regarding the transfer of monetary value from one party in a transaction to the other. According to the physical form of a payment instruction, payment instruments can be categorised as *paper* (e.g. cheques and paper giro payment/credit transfer orders), *electronic* (e.g.

electronic payment orders) and *payment cards* (e.g. credit and debit cards). Traditionally, the emphasis has been on the distinction between credit-based and debit-based transfers. With a *credit-based* instrument (for example a payment order) the sender gives the instruction directly to his own bank for onward transmission to the receiver's bank. When a *debit-based* instrument is used (for example a cheque), the sender gives the instruction to the receiver himself, and the receiver then passes the instruction to his bank, which will in turn pass it to the sender's bank (Sheppard 1996). With regard to the person making a payment, her account can be debited or her monetary claim can be reduced: *before* (for example, in case of traveller's cheques and prepaid cards), *at the time* (e.g. debit card payments at the point of sale) *or after* (credit card payments) *the payment instruction itself.*

The range of payment instruments available in any particular country reflects that country's historical and social background, built into the architecture of the financial system. The selection of payment instrument for a particular transaction, however, will depend on: a) customer's familiarity with the particular instrument and the costs and risks involved, b) frequency, urgency, place and value of the payment, and c) the counterparts' preferences and 'negotiation' power or position.

2.1.3. Payment system risks

Any form of payment involves some risk to one or more of the participants in the payment. Risks come about primarily because many payments involve *implicit or explicit extension of credit*, i.e. there is often *a lag* between the time that a transaction takes place and the time that settlement occurs (Berger et al 1996), and because payment instruments are often handled by *multiple parties* - any of whom could fail to perform their function before the funds are completely delivered from the payer to the payee (Marquardt 1994). In other words, the risks in the payment system arise from institutional inter-dependency in the payment process that creates different risks among parties in the payment chain and from timing delays between the transaction and the final settlement of the associated payment (Bank of Canada 1997a).

It is, therefore, the payment lag and involvement of multiple parties that distinguish between the risks borne in the payment process itself and other underlying risks in the financial system that can be transmitted through the payment system.

According to the Bank for International Settlement[1], the main risks incurred in payment systems are credit risk, liquidity risk, operational risk and systemic risk. These can be defined as follows: *credit risk* refers to the risk of a transaction not being realised at full value (typically related to insolvency by the payor or a payment intermediary); a *liquidity risk* is a risk of a settlement not being realised at the desired time but at an unspecified time in the future; *operational risks* relate to computers and telecommunications systems break-downs[2]; *systemic risk* designates the risk that serious solvency and liquidity problems within one or several banks jeopardise the stability of the entire banking system.

Additional risks (that are not included in the definition) are *technology risk, security risk* and *legal risk.* Technology risk occurs when technological investments do not produce the anticipated cost savings in economies of scale and scope (Saunders 1994). It is particularly relevant for the debate about payment system design and efficiency. Security risk refers to illegal access to payment information or funds by a third party. It can leave a party subject to financial loss or the risk to privacy and results from fraud or negligence. Legal risk exists when there are uncertainties or gaps in the legal framework for payments or payment systems that can impose liquidity or credit risk on participants (Bank of Canada 1997a). The uncertainties or misinterpretations with regard to laws and private arrangements have implications on legal enforceability of parties' rights and obligations with regard to the payments.

Scott (1993) regards *fraud, mistake* and *systemic* risk to be the three major risks in the payment system. The first two require improvements in the legal framework but the major concern is systemic risk - the failure of a bank to settle its net position could lead to a chain reaction of bank failures (ibid. 1993). Systemic risk is defined differently by different authors[3], but regardless of the definition it remains the major concern

[1] Used also by Rochet and Tirole (1996)

[2] This definition of operational risk (BIS 1997a) seems too narrowly focused. The operational risk can also relate to human error, natural disasters or system design flaws (Bank of Canada 1997a). It, therfore, refers to the reliability and integrity of the payment system with respect to the processing of payments.

[3] For example BIS (1997a), Rochet and Tirole (1996), Bartholomew and Whalen (1995), Mishkin (1995), Saunders (1994), Blommestein and Lange (1993), Scott (1993).

especially for the monetary authorities. Central banks have a particular interest in limiting systemic risk in large-value funds transfer systems as the aggregate value of transactions and exposures in LVTS are significantly higher than those in retail funds transfer systems. At the same time, the debate about systemic risk issues is often used to support or criticise government/central bank's regulation of and intervention in banking and payment system.

2.1.4. Payment system costs

Payment system costs include the real resource costs of operating the payments system, the financial costs to payments system participants from holding portfolios that differ from what otherwise would be optimal if the payment system was friction-less, and the real and financial costs of delays in funds being transferred to payees (Berger et al 1996). Total resource costs of making payments typically absorb about 3 percent of GDP in developed countries (Hancock and Humphrey 1998).

The real resource costs of payment, which consume an estimated 1 percent to 1.5 percent of GDP annually (Humphrey, Pulley and Vesala 1996), include: accounting, mailing , labour etc., all borne in obtaining and tendering the means of payment by the payer; costs of providing physical instruments (e.g. notes, coins, checks, credit cards, slips); costs of collection, processing, physical transportation, electronic communication, and accounting incurred by intermediaries (including banks, clearinghouses, central banks and others); costs of depositing, safeguarding, and accounting by the payee; and costs of identifying and reducing the risks (for example, costs of evaluating, monitoring and controlling credit and risk positions, and costs of obtaining and maintaining collateral or external guarantees by the payer).

The financial costs include: costs of holding *more liquid portfolios* with lower returns in order to discharge payment obligations, because it is difficult and costly to convert assets into some form of money and vice versa, when the payee cannot instantaneously convert money into higher-yielding assets; costs of holding *safer than optimal portfolios*, i.e. for the payer to demonstrate his or her creditworthiness to potential payees or intermediaries to gain acceptance or better payment terms; costs of

holding more *informational transparent portfolios* to help demonstrate creditworthiness and liquidity to potential payees, clearinghouses or other intermediaries.

Costs from delays in the funds transfer could be: *opportunity cost of time* in waiting for payments to be settled, resulting in funds being employed in lower-return activities (when the payee eventually gets the funds) or moral hazard, if the payer has access to the funds beyond the payment date (when he or she is effectively using someone else's funds); and cost of *real resources,* spent to reduce the delays and risks caused by the delays. Settlement delays on various payment instruments may also make monetary policy more difficult to conduct. Monetary policy operates through the payment system as funds that are transferred from the central bank must filter their way quickly and smoothly through entire payment system (Berger et al 1996). Payment delays or uncertainty about how fast funds will be distributed make it difficult to determine the effect of open market operations or discount window lending. This can increase both costs of real resources, that central bank may employ to reduce the uncertainty, and costs of inadequate timing of policy measures, i.e. lagged and/or undesired effects when the circumstances might have changed.

2.1.5. Risks v costs framework

Berger, Hancock and Marquardt (1996) suggest an analytical framework which emphasises the trade-off between risk and costs in the payment system, and how this trade-off can be affected by technological, financial, and regulatory innovations. The axes in Figure 2-1 measure the risk and costs borne by the payors and payees as well as those imposed on others (e.g. systemic risk). The vertical axis measures a weighted sum of risks of all parties bearing payment risk, where the risk borne by one party may be represented by a function of the variance and possibly higher moments of distribution of its losses due to payment activity. The horizontal axis measures the weighted sum of costs borne by all the parties.

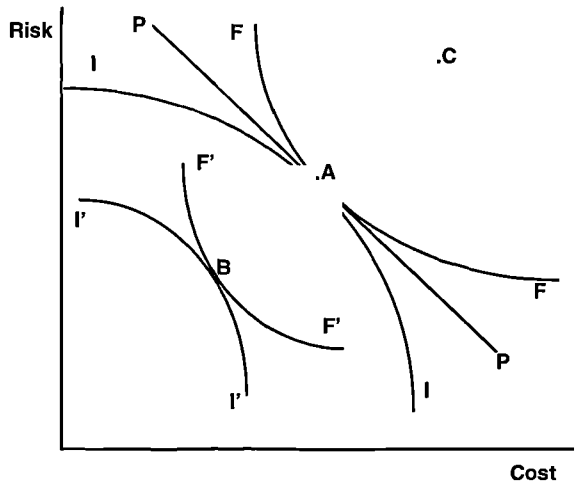

Figure 2-1 The Risk-Cost Frontier for the Payment System: A demonstration of Efficiency (A), Technological Progress (B), Technical Inefficiency (C)

The curve FF is social best practice efficient frontier for the payment system in the sense that risks cannot be reduced further without increasing the costs of payments, and these costs cannot be reduced further without increasing risks. The convex shape of the frontier reflects the usual assumption of diminishing marginal returns. The best practice available depend upon the current technology for processing and settling payments, the current financial techniques for monitoring and controlling risk, and the current regulatory environment, all of which may be altered by innovations, thus shifting the FF curve to its new position F'F'. As the authors put it, the FF frontier can be looked at as a reversed version of standard production-possibilities frontier that is expressed in terms of the output of two negative outcomes instead of the trade-off between goods. In effect, they are measuring the deviations from the standard assumption of economic models in which the payment system creates only negligible transaction costs and has little effect on the financial holdings of participants (i.e. risk and costs are measured relative to an ideal, friction-less payment system in which all payments are riskless, costless, and instantaneous). The non-frontier points (e.g. point C) reflect inefficient choices from a social viewpoint in which both risk and costs could be reduced. The payor and payees that are directly involved in the transaction may in some cases prefer outcomes that are not on the frontier, where substantial risk and costs are imposed on others but where their own risks and costs are smaller.

The social indifference curve II represents the highest level of social utility that can be obtained given the frontier, measured by a weighted sum of the utilities of the

affected parties. The concave shape of the indifference curve reflects an assumption of diminishing marginal utility from risk reduction - as risk gets lower and lower those bearing risk would be willing to pay less and less to remove marginal risk.

Point A where the indifference curve is tangent to the efficient frontier, represents the best social choice of payment risk and costs. The tangent price line PP shows the rate at which risks and costs are traded off at the optimum. At point A, the marginal costs of reducing risk just matches the marginal disutility from risk on a weighted basis. That is, the marginal rate of transformation between risk and costs equals the marginal rate of substitution, yielding a Pareto-optimal outcome in which no party could be made better off in terms of payment risks and costs without another party being made worse off.

Schoenmaker (1995) emphasises the trade-off between costs and delays (efficiency), which is another way to look at the current best social practice and how it can be improved. Folkerts-Landau et al (1993) talk about discipline (i.e. risks) versus speed (i.e. efficiency) and the tension between them that constrains the design of a payment system. Although they do not present the explicit analytical models for the trade-offs, the analogy with the CAPM efficient frontier can be applied to Schoenmaker's and Folkerts-Landau et al's paradigms.

2.1.6. Gross v Net Settlement

Large-value payments systems, also referred to as wholesale or interbank payment systems, usually transfer payments of significant size which are often time-critical. There is general agreement that most payment system participants and regulatory authorities prefer very low risk systems for handling their largest payments (Berger et al 1996). They are willing to undertake significant costs to keep their own risk and systemic risk to negligible levels. There is substantial disagreement, however, over the best methods for keeping risks very low at the minimum possible cost (Ibid. 1996).

With regard to how the messages are processed and the finality of payment orders there are two existing paradigms[4]:

1) *Deferred Net Settlement (DNS)* System, that settles banks' net positions (usually) at the end of the day. Each party's out-payments are netted against its in-payments before settlement takes place. For example, CHIPS[5], which is the largest system in terms of value transmitted in the United States.
2) *Real-Time Gross Settlement (RTGS)* System, with gross processing and settlement -- i.e. on a transaction by transaction basis -- and with the intervention of a settlement agent (usually central bank). Each payment instruction is passed from the payor's bank to the settlement agent and is individually settled across the accounts of the paying and receiving bank at the settlement institution. For example, Fedwire in the United States or CHAPS[6] in the United Kingdom.

Rochet and Tirole (1996a) distinguish another basic settlement system - *Direct Gross Settlement without counter-party* (central bank), i.e., SIC[7] in Switzerland. Instead of the possibility of intra-day overdrafts granted by central bank, SIC employs queue management[8], i.e., orders are processed only if there are funds at the payor bank's account on, for example, the first in first out mode. However, as the authors note, a gross system without counter-party but with queue optimisation is not unlike a net system operating several times a day. Furthermore, in light of the credit granting arrangement (private or by central bank), Summers (1996) argues that, although SIC is interesting in its own right, it is not directly relevant to the problem. Most authors often treat SIC as a specific form of RTGS. Whether a system that applies queuing management resembles more an RTGS or a DNS system depends on access to information on queued payments by the receiving bank and on the processing sequence[9]. Some of the queuing issues are discussed further in section 2.3.6.

[4] See for example Borio et al (1993), Scott (1993), Summers (1993,1994), Schoenmaker (1995), European Monetary Institute (1996), Berger et al (1996).
[5] Clearing House Interbank Payments System
[6] Clearing House Automated Payment System
[7] Swiss Interbank Clearing system
[8] If a sending bank lacks 'good funds' (reserve balances at central bank) to settle payment message, the message enters a queue to be processed when sufficient funds have been delivered on incoming payment massages.
[9] If a receiving bank has access to the information on payments, it can act on it and make the funds available to its customers which creates the same type of settlement risk as a DNS system. Furthermore, if the pending payments are not automatically delivered and can be cancelled, as in SIC, it makes such a system de facto a DNS system.

It is worth mentioning that, particularly with the development of payment technology, the distinction between RTGS and DNS concerns the form of settlement, not the form of transmission and processing. Like RTGS systems, many net settlement systems transmit and process payment messages in real time on a transaction-by-transaction basis, but they settle, by definition, on a net basis at discrete intervals (BIS 1997a).

There is no overall consensus over whether RTGS or DNS systems yields the best trade-off between risk and costs on LVTS. In RTGS the payee has good funds immediately and does not have to wait until net settlement occurs. Gross systems with immediate finality can, however, shift the settlement risk to the central bank - if the finality of payment is guaranteed; cause *queuing* or *gridlock*[10] when payor banks do not have sufficient funds available to complete transaction orders; and/or require costly collateral or reserves to be held by the participants. With respect to reserve requirements, the incremental costs of maintaining additional (sterile) bank balances to fund RTGS payments with cash increases the cost of using this form of settlement compared to DNS (Summers 1996).

On the other hand, it is often argued, RTGS almost eliminates the systemic risk. However, the queuing and gridlock may also cause widespread liquidity problems and systemic risk. If banks do not have sufficient liquidity, no one may be willing or able to make the first large payment. This, however, could be somewhat mitigated by sending very large values in several smaller instalments. One possible solution to these problems is to have the central bank provide additional funds needed for RTGS settlement operations (Berger et al 1996). US Fedwire, for example, provides reserve account overdrafts with the guarantee of finality to the receiving institution. In addition, most central banks have policies regarding the provision of overnight credit through a discount window or other mechanisms (Summers 1995).

Net settlement is generally regarded as cheaper but riskier (particularly with regard to systemic risk). DNS system often put much of the settlement risk on the payee, its bank, or clearinghouse (Berger et al 1996). A particular concern, that may cause systemic risk, is *unwinding*, that is, cancellation of all payment orders sent to and

[10] Co-ordination failure, regardless of overall liquidity of the system, where banks delay their payment orders until they themselves receive incoming orders.

received by a failing institution during the day of trade. However, these risks can be controlled - as in CHIPS. The participants in DNS systems are allowed to run only limited and controlled overdrafts, and they increasingly tend to be backed by either prime collateral or external guarantees (ibid. 1996). Furthermore, as argued by Schoenmaker (1995), the extra cost of gross settlement exceeds the reduction in systemic risk which goes in favour of the net settlement system.

The choice between an interbank and a central bank financing depends on costs and risks. A central bank financing has the advantage that the liquidity risks and credit risks are taken away from the banking sector (Bergendahl and Lindblom 1995). The central bank could guarantee settlement, as in the Japanese Zengin system. However, such a guarantee removes the insolvency test from the system, since banks will more readily assume credit risks from other banks. A middle road can be pursued e.g. controls can be set on bank exposures, through imposing limits on bank positions and required collateral, as in US CHIPS system.

According to Kahn and Roberds (1997) the trade-off between net and real-time gross settlement can be characterised as a trade-off between two distortions. Net settlement increases default probability and thereby the cost associated with potential defaults, while gross settlement increases the costs associated with holding non-interest bearing reserves (ibid. 1997). Therefore, the current lack of consensus on the issue of optimality of particular settlement rules might be explained with different weightings that bank regulators and banks allocate to different payment system costs.

2.1.7. Securities settlement systems

There is a great variety of both equity market structures and securities settlement systems that exist today in different countries. Some countries practice physical delivery of securities (e.g. Germany), a few countries have centralised systems of clearing and settlement (e.g. France) and other countries have a network of multiple settlement and clearing systems (e.g. the United Kingdom). Some of the securities markets are of the organised type, e.g. New York Stock Exchange, Tokyo Stock Exchange and most of the European stock exchanges (or bourses), where orders are centralised in a single location and executed there. In other markets, like in London and New York (NASDAQ), there

are independent market-making activities by intermediaries which are coupled with the rise in the use of electronic quotation systems. These markets are essentially over-the-counter (OTC) markets.

There are also various price-setting mechanisms ranging from "the batch" or periodic call system to the "continuous" market system. Under the former system, orders coming in over an interval of time are not transacted immediately, but are stored and transacted together in a multilateral transaction. In this sense, the orders are transmitted and processed on a 'net basis'. There is, however, evolutionary shift towards continuous, i.e. gross, clearing[11], whereby a transaction occurs whenever two traders' orders cross.

Organised clearance and settlement dates back to the Amsterdam stock exchange[12] clearing system which included netting and margining functions[13]. Centralised market places were necessary at the time for the price discovery and liquidity needed to support initial offerings and for secondary trading, which made those markets liquid. Advances in technology and communications, as well as in risk assessment mechanisms, gave a boost to the development of OTC markets and electronic trading systems. The process reflects the customer demand and, given the dominant share of the trade volume in the OTC markets, points to a new model for financial markets and regulation. However, the regulators efforts still concentrate on the organised markets, treating them as if they were the focal point of financial transactions (Reid 1993). Earle (1993), therefore, suggests the need to regulate the intermediary, as the risk lies in the intermediary not the market.

Customers demand settlement services that meet modern international standards, such as *delivery versus payment* (DVP), and *three-day settlement cycle* (Smith 1996). The former refers to the link between a securities transfer system and a funds transfer

[11] In the securities markets the term "clearance" may have two meanings. One stands for the process of calculating the mutual obligations of market participants, usually on a net basis, for the exchange of securities and money (BIS 1997b). It may also signify the process of transferring securities on the settlement date, i.e. to refer to securities settlement. In this study, and by consistently applying the general distinction made earlier, the term is used only in the first sense.

[12] Established in 1688.

[13] In the modern context, the process of margining requires a counterpart to pay a certain amount, before the actual settlement, to reduce replacement cost exposures resulting from changes in market prices, following the revaluation of securities that are the subject of unsettled trade. Related to it is the concept of "marking to market", which is the practice of re-valuing securities using current market prices followed with the requirement of transferring funds or securities equal to the value of (yet unrealised) loss to the other counterpart. Netting refers to an agreed offsetting of mutual positions or obligations by trading partners or participants in the system.

system that ensures that delivery occurs if, and only if, payment occurs, thus mitigating the settlement risk. At the same time, there is a shift towards 'dematerialised' holding and transfer of shares, whereby legal ownership of securities is transferred electronically without a written instrument of transfer[14]. *Book-entry system* for transfer and settlement of securities, doesn't necessarily require the latest technology, although fully computerised systems are becoming a norm. Nonetheless, electronic holding and transfer of shares are still inaccessible and/or cost-ineffective for 'small' shareholders and infrequent traders[15].

The same groups of risks and costs that are immanent to other payment systems can emerge in the process of securities clearing and settlement. In the case of securities settlement, credit risk can manifest itself as replacement cost risk (resulting in the cost of replacing, at current market prices, the original transaction because a counterpart failed to perform), principal risk (if there is no delivery after the payment and vice versa), and cash deposit risk (resulting from holding the funds with an intermediary for the purpose of settlement). In addition to a 'counterpart' liquidity risk, there is an issue of overall market liquidity and flexibility that allow for the smoother trade activity and tailor-made solutions. A system of independent market making and electronic quotation has some advantages over organised (centralised) exchanges in that it allows the intermediaries to trade for their own account and engage in market-making activities. This, on the other hand, can result in bigger exposure of the participants to the risks borne by intermediaries, but can be controlled for by licensing procedures and capital requirements. Operational risk can also be bigger in the case of organised markets whereby the higher number of participants can suffer from the organisational or technical inefficiencies of the exchange.

As with other payment systems, there is a threat of systemic risk and a) the risks can be shifted to the settlement agent if it guarantees settlement or extends credit, or to other participants and other systems, b) the risks can be limited by use of collateral, margins, caps etc., and c) there could be problems of gridlock, unwinding, delays, 'daylight' exposures etc. These depend on whether gross or net settlement is in use and

[14] For example, London's CREST settlement system (launched in 1997) provides for that.
[15] 'Paper-form' shares usually settle only after 6 to 10 days. There are some positive developments though. For example, as from mid-1999 the CREST system will reduce the membership fee to £10, thus making it more accessible to small shareholders.

which settlement agent is chosen[16], default procedures and provisions (e.g. loss-sharing agreement etc.), regulations, and technical and intellectual expertise of the intermediaries and exchanges. Additional risk, that is unique to the process of securities trade activity, is *custody risk.* This is the risk of loss of securities held in custody occasioned by the insolvency, negligence or fraudulent action of the custodian[17] or of a sub-custodian (BIS 1997b). This issue is particularly relevant for the cross-border securities clearing and settlement.

Securities settlement systems are important parts of wholesale payment systems, especially in countries with more developed capital markets, as the securities clearing, open market operations and pledge of collateral for payment purposes are the essential components of monetary policy operations and financial institutions' liquidity management in those countries. The efforts towards reducing clearing cycle and settlement risk for transactions with securities, and freeing the liquidity that may be trapped in (or is needed for) a capital market – i.e. delivery versus payment consideration, can partially explain the increasing establishment of national RTGS systems.

Arguably, given the state of development of securities clearing systems and market infrastructure, there may be a trade-off between reducing systemic risk and increasing operational risk, if securities clearing and settlement cycle is reduced to t+0 days. Fast clearing requires good operational risk control and provisions (and advanced technological and institutional framework) to mitigate the potential costs of operational mistakes or failure. Furthermore, DVP and shorter clearing cycle can increase the need for liquidity and require additional legal and credit-risk provisions.

2.2. Cross-border payment and foreign exchange settlement systems

2.2.1. Introduction

Financial liberalisation, expanded cross-border capital flows and major advances in trading technology have led to dramatic changes and growth in foreign exchange

[16] For example interbank payment system or established bank as a settlement agent or central bank.

trading in the last twenty years. While banks have upgraded their operational capacity to settle these trades over time, current settlement practices generally expose each trading bank to the risk that it could pay over the funds it owes on a trade, but not receive the funds it is due to receive from the counterpart. Given the estimated US$ 1.25 trillion[18] of foreign exchange trades arranged daily, the resulting large exposures raise significant concerns for individual banks and the international financial system as a whole (BIS 1996a). Settlement risk in this market involves not only 'daylight' credit risks but also potentially significant overnight credit risk. Settlement risk in foreign exchange markets can potentially disrupt the payment systems of many countries (Berger et al 1996). The interbank foreign exchange market has been one of the most difficult areas to improve settlement practices (Greenspan 1996). The complexity of settlement practices in the foreign exchange market, involving many different banks, currencies payment systems, and countries is at the root of the difficulty of reducing credit, liquidity, and systemic risk (ibid. 1996).

Cross-border payments involve a variety of legal and regulatory arrangements and communication channels. Traditionally, banks have relied on *"correspondent banking"* relationship. Non-resident banks do not generally participate directly in domestic interbank funds transfer systems and do not normally hold accounts with the local central bank (EMI 1996). Therefore, payments in a particular currency tend to be executed via banks located in the country of issue. Cross-border payments through corespondents are executed by means of reciprocal accounts[19] to which standard credit lines may be attached. The correspondent banking system remains widely in use throughout the world, although, in an age of electronic messaging it is rapidly becoming a costly anachronism which simply adds to the costs of each payment transfer and is one of the major obstacles to implementing effective cross-border electronic payment networks (Crede 1995).

According to EMI (1996), some banks have also resorted to the "in-house solution", that is, they have established a presence in different countries through

[17] Custodian is an entity, often a bank, that safekeeps and administers securities for customers and that may provide various other services, including clearance and settlement, income collection, tax reclamation, corporate actions cash management, foreign exchange and security (stock) lending and reporting.
[18] In 1999, the market participants informaly talk about approximately $3 trillion forex transactions a day.
[19] The accounts are referred to as "nostro" and "loro" accounts. An account held on behalf of a foreign bank is described as loro account, while the foreign bank would regard this account as its nostro account.

branches or subsidiaries, becoming a member of the relevant domestic clearing and settlement systems in the countries concerned. Others have applied the so-called "club solution", which is an agreement or set of agreements between a group of individual institutions, one or more in each country, which provide one another with indirect access to the domestic payment system[20]. Another approach would be the "sectoral system" which consists of arrangements between groups of institutions of the same kind or with common objectives. These groups consist of several institutions co-operating in one country, with a view to linking up with groups of institutions in other countries (ibid. 1996)[21].

The creation of cross-border linkages can be taken a step further by creating interfaces directly between the Automated Clearing Houses of several countries[22]. The approach, although still underdeveloped, departs the most from the concept of traditional corespondent banking. Another approach in this direction is "virtual" cross-border banking which, by operating in real-time and using proprietary harmonised standards, transfers funds directly and in seconds between the customers' accounts at member branches (for example the IBOS[23]). IBOS and similar systems (e.g. Financial Network Association) utilise more up-to-date technological solutions for implementing electronic payments, thus improving outdated correspondent banking practice of routing payments, which is both expensive and time inefficient.

2.2.2. Large-value cross-border payments

It is useful, however, to make a distinction between cross-border interbank and retail payment systems. The cross-border interbank funds transfers are of greater value and may cause potentially big disruptions, i.e. bring about significant risks and costs for the participants. In the case of large-value payments, the market operators' main interest is to reduce the banks' exposure to settlement risk through the establishment of special bilateral or multilateral arrangements and through the development of cross-border and

[20] E.g. DISCUS system, designed and operated by Commerzbank, Credito Italiano, NatWest and Societe Generale.
[21] A typical example is TIPA system, created to service a network of co-operative banks. Further example is EUROGIRO, a cross-border payment service which is available to private and business organisations of the Post/Giro organisations of sixteen European countries.
[22] For example, such linkages exist between BZS in Germany and BACS in the UK and BGC in the Netherlands.

multi-currency netting schemes. Banks are becoming increasingly dependent on automated interfaces with these networks to handle and pass on incoming payment instructions.

The best known global interbank communication system is undoubtedly Society for Worldwide Interbank Financial Telecommunication (SWIFT)[24], which can be also used within a single country, as in France. It handles the exchange of nearly 3 million financial messages on average per business day over its proprietary network. However, the SWIFT payment order does not, by itself or under SWIFT rules, create an irrevocable obligation on the part of the sending bank which may result in the receiving bank bearing the risks of executing the instructions. Financial institutions have to rely on correspondent banking relationships to arrange clearing and/or settlement. This may create problems for non-member users in terms of float or lag. If, for example, a payment initiator's bank sends a message to its correspondent bank requesting it to debit a "loro" account and transfer the amount to the fund receiver's bank, it may create a strong incentive for the correspondent bank to choose a slow payment procedure in order to benefit from the float (Bergendahl and Lindblom 1995). Possible solutions to some of these problems are: a) for a sending bank, to send the message directly to the receiver's bank, which will contact the corespondent bank and see that the payment is settled as soon as possible (ibid. 1995) and b) an already developing practice whereby the incoming orders are forwarded to the domestic interbank fund transfer system without relying on corespondent banking.

A good example of both potential improvements of speed and safety of the message flow and a departure from traditional corespondent banking relationship in cross-border payments is the EU's TARGET[25] system. It resulted from a need for payment operations between the European System of Central Banks (ESCB) and the banking system to be effected quickly and safely, with a view to facilitating single monetary policy and an integrated money market for the countries participating in the European *Economic and Monetary Union* - EMU (EMI 1996). TARGET is designed as a

[23] Inter-bank Online System. The system was originally created by the Royal Bank of Scotland and Banco Santander in 1991.
[24] SWIFT is a private company, established in Belgium in 1973, which is owned by nearly 3000 banks. It transmits financial messages between 5,200 financial institutions connected to the company's proprietary network which covers about 140 countries.
[25] Trans-European Automated Real-time Gross settlement Express Transfer system.

payment system composed of one RTGS system in each of the countries which participate in stage three of EMU. The RTGS systems are interconnected to each other according to common infrastructures and procedures – the so-called "Interlinking system". Effectively, TARGET has become the ultimate RTGS system for EMU, i.e. it processes cross-border payments denominated in "Euro" as if they were domestic payments. Only the National Central Banks, as settlement agents of their national RTGS systems, will be allowed to make use of, and participate in, the Interlinking procedures, for their own purpose or on behalf of their customer banks (ibid. 1996, ECB 1998a). There are, however, some issues and limitations that need to be addressed.

First, TARGET is designed as a wholesale interbank funds transfer system of EMU countries' banks, and as such it facilitates payment instructions denominated in Euros only and within the EU borders. If one assumes that all EU countries will participate in EMU eventually, i.e. that all major European currencies are to be replaced with the Euro, this still leaves unchanged the practice of the cross-border (outside EU) payments and the payments denominated in, for example, US dollars, Swiss francs or Japanese yen. If, for example, a UK company trades with a US counterpart and the trade is in dollars, the payor's bank still has to have a correspondent banking relationship and an account in the other currency or there has to be an arrangement between the two countries for incoming orders to be forwarded to, and processed by, the domestic interbank fund transfer system. The latter solution, being in line with the improvements of cross-border payments, may require that individual countries, i.e. RTGS systems, establish relationships with RTGS systems in the countries outside the EU.

The implication for TARGET, and thus the European Central Bank – ECB, is the question of whether it will assume the role of central RTGS for the payments outside EU and in other currencies or will it leave it to each country's central bank or other institutions to make such arrangements. A further question relates to the countries' independence in conducting foreign trade and resulting foreign exchange policies. The answers to the questions of harmonisation, single policies and independence with regard to the particular decisions will have an effect on EMU monetary policy, both in terms of the Euro exchange rate and interest rates.

Second, there is a need to establish the provisions of intraday liquidity, operating hours and pricing policies all of which requires further provisions. Related to this, is the

policy on the treatment and provision of liquidity for 'out' EMU countries that are the members of the EU (e.g. UK). Third, the retail cross-border payments are unlikely to be processed by TARGET which requires further development of other systems and schemes. And finally, with regard to the network of RTGS systems both at the countries and EU level, there is an issue of costs for individual banks participating in cross-border trade and further implications of development of alternative net systems. By definition, the RTGS systems will process payments only if there are sufficient funds or overdrafts facilities available on the sending institution's account with its central bank and, it is conceived, that the national central banks will grant overdraft facilities for 'TARGET' payments only if they can be fully collateralised.

This raises several issues ranging from the merits and disadvantages of RTGS systems in general, increased costs of payments, to the freedom of choice of payment arrangements. If, for example, the users view TARGET as more expensive than existing payment arrangements, the system may be under-utilised as the users will turn to other schemes and netting arrangements[26]. This means that users have to be encouraged and the system may have to be subsidised initially in order for TARGET to establish a trading volume large enough to minimise marginal cost per use. Furthermore, the parallel existence of several settlement systems may complicate EU monetary policy[27].

2.2.3. Cross-border retail payment systems

Over the years a number of initiatives have been taken by providers of international funds transfer services to offer their customers services which are more transparent with regard to processing, time and cost, faster, and cheaper in terms of the commission charged. The initiatives range from specially designed transfer systems for a particular segment of the funds transfer market to efforts towards linking national ACH. In the past small value cross-border payments were mainly conducted in foreign

[26] During the 1990s (and earlier) several cross-border payment systems have been established in Europe, which are not primarily based on correspondent banking relationships. The most important are EUROGIRO - 1991, ECHO – 1995, ECU Clearing and Settlement – 1983, and Euro Clearing System – 1999, which all rely on multilateral netting.

[27] The latest private development is Continuous Linked Settlement – CLS, which will start operating in the year 2000, with, initially, about 60 member FIs. The system will effectively function as a RTGS settlement bank, with simultaneous exchange of separate payment legs of a FX trade. For each currency it handles, CLS Bank will hold accounts for settlement members. Each member bank's account will be broken down into sub-accounts for each currency it trades in. CLS Bank will continuously settle transactions through these sub-accounts. At the start and end of the trading day, each member will pay or receive central banks funds into/from each sub-account.

currency (notes and coins) and with use of cheques and later traveller's cheques. The cheque schemes relied on numerous bilateral arrangements for clearing cheques denominated mainly in the currency of the country in which a bank's customer had the account. The first major innovation was the introduction of credit card schemes, such as, Diners, American Express, VISA, MasterCard. At present major financial institutions and card issuers are developing international multi-currency electronic purse products[28], such as *CAFE project*, EXPRESS, MONDEX, VISA Cash etc., and technical standards for their use, such as EMV[29] standards for card-reading terminals.

All the cross-border retail payment instruments can be classified[30] in three groups: "pay before", "pay now", and "pay later". The pay before group of instruments comprise traveller's cheques and electronic prepaid cards. The pay now group consists of cheques, cash dispenser cards and debit cards. The last group of instruments refers to credit cards. With regard to the clearing and settlement of the SVTS cross-border payments, banks use corespondent banking, in house solutions, club solutions, 'sectoral' solutions and 'virtual banking'. As for the card issuers, they settle the payments on a multilateral net settlement basis at the chosen institution - in the case of Europay, and/or use corespondent services of domestic clearing and settlement systems via chosen settlement banks for each of the accepted currencies - in case of VISA and MasterCard.

The main problems that consumers encounter making cross-border payments are the delays and uncertainty of funds transfer, high costs relative to the value of payments, double charging, low transparency and lack of information and advice. Therefore, the major issues that need to be addressed are standardisation of payment services (with regard to the minimum quality and speed of clearing and settlement), alternatives available, and transparent pricing. Hopefully, the existence of a) alternative payment systems, such as EUROGIRO - the network of European giro and postal institutions (used for transmission of both large value and small value payments in Europe) and TIPA that relies on national ACHs for clearing and settlement, on one hand, and b) established correspondent banking that uses SWIFT network and major card schemes and developments, on the other hand, will result in competition between them

[28] The issue is discussed in more detail under the heading "The new payment technologies"
[29] Developed jointly by Europay International, MasterCard International and VISA International.
[30] As defined by Europay International (in EMI 1996).

with a view to enhancing the retail cross-border payment service in terms of lower costs and higher speed and reliability.

Within the EMU region, with use of the single currency, the 'cross-border' retail payments are anticipated to start functioning as effectively and efficiently as within the particular developed countries. The advent of the Euro, therefore, brings many potential benefits and opportunities to the EMU member countries, including – transparent pricing, price competition, lower charges (no exchange rate or foreign transaction charges), reduced clearing and settlement time and, thus, risks and exposures, etc. Also, there is an opportunity for introducing electronic payment instruments, and electronic money products, on a much wider scale, thus enabling the replacement of coin operated vending machines, public telephones etc. and an overall reduction of cash in circulation.

2.2.4. Settlement in the international securities market

The international securities market consists of the international bond market for long term debt instruments (so called "Eurobonds" and foreign bonds) and "Euro-note" market for short-term securities. By far the largest proportion of the stock of international bonds is denominated in US dollars (EMI 1996). Most of the international securities are listed on established stock exchanges, though trading is normally carried out over-the-counter and conducted by various specialised dealer groups. Most of the securities in the market are in bearer form and are not fully dematerialised (ibid. 1996), thereby the majority of the transfers of ownership is by physical delivery of securities. The major global securities depositories and settlement organisations Cedel and Euroclear, however, provide for bearer securities to be deposited in an account with them enabling the transfer of ownership via book entries which should improve the settlement practice and reduce the risks involved.

Investment in and trade with equities can also have an international dimension, in which case the participants can use global custodians, local banks or dealers, and

international securities depository firms[31] which facilitate the global portfolio diversification and resulting settlement procedures.

The users of capital markets issue and trade securities in financial centres with the lowest regulatory standards and, hence, the lowest costs. Cross-border securities trading - brought about by freer markets, widely available information and new communication technologies - is estimated to be from $12 to $15 trillion a year. "International securitisation" (e.g. a US firm issuing new bonds and selling them directly to a Japanese investors) competes with "international financial intermediation". In addition to relative costs, which appear to be smaller when a middleman is cut out, the participants in capital markets should also assess the risks involved, i.e. the cost of gathering information on foreign firms. The emergence of fund raising and public offerings over the Internet and the threat for established organised markets could be viewed in the context of a costs versus asymmetric information trade-off.

Another important matter is the use of securities for collateral purposes in the conduct of monetary policy across EMU. Repurchase Agreements – "repos" will be the backbone of the new (monetary) order after EMU (Euromoney 1998), i.e. ECB will use them as its main regulatory tool for open market operations. There are many issues that need to be resolved. The most important is the eligibility of securities issued in different EMU countries by different governments and institutions[32]. From a payment system perspective, the most important is the establishment of a clearing model for the 'cross-border' (but within EMU) repos and how collateral will be treated and transferred by central banks. As in the case of cross-border payments in general, this can be done a) via the corespondent accounts of, and credit lines between, the central banks and b) via a real-time system, i.e. TARGET[33].

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[31] Although major global depositories organisations, Cedel and Euroclear, which offer trade settlement in over 25 different domestic markets, have a very small share of the cross-border equity settlement business (Giddy, Saunders and Walter 1996). The organisations' combined annual turnover (mainly in domestic markets) is about $100 trillion.

[32] Currently central banks accept only their own collateral and their own list of eligible bonds, but after the monetary union, the government bonds of the more debt- ridden countries (e.g. Belgium and Italy) will be trading in the same tier as those of France and Germany (Euromoney 1998).

[33] Both models would require, at least in the medium run, 'intermediation' of either Cedel or Euroclear as the depository institutions with networks of national depositories in the respective countries. Both Cedel and Euroclear plan to introduce the real-time cross-border settlement in the European trading day, for equities and bonds, by the end of 1999. It is expected that the majority of their customers will only start utilising it, and tentatively at first, from the year 2000 (Banking Technology 1999). The slow take-up will be mainly due to the need for changes in internal

2.2.5. Cross-border payments risks

In addition to the risks immanent to the domestic banking and payment systems there are two groups of risks that cross-border or foreign exchange payment participants may be exposed to -- namely *sovereign risk* and *foreign exchange risk.*
Country or sovereign risk is a more serious credit risk than that faced by a firm, or its financial intermediary, that operates in a single country. A foreign counterpart may be unable to repay issued claims even if it would like to, because the government of the country have prohibited or limited payments due to foreign currency shortages and political reasons (Saunders 1994). In that case there are no automatic bankruptcy procedures and provisions that a payee may resort to as in home country.

Foreign exchange risk relates to the net exposure, i.e. the degree to which a bank is net long (positive) or net short (negative), in a given currency (ibid. 1994). In terms of the payment processing, firms and banks may hold foreign currency reserves and/or collateral, which are exposed to the volatility of the exchange rate movements on a daily (even hourly) basis, and may result in huge losses for the participants. As for the foreign exchange trade between the banks in a single market, e.g. in London, the risks may result from the trade convention, i.e. the participants generally rely on the good will of parties to follow through the *oral promises* of their traders or to resolve disputes out of court.

The European Monetary Institute (1996) emphasises *foreign exchange settlement risk,* which can be defined as the inability of the second party to deliver counter-value after an institution has irrevocably paid it out funds in foreign currency. The inability may be due to operational or liquidity problems, the commencement of insolvency proceedings or political factors. The example of Bankhaus Herstatt, a relatively small German bank very active in foreign exchange trading, is often used to illustrate the risk raised by the asynchronous settlement of foreign exchange transactions (so-called Herstatt risk). In 1974 the bank was ordered into liquidation by the German banking supervisory authorities, thereby suspending all payments. The suspension and related announcement took place after the closing of the interbank funds

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reporting procedures (of its users) and central hardware reprogramming, both subordinate to the year 2000 ('Y2K') and primary Euro IT projects and required changes (ibid. 1999)

transfer system in Germany so that all Herstatt's Deutche Mark receipts were already final, but before its US dollar obligation were to be settled on US CHIPS system. As a consequence a number of the counterparts faced the prospect of losses. It was only with difficulty that normal interbank payment flows were re-established. Concerns about foreign exchange settlement risk have also arisen in a variety of later episodes, such as the liquidation of BCCI (in 1991), the emergency in the former Soviet Union in August 1991, and collapse of Barings in 1995 (BIS 1996a).

What complicates the management of foreign exchange settlement risk is a) differences between national systems as to when, during their operating cycle, transfers can be initiated and when they are final and b) variations in the operating hours of payment systems themselves. Both these restrictions limit the possibility for simultaneous and final exchanges of currencies through national payment systems. The degree of overlap in the operating hours is naturally greater within the EU. A bank's actual exposure in the settlement of any foreign exchange deal can be defined, therefore, as being equal to the full amount of the currency it has purchased, and lasts from the time at which its payment instruction for the currency sold can no longer be cancelled unilaterally until the time at which the currency purchased is received with finality (BIS 1996a). This implies that a way forward for resolving some of the problems that arise from a foreign exchange transaction exposure is extension of working hours of different settlement institutions in different countries, so as to increase overlap in the operating hours. In addition, there is an obvious need to standardise the format of the messages exchanged (e.g. use of EDI and EDIFACT standards) and to create a 'level playing field' for the participants - both in terms of national legislations and international co-operation.

However, the major risk in foreign exchange dealings remains the duration of the settlement exposure. It is estimated (BIS 1996a) that the exposure currently lasts for a minimum of one to three business days, plus any intervening weekends and holidays. As an illustration of the extent of exposure, some banks routinely settle FX trades worth well over US$ 1 billion with a single counterpart on a single day (ibid. 1996a). Some of the suggested solutions to the risks are a) "obligation netting", as opposed to trade-by-trade settlement, by reducing the amount at risk by lowering the number and size of payments that would otherwise be needed to settle the underlying transactions, b) one of

the "payment versus payment" modes for settlement that assures participants that a final transfer in one currency will occur if, and only if, a final transfer of another currency, or currencies, takes place, c) improved risk measurement and control techniques applied regularly and thoroughly by the counterparts, intermediaries and settlement agents.

In the long run, however, the most effective solutions would be shorter settlement period duration, made possible by improved payment and communication technologies. The latest private banking initiative - CLS[34] will enable simultaneous and 'good funds' settlement of both legs of a foreign exchange transaction, and the CLS bank (clearinghouse) will hold accounts at each relevant central bank for that purpose.

There are also some specific issues, with potentially important implications, resulting from the replacement of the national notes and coins of the EMU member states with Euro notes and coins in the year 2002. Firstly, there may be a threat posed by potentially increased counterfeiting of the new currency, resulting from the lack of familiarity with (intuitive feel for) the new fiat currency by the public across the region[35]. Secondly, the currency replacement may result in potentially significant costs, both social (production and distribution of the new currency and withdrawals of old currencies etc.) and private (changes needed relating to the operation of vending machines, public telephones, some ATM terminals etc.). Therefore, there could be the case for wider and early introduction of electronic money, which seems to have some cost-advantages over cash, both in terms of preventing counterfeiting (as suggested by APACS 1998) and social and private costs of currency replacement (see, for example, Humphrey 1996). The e-money issues are discussed in more detail in section 2.4.

There are additional risks and real costs brought about by the advent of Euro. These include new technology investments, accounting and operational system replacement costs for the retailers and merchants, consumers (payers) resistance to change, legal and jurisdiction ambiguities. Furthermore, institutional arrangements and/or technology change of such a scale can undermine trust and confidence, the very pivots of an efficient payment system[36].

[34] As defined in footnote 27.
[35] Given the reserve currency function of the Euro, the issues may also be relevant outside the EU/EMU borders.
[36] Notwithstanding the importance of payment system arrangements, the major potential threats to the financial stability and success of the Euro are political and economic in nature.

2.3. Payment System and Public Policy

2.3.1. Introduction

The significance of payment system is, inter alia, in its role in, and impact on, financial stability (confidence and certainty) and monetary policy implementation. Payment system is one of the first places where financial stress is manifested, as firms in financial difficulty fail to meet their payment obligations (Summers 1994). It can be argued that the improvements in payment methods and payment innovations have contributed to more efficient trade and economic specialisation, both at national and international levels. An indicator of the importance of payment system is the magnitude of payment system flows in developed countries, where payment system turnover is 20 times (Canada) to 100 times (Japan) greater than the country's annual GDP. Thus, the potential inefficiencies, costs or improvements that relate to payment systems functioning are potentially significant for a financial system functioning.

As payment systems are at the heart of the functioning of financial systems, which in turn fuel the whole economy, it would be easy to over-state its significance. Few people, however, think about payment system as long as it works. Moreover, it is only in the last decade that the policy makers and academics have seriously focused on the issue in its own right. Since there were no major breakdowns or disruptions in the functioning of payment systems in industrial countries recently, the question is - what lies behind the increased attention to the matter in recent years?

First, changes in financial systems around the world, together with increased economic activity and trade, brought about by increased competition, innovations, 'globalisation' and deregulation, have resulted in increased volumes and values of payments that accompany these economic activities. Table 2-1 illustrates the magnitude of payment transactions values in developed countries. The sheer size of the average daily values of the transactions induced both the policy makers (i.e. mostly central banks) and the researchers to give more attention to the payment system risks, as well as to look at the ways in which payment costs can be reduced and efficiency increased. Second, the advent of new communication and computer technologies, and new payment technologies in particular, have produced new threats and, most importantly,

new opportunities for banking and monetary systems. Finally, at a political level, the efforts towards establishing European Monetary Union, the rebuilding of the financial systems of economies in transition, and the quest of central banks in developed countries for global competitiveness of their respective financial systems, have resulted in more efforts towards payment systems analysis.

Table 2-1 Payment flows and GDP in "G10" countries

		1994 data	
Country	**Annual turnover in payment systems $000 billion**	**Ratio of payment system turnover to annual GDP**	**Number of days to turn over annual GDP[1]**
Belgium	10.9	47.5	5.25
Canada	11.6	20.7	12
France	58.3	43.9	5.5
Germany	129.1	63	4
Italy	20.4	29.9	8.35
Japan	463.4	100.9	2.5
Netherlands	12.4	37.5	6.75
Sweden	6.4	32.6	7.75
Switzerland	24.5	93.9	2.75
United Kingdom	42.9	41.9	6
United States	506.5	73.6	3.25

Source: Bank for International Settlements (from Sheppard, 1996)
[1] Assuming approximately 250 days (working days only) on average a year.

These trends re-emphasise the importance of some public policy questions with regard to payment system, such as:

- Are payment services a 'public good', i.e. what are the advantages and disadvantages of both public and private provision of the services? Related is the question of 'market solutions' versus 'regulatory solutions'.
- What is the relationship between payment systems and monetary policy? What is the proper role of monetary authorities in payment systems?
- What are the ways of reducing risk and costs in large value transaction systems? How does the settlement system design bear on the shape of, and competition in, banking industry and what are the consequences for banks' liquidity management?

- What is the evidence of systemic risk in the interbank market and what is the impact of the rise in global transactions on this risk? Related are the questions of the need for international co-ordination by supervisors and the provision of liquidity for settling international transactions[37].
- What is the potential impact of new retail payment technologies on monetary and other public policies?

The public policy strategy, therefore, has to address the questions of desirable properties of a payment system and to balance the trade-offs between different public policies' objectives and, indeed, various groups of stakeholders involved in or affected by a payment system design. The Bank of Canada (1997b) explicitly states three broad policy objectives regarding payment system - efficiency, safety and consumer interests. In the UK the payment system issues are treated under two distinctive, yet closely related, organisational and functional activities of the Bank of England - financial stability (also the responsibility of the Financial Services Authority, as from June 1998) and monetary policy[38]. The US Federal Reserve (Greenspan 1998, Moscow 1998) acknowledge that, in the medium term, the role of the Fed is: a) in providing nation-wide, accessible to all, payment services (such as check clearing and ACH businesses) and encouragement and help in the use of electronic payment technologies, and b) as a setter and rule-maker instead of the operational presence in other payment activities (to foster a competitive environment).

More to the actual policy objectives, Ferguson (1998) states that the Fed needs to ensure that the payment system: 1) supports economic growth by ensuring open access, 2) manage risk well, 3) is resilient in the face of crisis, and 4) continues to evolve to keep pace with the needs of an evolving economy. The European Central Bank (EMI 1996, Hartman 1998, Issing 1998) see the role of the payment system (TARGET) in facilitating the conduct of an efficient single monetary policy within the monetary union by enabling quick and efficient transmission of monetary policy measures and signals, allowing the arbitrage and competition to the same end.

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[37] The relating questions were also raised at the 34th Annual Conference on Bank Structure and Competition of the Federal Reserve Bank of Chicago in May 1998.

[38] Thus the FSA is mainly responsible for the supervision of the individual financial institutions, and the Bank of England is responsible for "the overall stability of the financial system as a whole" (see e.g. www.bankofengland.co.uk /geninfo2.htm).

As no two financial systems or central banks are identical, the public policies and strategies differ around the world. There, are however some common features with regard to the payment systems and public policy relationship which are analysed next.

2.3.2. Payment system as a 'public good'

In light of the current practice around the world, whereby the payment systems are under monetary and regulatory authorities' control, a question arises: is payment system, or some of its parts, a "public good"? A simple answer is no. Because it can be rivalrous, excludable and subject to congestion, and given the state of modern payment system technologies that can easily discriminate between the users, payment system is not a pure public good. There are, however, some features of payment system that seem to make market outcomes inefficient, i.e. which make the case for a *market failure* hypothesis[39].

It can be argued that payment system, as a form of co-operative network, is prone to creating *service monopolies*, whereby there can exist exclusions, barriers to entry, predatory pricing or price discrimination of the services etc. This is especially true if financial systems are concentrated and/or payment systems are owned by large private institutions that can exercise economies of scale and scope and otherwise exclude competition. This issue is most relevant in the network organisation offering infrastructure clearing services and processing services for payments (Bank of Canada 1997b). It has been the case in the majority of countries that governments (central banks) assumed the ownership and/or operation of central settlement institutions as response to the 'natural monopoly' of payment system, the industry with dominant scale effects. In some industrial countries (for example, US, UK and Canada) there is, however, a shift (gradual return) towards government regulation and/or oversight of the system as a whole - as opposed to a direct operational involvement.

It can also be argued that payment systems produce both *positive and negative externalities*. Positive externalities exist when, for example, participants in a credit card network or a settlement system benefit from a new member, both in terms of spreading

[39] For an elaborate discussion on what is and what is not a public good and on market failure see Lipsey and Christal (1995, p.418-424).

network operating costs and expansion of the network of members they can deal with. Negative externalities exist when network members do not bear appropriate costs, thereby increasing the overall social costs of payment systems. Negative externalities are present, for example, in the case of inadequate risk monitoring in a private system and consequent risk spill-over to the payment system (e.g. collapse of Barings in 1995), i.e. if there is a threat of systemic risk.

Related to systemic risk concerns, one may argue that another component of 'market failure' - *asymmetric information* - can exists in a payment system which is entirely privately owned. This can be manifested both as:

a) a *principal-agent problem*, reflected in inadequate monitoring of payment system's management behaviour and risk control that can produce negative externalities, and
b) a *missing market problem,* particularly relevant for transitional countries, which are trying to adjust their financial systems to market economy requirements (for example, non-existing risk insurance markets, underdeveloped interbank and liquidity markets etc.).

Therefore, because of potential social costs that are not taken into account by the bearers of private costs in payment systems, payment systems can be provisionally dubbed as a 'public good', in that it may require some form of public intervention as opposed to a totally free-market solution. Furthermore, in CIT there may be arguably a stronger case for public intervention in payment systems because of the need to achieve other social goals, such as restructuring of the banking and monetary systems in a short period of time.

Benston and Kaufman (1994) from their review of evidence[40] concluded that a payment system is not a 'public good' and that fragility of banking and payment systems should not be a public concern, other than actions for preventing actions, including those by government, that either directly or indirectly increase the risk profile of banks or the potential losses from banks' (and payment systems') failures to other banks or taxpayers. Their research and conclusions, however, make a case for settlement in 'good funds' (central bank's money) and supervision of payment services providers.

[40] For a summary of reserach in the field see Benston and Kaufman (1994). For a discussion on banking system regulation see (Dow 1996)

McAndrews (1997b) argues that it is useful to analyse a payment system as a *network good*, for which the value that a person gets from the product increases as more people consume it and the technique a firm chooses to produce the product will depend on techniques chosen by other firms. A network good is, therefore, characterised by economies of scale, complementary technologies (both within a system and between the systems)[41], possibilities of under-utilisation and high average costs per user (if there is not a critical number of users), price fixing (as an extreme type of co-operation) and of early leaders establishing dominance or monopoly. There is also a possibility that an already installed technological base (i.e. their users/owners who have invested in it) can prevent or delay new, better, solutions or improvements to the system, in which case the outcome is clearly inefficient from a social point of view (e.g. magnetic v chip cards).

Weinberg (1997) takes a view that networks are fundamental to the role played by intermediary institutions in payment systems and that clearing and settlement are inherently network services. Therefore, the payment system also 'suffers' from network specific externalities. In his theoretical model (ibid. 1997), Weinberg focuses on positive externalities and concludes that public intervention can never improve upon the economic performance of a private network unless there are barriers that prevent groups of economic agents from pursuing the alternatives of their choices.

Therefore, the role of public policy would be to understand and try to prevent such barriers from occurring by regulation and pricing practices and "antitrust scrutiny" of firms by large market share. The model, however, does not prove that all economic decision-makers are always free to make alternative arrangements in a network. Moreover, as the model assumes that the externalities can be only enjoyed if one joins the network (network specific - internal externalities that may be external to the individual participants), it does not address the negative externalities, i.e. potential spill-over of risks.

Inefficiency of a clearinghouse due to the principal-agent problems should also be considered. Bauer and Ferrier (1996), illustrate the point by stating that since there is no market for corporate control to "discipline" managers at the US Federal Reserve processing sites, monitoring costs will be higher at the Federal Reserve than at publicly

[41] For example, use of standard equipment for credit cards by merchants and use of the same equipment/network for credit cards ('off-line' service) and debit cards ('on-line' service), respectively.

traded corporations. Furthermore, the FED lacks the value traded shares and interest rates[42] as monitoring devices.

On the other hand, the success of a new payment network may require a second-best economic solution, such as allowing a large degree of control by one firm, significant co-operation among rivals, or government mandate to set technical standards in order to guarantee widespread access to yield large benefits for consumers (Mayer 1996). For example, nation-wide banks with access to many local payments clearinghouses may be able to compete mere effectively for payments intermediation business and find more efficient ways to clear and settle interregional payments (Hughes et al 1996). The increase in size and geographical spread of large banking organisations can improve the risk expected return trade-off faced by these organisations by reducing deposit volatility and by allowing for greater diversification of asset risks for a given rate of return.

In conclusion, given the current organisational structure and design of payment systems, i.e. the involvement of monetary authorities, it is the 'superiority of the market solution in payment system' hypothesis that is continuously tested. As the evidence is inconclusive, payment systems remain guilty until proven innocent.

2.3.4. Payment system and monetary policy

"Only a central bank, with its unlimited power to create money, can with a high probability thwart a chain reaction of defaults before it becomes destructive... hence, a central bank will of necessity be drawn into becoming lender of last resort" (Greenspan 1998). Given the nature of final payment settlement in an economy (that is in central bank's funds), if the central bank guarantees intraday liquidity for payments it may assume the role of the 'lender of first resort' thus creating a moral hazard problem. In light of the rapid growth in volumes and values of payment transactions and their increased real and potential impact on risks and costs of financial transactions (and not just within national borders), *the systemic risk versus moral hazard trade-off* became a part of central banks' day-to-day input choice in their monetary management.

[42] That is, it doesn't borrow funds to purchase buildings etc.

Related to this issue is a central bank's involvement in the settlement process, i.e. the choice between the *types of settlement and liquidity provision systems* for large value transactions. Goodhart (1988) has argued that central banks evolved in part out of the need for an independent provider of payment services. A system choice, as discussed under the heading "gross v net settlement", influences the value, type and costs of liquidity needed for settlement purposes. In addition, liquidity provision arrangements further determine the risks and possibility of 'spillover' of intraday credits for payments to overnight credits.

Thus, a choice of a RTGS system for final settlements raises policy questions about: 'daylight overdrafts' and pricing of the credit (also a potential need for the development of intraday money markets and hourly/minutely pricing); guarantee of finality of payments by central bank or queuing arrangements if there is no such guarantee; operational efficiency/smooth transactions versus moral hazard; need to redefine/shorten time horizon of monetary policy operating objectives and, finally, costs of liquidity for settling every transactions in good funds (and therefore utilisation of such a system if there is an alternative DNS system available, e.g. TARGET versus correspondent banking). A choice of a DNS system puts public policy emphasis on risk reduction and related issues, such as: bilateral and multilateral credit limits within the system, i.e. caps on exposures, risk/loss sharing arrangements among the participants, other prudential requirements for payment intermediaries, and supervision and early intervention. A significant step towards risk reduction in DNS systems, especially for cross-border transactions, was increased awareness of inherent risk in DNS systems by commercial and central banks and consequent adoption of standards for net settlements - as formulated by "Lamfalussy Standards"[43].

Apart from systemic risk and liquidity provision concerns, a strong link between payment systems and monetary policy is the influence of payment systems on available and optimal *choice among monetary policy instruments*. For example, open market operations, which are increasingly becoming the dominant instruments of monetary

[43] Minimum standards for interbank netting schemes that require convergence of net settlement systems in developed countries towards netting arrangements with: a) well-founded legal basis, b) clear understanding of risks affected by the netting process, c) clear defined procedures for credit risk and liquidity management which specify responsibilities of participants and limit maximum level of credit exposures by each participant, d) ability of ensuring timely completion of daily settlements in the event of an inability of the participant with the largest single net-debit

operations world-wide (Borio 1997, Johnson 1998), require efficient and fast payment systems that can convey changes in prices/interest rates for allocation purposes. Well-developed financial markets, as a prerequisite for efficiency of these indirect monetary instruments, are shaped by the speed, risks and costs of payment systems. For example, open market operations require payment systems that ensure the transfer of securities through book entries and the rapid settlement of funds through accounts at the central bank (Fry et al 1998).

A further tie between monetary policy and payment system is *the payment/settlement float.* Depending on the type (credit or debit float) and the central bank's ability to influence/measure that float, monetary policy can be seriously undermined if payment lags are beyond the central bank's control. The direction, i.e. extension/retraction of credit, and size and variability of the float influence the level and volatility of banks' reserves and hence the demand for money. As the existing technology can easily and cheaply minimise the size of float formed by payment and accounting lags, elimination of the remaining variability of float is a matter of institutional arrangements. As banks may like float as a form of free credit, the monetary policy and institutional arrangements must ensure that central bank does not credit banks' accounts before related debits and that banks do not delay crediting customers' accounts after receiving related payments.

In addition, substitution of paper based payment instruments by electronic payment instruments for retail payments increases the speed of transactions and settlement and, therefore, reduces the payment float made with, for example, cheques and credit card payments. Hence, the public policy involvement can be extended to retail payments to encourage electronic payments with a view to increasing monetary control and overall efficiency of the financial system.

The impact of float is particularly relevant to high inflation countries, such as CIT. In a high inflation environment, payment system inefficiencies and resulting float dramatically increase the opportunity cost of holding money. The increased velocity of money and inability to predict and measure the demand for money and the effects of money supply in those circumstances put everyday monetary operations at risk of being

position to settle, e) transparent, open and fair access, and f) back-up facilities capable of completing daily processing to ensure operational reliability of the technical system (BIS 1990).

ineffective or counterproductive. Furthermore, the losses resulting from the combined effects of inflation and payment lags can seriously damage trust in payment and banking systems and/or result in deposit withdrawals, increased currency substitution and black market operations.

In summary, payment systems transmission mechanism, i.e. its speed (lags, float, delays), costs, risks and transparency, has important monetary policy implications with regard to the ability of monetary authorities to measure and control the money stock. In the case of interest rates as a monetary policy tool, payment system must convey changes in interest rates for allocation purposes. In the case of the money base as a monetary policy tool, payment systems must reduce, and/or enable control of, payment float for effective money stock control. Arguably, in light of the financial and payment systems innovations and new payment technologies, and thus potential *changes in, and/or volatility of, demand for money,* interest rate setting by central banks may be superior to the money base as the main monetary policy tool[44].

Finally, the monetary policy/payment system relationship can be observed through an analysis of the demand for and supply of *bank reserves*. Banks hold reserves to meet withdrawals of deposits and make payments. Central banks have imposed reserve requirements (as a percentage of bank deposits) on banks primarily as a 'buffer' for changes in liquidity conditions, including unforeseen withdrawals. The reserve requirements, however, serve three additional functions: first, liquidity management - as they contribute to offsetting the supply of liquidity generated through autonomous factors; second, monetary control - because they can be used as a means of controlling monetary aggregates; and, finally, income or tax function - as they are a source of revenue for the central bank (Borio 1997). Generally, required reserves balances have evolved so that they can be used for payments. Another significant trend is the reduction in reserve requirements over the last decade in all countries (Borio 1997, Fry et al 1998).

In the absence of binding reserve requirements, holdings of central bank deposit liabilities are governed by the clearing function they serve (Lacker 1997). In virtually all (industrial) countries, banks target small settlement balances whose amounts appear

[44] Thus, changes in payment technology may affect changes in monetary policy which in turn may change the payment settlement system design (because of the need for fast and efficient payment system).

to be highly insensitive to movements in the overnight rate (Borio 1997). The amounts held are largely dictated by the technical and institutional characteristics of payment and settlement arrangements, including the central bank's attitude to the provision of end-of-day marginal financing (ibid. 1997). Furthermore, in line with the trend towards market oriented monetary policy (indirect instruments) the significance of required reserves for controlling monetary aggregates and as a source of income have generally declined.

In light of the trends, it can be argued that settlement arrangements, central bank's involvement in the provision of liquidity for payments and the efficiency of interbank money markets affected by payment systems are the three most significant factors for analysing the demand for bank reserves and hence policy implementation. In a RTGS system, as opposed to a DNS system, there is a need for intraday settlement balances, i.e. intraday credit. To prevent the intraday credit from 'spilling over' to overnight credit, the liquidity management facilities - central bank intraday credit or queuing mechanisms - need to provide sufficient liquidity and otherwise discourage banks from turning to the central bank for 'overnight' liquidity.

On the supply side, the increased reliance on market operations, i.e. interest rates as an operational target, have contributed to more active liquidity management, that in turn requires an efficient and reliable payment system. More to the point, the provision of intraday liquidity entails the choice of the optimal mechanism through which the credit is provided (e.g. overdraft facilities as in US or intraday repos as in UK). Related to the issue is the potential impact of these mechanisms on the use of collateral for interday credit for payments and reduced availability of the pool of collateral for overnight credit and/or emergency purposes (thus reducing protection in case of systemic risk).

In short, regardless of the stage of development of financial markets and payment systems, i.e. available monetary instruments, large value payment systems are the transmission mechanism of day-to-day monetary operations. As such they determine speed, precision, costs and predictability, and hence efficiency, of monetary interventions. Related is the issue of the ability to measure, and the usefulness of, monetary targets. It is affected by rapid changes in payment systems that *influence demand and supply of money.*

Demand for money, as influenced by payment systems, depends on: a) demand for settlement reserves - depending on the type of settlement system, provision of liquidity by the central bank, the development of financial markets, liquidity management by commercial banks and treatment and level of obligatory and excess reserves, and b) type, size and variability of payment float and lags - through its influence on velocity of money and cost of inflation. Together, they are reflected in transaction, precautionary and speculative motives of demand for money for payment purposes. These motives are, in respective order, determined by: 1) type of settlement system and stage of development of interbank money market - that influences the degree of synchronisation of payments, 2) payment system costs, reliability and frictions - that indicate the level of uncertainty, and 3) opportunities and threats brought about by developing payment technologies - that enable quick transfer of money and conversion between monetary assets.

The supply of money, on the other hand, is affected by: a) payment system efficiency, i.e. how fast and predictable are the distribution of money and monetary operations through payment system channels, b) availability of, and optimal choice among, monetary instruments determined by the stage of development of financial markets and payment systems and c) ability to control/prevent spillover of intraday to overnight borrowings for payment purposes (particularly relevant in a RTGS system).

Therefore, the stage of development and efficiency of payment systems and central bank's ability to determine the effects that changes in payment systems can have on monetary management reflect on the effects, efficiency and transparency of monetary policy and the ability to measure its effects. The most significant changes in payment systems that may affect monetary policy management are the emergence of electronic money[45] and the increased introduction of real-time gross settlement systems around the world.

2.3.5. Payment system design and operations

Central banks naturally assume two payment related services - cash services and final settlement of interbank payments in central bank money. In addition they may

[45] As discussed under the heading "The New Payment Technologies".

assume provision of liquidity for payments to support the smooth functioning of economic activities. The roles, however, may not be 'inherently' central bank's duties. Nevertheless, the research regarding private versus central bank money (seniorage cost v private money real and opportunity costs) and private versus central bank settlement is yet to provide convincing evidence about the issues.

For small value/retail payments a proper role of a central bank is not so obvious. The US Federal Reserve, for example, provides check and ACH services. The involvement in the retail payment services has been justified by concern as to whether private sector providers would adequately meet the needs of all depository institutions, especially small institutions and those in remote locations (Ferguson 1998, Rivlin 1998). Therefore, the need for the Fed's involvement can be explained either by inadequate market competition (and/or underdeveloped markets) or public policy that gives priority to serving all institutions in all regions, thus supporting local economies. On the other hand, a central bank's involvement, however well intended, may pose significant barriers to private firms' entry and/or impede competition or progress as payment services evolve. The stakes for banks in retail payment services are high. It has been estimated that payment business represents as much as one-third of industry revenues, expenses and profits in the United States (Ferguson 1998).

There are some fundamental advantages and disadvantages that central banks may have as a competitor. Advantages stem from central bank's immunity to insolvency or default and institutional and/or financial powers. Disadvantages, on the other hand, are in different risk taking profiles and the flexibility to be selective with regard to customers and the pricing of the services (ibid. 1998). In view of the potential impediments to progress and the high stakes for banks, central banks in developed counties have increasingly started to adopt a market based approach to payment system policies. The emphasis has been on fostering competition, regulatory improvements and removing obsolete regulation as well as the strategy for a withdrawal from direct involvement in payment system operations with a shift towards supervision and surveillance. Nevertheless, central banks still remain major owners of their countries' large-value payment systems (see Table 2-2.). Furthermore, there is a trend towards

central banks' ownership of the countries settlement systems, as the new RTGS systems in central banks' ownership[46] are squeezing out DNS systems.

Table 2-2 Central Bank Ownership of Payment Systems in the Bank of England Group[1,2]

Type	Industrial	Transitional	Developing
RTGS			
Sole	56	86	100
Joint	6	14	0
None	38	0	0
DNS			
Sole	6	44	47
Joint	44	44	37
None	50	12	16

Source: Bank of England Survey of 70 central banks (Fry et al 1998)
[1)] Bank of England Group comprises 70 countries that responded to Bank of England Survey on Payment Systems, conducted in February 1998. There are 21 industrial countries, 13 transitional and 36 developing countries.
[2)] Percent of countries in each group

There are, however, other stakeholders involved in payment system design and operation. These include: the banking supervisors (if different from central bank), the government, the commercial banks and other financial institutions (both domestic and foreign), organised financial markets and clearinghouses, customers (domestic and foreign) and system's suppliers and operators. In order to establish an efficient payment system, they need to co-operate in one way or another and, critically, to 'buy-in' the design choices and system as a whole (Keppler 1998). The type of co-operation and policy approach, however, will depend on the individual county's circumstances, i.e. stage of development of payment and overall financial systems, and whether a new payment system is being built or an existing one improved.

In general, in recent years, industrial countries tended to rely on a more informal and/or market based approach. Development of payment systems in those countries followed, in the business strategy terminology, a 'bottom-up' approach, whereby the system improvements were a consequence of natural evolution and maturity of financial systems, and were financial industry driven. Less-developed countries, on the other hand, usually opt for a 'top-down' approach, whereby the system changes and/or other institutional and regulatory changes were initiated mainly by central banks with a view

[46] Belgium and UK are the rare examples of countries in which RTGS system is not in the central bank's ownership.

to promoting efficiency and reducing risks. Thus, these countries are trying to 'leap-frog' into a state of effective and efficient payment systems that can help sustain or promote the development of financial systems. Notwithstanding these developments, Fry et al (1998) found in their survey of "The Bank of England Group" of 70 countries that the central banks generally had strong preferences for evolutionary rather than revolutionary development of their countries' payment systems.

The basic issues and choices that policy makers should be concerned with when designing or improving payment systems are payment system user needs, risk control, payment instruments, legal requirements, system requirements, system's ownership and control[47], and cost recovery and pricing of the services (Montes-Negret and Keppler 1995). In particular, the choices are about type of settlement system (e.g. RTGS or DNS) and payment processing system (e.g. individual or batch), type of instruments offered (e.g. paper or electronic or both), operation and ownership of the system (e.g. central bank's, private or joint). The major obstacles in that process of payment system development, as illustrated by the survey of the Bank of England Group of countries (Fry et al 1998), are: a) legal framework - for developed countries, b) immaturity of the banking system and poor legal framework - for countries in transition, and c) poor technical infrastructure, legal framework and maturity of the banking system, respectively - for developing countries.

For countries that intend to introduce major new systems (these include some industrial countries) or are developing a modern payment system for the first time there are some policy recommendations based on payment systems implementation experience of The World Bank (Listfield and Montes-Negret (1994), Montes-Negret and Keppler (1995), Humphrey, Keppler and Montes-Negret (1997) and Keppler (1998)). In short they relate to the recommendations that the participants must 'own' the systems' changes and that payment systems should operate profitably (full-cost recovery) and pay for themselves in several years. Some of the studies seem to suggest that there is no difference in issues for developed and developing countries, but for different level of sophistication of problem-solvers. One may note that an additional difference between developed and developing countries lies in the level of available

resources. Furthermore, also relevant for EMU TARGET or any new RTGS system, full-cost recovery may result in under-utilisation of the systems, especially if there are some alternative systems available.

However, a thorough macro and micro economic cost-benefit study and situation analysis are not always the starting points in payment system design, as more operational (tactical) approaches for payment system improvements and/or trouble-shooting overtakes a 'strategic' approach to system development. These will depend on the state of development of existing payment system(s), business environment and needs, who leads and participates in system design and implementation and a country's institutional, legal and technological infrastructure.

Once a new payment system is in place, policy makers face somewhat different problems, including:

- the choice of type of both oversight over system and further involvement in the system operations by the monetary authorities;
- encouragement of competition and private solutions; and
- influence of increased global financial integration and competition on domestic payment and monetary systems.

2.3.6. Payment system reforms and trends

The past ten years was a hectic period for many policy makers around the world in respect of payment system reforms. Regardless of the causes and motives for the particular reforms, there are some common trends that can be identified from the variety of actions. The first trend is the strengthening of so-called wholesale payment systems in light of the increased risk-awareness of the payment systems' participants. One general approach has been to 'secure' existing payment system arrangements based on net settlement and the other involved the introduction of real-time gross settlement systems, coupled with the efforts towards encouraging private sector use of the systems (BIS 1997a, Emmons 1997).

[47] However, in many developing or transitional countries central banks may be the 'only act in town' (Keppler 1998) and, therefore, have no choice but to take the lead in system changes, as 'market solution' may take too long for the policy makers' liking.

Together with these efforts came second and third common themes in payment system reforms. One, more apparent in industrial countries, is the establishment of delivery-versus-payment (DVP) mode for securities settlement and a shortening of settlement periods. The other is an initiative for payment-versus-payment (PVP) settlement of foreign-exchange payment transactions. Thus, the policy makers in industrial countries are concerned with the more advanced payment system issues, such as payment system risks and costs that arise from securities settlement and foreign exchange operations.

The measures to secure net settlement systems typically include real-time monitoring of counter-parties within the system, net debit caps, collateralisation, and additional open-ended financial guarantees (i.e. loss-sharing arrangements) in case all other safeguards prove inadequate (Emmons 1997). Bilateral correspondent-banking relationship for FOREX transactions, as another form of deferred net settlement, was also improved to include payment and financial obligation netting, accompanied with necessary legal provisions, thus reducing intraday exposures. Furthermore, the central banks' co-operation facilitated through Bank for International Settlements' forums, have resulted in greater insistence on adoption of the Lamfalussy Standards within national DNS systems.

The largest private DNS system in the US and the world CHIPS, which includes over 100 members, deals with on average about one million transfers worth above six trillion dollars (just below the value of US annual GDP) each week (data for 1996). Another significant national DNS is Canadian LVTS, the only large value net settlement system in developed countries without an RTGS competitor. Another private DNS system in Europe is the ECU Clearing and Settlement System, which, as from 1999, evolved into a multilateral private DNS alternative to TARGET – called Euro Clearing System (ECS). Although all industrial countries, except Sweden and Switzerland, have operational DNS systems for large value payments, the emphasis has been on the introduction and/or promotion of RTGS systems. Thus, Japan intends to abolish the DNS mode within its BOJ-NET by the end of the year 2000 (Shimoda 1998), since 1996 UK CHAPS is no longer a DNS system and Austria, Finland, Greece, Ireland, Luxembourg, Portugal and Spain are also developing RTGS systems. In the European Union this trend

has been additionally supported by the efforts towards monetary union and creation of TARGET - the system of interlinking of national RTGS systems.

Nevertheless, all gross settlement systems are not the same and differ in respect of liquidity provision or operational mechanism. Moreover, some so-called real-time systems actually do not operate in this mode. The systems can be divided broadly into two groups - systems without a central bank intraday credit facility and systems with the facility (BIS 1997a). The examples of the former group are SIC (Switzerland) and BOJ-NET (Japan). In SIC, transfer orders are temporarily held in the centrally located queue if covering funds are not sufficient and processed on first in - first out basis, subject to assigned priorities upon the availability of funds (BIS 1997a, Heller 1998). In BOJ-NET uncovered transfers orders are rejected and returned to the sender (BIS 1997a, Shimoda 1998).

In the countries where central banks provide intraday liquidity, the credit is extended through intraday overdraft facilities or, as in U.K. and France, through intraday sale and repurchase transactions with the central bank. In European industrial countries, the overdrafts or credits must be fully collateralised in all systems. U.S. Fedwire, on the other hand, charges fees for, and imposes net debit caps on, the overdrafts. Table 2-3 gives an overview of the arrangements in G-10 countries.

Table 2-3 Financial and queuing arrangements in G-10 countries

System with:	Centrally located queue	No centrally located queue
Central bank intraday credit	ELLIPS (Belgium) TBF (France) EIL-ZV (Germany) BI-REL (Italy) TOP (Netherlands) RIX (Sweden)	CHAPS (UK) FEDWIRE (USA)
No central bank intraday credit	SIC (Switzerland)	BOJ-NET (Japan)
No RTGS system : Canada		

Source: Bank for International Settlements (1997a)

The use of RTGS is also growing outside the Group of Ten and European Union (BIS 1997a). For example, RTGS systems are already in operation in the Czech Republic, Hong Kong, Korea and Thailand and the systems will be introduced in

Australia, China, New Zealand and Saudi Arabia (ibid. 1997a). Its legal and technical simplicity make an RTGS system attractive even for countries with less developed financial systems. However, the major driving force behind RTGS systems in those countries is arguably the involvement of central banks as initiators and facilitators of the reforms. A centralised RTGS system with its monetary control properties would be a logical reward for a central bank's efforts. The adoption of the state-of-the-art gross systems may also be driven by some exogenous factors stemming from the deployment of foreign advisors, equipment providers and system development experts. Furthermore, there may be a justifiable desire of some of these countries to integrate more into regional trade and financial flows. The examples include the Eastern European countries/European Union link and the South African region. Furthermore, RTGS system may give confidence to foreign FI that their payments will not be delayed or go astray, and support their bigger involvement. Therefore, a payment system choice can be a part of a public policy strategy aimed at attracting foreign investments and/or financial institutions, thus encouraging competition, investments or discipline in the financial system.

2.4. The new payment technologies

2.4.1. Introduction

Payment system expenses are estimated to be between 2 percent to 3 percent of GDP in the United States (Humphrey et al 1996). The figures are similar in other developed countries, although European Union countries, due to greater use of electronic payment instruments, seem to have somewhat less costly payment systems (EMI 1996). This cost can be markedly reduced when paper-based payment systems are replaced by electronic payments, since the social costs of electronic payment may be only one-third to one-half that of a paper based transaction (Humphrey et al 1996). New payment technologies, particularly newer electronic methods of consumer payments that may replace older paper-based methods, can potentially speed up settlement to

lessen risk and reduce the real resource and financial costs of making payments (Berger et al 1996).

Despite what appears to be significant potential benefit in adopting technological innovations, there are typically extraordinarily long lags between the introduction of new payment methods and their widespread use (ibid. 1996). For example, it was often predicted in the 1960s and 1970s that most SVTS consumer payments would be electronic long before now (Flannery 1996b, Mayer 1996 and Osterberg and Thompson 1998). Humphrey et al (1996) find that payees' familiarity with using a payment instrument and its acceptability are significant factors that influence payment instrument choice. The speed of adoption of new technologies may also depend on the distribution of risk and cost benefits of the new payment methods (Humphrey and Berger 1990, Berger et al 1996). For example, consumers may be reluctant to give up the benefits of the float by switching to electronic methods of payment. Another important factor may be the distribution of benefits among payment services producers and the dynamics of the competitive process, where economies of scale and scope play a significant role.

Much of the 1970s-era hype about electronic funds transfer has become routine for banks and corporations (in the developed countries)[48]. But the consumers continued to employ traditional, paper-based transactions media, largely because they are not required to bear the full costs of their payment media choices (Flannery 1996b). There is, however, the uniform and unmistakable, though gradual, movement towards greater use of electronic payment methods both cross-countries and over time (Humphrey et al 1996).

In addition to already established credit card, debit card and electronic giro payments the new electronic payment instruments, namely those based on smart card technology and products that utilise computer networks, are responsible for the new 'payment system revolution'. However, given the profession's mixed success in predicting the impact of technology on the payment system in 1970, today's analogous forecasts (of the impact of the new payment instruments and technology) might be taken with a grain of salt (Flannery 1996b).

[48] The most prominent electronic LVTS is undoubtedly S.W.I.F.T., which is used for both domestic (inter and intra bank) and cross-border payments and messages exchange.

2.4.2. Electronic money defined

The term electronic money is often used loosely to refer to a wide variety of retail payment mechanisms such as prepaid cards, cash cards, electronic purse, smart cards, digital cash, e-cash, cyber-money, software products that use Internet network etc. The Bank for International Settlements - BIS (1996b), defines e-money as stored-value or prepaid products in which a record of the funds or value available to a consumer is stored on an electronic device in the consumer's possession. The electronic value is purchased by the consumer (e.g. by transferring funds from its bank account) and is reduced whenever the consumer uses the device to make payment.

E-money products are intended to be used as general, multipurpose means of payment and are, therefore a closer substitute to cash than many existing single purpose prepaid cards (e.g. phone cards). They are also different from traditional electronic payment instruments (i.e. debit and credit cards) in the sense that e-money products don't require on-line authorisation before, or debiting of consumer's bank account after, each transaction. The term is used for both prepaid cards, i.e. electronic purses, and prepaid software products that use computer networks such as Internet and various Intranets, i.e. digital cash. Frontier application is smart-card technology, where chip-in-card technology substantially expands the memory capacity of prepaid vehicles.

E-money differs from "access products", which are products that allow consumers to use electronic means of communication to access otherwise conventional payment services, e.g. use of a PC and Internet to make a credit card payment or to transmit instructions to make funds transfers between bank accounts (BIS, 1996b). It is only in conjunction with stored smart cards that specialised software installed on a standard computer can be referred to as digital cash. Another, already developing, possibility is to transfer funds from a bank account to a PC, from which, from that moment onwards, a payment can be made in the same manner as by using a smart card.

At the moment, it seems that there are three distinguished ways in which future electronic SVTS payment schemes will be developing. First, the use of *smart card* - off-line - payments as a close substitute for cash payments, for example the Mondex[49]

[49] Mondex electronic cash is carried on a smartcard, which is credit card-sized with an embedded microprocessor, capable of making transactions and storing balances. Customers charge their card with encrypted cash from an ATM,

scheme in the UK. Second, a scheme that utilises both smart cards and personal computers (together with a computer network e.g. Internet) for making payments, i.e. *combines access products and specific computer software with e-money cards.* For example Unisource and Milicent systems[50] both launched in 1997. And third, the use of *access products* to make on-line electronic payment instructions and orders, e.g. by using a computer, interactive TV or a public terminal (such as ATM) rather than visiting a bank branch, using a standard telephone or going out for shopping. The term "electronic banking" is often used to refer to different products and procedures that operate under the hub of the latter two schemes.

Another way in which the SVTS payments are likely to develop is, of course, improvement in both the existing payment mechanisms of debit and credit cards - by means of using built-in-chip technology, and access products. This will probably increase the speed and efficiency of on-line authorisation and clearing, and probably reduce the costs of the payments, but, on the other hand, it is unlikely to change the underlying settlement procedures in the medium term.

The success and implications of all these schemes will depend on a number of factors, which are looked at in more detail in the subsequent sections.

2.4.3. Issues raised by the development of e-money and electronic banking

Here is a non-exhaustive list of the most important issues, with a brief evaluation of each.

Clearance and settlement. E-money, i.e. smart card technology and/or specific software, makes it possible for payment transactions to *settle instantly.* In that sense it is a close substitute for cash as it represents direct, off-line, immediate (real-time), delivery-against-payment payment between the buyers and sellers in an economy. The

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from a public telephone, from their own smartcard-enabled telephone or a PC. The Mondex card is inserted in a terminal to make a purchase. The amount of the transaction is transferred to the retailer's smartcard in the terminal, and the balance is later transmitted to the bank - manually, by presenting a card or electronically (by switching to on-line communication with the bank).

[50] Payments via Unisource are made by inserting a Mondex card into a computer which utilises instant settlement feature of smart card technology and enables a simple 'pay-as-you-go' service. Similarly, the Milicent system uses a distributed brokers approach, versus a centralised clearing-house approach, to speed verification and minimise costs enabling efficient and cheap 'pay-per-click' mechanism. Vendors contract with brokers to sell scrip to users. After the user purchases the scrip from a broker via some standard payment method (e.g. credit card) all transactions are transparent.

so-called 'off-line' schemes have, therefore, an advantage over credit and debit card payment mechanisms (as they currently exist), because they doesn't require 'on-line' authorisation of the payment nor ex-post debiting of an account, which makes it cheap even for smallest payments. The schemes are designed to facilitate retail payments and have a relatively low limit on the maximum value that can be held. It limits the potential 'damage' that they can do.

Acceptance. The future of e-money is likely to depend on its cost advantages over other payment methods, revenues from fees and the investment of outstanding balances for issuers, and considerations of security and privacy for users (BIS 1996b). To succeed, an electronic purse system will need to offer enough features of value to its three constituencies - consumers, merchants, and issuers - to induce them to bear the cost (Wenninger and Laster 1995). As for *the institutions* (issuers), "although hard data are scarce, the cost advantage to, for example, debit cards is alleged to be in the range of 50 percent" (Saul 1994). Banks seem to be enthusiastic about the new products and are actively involved in their development. Some banks are rushing into electronic banking, perhaps because they see cyberspace as a place where their customers will do their work for them. An ATM transaction typically costs one-tenth of what a live-teller transaction does (Martin 1995)[51].

Merchants are perceived to be winners too, because off-line prepaid cards are expected to reduce the costs of clearing of transactions, handling cash, and reducing fraud (Santamero and Seater 1996). As for the electronic banking, i.e. the use of *access products* to make on-line electronic payment instructions and orders, it opens a whole new world of opportunities for sellers. The trade over the Internet, that utilises smart cards and/or specialised hardware and software, i.e. electronic commerce, is up and running. Interactive TV, that enables on-line ordering and payment instructions, is another example.

The third group, *consumers,* seem to be enthusiastic too. Smart Card Enterprises found, in their 1993 survey, that 88 percent of the consumers are willing to use some

[51]Illustrative is the quote from a magazine: "Why the rush? Banks are feeling backed into a corner. Nonbank competitors with stocks and mutual funds are eating into deposits, and expensive branch networks are bleeding operating budgets. To compete with Merrill Lynch, Fidelity Investments and others, banks have to offer more products and superior service -- while reducing overhead. How, you ask? By getting customers to do a lot of banking's backshop work on automated teller machines and their own PCs and telephones." "Net Worth" by Edward Martin, North Carolina Magazine - November 1995,

form of the new technology (Saul 1994). The economic rationale for this enthusiasm is a bit unclear (Santamero and Seater 1996). Each application is different, and they have to be evaluated by potential users in terms of transfer fees, acceptability, deferential float, different implied yields on balances held in each form etc. (ibid. 1996). It seems, therefore, that universal receptivity to alternative monies "may be more a good marketing ploy than good economics" (ibid. 1996, p.943). Consumer acceptance of any new technology, however, will be key to its success.

Security[52]**.** Security risks to electronic money systems could arise in the consumer or merchant domains and in the financial institutions domain, as well as in the network domain (BIS 1996c). The Task Force of Security of Electronic Money established by the Committee on Payment and Settlement Systems[53] of the G-10 central bank, found that one critical safeguard in the card-based systems is the degree of tamper-resistance[54] of the microchip embedded in the card or other device. It is their finding that this feature provides a significant advantage for card-based systems over software-based systems in terms of technical security, but also adds significantly to their production costs. Cryptography[55] is the other safeguard for card-based systems and the primary safeguard for software-based systems.

But, as the Task Force states, it is the potential unavailability of transaction information[56] for security monitoring purposes, rather than the safe transferability of electronic value, that poses greater challenges to security. The Task Force concludes, that electronic money systems can be designed with an adequate level of security (relative to other forms of retail payment) and that in choosing an option for security purposes, developers face trade-offs in the areas of cost, functionality, speed and reliability (ibid. 1996c). Given the robustness of the technical security features, a greater risk may arise during the manufacturing, distribution or issuing process, e.g. stealing of the cards during these processes etc.

Access products. Well functioning smart card and electronic home banking schemes require, apart from publicly available terminals (such as ATMs, public

[52] For more detail on the security issues see BIS (1996c and 1998).
[53] Which acts as an forum organised by Bank for International Settlements
[54] The capacity of devices to resist physical attack up to a certain point.
[55] Cryptography stands for the application of mathematical theory to develop techniques and algorithms that can be applied to data to ensure goals such as confidentiality, data integrity and authentication.
[56] The issue is discussed further under the part that looks at the issues of concern for central bank.

telephones etc.), some electronic device in the home. There has been uncertainty as to whether the most promising device is the telephone, interactive TV, or personal computer (Bogolin 1995). The first two have the advantage of universal presence and familiarity. Telephone banking is already well established, though with limited functions. The PC is a device better suited for banking functions (Horvitz 1996), but there is a problem of household penetration. However, the PC can emerge as a true consumer item[57]. The major cable-television companies, are all experimenting with the remote delivery of financial services over either cable television or telephone lines. In order to achieve that wider bandwidth, both TV and telephone companies need to get more fiber-optic cable into the ground, a huge and hugely expensive undertaking, but one which will be accomplished over the next 10 years (Sheshunoff 1996).

From a customer's point of view, however, all those technologies are compatible (and will eventually be only just a means for payments processing, i.e. commodities) and what she faces is the decision whether she really needs electronic banking, weighing up the advantages and the costs. For the providers, however, there are huge incentives to win the competition as the potential benefits are large. In the United States, for example, consumers are now paying about $5 billion per year to mail checks (Humphrey et al 1996). Horvitz (1996) illustrates the benefits, stating that if Microsoft (who has the ambition to take over the control over electronic banking) were able to extract ten cents from every such payment, it would earn profits of $1.5 billion per year. The fixed costs are high, however, and with low volume of usage, average costs (that the consumers who chose to participate will end up paying) are too high for most consumers and payees (ibid. 1996).

2.4.4. Public policy implications

There are number of issues of potential concern to monetary authorities raised by the development of e-money. Of particular relevance are the implications on the oversight function, seigniorage, monetary policy and financial risks borne by issuers of e-money. From a policy point of view, the main interest in the e-money schemes lies in

[57] "Microsoft Corp. chairman Bill Gates recently tagged PC household penetration at 35%, and predicted it would reach 50% within two years. This is pretty optimistic, but in line with other benchmarks." (Sheshunoff 1996)

who issues the prepaid value, how it is used as a means of payment and the impact on central banks' balance sheet (BIS, 1996b).

There are different types of service providers involved in the operation of an e-money scheme[58]. As far as a central bank is concerned, *the issuers* are the most important providers, since e-money is a balance-sheet liability of these institutions (ibid. 1996b). It is of particular importance who issues the money, i.e. can a central bank exercise control over them. These could be banks, non-bank financial institutions and non-financial institutions. It seems that in the European Union in general and its member countries in particular, the only group allowed to issue multipurpose prepaid cards will be credit institutions (EMI 1996, ECB 1998b). In the United States, it appears that under current state and federal laws, entities other than depository institutions may issue e-money (BIS 1996a). The decision about who can issue e-money involves a trade-off between the risks and implications on competition. However, if e-money is to replace cash[59] there has to be a certain provision regarding the guarantee of claims the products carry, i.e. to insure that, for example, the funds backing the issue of electronic money be held the asset of sufficiently high quality, liquidity to meet claims and be subject to a risk-adjusted requirements.

The particular risks that seem to worry tax and monetary officials, are the possibilities of *money laundering* across borders and the issuance of *multicurrency* cards. The latter makes it more difficult for central banks to measure accurately the stock of e-money denominated in the home currency. Another concern for public authorities is how to obtain detailed and precise information about the products or schemes being promoted in their country by foreign vendors. As for the security and money laundering issues, if they are perceived to be of sufficient concern, there might be a desire to regulate not just who issues e-money but also the types of products that can be offered.

Related to this is the question of the extent to which transactions are *recorded.* If details of a transaction can be registered in a central database, which could then be monitored, then there is a great deal of control over payment process and individual transactions. If not, as with smart cards that are closer substitutes for cash (e.g. Mondex

[58] Typically, these are: the issuers of the e-money value, the network operators, the vendors of specialised hardware and software and the clearers of e-money transactions.

cards), the oversight function of central banks for payment systems is diminished. In addition, the lack of an audit trail and the possibility of money laundering worries tax and police authorities[60].

But the concerns, especially from the monetary authorities' perspective, seem to be somewhat misplaced. As long as there is *control over issuers* of e-money and good technical and *security standards* for the payment instruments, that is the cards and software, the supervision of e-money transactions is going to be even easier than the supervision of cash transactions, including foreign exchange transactions. The real question is that of the purpose of monitoring, that is, is the oversight function of central banks used for monetary and perhaps audit control or has it the additional feature of data and information gathering for whatever additional purpose. The issue of privacy aside, it is not for a central bank to undertake such an ambitious task anyway. However, the issues of consumer protection, disclosure and assignment of participants liability, and privacy, as major public policy considerations, are still important and should be addressed by regulators and law-makers (McAndrews 1997a).

Another consideration might be whether the failure of one participant was likely to threaten the viability of the whole scheme or whether the failure of one scheme could threaten the viability of other schemes or the reputation of electronic payment systems more generally (BIS 1996b). *The systemic risk* born exclusively by e-money schemes, however, is likely to be limited because: a) given the retail nature, the amounts are likely to be small and b) the issue of systemic risk for e-money schemes is not unlike the issue of systemic risk in banking or payment systems as a whole. As long as there are adequate ex-ante licensing procedures and ex-post policy measures (similar to those for conventional banking) the e-money schemes can be treated in a similar way as the other payment mechanisms. The difficulty is in deciding on the nature of the e-money, i.e. whether it is a substitute for cash or deposits (and other payment instruments) or both.

Designing an appropriate *regulatory framework* for e-money involves balancing different objectives including the stability and financial integrity of the issuers, protection of consumers and the promotion of competition and innovation (BIS 1996b).

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[59] Whose nominal value is backed by a state guarantee.

Excessive new regulations, therefore, may not be appropriate. If, for example, it is decided that e-money balances are a form of deposit, any existing regulations concerning deposits are likely to apply[61]. Furthermore, it is not certain which schemes, with what possible implications, are likely to be in use in the future[62]. Central banks, however, should stay vigilant and monitor closely the developments. On the other hand, it also has to be ensured that monetary authorities are not a hindrance in the process of innovative electronic payment mechanisms' development. Mayer (1996, p. 975) states that "processing checks provides more than half the employment in the Federal Reserve System (in the United States)" and that "for reasons of self-interest (Fed) has held back the development of electronic payments and electronic data interchange, putting up roadblocks where the public interest called for it to bulldoze barricades." However, in the EU and some CIT (e.g. Czech Republic), there is a clear trend towards over-regulation of the underdeveloped financial and technological innovations, of unproven merits and drawbacks (see, for example, ECB 1998b)

2.4.5. E-money and monetary policy

The greatest concern for central banks should be the effect of e-money on the demand for money and on the formulation of *monetary policy.* E-money could lead to shifts in the velocity of money which might temporarily reduce the usefulness of the monetary aggregates, especially narrower ones, for countries that rely on them as targets or indicators (BIS 1996b). There would also be some statistical questions to resolve, namely how the amount of electronic money outstanding should be treated and how frequently it should be measured (Robson 1996).

The effect of e-money on the implementation of monetary policy will, however, depend on a) whether e-money will substitute for bank deposits (that are the base for other non-cash payment instruments) or cash in circulation and b) the speed of adoption. The effect on demand would result from the substitution of e-money for 'reservable' deposits or from a substantial reduction in banks' demand for settlement balances (BIS

[60] See, for example, "FT Guide to Electronic Money", Financial Times, February 5 1997 and "Security of Electronic Money" BIS, August 1996.
[61] Although some electronic money products have more in common with cash than with deposits.
[62] As illustrated by the failure of many e-money schemes, e.g. Digicash more recently.

1996b). A very substantial substitution can, on the other hand, complicate the setting of money market interest rates. Given the nature of e-money and its use for so-called 'micro-payments' payments, as a substitute for cash, it is less likely that e-money will substitute for deposits.

The speed of adoption seems unlikely to be fast in the short and medium term. Nonetheless, the payment network characteristics, such as critical mass acceptance, interdependent demand and exponential growth (Osterberg and Thomson 1998), can apply to the analysis of e-money and its development.

In short, the acceptance of e-money and possible substantial substitution of e-money for cash (and/or deposits) will depend on: a) its costs and risks, as well as its cost-effectiveness compared to the other payment instruments, b) incentives, marketing efforts and 'critical-mass' acceptance, c) development of electronic commerce and d) substitution of 'paper-based' administration and communications with 'e-files' economy.

What the central bank has direct control over is referred to as high-powered money, the cash base, or the monetary base (Lipsey and Chrystal 1995). This consists of currency held by the public and the banks and of deposits held by the banks with the central bank (ibid. 1995). It is the former that may change/shrink due to the e-money development. Although it may concern a central bank, since cash is the largest component of central banks liabilities, the improvement of payment mechanisms and the substitution of cash (if those instruments become widely accepted), ceteris paribus, would probably reduce the transactions balances altogether. It is to the benefit of customers and businesses to hold less non-interest bearing instruments.

The substitution of e-money for cash, per se, doesn't increase a cash drain to the public[63]. It could, however, have reverse, and thus, from banking system perspective, positive effects. The actual reduction of cash balances due to the influence of e-money would be a result of, for example, a faster and more convenient link with individual bank accounts for occasional e-cash 'withdrawals' through portable or easily accessible

[63] A cash drain to the public reduces the expansion of deposit money that can be supported by the banking system (Lipsey and Chrystal 1995). It is the effect of public holdings of its money in a fairly stable proportion between cash and deposits. This means that when the banking system creates new deposit money the public withdraws cash from the banks to maintain the ratio (ibid. 1995).

devices, such as mobile phones, personal computers or public telephones and terminals[64].

The desired cash holdings ratio of the public, the banks desired reserve ratio, and hence demand for money as a whole, are likely to continue to be influenced by more fundamental variables, i.e. those of national income and wealth, inflation and interest rates. The second and third components of the demand for money, i.e. precautionary and speculative motives, shouldn't be influenced a great deal by the development e-money itself. It is the reduction in uncertainty, born by the payment system itself, of money inflows and outflows that may change those more fundamental variables (motives for the demand for money). If the evolution of electronic payment mechanism contributes to the efficiency of the payment system, by improving clearing and settlement procedures, and, therefore, reduces the transaction balances it is something that monetary authorities should encourage and help. An overview of the issues is given in table 2-4.

Table 2-4 Electronic money influence on demand for money and cash balances

	Influence	consequence/consideration
Motives		
Transactions	Yes, if substantial substitution	Reduce demand
Speculative	Maybe	Black market payments, tax evasion
Precautionary	Not likely	-
Functions		
Means of Exchange	Yes	Replace cash, cheques and other SVTS
Store of Value	Maybe	Convenience v privacy
Unit of Account	Maybe, depending on the regulation	Fiat money v private money

What might worry some central banks, especially if the substitution is substantial, is *the loss of "seigniorage"*[65]. If the adoption of e-money was extensive enough, the loss of seigniorage could become a concern to central banks, which might in consequence become more dependent on other sources of revenue (BIS 1996b). This, however, shouldn't worry an economy as a whole, although some governments (particularly those with large budget deficits) may argue the opposite. Firstly, regarding

[64] Thus, the 'off-line' feature of e-money purses could be combined with 'on-line' connection with one's bank account for e-cash withdrawals.

[65] In the modern context, "the term applies to the revenue that accrues from the power to print bank notes, which have very low production costs relative to their face value, and from the fact that many central banks force banks to place non-interest-bearing deposits at the central bank (which finances the holding of interest-bearing securities)" (ibid., p.675, 1995).

the government revenue, it is up to general fiscal and tax policy to cater for it[66]. Secondly, there is no reason why a central bank cannot issue e-cash instead of paper cash, once or if e-money substitutes for cash.

The fundamentals remain the same, the money supply is determined by demand for money, regardless of the physical form of money. The reserve requirements, credits for liquidity, regulatory role, and the function of banker to the government and the banks are likely to remain within central bank's jurisdiction for a long time to come. If we don't question the role of the banking system and its credit function on one hand, and central banks' fundamental functions on the other hand, the function and volume of deposit money is unlikely to change (only because of the introduction of e-money) and electronic units can safely replace pieces of paper. To compensate, to a certain extent, for the loss of seigniorage, central banks can charge fees for giving a licence for issuers or start issuing e-cash themselves[67]. The reserve requirements could then be in the form of e-money just as in cash. The substitution process is not likely to be very fast and one should not feel sorry for central banks, as they will find a way to readjust to the new situation.

The improvement of existing credit and especially debit card schemes, by replacing magnetic stripes with computer chips, and the improvement of access products by increasing security and speed of transactions, may, however, have more significant effects on monetary systems in the long run. The logic is that if it is easy and widely acceptable to make payments directly from ones bank account, via improved plastic cards, this might change/reduce desired cash holdings altogether. If it is cheap and secure to make even the smallest payments, effective and efficient on-line authorisation can reduce/ replace the role of cash and therefore central bank's role of the cash supplier. This, however, doesn't take into account the issues of privacy, customs, familiarity, initial costs and investments which are proving to be hard to overcome.

The obstacles are, therefore, more of the social and ethical than technical nature. The first obstacles (security and costs for providers issues aside) are the technical sophistication of the users, availability and costs of the products. It has been estimated that in the developed countries only about 20 percent of the households had both a PC

[66] It is only fair that government revenues are transparent to the public.
[67] As central banks did in the past, when they took over control, from private banks, over issuing currency.

and a modem (Horvitz 1996, World Bank Atlas 1998, Judd 1998). Furthermore, for example, in the United States in 1996, "a quarter of the nation's households are 'unbanked', and the fraction is rising" (Mayer 1996). People may also be reluctant to grant financial giants a licence to supervise their finances and have even more insight into their affairs.

The features of cash of a reliable and familiar, off-line, real-time, delivery-versus-payment, payment medium is something that all other electronic payment mechanisms, including e-money, must posses if they have the ambition to replace it.

2.5. The research in payment systems

2.5.1. Introduction

As payment systems are integral part of banking and financial systems, the topic has been a part of many a study that analysed the functioning of monetary systems. Payment issues are significantly linked with portfolio allocation issues, particularly the demand for various forms of money. There is some research linking asset conversion costs and payments transactions costs with portfolio allocation and the demand for money. Baumol (1952) introduced the inventory model of the demand for money in which he outlined the trade-off between transaction money and interest earning assets, i.e. the opportunity costs of holding more liquid non-interest-bearing funds and the transaction costs of having to convert other assets into money more frequently. He also suggested transaction money to be treated as an inventory, i.e. that the level of inventory of transaction money be optimised according to stock level optimisation rules. Tobin (1956) integrated the interest elasticity of transaction money for a given volume with Baumol's income elasticity in what is often referred to as Baumol-Tobin inventory model. Miller and Orr (1966) presented "a model of the demand for money by firms" in which they incorporated the variance of net cash flows, the transaction costs of converting assets and interest rates to determine the lower and upper limit, as well as the "return point", of transaction money that a firm should hold. Akerlof (1980) makes a distinction between short-run and long-run demand for transaction money. He argues that the timing of payments is important in determining which factors influence the

demand for money, i.e. besides the changes of interest rates and income there is a third element influencing the demand for money -- the variability of payment structure, which is more influential in the short run.

From a modern macroeconomic point of view a more holistic approach (that incorporates these and other theories) to the demand for money is accepted. The demand for money is determined by the three different motives for holding money: the transactions, precautionary, and speculative motives (see Lipsey and Chrystal 1995). In general, if there were no payment system frictions and no costs of converting other assets into or out of money, the transaction demand for money may approach zero. It is, therefore, the payment system frictions and costs that require further research as far as the portfolio and monetary implications of payment system functioning are concerned.

In addition, the analysis of the demand for money and motives for holding money can be expanded to include the analysis of particular functions that money serves in a particular country. Therefore, relating it to the payment system, it can be looked at the *unit of account, store of value and means of exchange* functions of money when evaluating relative use and importance of cash in an economy.

There are other areas of research in banking and finance in which insights into payment issues are realised. The early models of payment instrument choice, for example, focus on the costs, convenience, and other characteristics of the various payment media. These models are mainly concerned with mispricing of the payment instruments and the trade off between private and social costs of payment instrument choice. For example, Johnson (1968) looks at the extent to which transaction prices may not accurately reflect resource usage on some types of SVTS payments. However, portfolio allocation and monetary research have often given little attention to changes in payment systems, and similarly, research on payment instrument choice has typically neglected the portfolio and monetary implications (Berger et al 1996). It was only much later that payment system and its relationship with banking and monetary systems became a research topic in its own right.

Apart from standard portfolio and demand for money considerations, there are other payment system problems that are worth the research effort and require focusing on more specific payment system issues. These include: types and importance of risks and costs of payment system, the choice of clearing and settlement system that

minimises those risks and costs, customer choice and payment instrument use, adoption of new payment technologies, efficiency of payment intermediaries, cross-border and foreign exchange payments problems, role of government and private agents in running and/or supervising the functioning of the system etc.

2.5.2. Payment system research literature review

This section focuses on major empirical and theoretical research studies that have been conducted on payment system problems, which have been addressed in the previous sections. The research work can be roughly grouped into four major areas with regard to the subject of research.

The first major area of research is payment instrument choice and use and its implications for monetary policy. Humphrey, Pulley and Vesala - HPV (1996) try to explain payment instrument choice and investigate factors beyond standard demand theory influences. Therefore, beside the influence of relative prices and income, they also look at banking system concentration, habit, violent crime rate, payment instruments availability differences and changing patterns of payments over time. They analyse the payment system of fourteen developed countries using payment data over 1987-1993, constructed by the BIS. They estimated the five-equation model[68] in log-linear form. Separate equations for each of the five payment instruments (cheque, paper giro, electronic giro, credit card and debit card) were estimated using ordinary least squares. HPV estimate two systems of demand equations for five payment methods. One set of estimates employs dummy variables for each country and the other excludes dummies and prices.

They find striking cross-country differences with regard to various payment instruments use that can be explained by common consumer reaction to exogenously given GDP, the stock of POS and ATMs and lagged usage of other means of payment. They also find a positive statistical relationship between the availability and usage of new payment instruments, a shift towards usage of electronic payment instruments and

[68] For each of the five instruments, and each instruments' annual transactions per person being a function of: the instruments price;. real per capita GDP; number of POS terminals per person; number of ATM terminals per person; use of the payment instrument in the previous year; real value of cash held per person; and two 'institutional' variables – the number of violent crimes and the asset concentration ratio of the largest five banks in each country.

the significance of institutional factors for which rate of violent crime and banks' asset concentration are used as proxies.

As a result of the wide variety of patterns and customs in world payment systems, most empirical studies have been limited to investigating changes over time within one country (Avery 1996). There is no evidence as to whether countries can be viewed as similar entities existing at different stages of development, or as idiosyncratic entities with payment systems that differ because of basic cultural factors. Avery (1996) urges caution about drawing too great an inference from HPV, especially in making assumptions about the future development of payment systems in less-developed countries. He is also sceptical about the significance of the results, of high adjusted R squares of changes in usage of over .98, as in change equation (over time) much of the 'action' appears to come from lagged values of the other payment use variables and in the level equations (cross section) the action comes from the fixed effects. Apart form the technical details the critique is addressed to the importance of finding truly exogenous factors which dictate differences in payment systems over time or cross-country.

One can build on Avery's critique of HPV (1996) and note that the part of the HPV study that explains the instruments use by customers reaction/demand at different stages of development does not take into account the system structure, i.e. the issues of competition and banking system maturity, regulatory framework, technical infrastructure and other 'true' institutional aspects of payment system. Similarly, are the crime rate and asset concentration good proxies for the most significant institutional variables? It seems that, for example, the level of development of a country's legal, banking and technical infrastructures more adequately represent the institutional framework for payments. Furthermore, the findings for the 14 countries may not be generalised and expanded to analyse other developed and developing countries and their payment systems. This is not only because HPV do not provide the evidence that the differences are indeed influenced by the different stages of development, but because the scope of the analysis is confined to the most-developed countries, with similar characteristics/levels of development.

HPV have expanded the framework of the analysis to consider cross-country variations and institutional aspects of payment instrument use, choice and their changes

over time. In addition, the Avery's remark to be wary about using any empirical models before we have a better understanding of the truly exogenous factors that determine the differences can be self-serving. If there are no attempts at constructing empirical models to test propositions one can never be sure whether the theoretical explanations are good enough to be used for constructing such a model. HPV (1996) is a significant attempt to explain payment instrument use. It contributes to the insights given by Humphrey and Berger (1990) concerning the pricing of payment instruments problem, Daniels and Murphy (1994) about conversion costs and demand for debit cards, Vesela (1993) on availability and usage of new payment instruments, Humphrey and Berger (1990) and Robinson and Flatraaker (1995) on costs and advantages of electronic payment, and Boeschtoen (1992) on use of cash.

The second group of research work focuses on issues of controlling risk on LVTS, type of settlement system, and the role of private arrangements, government and central bank in payment systems design and operation. Rochet and Tirole (1996a) provide a model of interbank lending and systemic risk that addresses the sharing of risks and monitoring between market participants and the government. They argue that existing substantial interbank lending implies banks do a considerable amount of monitoring of each other and that the peer monitoring associated with interbank lending can make banks safer and reduce the need for regulation. However, they suggest interbank lending might fail to discipline systemic risk and that only central banks can provide liquidity in the event of a systemic crisis. Calomiris and Kahn (1996) use historical data from Suffolk System (that operated in New England from the 1820s to 1850s) to illustrate that banks' own networks, without the central bank, can fairly successfully clear payments and control risks. The results of these two studies, however, do not necessarily suggest that private clearing mechanisms can handle systemic risk well. Flannery (1996a) presents a model of private clearing in which he makes the case for central banks to provide liquidity through the discount window in cases of crisis. The 'remedy' is criticised by Kaufman (1996) who views the discount window as an obsolete safety instrument in the developed countries that can only give rise to moral hazard problems. He is in favour of completely privately operated payment systems.

There is also no agreement on which settlement system minimises both the payment system risks and costs, i.e. which system provides an optimal balance of speed,

accuracy, costs and risks. Central bankers (see for example Greenspan 1996, and EMI 1996) would like to see a movement towards real-time gross settlement systems at central banks on all types of payments. The research evidence is, however, mixed and goes more in favour of deferred net settlement. Schoenmaker (1995) finds that the estimated extra cost of gross settlement may exceed the estimated reduction in settlement and systemic risk using the data on CHIPS and Fedwire for the period 1990 to 1994. He also finds that the cost of improving the risk management of netting schemes is moderate. There are, however, some limitations to the study, namely the data limitations and the assumption of risk-neutrality both acknowledged by the author.

Kahn and Roberds (1998) present a general equilibrium model of a payment system that operates real-time gross settlement, in which the liquidity constraints imposed by the system result in settlement delays. They also argue that general policy responses to the problems of central bank's risk exposure[69]– full collateralisation of overdrafts and/or charging interest on 'daylight' credits – are both flawed along some dimensions. They reach a tentative conclusion that a policy of partial collateralisation of intraday credit, when coupled with compatible monetary policy, both eases the effect of liquidity constraints and reduces the intraday exposure of central banks.

Vital (1994) describes quite a different settlement system, that of the Swiss Interbank Clearing system - SIC, which apparently works very well in Switzerland. Rochet and Tirole (1996b) provide an analytical framework for analysing the control of risk using the characteristics of CHIPS, Fedwire and SIC. They suggest creating a system with some of the best components of both RTGS and DNS systems. Their suggestion that a RTGS can be privately organised and run (without a central bank) contradicts the acknowledged advantage of a central bank in providing liquidity and guarantees to such a system - the very advantages of a RTGS system over a DNS system. Hancock and Wilcox (1996) and Khan and Roberds (1997) provide additional empirical and theoretical insights, respectively, into the risk reduction and limits and merits of different settlement systems. The evidence, however, is not conclusive.

The third area of research interest is the efficiency of payment system intermediaries, i.e. the problems of efficiency and costs of payment system providers,

[69] If intraday liquidity or guarantee for payments is granted by central bank for elevating the credit constraint imposed by a 'pure' RTGS system.

economies of scale and scope, technological changes etc. For the payment system to be on or near the risk-cost frontier, the costs of payments processing and settlement incurred by intermediaries must be at or near the minimum for the risk taken (Berger et al 1996). To meet this condition, payments intermediaries must be reasonably scale efficient, scope efficient, and X-efficient[70]. Bauer and Hancock (1993) measure the scale efficiency and X-efficiency of US Federal Reserve check processing and found the average X-inefficiency of the Fed offices to be about 25 percent to 30 percent of costs. Berger, Hunter, and Timme (1993) found similar efficiency results for US commercial banks as a whole. Hughes, Lang, Mester and Moon (1996) give insights into controlling deposit volatility and diversification of asset risk by looking at banks that branch across state lines in the United States. Linking it to payment system operations they suggest that transaction deposits give banks an informational advantage over other types of lenders because they provide information that is useful in credit analysis and loan monitoring. Their findings are in line with work of Humphrey and Berger (1990) who argue in favour of nation-wide branch banking as it may increase the efficiency of the payments system by reducing the volume of interbank payments that need to be made. [71]

Bauer and Ferrier (1996) provide a thorough analysis of the payments cost performance of the Federal Reserve in 1990-1994. The study is significant because of both its internal validity (with respect to the methodology applied) and contribution to the literature on the production of payment services (with respect to the empirical results and insights). Using frontier cost functions for each of the three payment services (cheques, automated clearinghouse services - ACH and Fedwire services) they measure their marginal costs, economies of scale, cost efficiencies, and rates of technological change. The efficiency is measured relative to a "best-practice" cost curve and the cost frontier is estimated using a stochastic, parametric model. They find wide differences in performance across processing sites, that scale economies have been exhausted for almost all check-processing sites and that ACH processing sites have statistically significant scale economies. They also find substantial technological progress over time for ACH and Fedwire transactions.

[70] For an excellent review on studies on financial institution efficiency see Berger and Humphrey (1997). For conceptual, methodological and practical issues in defining and measuring efficiency see Berger and Mester (1997)
[71] The arguments are useful for analysing who should run the payment system operations in Yugoslavia.

Finally, there are studies that look at new payment technologies and new instruments, their adoption and implications for the financial sector and monetary policy. Empirical studies by Bauer and Hancock (1993), Bauer and Hancock (1995) and Bauer and Ferrier (1996) found that significant cost savings can be achieved from scale efficiency in the production of electronic based payment systems. Humphrey and Berger (1990) argue that float benefits may be important in keeping customer and business payors in the United States from switching from older paper-based payment methods to newer electronic methods. Humphrey, Pulley and Vesala (1996) find that payees' familiarity with using a payment instrument and its acceptability are significant factors that influence payment instrument choice. Santamero and Seater (1996) build a mathematical model to investigate consumer willingness to substitute electronic money for paper-based money. Their pioneering model, however, is concerned only with, what Kane (1996) would call, pocket money.

Boeschoten and Hebbink (1996) investigate the effect of electronic money on cash substitution and central bank seigniorage in the G-10 countries. As the authors admit, the analysis is 'static' and is based on the arbitrary assumptions of electronic money for cash substitution[72]. Furthermore, the authors resort to questionable generalisations about cash payments over the whole group of countries from some estimates on use and importance of cash in particular economies. Nonetheless, the study re-examined the use and importance of cash and e-money potential and can be extended by future research to include individual countries' specifics, type and magnitude of cash payments and motives for holding, and features of, e-money. Although there is a lot of effort to explain and explore the issues raised by the improvements in payment technology and technological innovations, the research literature on new payment technologies and instruments, especially electronic money, is yet to be formed. The research is, at the moment, mainly concentrated within, and associated with, the central banks' research departments.

[72] Other payment instruments were not included into analysis. Also, there are the issues of 'critical mass', network good and exponential growth, incentives, cross-demand etc.

2.5.3. Future research topics

In view of the deficiencies identified in the existing literature, evolving payment systems and payment system problems and practical requirements of banking and monetary systems, there are several directions for future research.[73] First, there is no consensus on whether RTGS or DNS settlement systems yield the best trade-off between risks and costs. In addition, how do institutional factors, such as banking structure and the monetary regime, bear on the choice between the systems? Related are the questions of government versus private sector in providing credit or liquidity to payment systems and conflict/congruence of interests of central banks and commercial banks. Second, related to payment instrument choice and monetary policy, there are the issues of whether 'mispricing' of payment services creates significant 'misallocations' of resources, and how innovations in the payment system affect money demand. Also, there is the 'problem' of slow adoption of new payment technologies. Third, the research agenda for studying efficiency of payment intermediaries is also in its infancy, with almost all of the studies having analysed a single organisation, the Federal Reserve (Berger et al 1996). Fourth, the legal and regulatory structures are also important and not investigated enough. Similarly, the existing research should be expanded to take into account the complicated *institutional and policy environment within which major* payment system decisions take place. Fifth, one of the most difficult areas in which to improve settlement practices has been the interbank foreign exchange market (Greenspan 1996). Sixth, there are the problems associated with long securities settlement cycle, liquidity and collateral issues of use of securities for (inter)national payments and how to minimise custody risks. Seventh, new payment technologies and innovations open a wide range of questions, of which the most important concern monetary policy implications and banking sector strategies for the future. Finally, the empirical studies focused almost exclusively the US payment system (due to good data sets available) and occasionally payment systems in other developed countries, with little reference to less-developed countries.

[73] See also Greenspan 1996, Summers 1996, Berger et al 1996, OECD 1997, BIS 1996a,b,c,d and 1997a. and the Banking Structure Conference Notes - available at the Chicago Federal Reserve Bank web site www.frbchi.org .

2.6. Payment systems in Countries in Transition: the literature review and debate

2.6.1. Introduction

Creation of a fully-fledged market-based financial system is an integral and important part of the transition strategy (Blommestein 1993). An efficient payment system, with a well functioning clearing and settlements system, is essential for attaining this objective - especially to enable efficient functioning of competitive money and capital markets and monetary control. The banking system is integral to the payment process (Summers 1994) and, therefore, the stability and efficient working of the banking system is itself tied to the integrity of the payment system (Blommestein 1993). Inefficient payment system increases the transaction costs of private agents and hampers the development of liquid money markets, therefore reducing the efficiency of the overall economy. The purpose of this section is to point out the key problems and general policy issues in the reform of the payment system in CIT, as well as to show the specifics of the payment system issues in the particular economic environments.

2.6.2. Payment system reform: monetary policy and control

Effective market based implementation of monetary policy is a medium-term goal of financial sector restructuring in Central and Eastern European countries (Khan and Sunderarajan 1991). Payment system arrangements are of great importance for the conduct of monetary management (Borio and Van den Bergh 1993). Consequently, payment system reform contributes to a strengthening of monetary control (Summers 1993, Folkerts-Landau, Garber and Lane 1993).

The payment system reform in CIT was conducted mainly to strengthen monetary control and newly formed banking systems. With an efficient payment system this can be achieved in several ways[74]. First, by facilitating *active liquidity management* by banks, the improvement will reduce the need for banks to hold large and variable excess reserves. Active liquidity management also reduces the risk that tighter monetary policy will make individual banks illiquid so that subsequently the central bank will be forced to loosen monetary policy through refinance facilities. Second, a well-

functioning system to handle large-value transfers among banks makes *short-term interest rates a more reliable signal for monetary control purposes.* And finally, the payment system reform should reduce the *size and variability of net payment float.* The value of net payment float has an influence on the amount and distribution of reserves available to the banking system for the purposes of making loans. Central banks must be able to measure and forecast changes in the value of net float in order to forecast the level of excess reserve liabilities.

An additional way of strengthening central banks monetary management, as argued by Blommestein (1993), is the requirement that settlement of payment obligations should be through the transfer of banks' deposits at the central bank, i.e. implicitly with RTGS (as opposed to settlement between commercial banks through a network of mutual accounts, i.e. with DNS), in order to prevent uncontrolled increases in money and credit. Although appealing from central banks' perspective, this argument doesn't take into account the costs and efficiency considerations. There is some evidence that the estimated extra costs of RTGS exceed the estimated reduction in settlement and systemic risk (e.g. Schoenmaker 1995), and that self-regulated payment systems perform as efficiently as those regulated by government (e.g. Calomiris and Kahn 1996). However, it is worth mentioning that the evidence is for the developed countries and that the major issue for the payment system reform in CIT is that of restoring financial discipline and trust in banks. Thus, it is often argued that, in order to achieve this in the initial stages the central bank must play a crucial role[75].

If banks cannot readily transfer funds among themselves it is difficult for them to engage in active liquidity management, for they lack the means of investing funds for short periods or obtaining funds at short notice (Folkerts-Landay et al, 1993). An unexpected excess of payments over receipts may lead a bank to become illiquid, possibly generating a banking crisis. In the absence of a sufficiently deep money market, tightening monetary policy will either risk making one or more banks illiquid or lead to and offsetting expansion of the monetary base through refinance facilities.

Among the four widely recognised elements of the safety net under the banking and payment system - i.e. open market operations, deposit insurance, finality on

[74] See Blommestein (1993), Summers (1993) and Folkerts-Landau, Garber and Lane (1993)
[75] The merits of the two different settlement systems for CIT are discussed in section 2.6.4.

interbank clearing and settlement and discount window - it is the last one that is perceived as the most effective in economies without sophisticated and broad financial markets, such as in CIT (Flannery 1996a and Kaufman 1991,1996, BIS 1998). It is argued, that the more information that is available only to the central bank, the more is the discount window the appropriate tool to allocate emergency liquidity directly, quickly, and efficiently. It is also argued (Goodfriend and King 1988 and Kaufman 1991), that in financial and technologically advanced countries, the discount window is likely to misallocate credit. Payment system (LVTS) has a task to transfer the credit in a fast and effective manner. However, the effectiveness of the tool makes it more dangerous in the hands of irresponsible and/or politically easily influenced monetary authorities. The Yugoslav experience, described in section 2.7 may be used as an illustration of how things may go wrong.

Government/central bank play a role in developing and regulating the payment system. They have a clear supervisory role because the stability of the financial system depends, in part, on the integrity of the payment system. It is, therefore, central bank's function to ensure that private participants employ proper measures to protect themselves against payment system risks (Summers 1993), and to provide funds to financial institutions that are illiquid but solvent in order to prevent liquidity crisis (Folkerts-Landau et al 1993). This implies assessing banks' fitness to participate in the payment system operations and the 'lender of last resort' function. The latter is the basis of provision of 'day-light overdrafts' and the guarantee of finality of payments by the central bank to permit payments to be processed without the need for every payment system participant to assess the creditworthiness of every other participant.

This, however may cause *moral hazard problems*, as banks may assume that they will be bailed out by the central bank, and *transfer the risk* from the banks *to the central bank,* thus removing banks' incentive to monitor one another and to act on the information they obtain. So, there is a trade-off between systemic risk prevention and moral hazard which should be weighted by the central bank when making a policy decision about the appropriate division of risk among the individual banks in the payment system and itself. A central bank's role in the payment system supervision and operation, although important and necessary, should not restrict potential competition and the possibility of turning over payment system operations to the private sector.

Although it is easy to hedge one's bets, by saying that the active role of central banks in CIT should be weighted against the long-term implications on banking system competition and moral hazard, it sends confusing messages to the policy makers in those countries. The ability of 'fine tuning'[76] and economic policy consensus needs to be developed in these countries. Furthermore, calls for quick and effective reforms put pressure on the policy makers to produce clear-cut measures. A possible solution to this 'problem' could be clear determination of the stages of the reform by the government, and what role and for how long should each of the participants play[77]. A clearly defined programme of reform by government and monetary authorities will help in mobilising potentially confronted participants around the same goal and also set benchmarks by which the role of the government and central bank as well as the progress can be assessed. One may note that this gives the regulators and policy makers a key role in the start of the reform which may be difficult to overthrow later on, but the authorities will continue to assume that role anyway and it is helpful to commit them by having to explain and allocate different functions to different participants in the banking and payment system reform.

2.6.3. Management of payment system risks

The debate about the payment system risks in CIT distils down to the *finality of settlement* and how to achieve it, trading-off systemic risk and moral hazard. A final payment is an irrevocable and unconditional transfer which discharges the obligation to make the payment (Summers 1993), that is, once a payment message is sent, it is certain that the payee will receive good funds that cannot be reversed, even if the payor subsequently becomes insolvent (Folkerts-Landay et al 1993). Because it eliminates the risk faced by payees, finality is generally a desirable characteristic of payment systems, even more so in CIT, who strive to rebuild financial discipline and trust in banking system. In these countries there has been a preference for cash payment as a response to inefficient clearing and settlement systems and a lack of trust in financial

[76] The term refers to precision and sophistication of policy provision rather than frequency of intervention.
[77] If, for instance, the aim of the first stage of the reform is the development of well-functioning money markets, it could be established that say, for a year, the central bank fully guarantees the finality of interbank transfers through the payment system (catering for moral hazard through supervision and licensing procedures).

intermediaries[78]. The transaction using currency, which represents direct real-time payments between buyers and sellers in an economy, also permit the legal obligations that give rise to the payments to be discharged very rapidly once the payment process has begun (Greenspan 1996). In this respect, "the process of payment and settlement by currency sets a standard of efficiency against which other payment mechanisms may be compared" (ibid. 1996, p.690).

Finality of settlement, however, comes at a price, since the risk associated with default cannot be eliminated but rather shifted either to the central bank (in case of RTGS system) or the members of the clearinghouse (in DNS system). If there is no guarantee of finality, as in the Swiss SIC, finality can be achieved at the cost of delays in carrying out payments, e.g. waiting until the payor has good funds available to process a payment message. A settlement system that does not extend credit may virtually eliminate risk associated with the payment on that system, but the payors may shift risk elsewhere by borrowing to gain the liquidity needed to make payments on the system, or by shifting transactions to other payments mechanisms where credit is more easily available (Berger et al 1996).

However, if there is only one settlement system and an underdeveloped and inefficient money market - as it is the case in CIT - and with no guarantee from the central bank, then, one may infer, there is no shift of risk and the risk can be eliminated completely, but at the cost of delays or gridlock. Although, following this logic, it would seem that there could be a perfect substitution between risks and costs, the systemic risk cannot be totally eliminated. For instance, in a RTGS system with no central bank intervention banks will lend for the liquidity from other creditors. If there is a lack of liquidity in a banking system (say there are no sufficiently available deposits and/or there is a restrictive monetary policy or some exogenous shock) creditors will be less able to lend. This will perpetuate illiquidity and some institutions will become totally illiquid (an increase in bad debts is also likely to follow) and this may cause further withdrawals of transaction deposits from those institutions and/or conducting the transactions in cash. If the illiquidity of sufficient number of institutions is perceived to be serious by the depositors, this may cause a run on banks where even solvent intermediaries could fail soon.

[78] See, for instance, Scott 1993; Topinski and Struzynski 1995 and Nesic 1996

The described scenario may seem a long process, with lot of hypothetical steps that need to follow each other, but, especially during a financial crisis or with high uncertainty (as in many of CIT) it is very possible. For example, in Yugoslav banks since 1992, with frozen foreign currency deposits and a lack of trust in banks, the only form of deposits have been current accounts. This makes transaction money even more potent at causing disturbance. Therefore, although indirectly, payment systems can provoke, i.e. contribute to, systemic risk even in a RTGS - even more so if the central bank is dedicated to maintaining price stability.

Similarly, if central bank does assume the risk, i.e. guarantees the finality of payments, this may lead to moral hazard problems. This in turn will increase risk-taking and ineffective investments and consequently losses. The final result may be a series of financial institutions bankruptcies, which, due to a reduced amount of financial intermediation undertaken by banks[79], leads to a decline in investment and aggregate economic activity. Another possibility, although with the same ultimate consequences (decline in investment and aggregate economic activity), is, as illustrated by the Yugoslav case in 1993, that the central bank grants overnight liquidity at the expense of loosening monetary control, which consequently results in hyperinflation.[80]

This speculation illustrates two points. First, the theoretical model suggested by Berger et al (1996, p. 699-702), although good at pointing out that cost and risks are immanent to payment systems and illustrating the impact of payment innovations, doesn't completely explain the issue of efficiency of a payment system or method. If risk cannot be totally eliminated it is costly, adding up to the costs already incurred by eliminating other risks. Therefore, risk has its cost. In that sense, risk/costs trade-off analysis should be accompanied, or replaced, with cost/efficiency trade-off and discipline (i.e. risks) v speed (i.e. efficiency) analysis, outlined by Schoenmaker (1995) and Folkerts-Landau et al (1993) respectively. The latter two paradigms are of more help to policy makers in CIT, especially when weighing advantages and disadvantages of different settlement systems. This is because: a) the choice between two negative outcomes may be in favour of the one that has no immediate consequences, e.g. choosing a less costly system because of the budget constraints, neglecting the risks,

[79] The most important, and often the only, financial intermediaries in those countries.

and b) both the cost/efficiency trade-off and discipline v speed analysis are more transparent for analysing benefits and drawbacks of the investment decisions regarding the payment system.

Second, it is tentative to conclude that the soundness of a payment system depends more on the soundness of the banking and economic system, financial discipline and prudence of its participants, and the level of trust and confidence in payment intermediaries, than on the type of central bank intervention or involvement in payment system operations (i.e. type and design of settlement system). In other words, no matter how good a central bank and its payment system policy is, it cannot make up for inefficient banking and financial systems (although, central bank's performance is reflected, among other things, in the performance and efficiency of financial sector). It is illustrated by the experience of developed countries where both RTGS and DNS systems seem to function well. The hypothesis is, therefore, that it is important for the post-communist countries to start restructuring the whole of their banking systems, whose inefficient payment system is only one (though important) problem[81]. The hypothesis and the relating issues are analysed in chapters 4 to 7.

2.6.4. What payment system is suitable for CIT?

Notwithstanding the importance of overall financial system reforms, the choice of clearing and settlement system is very important, as it determines: the role of the central bank; who bears the risks of payment; how losses are shared in case of failure; how fast, expensive, or safe the system is; and what are the implication for monetary policy and the liquidity of banks.

It seems that there is an agreement among the authors on which kind of settlement system for large-value payment CITs should initially implement. Blommestein (1993) explicitly recommends that all large-value transfers settle on the books of the central bank as opposed to settlement between commercial banks through a network of mutual accounts, to prevent uncontrolled increases in money and credit. He, therefore, views monetary control as a prime objective of the reform. In light of the

[80] However, it might be worth making a digression by stressing that the greatest moral hazard problems were borne out by the "soft budget constraints" and bailing out of the "too big to fail" socialist giants in the past.
[81] Other being: non-performing loans, banks' inadequate capital base, poor management practice and lack of financial discipline, perverse incentives and 'soft' budget constraints, low per capita income and propensity to saving etc.

costs of establishing a settlement system, Scott (1993) argues that those countries should only have one of the systems in the medium term, and that gross system, with immediate finality would seem necessary for the development of the interbank money market and the efficient conduct of monetary policy. He leaves the possibility that the gross system can be privately owned and operated. Summers (1993, p.181) states that the large-value transfer system should be operated by the Central Bank (of Russia) and that it should be a gross settlement system and operate in real-time. There is also unanimous agreement that the system should provide same-day settlement with finality for payments. All this should encourage the development of money markets and contribute to the central bank' ability to perform its monetary control function.

The analysis of the merits of different settlement systems should take into account the complicated institutional and policy environments within which major payment system decisions take place (Summers 1996). Schoenmaker (1995), therefore, after finding that the extra costs of RTGS exceed the estimated reductions in settlement and systemic risk, leaves the possibility that the potential benefits from a more permissive and less distorting regulatory system could outweigh the extra cost of RTGS. So if, for example, the central bank wishes to reduce its role and/or strengthen market discipline it may opt for a safer and more expensive payment system (i.e. RTGS) to reduce banking regulation and supervision (ibid. 1995, p. 27).

Therefore, though it may look contradictory, the more monetary authorities' have control over, and initial involvement in, establishing and operating (safe and robust) payment system, the less overall banking regulation and supervision (and ex post intervention) will be required. RTGS is also a pre-requisite for the use of a delivery against payment mechanism, which should strengthen financial discipline and confidence in payment intermediaries and contribute to the development of capital markets. In favour of RTGS systems in CIT also goes the preference of the EU countries for such a system, both prior to, and for its implementation under, the Economic and Monetary Union (EMU). For Central and Eastern European countries it is important to build compatible systems which are easy to link to the ultimate EMU network of national RTGS systems.

A gross settlement system under central bank in its own right, however, does not imply technical efficiency, speed of payment messages processing and same-day

settlement. The 'real-time' operation requires high technical standards especially for the clearinghouse. This requires substantial set-up costs.

New electronic transfer systems should be robust and technically efficient to help in restoring two vital payment system requirements: *trust and discipline*. The long-term implications of a payment system design decision on potential retardation of private markets, competition and moral hazard are also important. As DNS systems seems to have certain advantages with regard to those considerations, and seemingly lower cost, it should not be a priori discarded as inadequate for CIT.

2.7. Payment system in Yugoslavia

2.7.1. Background issues

Following the break-up of the mono-bank system in the former Yugoslavia in the 1960s some core payment functions were given not to the commercial banks or to the central bank but to the newly formed Social Accounting Service better known as SDK[82]. Apart from having a monopoly on payments, the SDK also carried tax and budgetary controls, financial inspection and financial information dissemination. Inter-company transactions were, until recently, handled by SDK through "giro-accounts"[83] without passing through the banks, with SDK collecting fees from both companies and banks. The National Bank of Yugoslavia - NBY received on a daily basis the information on the gross value of bank positions. Inter-bank trading was conducted 'over-night' and the positions were reported the following morning.

The main criticism of SDK – the clearinghouse related to its independence from the National Bank and its capability to create so called 'quasi-deposits', beyond the control of NBY, thus undermining monetary policy management. In early 1996, SDK became an integral part of the National Bank, formally retaining only its financial and tax control functions, and the banks opened new accounts at the National Bank for that purpose. However, banks still need to readjust their human and technical recourses to

[82] "Sluzba Drustvenog Knjigovodstva" (SDK) in Serbian/Croatian/Macedonian/Slovenian. Although they changed the name and organisational structure, the name is still in use as a paradigm for the institution and its functions.

the new function. In view of that, it is provided that, what was known as SDK, performs payment operations during the transition (i.e. acts as a clearinghouse) thus utilising its good human resources and technical facilities. The year 2000 was announced as the deadline for the transformation.

There have been, however, claims that the transformation of the payment system from SDK to banks came too late and that at this stage it is counter-productive. It is argued that the transformation will slow down the progress towards a completely electronic funds transfer system that is, therefore, viewed as the final objective of the payment system restructuring. As this requires high technical standards for all the participants in the payment system (particularly banks) and a legal framework for electronic payments, the argument is that the clearinghouse is more likely to achieve them. The counter-argument that the participants in the payment system are increasingly becoming adequately equipped for completely electronic system of payment can be, to some extent, accepted. Nonetheless, the lack of a legal framework and more importantly financial discipline and operational skills is something that cannot be overcome over night.

On the other hand, the transformation of the payment system to banks does not hold back the improvement of technical facilities (of the various parties in the payment system) and the possibility of creating an electronic clearinghouse and further electronic netting. As for the latter, what was known as SDK can still play a crucial role. The key questions, however, are that of the efficiency, costs and risks of the payment system, i.e., how to utilise and improve the existing resources without increasing the payment system costs and risks.

2.7.2. Efficiency of the payment system intermediaries

Before the tighter monetary policy measures in 1994, Yugoslav banks did not have liquidity problems. All they had to do was to put political pressure (through their owners - large state-owned enterprises) on the National Bank of Yugoslavia for more funds, which were usually granted for the reason of preserving social stability and/or

[83] The giro-accounts are the transaction accounts held at SDK, and are, therefore, close substitute for current accounts at the banks. With giro accounts the balance must be either zero or positive, i.e. there are no overdraft or credit

preventing systemic risk. In effect, the central bank provided open-ended overdraft facilities for banks. This was one of the main reasons for one of the largest inflations in world economic history[84].

Effective monetary control is essential for achieving the price level stability that is in turn essential for efficient economic activity. As experienced by the Yugoslav economy, during the *hyperinflation* period (see picture 2-1), there was neither effective monetary control nor economic growth (there was also a huge decline in GDP[85]). With tighter monetary control and very low liquidity of the banks, in the last few years, the efficient payment system is required to reduce uncertainty in the timing of settlements, so that banks do not need to turn to the central bank for funds to deal with daily fluctuations in their payments and receipts.

Picture 2-1 A five-hundred billion Yugoslav Dinars banknote, issued in December 1993

A well-functioning clearing and settlement system is essential for efficient and competitive banking systems and capital markets and the creation of effective monetary control. The inefficient executions of payment instructions adversely affects the efficiency of the overall economy because it increases the demand for transaction money, which bears little or no interest. In addition, the lack of an efficient system of interbank payments hampers the development of liquid money markets. Transition from

extension facilities. Given the organisation of the system they were preferred to current accounts at the banks.

[84] In December 1993, the (officially published) monthly inflation rate in Yugoslavia was about 300 million percent (see appendix 3-1).

a payment system based on cash transactions to one involving the establishment and transfer of bank liabilities requires a high degree of *trust in banks*, that is, a precondition for large-scale movement away from cash is confidence in the banking system (Scott, 1993). However, many banks in CIT have serious bad asset problems which puts their depositors at risk if they become insolvent.

Indeed, the Yugoslav experience from 1992 to 1996 shows depositors were the first to suffer during the periods of illiquidity or tighter monetary control. Extreme cases, however, occurred in 1993 during the period of the hyperinflation, when a salary or any other receipts, if not withdrawn the same day, and exchanged for a hard currency (in a black market), were virtually worthless the next day[86]. As a consequence, most of the payment transactions were conducted in cash and outside the official payment system as it was banks practice to delay payments. The situation didn't improve much in 1995, 1996 and 1997, despite the lower inflation rate and more stable macroeconomic conditions[87]. This brings the debate back to trust and reliability issues and calls for clearly established rights and responsibilities of the various parties in the payment system. The Yugoslav payment system problems are revisited in Chapters 6 and 7.

[85] Economic sanctions and isolation, and instability (war) in the region are regarded as two factors that contributed to the fall in GDP in Yugoslavia during that period.

[86] This phenomenon is known as hysterics of currency substitution, which also resulted in the 'hysteresis' in the price levels adjustment).

[87] Nesic (1996), states the contrast of 1.6 billion dinars worth of payments that are processed on average every day by the clearing system and only 114 million dinars on average a day that are in the banks 'giro' accounts. On the other hand, this illustration doesn't take into account that if the payment system reform allows and encourages the transformation of the payment system so that the banks are the main providers of the service, this gap would narrow.

3. The Research Framework

3.1. Research design and approach

3.1.1. Background to the research

Greenspan (1996) emphasises the need for greater research efforts involving payment systems. He points out that the new ideas should reflect broad monetary, banking and infrastructure aspects of payment systems. Insights into innovations, efficiency and risks are, therefore, dependent on understanding complex institutions and processes. In view of the institutional environment and infrastructure, Blommestein (1993), Scott (1993), Summers (1994) and Schoenmaker (1995) put the case for the greater involvement of monetary authorities in payment system design in transitional countries, and the establishment of safe and robust clearing and settlement systems. Summers (1996) argues that the analysis of the difference between payment system goals of central banks and commercial banks, as well as the question of how banking structure and monetary regime impact on the choice of settlement system, could be expanded to take into account the complicated institutional and policy environment within which major payment system decisions take place.

This research is, therefore, focused on payment system reform as a part of monetary and banking systems restructuring and institutional aspects of payment system functioning. It is aimed at testing some general assumptions about payment system in general. In the case of CIT and Yugoslavia, in particular, it identifies and scrutinises the critical aspects of payment system operations. The major aspects of the analysis are: payment systems costs, risks and speed of payments; use and importance of cash; payment instruments and providers choice; use of technology and innovations; monetary policy; banking system reform; and customer satisfaction. In summary, the research will look at payment system components that influence the efficiency of a modern monetary economy.

The theoretical background to the research is a combination of BIS statistical methodology (e.g. BIS 1996d), in terms of the type of descriptive and explanatory statistics applied, and the works of Humphrey et al. (1996), Rochet and Tirole (1996)

and Bauer and Ferrier (1996) in establishing and testing the major variables. The research model draws from different theoretical and practical methods and methodologies for describing and analysing payment systems. The research is designed to apply recognised analytical techniques in a new context, with a view to testing some theoretical propositions and making recommendations about payment system problems in the particular environment. Given the complexity of overall payment system design and the number of issues that need to be considered, it may be justified to use a compilation of different methods, in conducting this applied research.

3.1.2. Research focus and major variables

The research focuses on Countries in Transition and FR Yugoslavia, i.e. their payment, banking and monetary systems - with the reference from, and comparative analysis of, both industrial and developing countries. The period under investigation is the nineties. The research is expected to define and explain the problems as well as to present possible solutions for them.

The variables are test-specific and differ depending on the group of countries being researched. Further explanatory notes are given for each analytical chapter separately. In general, the major *dependant variables*[1] are:

- Use and importance of cash,
- Payment instruments use and choice,
- Type and performance of wholesale clearing and settlement systems,
- Payment systems overall efficiency, i.e. the costs, risks, speed and float.

It is argued that these were influenced by the regulatory and institutional framework, payment system technology and overall technical infrastructure, interest and inflation rates, monetary policy measures, clearing functioning and efficiency, banking sector facilities and quality of staff.

[1] It should be noted that because of analytical purposes and exploratory nature of the bulk of the research the dependent, independent and endogenous/exogenous variables are very broadly defined here and are, therefore, not defined from a statistical point of view.

In particular, the following are defined as *independent variables*:

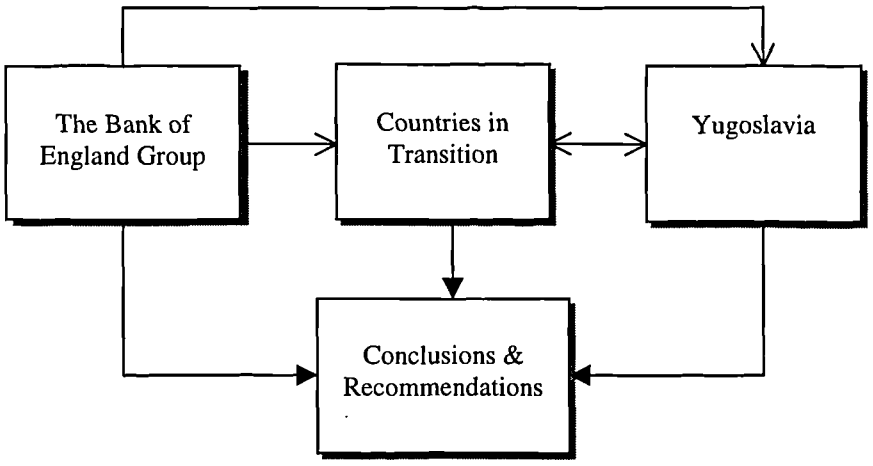
- General level of wealth and development of a country (GDP and/or GNP);
- Institutional framework, including banking system maturity and structure;
- Legislation and legal system efficiency;
- Applied payment system technologies and procedures and overall technical infrastructure;
- Monetary policy, inflation rates, interest rates, required reserves; and
- Competition among payment system providers.

3.1.3. Research approach

A three-step research approach is employed (see figure 3-1).

- The research starts with a cross-section analysis of payment systems in a group of 70 countries, the so-called "The Bank of England Group". The investigation sets out to identify and present the major explanatory variables establishing whether payment systems are significantly different in industrial, developing and transitional countries.
- The payment systems and overall financial environment of CIT are investigated to find their characteristics. Also, some generalisations and recommendations are put forward, both as lessons for other countries and suggestions for the systems' improvements.
- The past and current performance of the Yugoslav payment system is analysed with a view to establishing a background for its improvement, i.e. to suggest a way forward for establishing an efficient and effective payment system in the given environment. The findings are also incorporated in the final conclusions on payment systems in CIT.

Figure 3-1 The analytical framework



The main questions the research seeks to find answers to are:

- What are the differences between payment systems in CIT and other countries? What are the characteristics of CIT payment systems?
- What are the major problems in different payment systems? Are there universal solutions?
- What role should government and central bank play?
- What are the implications of payment system design for the banking system, its performance, monetary policy and the transition of the economy as a whole?
- Was the Yugoslav payment system efficient[2] in the past? What were the major problems associated with the payment system in the past and present?
- What clearing and settlement system is best suitable for the Yugoslav economy and how to achieve it cost-effectively?

In short, the research hopes to contribute to explaining the issues, defining the problems and to discovering possible solutions to the CIT and Yugoslav case.

Descriptive and explanatory research are combined into a "problem-solving" research by means of cross-border comparative analysis, examining the performance over time and both theoretical and practical achievements in that field in an international context. The research also seeks to find the limits to, or merits of, previously proposed generalisations and recommendations for CIT and Yugoslavia, as

[2] In terms of costs, risks, speed, reliability and influence on other aspects of the monetary economy.

far as particular problems are concerned. In this sense, the research is deductive. It draws conclusions from the comparative analysis and best-established practice in both developed countries and CIT. Nonetheless, in light of the other research methodologies, as discussed in the subsequent sections, the research is also of an inductive nature. The conclusions are drawn and the generalisations are made from the results of various tests and illustrations that use empirical data on the particular transitional countries and Yugoslavia.

3.2. Research model and methodology

Given the scope and complexity of the problem, isolated methods of data collection and analysis would seem too narrowly focused or somewhat biased. Triangulation, i.e. the use of different research approaches, methods and techniques, is used to overcome the potential bias of a single-method approach. The major *methods* that are applied in the course of the research, with the given approach in mind, are:

a) explanatory statistics that uses comparison, correlation and regression tests for analysing the major variables across countries,
b) exploratory data analysis - based on descriptive statistics on payment and banking system performance in CIT and Yugoslavia,
c) field research - by conducting surveys and interviews of the CIT central bankers and Yugoslav banks senior management's and other 'stake-holders'[3] opinions on the matters,

Secondary analysis was conducted to critically evaluate some of the normative economics and established practice both in the East and West.

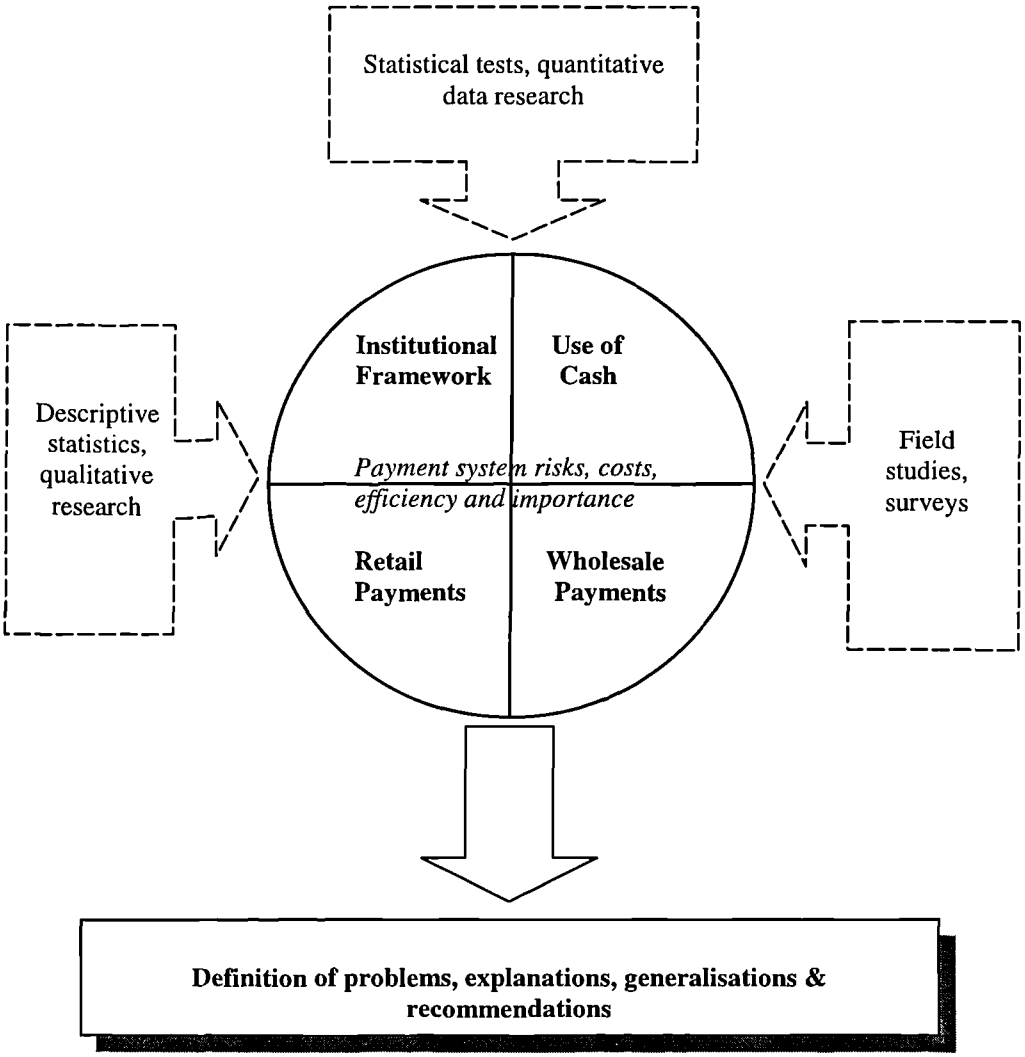
The major *categories* of investigation are:

1. Institutional framework.
2. Use and importance of cash for payments.
3. Retail payment systems, including use and importance of payment instruments.
4. Wholesale payment systems, their performance and reforms.
5. Overall payment system's risks, costs and place in a monetary economy.

[3] Namely experts and managers from the National Bank and clearinghouse - ZOP, and two bourses.

The institutional framework, as a qualitative variable, is quantified on an ordinary scale. Use and importance of cash is measured by cash in circulation, cash to narrow money ratio and cash to gross domestic product ratio. Retail payment systems are analysed in terms of payment instruments choice, use and importance. Wholesale payment systems are evaluated in terms of costs, risks, speed and monetary policy considerations. There are, however, some specifics regarding each of the three research sites in respect of the research models and methodologies. They are presented next. The research model is also shown in Figure 3-2.

Figure 3-2 The Research model



3.2.1. The Bank of England Group of countries

The analysis of the Bank of England Group of 70 countries is based on the data set formed from the survey responses of the countries' central banks. The survey was conducted by the Centre for Central Banking Studies of the Bank of England in February 1998.

In the case of The Bank of England Group data analysis the approach is to:

- Identify and present major payment system explanatory variables;
- Compare payment system categories between the industrial, developing and transitional countries.

The methods used for the comparative analysis are: Analysis of Variance (ANOVA) and Kruskal-Wallis tests – for comparison across the groups and t-statistics and Mann-Whitney – for comparison between the groups. The tests results wei checked by regression analysis and the introduction of two country-dummy variables. Further multiple regression and correlation analysis are used for explorative and explanatory purposes with regard to the major payment system variables. The tests were selected for their clarity, their explanatory properties, and for illustrative and interpretation purposes. A cross-section analysis of the countries' payment systems using data for a single year (1997) was regarded as an optimal choice given the nature of information provided by the survey[4]. The major aspects of the analysis are *institutional framework, cash holdings, required reserves and clearing cycles*. These categories were chosen for their analytical attributes and transparency in describing the differences in payment systems across the countries.

The three aspects of the *institutional framework* analysed are: banking system maturity; legal framework; technical infrastructure. Each of the factors was assessed as "satisfactory", "transitional" or "poor" for every country by the countries' central banks, and subsequently quantified on an ordinary scale. As data on total cash transactions for any country are extremely rare, *cash holdings* are measured by three

[4] That is, only cash holdings data are available and can be used for time-series analysis. However, the frequency and consistency of the data, i.e. the missing cases, vary across the groups and the variables, especially for less developed countries for the period prior to 1995. There are also many gaps in the time-series and inconsistencies in data presentation methodologies.

indirect measures that indicate the use and importance of cash in an economy. These are: a) cash in circulation in USD, at purchasing power parity rate, per capita, b) cash in circulation to narrow money ratio and c) cash in circulation to gross domestic product. The *length of the clearing cycle*, measured in days, is used as an indicator of payment processing efficiency. *Required reserves*, as an instrument of monetary policy, are investigated in relation to their payment purpose properties. In particular, the level of reserves, whether interest is paid on them or not, and if they can be used for payments, is analysed.

3.2.2. Countries in Transition

Four aspects of the CIT payment systems are investigated. Firstly, the institutional framework is presented. The CIT banking and legal systems development and technical infrastructures are assessed. Some descriptive statistics and illustrations are shown. Second, the CIT retail payment systems, including cash holdings and non-cash payment instruments, are illustrated. The analysis is mainly of a qualitative nature. Third, a select group of eleven transitional countries' payment systems and reforms are assessed, by means of case study approach. Finally, the payment systems of these eleven countries are analysed against the monetary frameworks for each of the countries, on a case by case basis.

The objectives are to:

- Identify the major characteristics of and trends in the payment systems in CIT.
- Find the major payment system problems of CIT.
- Suggest possible solutions to the problems.
- Place the payment systems reforms in a broader context of monetary economies and macroeconomic policies.

3.2.3. Yugoslavia

The first step in analysing the Yugoslav payment system is an exploratory data analysis, i.e. looking at the available descriptive statistics and other information, in

order to: present the characteristics of the system and evaluate proposed design changes; and identify what needs to be investigated further. This is followed by explanatory analysis. The final step is to incorporate the results of the survey into the analysis in order to strengthen or dispute the findings made by previous analytical techniques. Before each test of the assumptions and propositions, a further explanatory note will be given.

The purpose of the survey is to shed more light on the issues investigated in the research, namely to test-prove some of the quantitative variables and the analytical results based on them. In view of limited official data availability and depth the survey may contribute to a better explanation of the Yugoslav payment system and its functioning. The population is banks' presidents/directors. The views of Yugoslav banks' managers are of particular interest as the banks are both the users and providers of the payment system services and are directly involved in the process of payment system reform. Descriptive statistics and hypotheses testing by means of t-statistics tests are used. The data collection methods used are mail questionnaires and interviews. The results may contribute to explaining the implications of the payment system's past, present and future design on the banking and monetary system as a whole.

3.3. Data collection

In light of the general perception of limited availability and reliability of relevant data on the CIT, several data collection methods and perspectives[5] are used to examine the relevant aspects of the payment system. The following approaches to data collection are applied:

a) Use of the *official documentary sources* and data bases: for cross-border data these are Bank for International Settlements, World Bank, International Monetary Fund, European Bank for Reconstruction and Development (EBRD) etc.; for Yugoslavia these are provided by the National Bank of Yugoslavia, SDK/ZOP - the clearinghouse, and Yugoslav Statistical Office[6].

[5] So-called triangulation approach.
[6] "*Savezni zavod za statistiku* - SZS" in Serbian

b) *Mail questionnaires*, followed up by sample interviews - in person and telephone; Two surveys that were conducted include a survey of central banks of transitional countries and a survey of all Yugoslav banks and relevant financial institutions. In addition, the Bank of England Group survey data set is used.

c) Use of *other relevant sources*, including the bankers associations and major investment banks.

3.3.1. The Bank of England Group analysis

For the cross-countries comparative analysis, the following data sources are used. Data on the use of cash[7] in 1997, is provided by the International Financial Statistics (IFS 1998) and the World Bank Atlas 1998. International Financial Statistics also provide data on levels of required reserves. Data on clearing cycles, institutional factors, type of settlement system, use of required reserves for payments and interest on excess reserves, as well as various payment instruments volumes and values was collected by the BOE survey of 70 countries' central banks. The information is also checked against some central banks' reports or publications, made available upon request or at the various Internet homepages[8] of the institutions.

3.3.2. Countries in Transition analysis

The cash holdings data is taken from the IFS (August 1998) and the World Bank Atlas (1998). The institutional framework data, regarding the levels of banking system, legal framework and technological infrastructure development, is gathered from the major international financial institutions. EBRD provides data on the banking system and legal framework developments, classified on an ordinary scale and based on the field research carried out by the institution. The World Bank provides data on number of telephone mainlines, use of electricity per capita, number of personal computers per capita and percentage of paved roads in a country. They are all used for creating an indicator, quantified on a ordinary scale, of a technological framework development for

[7] It includes data on cash in circulation, GDP, purchasing power parity rate, monetary aggregates and population.
[8] For a link to central banks' homepages visit www.bis.org /central banks/

each transitional country[9]. Information about reforms, payment, banking and monetary systems is provided by the CIT central banks. This was gathered by the survey of CIT central banks and checked in the World Bank, EBRD and other institutions' publications.

Information gathered from the central banks was mainly in the form of specially prepared reports on the countries payment systems in response to the survey. As many central banks were unable to complete the questionnaires on their countries payment systems due to the lack of available data or the short periods for which the systems had operated, they were happy to prepare/send special reports or answer specific questions on the payment systems instead.

3.3.3. Analysis of the Yugoslav payment system

Data for the exploratory analysis was provided by the national clearinghouse (ZOP), National Bank of Yugoslavia, The Bankers' Association and the Yugoslav Statistical Office. Other data and information were gathered by the survey of all Yugoslav banks and the representatives of the central bank, the clearinghouse and the two bourses.

3.4. Research hypotheses and proposals

Several hypotheses and research questions are investigated in each of the three parts of the research. The main hypotheses and proposals that are tested in the course of the research are:

1. Countries in Transition, that are undertaking payment system reforms or adjusting their payment systems to support their market economies, should incorporate in their payment system design the best practice and experience of both developed countries and particularly CIT that have already gone through this process.

   The null hypothesis is formulated and tested as:

[9] A further explanation of the classification is given in the analytical chapter and in the relating appendix.

Payment system in each country is unique and the payment system design and/or reform should be unique too.

The argument is that the lessons from the payment system development in the CIT, and the proven merits and disadvantages of particular clearing and settlement systems that are in place in different industrial countries, can be used as a basis for the payment system development in countries undertaking the reforms. The difficulty, however, is in choosing among a great variety of different payment systems and particular solutions for payment system problems.

2. In CIT, overall banking and monetary system reform is necessary, and payment system design is only one part of it. A payment system reform should be in line with the overall monetary system reform and banking system restructuring strategy.

   The null hypothesis is:

   Payment system reform in CIT could, and should be, undertaken regardless of the banking system restructuring. It will improve, in its own right, the overall efficiency of the banking system and help the monetary policy.

The assumption is that payment system reform on its own cannot significantly improve the efficiency of the monetary economy as the functioning of the financial system and its relationship with the real economy are crucial for the system restructuring. Therefore, it is the overall institutional setting that determines the payment system's costs, risks and efficiency. In particular, the CIT are faced with the problems of ownership structure, loan repayments (bad debts) and lack of legal clarity, bankruptcy laws and accounting standards regarding payments.

If there are no real changes in the banking system, if payment system design is poorly co-ordinated with monetary policy, and if there is no efficient legal system, not even the implementation of state-of-the-art technology and organisational structure and well-thought of legal solutions will result in fast, cheap and risk-less payments. The problem is emphasised by the limited resources and/or choice among priorities that the policy-makers are dealing with. Nonetheless, payment system restructuring is

necessary, and it may contribute to the facilitation of other financial system restructuring objectives.

The main questions this research is attempting to answer are:

- What are the similarities and differences in payment systems around the world?
- What are the characteristics of payment systems in CIT?
- What are the main problems regarding the CIT payment system reforms?
- What are the possible solutions to the problems?
- Are the generalisations about the payment systems in different countries appropriate? and
- Are there universal solutions to the payment system problems?

The working hypotheses, as formulated for hypotheses testing by various statistical tests, are presented in each analytical chapter.

3.5. Contribution

Although payment system efficiency has been a part of many studies on banking and monetary systems functioning, it is only recently that it has been investigated in more detail and researched as a topic in its own right. As Berger, Hancock and Marquardt (1996, pp. 725) suggest: "It is an exciting time in the history of this research - a time when the key issues are being identified, a limited number of hypotheses are being put forth, and a few tentative conclusions are being drawn". There is also a need for more research efforts involving payment systems as a part of broad monetary and banking systems (Greenspan 1996). As a country's payment system costs are estimated to be about two to three percent of GDP per annum (Humphrey et al 1996), theoretical insights into improving the efficiency of payment systems could have significant practical use. In light of identified deficiencies in the literature and practical aspects of payment system reform in CIT, the research is aimed at contributing to three particular areas.

Firstly, building on previous studies, this research might contribute to investigating institutional, monetary and banking aspects of payment system functioning. Although focused on CIT and Yugoslavia, the research draws from existing theories and practice of developed countries. The results of the research can,

therefore, be used to show whether some of the proposed generalisations about payment instrument choice, adequate settlement system, payment intermediaries efficiency, and relationship between payment system and monetary system hold in the case of CIT. In this sense, the research will make a theoretical contribution to understanding payment systems as part of broad monetary and banking systems.

Secondly, there has been little research effort involving payment systems in CIT. Although there have been some studies[10] that examine aspects of payment system reforms in a particular country, they are limited in depth and devoid of empirical illustrations. Other studies in the field[11] have approached the problem from a normative economics point of view without using empirical research, largely as a consequence of the lack of available data. The aim of this research is to go further in investigating the problems and presenting some empirical evidence and illustrations. It is concerned with extending existing ideas and developing new ideas about:

- monetary policy and banking system implications of payment system reform,
- choice between settlement systems and payment system arrangements,
- new payment technologies and electronic money in CIT,
- empirical results of the study can also be used for further generalisations about payment and financial system functioning in CIT and as lessons for other countries undertaking the reforms.

Finally, from the perspective of the Yugoslav financial system, the contribution is in clarifying the points raised in the debate about the payment system and showing a way forward and/or possible solutions to the problem. It is the first study of the type regarding Yugoslavia and as such its task is to scrutinise some of the proposed claims, policies and actions undertaken. In particular, the recommendations concern:

- The choice of the appropriate settlement arrangements;
- Role of different participants in payment system (including government, central bank, commercial banks and the clearinghouse); and
- The place of the payment system reform in the overall banking and monetary system restructuring.

[10] For example, Topinski and Struzynski 1995.
[11] For example, Blommestein 1993, Scott 1993, Folksters-Landau et al. 1993, Summers 1994.

The particular contribution of the first analytical chapter[12] is:

a) Confirmation and explanation of seemingly contradicting assumptions about relatively high cash holdings in higher income and lower inflation countries and higher use and importance of cash in lower income / higher inflation countries.
b) Empirical analysis of payment systems in less developed countries.
c) Comparison and analysis of payment systems across different country groups.
d) Introduction of the institutional framework variables into empirical analysis on payment systems.

The second analytical chapter, Payment Systems in Countries in Transition, provides:

a) Empirical evidence on payment systems functioning in CIT.
b) Possible solutions for the payment system problems in the analysed CIT.
c) Transparent illustration of payment system and monetary and banking systems relationship in general.

The third and fourth analytical chapters (chapters 6 and 7), that analyse the payment system in Yugoslavia, scrutinise:

a) The perception about the payment system performance in the past.
b) Proposed payment system solutions for the future.

The overall results of the research may thus be used for illustration of functioning of payment system in monetary economy and the relation of payment system with banking, financial and economic systems.

3.6. Limitations of the research

There are also some constraints on the research. Lack of time-series data for some major variables, not enough detailed data, and unreliable and contradicting information sources - all regarding CIT and Yugoslavia - are the major constraints. Therefore, the research methodology and methods are, to a certain extent, dictated by data availability. For example, payment system efficiency is tested in an unorthodox manner, using a survey methodology rather than efficient frontier measures of cost or profit or 'alternative-profit' efficiency.

[12] Chapter 4 "Payment Systems Cross-Countries Analysis: The Bank of England Group".

There is also a problem of normative versus positive economics, i.e. some of the theoretical propositions and recommendations of payment system design in CIT can be critically evaluated only after they are implemented and run for some time. Lack of historical precedents, and an empirical basis, for testing some of the theoretical propositions mean that this and some further research will have to some extent base recommendations on normative economics, i.e. the prevailing perception of the reality and how the things should work at the time of the research.

However, conclusions and suggestions can be proposed on data and information that are available. Furthermore, the payment system problems have serious practical implications on all aspects of financial system operations in any country let alone a country in a state of transition towards an efficient market economy. Therefore, the problems should not be an obstacle but a challenge for a researcher.

4. Payment Systems Cross-Countries Analysis - The Bank of England Group

4.1. Introduction

This chapter presents a comparative analysis of payment systems across the world for the year 1997. The analysis is based on the survey responses of "The Bank of England Group" -- The BOE group -- of 70 countries. The BOE group comprises 21 industrial countries, 13 Countries in Transition - CIT, and 36 developing countries (see Table 4-1.). The survey was conducted by the Bank of England's Centre for Central Banking Studies, in February 1998. The analysis presented in this chapter follows up on the Centre's project[1] of comparing payment systems around the world.

The four broad categories used for analysis and presented in the subsequent sections are: 1) *use of cash*, 2) *clearing cycle*, 3) *required reserves* and 4) *institutional framework*. These categories were chosen for their properties of capturing and explaining differences between payment systems in different countries.

The aims of this part of the research are:

a) To establish explanatory variables for payment systems functioning in order to present the payment systems' characteristics; and

b) To compare payment systems across the three country groups to identify similarities and differences between them.

Table 4-1 The Bank of England Group of Countries

Industrial Countries	Transitional Countries	Developing Countries
Australia; Austria; Belgium; Canada; Finland; France; Germany; Greece; Hong Kong; Iceland; Italy; Netherlands; New Zealand; Norway; Portugal; Singapore; Spain; Sweden; Switzerland; United Kingdom; United States of America;	Armenia; Belarus; Bulgaria; China; Czech Republic; Hungary; Latvia; Poland; Russia; Slovak Republic; Slovenia; Tanzania; Vietnam;	Bahrain; Barbados; Bermuda; Botswana; Brazil; Columbia; Cyprus; Eastern Caribbean; Egypt; Fiji; Guyana; Jordan; Kenya; Korea; Kuwait; Lebanon; Malawi; Malaysia; Malta; Mauritius; Mexico; Morocco; Mozambique; Namibia; Nigeria; Pakistan; Peru; Saudi Arabia; South Africa; Swaziland; Tonga; Turkey; Uganda; United Arab Emirates; Zambia; Zimbabwe;

Source: Fry et al (1998)

[1] Fry et al (1998)

For the purpose of this study, the original data set collected by the survey was adjusted accordingly. Thus, the ordinal scales for some qualitative variables were established and some gaps, especially regarding data for CIT, were filled[2]. In addition, other data sources, such as International Financial Statistics and World Bank Atlas, were used.

The methodology is based on exploratory and explanatory analysis of the data sets collected by the survey. The methods used for the comparative analysis are: Analysis of Variance (ANOVA) and Kruskal-Wallis (K-W) test - across groups, and t-tests and Mann-Whitney test - between groups. The tests results were checked by regression analysis, where two country dummies were introduced[3]. The methodology is also explained in Chapter 3. A cross-section analysis for a single year was dictated by the data availability and the type of comparative analysis. In general, the year 1997 was chosen for the purpose of capturing the up-to-date payment systems developments. As some variables appear to follow a non-normal distribution (see table 9-13, appendix 1), both parametric and non-parametric methods were used for the tests. There are, however, no significant differences in the results from the two groups of tests. Detailed summaries of the tests are presented in the appendix 1, tables 9-1 to 9-13.

4.2. Use of cash

The extent of use of cash for payments (i.e. its proportion in overall volumes and values of payments) can be used as an indicator of a stage of a country's payment systems development and/or efficiency. Three indirect measures can be used to evaluate the importance of cash holdings for payments. These are *cash holdings per person*, i.e. currency in circulation, *ratio of currency in circulation to 'M1'* and *ratio of currency in circulation to Gross Domestic Product (GDP).* All three measures are considered in the analysis as they all provide additional information individually with regard to use of cash across the BOE group.

[2] The original data-sets, based on the Bank of England's survey responses, were marginally adjusted as some gaps for missing cases for various variables for transitional countries were filled. The data source for the adjustments are the central banks' annual reports for the year 1997.

[3] 'Ddummy' = 1 for developing countries and 0 otherwise, and 'citdummy' = 1 for CIT and 0 otherwise.

The first measure is supposed to capture 'the wealth effect', that is to be in line with the theoretical predictions of higher currency in circulation (CC) with higher GDP and lower CC with higher inflation and higher interest rates. Therefore, the measure may be an indicator of the store of value function of money. The second measure is an indicator of importance of cash compared to deposits[4], which are used for non-cash retail payments. The third measure caters for inflation and shows the relative importance of cash in circulation related to a country's 'wealth'. The latter two measures are supposed to capture the importance of cash as a medium of exchange[5] for the BOE group countries. The summary of results for the measures across groups is shown in table 4-5 in the summary section. The test results are also presented in the appendix 1.

4.2.1. Cash Holdings Per Person in USD

Cash holdings per person, defined as cash in circulation in USD at purchasing power parity rate - (ppp 1997) per inhabitant, seem to vary across countries and among the three groups. To avoid possible test ambiguities regarding the distribution of the variable, both parametric and non-parametric groups of tests were used. There are, however, no contradicting results in respect of the methods used. Whether the cash holdings are significantly influenced by GDP per capita (in USD at ppp 1997), i.e. if there is the 'wealth effect', is also tested. The analysis did not take into consideration the "currency substitution" phenomena, which characterises Central Asia, Turkey, Russia, Bulgaria, Mexico and countries with high income from tourism, such as Greece and Spain. Unfortunately, the data on "reserve currency" in circulation in those countries was not readily available[6]. It is assumed that this measure may not adequately capture the importance and use of cash (as a medium of exchange) in less developed countries, even though the cash holdings are expressed both per capita and at the purchasing power parity rate.

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[4] By definition: Cash in Circulation + Transaction Deposits = Narrow Money (denoted as M1)

[5] Central banks' fiat money is by law the unit of account in a particular economy. However, the local currency and its unit of account function, can be de facto substituted by a foreign currency, especially in a high inflation country.

[6] Foreign currency in circulation can reach up to 100 percent (anecdotal evidence for Turkey) of the local currency which could change some of the findings regarding this measure.

Differences across the three groups of countries

There are **statistically significant differences across the three groups** of countries in respect of cash holdings (cash in circulation) per person. A person in an industrial country 'holds' on average more cash than a person in developing country, who in turn has more cash than a person in a transitional country. The difference in cash holdings between CIT and developing countries is not statistically significant. ANOVA and K-W were also used to test whether three institutional factors -- banking system maturity, legal framework and technology -- significantly influence the cash holdings. Banking system maturity and 'technological level' seem important factors i.e. there are differences in countries with "poor", "developing" or "satisfactory" banking system maturity and technology in relation to the cash holdings (see appendix 1)[7].

Regression and correlation analysis

Figure 4-1 shows the cash holdings per person in relation to GDPppp per capita. Cash holdings are positively related to GDPppp per capita, i.e. income/wealth (r = 0.64). The three 'outliers' are Malta, with GDP/per capita of about $10,000 and the cash holdings of about $3,000, Spain, with GDP/per capita of below $15,000 and the cash holdings of about $1,500, and Finland, with GDP/per capita of about $20,000 and the cash holdings below $500. Malta and Spain have high cash holdings per capita and Finland and UK have low cash holdings per capita relative to the levels of GDP per capita. Possible explanation for high cash holdings in Malta and Spain are the presence and significance of offshore banking (surge of capital) and monetisation of foreign currency income from tourism, respectively. The explanation for the relatively low cash holdings in UK and Finland may be the high use of cash alternative payment instruments, such as debit cards, as found by Humphrey et al. (1996) and illustrated by BIS (1998).

[7] Because of the unbalanced sample design (unequal number of units in the groups and missing cases for some variables) two factor analysis was not possible other than by regression analysis.

In line with macroeconomics theory, additional explanatory variables identified and used in tests are:

1) "Velocity of money", defined as ratio of nominal GDP to nominal cash balance (base money), – negatively related. Therefore, the real money balance, CCpppPC, increases when the velocity (the 'work' that money does) decreases.
2) "Real interest rates", defined as deposit interest rates at annual level adjusted for the annual inflation rates, which is negatively related.

Together with GDPppp per capita the variables explain about 80% of the variation in relative cash holdings (R^2=0.805). GDPppp per capita and the velocity's β-coefficients are statistically very significant. All other variables on their own or in combinations do not increase explanatory power of the regression[8].

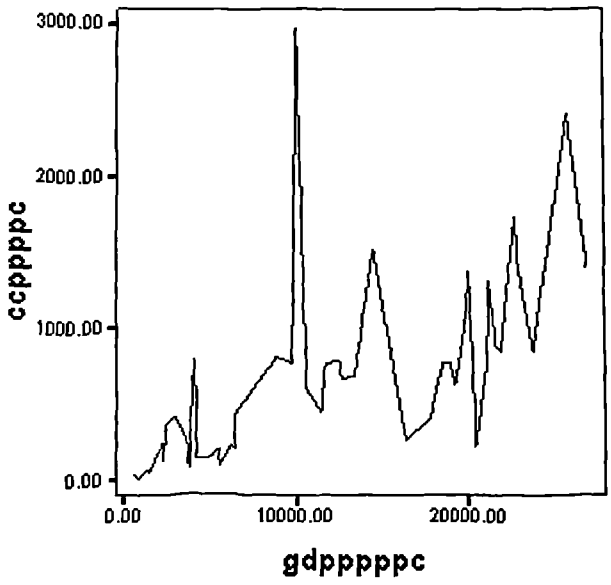

Figure 4-1 Cash in circulation per person in USD (purchasing power parity rate 1997)
The peak at $10,000 GDPppp per capita represents Malta.

[8] The econometrics tests confirm that the multiple regression can be used for the explanatory purposes as there seems to be no indication of multicollinearity, heteroscedasticity, autocorrelation or lack of fit with regard to model specification (see appendix 1).

4.2.2. Cash in circulation to narrow money ratio

It is tested for significant differences across the three groups of countries with regard to the level of currency in circulation relative to narrow money monetary aggregate[9] (CC/M1). Descriptive statistics (table 4-5) show that developing countries have a slightly higher level of currency in circulation relative to M1 than CIT, which in turn have much higher level of the ratio than industrial countries. The ratios are 40%, 39% and 22%, respectively.

Differences across the three country groups

There are **statistically significant differences across the three groups** of countries in respect to the level of cash in circulation to narrow money aggregate[10]. Only technology seems to be an influential institutional factor in respect to the level of the ratio, i.e. countries with the different levels of payment systems' technical infrastructure (as assessed by the central banks) have different levels of CC to M1. Thus, countries with 'poor' level of technical infrastructure tend to have larger proportion of cash in circulation to narrow money as compared to countries with 'satisfactory' payment system technology and/or banking system maturity. Possible explanations centre around payment instruments availability and efficiency of fund transfers for retail payment instruments, both dependent on the available payment system technology.

Regression analysis

GDP in USDppp per capita, cash in circulation in USDppp per capita, "technical infrastructure" and "length of clearing cycle (in days)" explains 70% of the variations of the ratio[11] (see table 9-4). The level of cash holdings to narrow money decreases with higher GDP but increases with higher relative cash in circulation, i.e. with the increased

[9] Based on the BIS (1998) classification and central banks' responses. The monetary aggregate has been denoted as M1, although the annotation may be different in different countries, for example in UK – M2 and Sweden – M3.

[10] The variable seems to have normal distribution. Nevertheless, the results were checked by non-parametric tests. The results are in agreement with the 'parametric' tests.

[11] Inlcusion of number and value of other payment instruments increases the explanatory power of regression but reduces the sample size to about one half of the observations, thus excluding lower income countries with underdeveloped statistics on payment instruments. This regression is, therefore, excluded from the analysis.

importance of store of value function of money. Length of clearing cycle has a direct influence on reliance on cash in conducting economic transactions, i.e. the longer the clearing the higher the CC/M1 ratio. Therefore, the faster the clearing the less need for the immediate settlement feature of cash, hence the higher the proportion of deposits (used for cash alternative payment instruments) in narrow money. The level of technological development is inversely related to proportion of cash in narrow money. Thus, the more advanced the technology, the more payment instruments available, more reliable (certain) the process of clearing, and the more convenient the process of payment with payment instruments other than cash.

The measure (CC/M1) seems significant in capturing differences across the three groups in respect to the relative importance of cash in the respective economies. It indicates whether a payment system is 'cash-based' or not, i.e. 'the phase' of a payment system development. Thus, in countries with the lower ratio the level and importance of transaction deposits with financial institutions (which are the base for non-cash payment instruments such as cheques or debit cards) is higher.

4.2.3. Cash in Circulation to GDP

The null hypothesis is that there are no significant differences across the three groups of countries (industrial, CIT, developing) regarding the currency in circulation (in local currency) to GDP (in local currency) ratio. The averages are 5%, 6.7% and 7.1%, respectively. It is also tested to establish if there are significant differences across countries with different levels ("poor", "developing" and "satisfactory") of banking system maturity, legal framework and technology in respect of a level of Currency in Circulation to GDP.

The measure (CC/GDP) is also identified as a 'link' between the opposing findings of the two other cash holdings measures[12], as illustrated by the correlation matrix (table 4-2).

[12] $CCpppPC and Cash in Circulation to M1. The former measure is higher in higher income and lower inflation countries and the latter measure is higher in lower income (and higher inflation) countries.

Table 4-2 Cash measures correlations

		CCPPPPC	CCGDP
CC/M1	Pearson Correlation	.153	.630**
	Sig. (2-tailed)	.282	.000
CCPPPPC	Pearson Correlation		.561**
	Sig. (2-tailed)		.000

**Correlation is significant at the 0.01 level (2-tailed).

Differences across the three groups

Both parametric and non-parametric tests show that there are **no significant differences** between industrial, transitional and developing countries in respect of currency in circulation to GDP ratio. The null hypothesis is, therefore, rejected. The dummy variables in the regression analysis are insignificant both individually and in explaining the total variation of the dependant variable. Legal framework adequacy influences the ratio. Even though the tests show that there are no significant differences between the *three groups* of countries in respect of the level of the ratio, there are significant differences *across countries* with different levels of GDP (economic wealth/development) in respect of the CC/GDP ratio (as illustrated by the regression analysis).[13]

Regression analysis

The proportion of currency in circulation to GDP is negatively related to the relative level of GDP - GDPppp per capita, level/class of legal framework and level of deposit interest rates. There is also a positive and significant relationship with a relative level of currency in circulation (CCppp per capita). These four variables explain about 80% of the variation in CC/GDP ($R^2 = 0.798$). Thus, the higher the GDP and the level of legal system development the lower the ratio. This can be explained by, for example, the higher level of economic and trade development in countries with higher income countries that requires cash-alternative payment instruments that are, in turn, well

[13] The differences in findings can be explained by the limitations of the classification of the countries into three distinct groups (as discussed in section 4.7) and/or small (gradual) change of the ratio with a change in a country's wealth (level of GDP).

guarded by law. Interest rates provide incentives for the use of other payment instruments, based on interest-bearing transaction deposits. The level of relative cash holdings ($CCpppPC) is positively related to relative importance/use of cash (CC/GDP). Other variables seem to contain no additional information on the dependant variable for the BOE group.

It can be also argued that the effectiveness and extensiveness of the legal system influences certainty and trust in the system, i.e. the use of cash-alternative payment instruments. Thus, the better the legal system, the less use of cash, hence the greater reliance on other payment instruments as there is less fear of credit risk (better protection of the parties involved in a transaction). This assumption seems to be confirmed by the findings of the regression analysis.

In summary, the CC to GDP ratio may be used as a measure of cash holdings that caters for inflation and differences in wealth across countries. The ratio is positively related to relative cash holdings ($CCppp per capita), and negatively related to the relative level of GDP (GDPppp per capita). Interest rates and legal framework adequacy inversely influence the ratio which can be explained by the opportunity costs and credit risk protection, respectively. The ratio is highest in the developing group of countries and lowest in the industrial group of countries.

4.3. Clearing Cycle

Length of clearing cycle is used as a proxy measure of both large-value payment systems' efficiency and speed of the payment systems' transactions. The following hypotheses are tested. The null hypothesis 1 is that there are no significant differences in length of clearing cycles across the three groups. The null hypothesis 2 is that banking system maturity and technology are not significantly different across groups, with regard to clearing cycle. Null hypothesis 3 is that use of RTGS system cannot explain differences in clearing cycles. The summary of descriptive statistics is shown in Table 4-3.

Table 4-3 Clearing cycles in The BOE Group

category	Industrial	Transitional	Developing	BOE group
Average length of clearing cycles in days	1	3.8	4.3	3.2
Standard deviation in days	0.9	4	4.5	3.9
Range in days	0 -3	1.5 - 4	0 - 23.5	0 - 23.5
1st Quartile - 3rd Quartile	0.3 - 1.5	1.8 - 3.6	2 - 6.5	1 - 3.5
Use of RTGS systems - percent of the countries	86	46	25	46

Differences in clearing cycles

Both parametric and non-parametric tests show that there are **significant differences in clearing cycles in developing, transitional and industrial countries** (see appendix 1). This is also confirmed by the regression analysis, where two country-dummies - one for developing and one for transitional countries - both have significant β-coefficients. The null hypothesis 1 is, therefore, rejected. The differences between transitional and developing countries alone are not significant and both these groups of countries have, on average, longer clearing cycles than industrial countries. The average clearing cycles for industrial, transitional and developing countries are 1, 3.8 and 4.3 days respectively.

There are also significant differences across the three groups of countries in respect to their use of RTGS systems. Countries that use RTGS systems have significantly shorter clearing cycles. However, the countries with a RTGS system tend to have a DNS system as well. Therefore, use of RTGS can be viewed as an extension of payment systems efficiency and risk control, rather than an explanatory variable in its own right. Banking system maturity and technology are also found to determine differences in clearing cycles. Thus, countries with satisfactory banking system maturity and/or technology have, on average, shorter clearing cycles than countries with developing or poor state of these 'factors' (see appendix 1). Hypotheses Ho 2 and Ho 3 are, therefore, rejected.

Regression analysis

The relationship between clearing cycle and GDPppp per capita is log-linear (see figure 4-2). Log GDP (in USD at ppp 1997, per capita) - loggdp - is the single most important explanatory variable in the regression equations. There is a negative correlation between the logs of the two variables of r=0.61 (see also appendix 1). For every one percent increase in GDPpppPC the length of the clearing cycle is expected to be reduced by approximately a half percent. Inflation (Consumer Price Index – CPI) is another significant explanatory variable. The best regression equation, which includes loggdp and logCPI, explains about 43% of the total variations in clearing cycles.

Other variables tend to reduce sample size (number of observations), as there are data/cases missing for less developed countries. GDP, inflation and total volume of payments, for example, explain over 97% of the variations, but in a sample of about one third of the countries (mostly higher income countries where clearing, GDP and inflation cases are matched with data for total volume of payments). Banking system maturity, technology, legal framework, existence of RTGS system and country dummies do not add to the explanatory power of the multiple regression analysis.

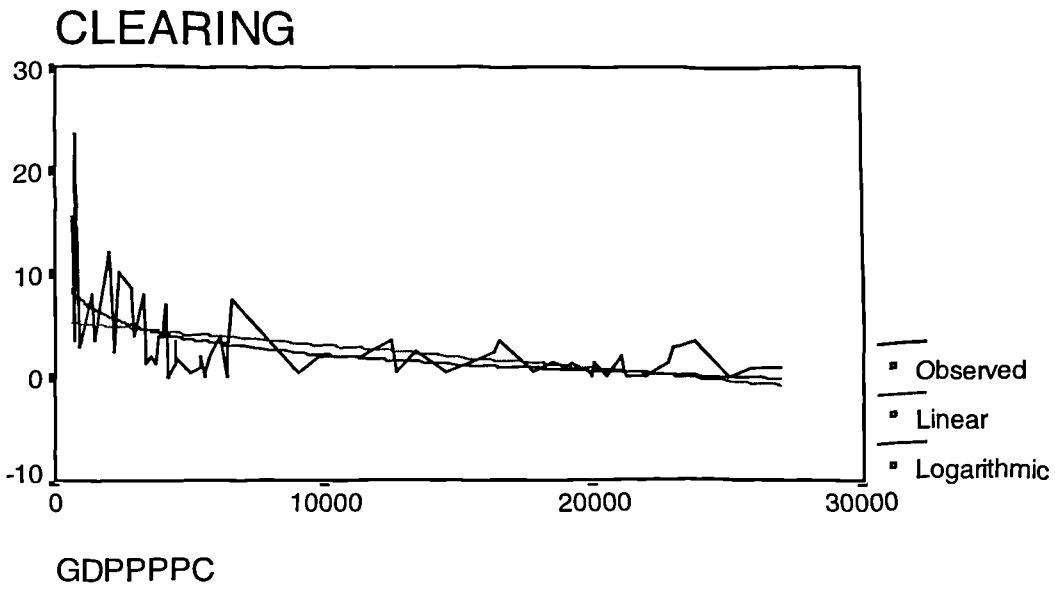

Figure 4-2 Clearing cycle (in days) and $GDPppp per capita relationship

Further explanations and limitations

The most important limitations for drawing final conclusions about clearing cycles from the results based on the regression analysis, relate to the measurement of the clearing cycle in the survey. Given the sample structure and data collection difficulties, the clearing cycles are measured in days rather than hours which may not be appropriate for countries that use advanced clearing and settlement systems. The limitation, however, did not blur the differences across the payment systems in the three groups of countries.

Inflation as an explanatory variable was included to test the assumption that long clearing cycles may benefit financial institutions (free liquidity from float) and/or central banks (seigniorage income) in countries with higher inflation. The variable, however, has an inverse influence. As the variable is very much determined by extreme values (for countries with CPI > 1100 percent), the reverse influence (the higher the inflation the faster the clearing), may be due to the relatively fast clearing (1 to 2.5 days) in high inflation countries in the sample. Another possible explanation is that the clearing institutions in countries with higher inflation feel the pressure of payment services users for faster clearing.

Use of electronic credit orders (inversely), total volume of transactions (inversely in developed countries – because of competition and electronics, positively in transitional and developing countries – due to increased work especially for paper orders), and total value of transactions (the same as total volume) would seem to add to explanatory power (and are significant) but reduce the sample to as low as 1/3 of the observations[14].

4.4. Required Reserves

As discussed in Chapter 2, required reserves have been used as both monetary policy instruments and payment system liquidity buffers in many countries. In general, the higher the required reserves, the more liquidity for payments which is available to financial institutions (provided that the reserves can be used for payments). The cost of

keeping required reserves, on the other hand, depends on whether interest (as well as its level) is paid on them. These required reserves arrangements are also important for assessing the costs of a RTGS type of settlement system[15].

The null hypothesis is that there are no significant differences across the groups with regard to the reserve requirements. The groups, however, do not seem to be homogeneous in respect of the reserve requirements. The descriptive statistics are shown in table 4-4. The results are also presented in the appendix 1.

Table 4-4 Required reserves in The BOE Group - in percent

category	Industrial	Transitional	Developing	BOE group
Required reserves - percent of the countries that use the instrument	59	100	92	82
Average value of the reserves	3.7	9.1	9.6	7.6
Standard deviation	4.7	1.8	7.8	6.9
Median	2	9	8	7
Range	0 - 15	6 – 12	0 - 35	0 - 35
Interest on reserves - paid in the percentage of the countries	29	40	19	25
Reserves used for payments percentage of the countries	67	70	53	60

Differences across groups ,

The tests reject the null hypothesis that there are no differences between the levels of required reserves for the three country groups. Therefore, **there are significant differences** across the three groups and between the individual groups in respect of the level of required reserves. Developing countries have, on average, the highest level of required reserves. The difference in percentage of required reserves between developing and transitional countries is not significant.

Reserves tend to be used for payments in all three groups of countries. Interest on reserves is paid in about 25% of the 'BOE countries'. There are no statistically

[14] As some less developed countries have no (available) statistical records on payment transactions volumes and values. The regression equation is, therefore, discarded from the analysis.
[15] As argued by Fry et al. (1998) and Khan and Roberds (1998).

significant differences across the three groups regarding the numbers of countries that pay interest on reserves or the number of countries that allow the reserves to be used for payment purposes.

Banking system maturity seems an important factor that influences the levels of reserve ratios. Countries with more mature banking systems have lower required reserve ratios. As monetary authorities in countries with more developed banking systems rely on monetary policy instruments other than required reserves, this diminishes both the importance and level of the required reserves in these countries. This also shifts the burden of liquidity planning more to financial institutions rather than the central bank. For this to work, however, an efficient interbank money market should exist to enable financial institutions to draw liquidity for payments.

4.5. Institutional factors

Three categories that are used as proxies for the payment systems' institutional infrastructure development are: banking system maturity; legal system adequacy; technical infrastructure. Each of the factors was assessed as "poor", "developing" or "satisfactory" by the countries' central banks. There are significant differences across the three country groups in respect of banking system maturity and technical infrastructure. In general, industrial countries have more mature banking systems and more developed technical infrastructure. Also, their legal systems seem more advanced and in line with more efficient payment systems.

The three factors seem to be important explanatory variables for different payment systems' characteristics and for capturing differences across countries and among the three country groups. The descriptive statistics is shown in table 4-5. Detailed test results are presented in the appendix 1.

4.5.1. Banking system maturity

Banking system maturity, in this context, can be viewed as being the banking best practice established through trial and errors, competition and satisfying customer needs (including business ethics), rather than technical advances or adequate legislation.

There are **statistically significant differences across the three country groups** regarding the banking system maturity, according to the central banks' evaluation of their countries respective systems. Industrial countries have reached a satisfactory stage of banking system development while in other two groups of countries banking systems can be classified as developing. Transitional countries, because of the nature of financial intermediation under communism, have the least mature banking systems.

Banking system maturity seems an important factor that **influences: the length of clearing cycle and reserve ratios (inversely related) and cash in circulation (same direction) in a country**. These findings can be explained by a) development of banking system skills and technology driven by competition and co-operation among banks to satisfy customers needs, b) available monetary policy instruments and adopted practice that resulted from banking system development, and c) banking system maturity and country's income and wealth positive correlation.

In general, banking systems with a longer tradition and/or faster development have more efficient money markets, require less liquidity, have established efficient banking supervision and are driven by the customer needs and competition which are a[11] reflected in the factor's influence on the respective categories.

4.5.2. Legal system adequacy

Legal system adequacy was assessed by each country's central bank according to the extent to which it is an obstacle to efficient payment systems. In that context, it was de facto the assessment of a system related to the optimal legal system in a country in terms of supporting an efficient payment system. There are **no statistically significant differences across the three country groups** regarding their legal systems adequacy. On the other hand, the factor seems to have influence on the relative use and importance of cash, as measured by Currency in Circulation to GDP ratio.

Possible explanations for the mentioned influence may be that the clearer the rules and more protected the creditors/payers in a payment system the less need to rely on cash as an immediate, real-time settlement instrument. The interpretation of the results as a whole, however, should be more in line with the fact that there is room for

improvements in all of the legal systems, rather than to say that there are no differences in the legal systems development and efficiency across the three country groups.

4.5.3. Technical infrastructure

There are statistically significant differences across the three country groups in respect of the development of payment systems' technical infrastructure, as assessed by the central banks. Technical infrastructure development has an inverse influence on the length of a clearing cycle, cash in circulation and cash in circulation to M1 ratio. Therefore, the more advanced the technology the faster the clearing cycle, the more payment instruments available, the more reliable (certain) the process of clearing and the more convenient the process of payment with payment instruments other than cash.

The strong influence of the technical solutions on payment system as a whole should come as no surprise, especially as the payment systems are sometimes equated with the payment technology. Of course, one should be wary in recommending the introduction of the most advanced technology in all cases, as the choice of the appropriate technical solutions is a matter of costs, resources, priorities and not least the banking, organisational, legal and telecommunications infrastructures needed to support the payment system technology.

4.6. Summary of the results

The results of the analysis (see also table 4-5) can be summarised as follows:

- The level of cash holdings, as measured by *Cash in Circulation in USD at purchasing power rate (1997)* is significantly different across the three country groups. The measure seems to capture the 'wealth effect' and store of value function of money and is in line with theoretical predictions of a positive relationship between a country's wealth and cash holdings. Thus, an individual in an industrial country holds on average double the value of cash than an individual in a developing country. The values of cash holdings are the lowest in transitional countries. Relative cash holdings are inversely influenced by velocity of money and interest rates and inflation, i.e. real interest rates.

- *Currency in circulation to narrow money monetary aggregate - M1* ratio is significantly different between industrial, transitional and developing countries. The measure may be used as an indicator for the stage of development of payment system, i.e. the relative importance and use of cash for the BOE countries group. The ratio decreases with higher GDPppp per capita and better technical framework. The ratio increases with longer clearing and higher relative level of cash in circulation. In developing and transitional countries the ratio is about 40 percent on average as compared to 22 percent in industrial countries.
- *Cash in circulation relative to nominal GDP* is not significantly different across the three country groups. It may, however, be used as a measure of cash holdings that 'caters' for inflation and differences in wealth across countries. The ratio is positively related to relative cash holdings ($CCppp per capita), and negatively related to the relative level of GDP (GDPppp per capita). Interest rates and legal framework adequacy inversely influence the ratio which can be explained by the opportunity costs and credit risk protection, respectively. The ratio is highest in the developing group of countries and lowest in the industrial group of countries. The measure reconciles different findings captured by other two 'use of cash' measures.
- *Length of clearing cycle in days* is significantly different across the BOE country groups. It is negatively related to GDPppp per capita and inflation. Use of RTGS and electronic payments, total volume and value of transactions and banking system maturity can also be used as explanatory variables. Industrial countries have the fastest clearing, which, on average, does not exceed one day. Transitional countries clear payments somewhat faster than developing countries.
- *Required reserve ratios* are significantly different in industrial, transitional and developing countries. There are no differences across the three country groups with regard to proportion of countries in each group where monetary authorities: a) allow use of the reserves for payment purposes and b) pay interest on reserves. Reserve ratios are significantly lower in countries with more mature banking systems.
- *Institutional factors – banking system maturity, legal system adequacy and technical infrastructure* are different across countries and the three country groups. These factors are also important explanatory variables for differences in cash holdings and clearing cycles.

Table 4-5 BOE Group - summary of the results (data for 1997)*

Category	Industrial	Transitional	Developing	BOE group	significant differences[1]
GDP per capita – USD ppp					
average	19794	4639	6792	10293	Yes
standard deviation	3763	3250	5923	7997	
Consumer Price Index (CPI)					
average	126.50%	291%	203530%	101850%	Yes
standard deviation	23pp	240pp	973196pp	688186pp	
median	117.50%	203%	188%	133%	
Deposit Interest Rate					
average	4.12%	11.68%	13.69%	10.15%	Yes
standard deviation	2.19pp	7.65pp	14.54pp	11.50pp	
Velocity of Base Money					
average	26.43	21.73	25.1	25.00	No
standard deviation	18.93	15.15	16.22	16.94	
Clearing Cycle - in days					
average	1	3.8	4.3	3.2	Yes
standard deviation	0.9	4.0	4.5	3.9	
Required Reserves					
average	3.70%	9.10%	9.60%	7.60%	Yes
standard deviation	4.7pp	1.8pp	7.8pp	6.9pp	
Cash Per Capita - USD ppp					
average	1000	287	475	644	Yes
standard deviation	523	207	642	601	
Cash to M1 - percent					
average	22	39	40	33	Yes
standard deviation	12.5pp	15.5pp	14pp	16.0pp	
Cash to GDP - percent					
average	5	6.7	7.1	6.2	No
standard deviation	2.3pp	4.7pp	7pp	5.1pp	
Banking System Maturity[2]					
average	2.95	1.83	2.24	2.4	Yes
standard deviation	0.23	0.40	0.72	0.68	
Adequate Legal Framework[2]					
average	2.5	2.1	2	2.2	No
standard deviation	0.7	0.7	0.86	0.8	
Technical Infrastructure[2]					
average	2.9	2.3	2.1	2.4	Yes
standard deviation	0.3	0.63	0.86	0.77	
Use of RTGS system - percent					
yes	86	46	25	45	Yes
no	14	54	75	55	
Use of plastic cards - retail					
percent of the countries	100	60	40	60	Yes
Use of electronic – wholesale					
percent of the countries	100	80	40	65	Yes

*Data Sources: Bank of England Payment Systems Survey of 70 countries, International Financial Statistics (August 1998), World Bank Atlas 1998 and Central banks annual reports for the year 1997.

[1)] The tests include Analysis of Variance and 2-sample t-tests, Kruskal-Wallis and Mann-Whitney non-parametric tests, and regression analysis. There are no differences in results with regard to the tests applied, except for CPI variable. As the variable seems to follow a non-normal distribution non-parametric tests were given more weight in the hypothesis testing. Moreover, when countries with CPI over 1000 percent are excluded from the sample, even 'parametric' tests show significant differences across the country groups in respect of levels of CPI.

[2)] The central banks' evaluation of their countries' respective systems. The responses were classified on an ordinary scale, where "poor" = 1, "developing" = 2, and "satisfactory" = 3.

4.7. Conclusions

The following describe the conclusions to be drawn from the analysis:

- The tests show that **there are significant differences across industrial, transitional and developing countries** in respect of their payment systems. Developing countries appear to be a heterogeneous group with regard to the level of income and other characteristics of development. Industrial and transitional countries form more homogenous groups in that respect, as the countries within these groups have major characteristics in common. Hence, possible generalisations and/or recommendations based on this study may be safer to make or implement for/in, for example, a country in transition.
- Although the characteristics of the CIT' payment systems look somewhat 'better' than those of the developing countries, **the differences between the transitional and developing countries are, on the whole, not significant.**
- **The relative importance of cash seems much higher in developing and transitional countries than in industrial countries.** This may be a consequence of less developed payment systems, i.e. less mature banking system, less developed legal and technical infrastructure, slower clearing and lack of alternative payment instruments available and/or competition among services providers. Immediate, real-time settlement provided through cash payments can be, therefore, substituted by more convenient alternatives only if they are cheap, reliable and efficient. The mere existence of the alternatives is no guarantee. The influence of wealth, interest rates, inflation and velocity of money, as found by the analysis, are in line with the theoretical predictions.
- **The length of a clearing cycle,** as a measure of payment processing efficiency, **is a matter of technological, economic and banking systems development.** The RTGS type of system, by definition, clear payments in real – time, i.e. immediately.
- **Industrial countries, and those with more mature banking systems** in the other two groups of countries, **tend to rely less on required reserves, hence the lower average ratio**, as an instrument of monetary policy. Developing and transitional

countries with underdeveloped money markets and acute illiqudity problems may still use the instrument effectively for monetary policy and efficient payments purposes.

- **Institutional infrastructure for payment systems is a combination of banking system maturity, legal framework and technical infrastructure,** all of which can, on their own or in combination, make obstacles for, or help facilitate, an efficient payment system functioning.
- As for **CIT,** a tentative conclusion is that they **need to improve both wholesale and retail payment systems**. In general, there is a high reliance on cash for retail payments, paper payments dominate the wholesale systems and the institutional infrastructure is still underdeveloped. Mainly centralised large value payments processing in the past have resulted in slightly faster wholesale payment systems' clearing than in developing countries.

Potential limitations of the analysis may be in:

- Use of the single year data for the cross-countries comparison.
- A smaller number of observations for less developed countries regarding different payment instruments (volumes and values of payments).
- Definition and measurement of some variables, e.g. clearing cycle.
- Classification of countries in the three groups, as some countries may have more in common with countries in a group other than 'their own'[16]. In general, "developing countries" seems to be a heterogeneous group of countries at different stage of banking and payment system development and level of GDP.

[16] For instance, in respect of payment system and institutional characteristics, Vietnam and Tanzania can also be regarded as developing countries and Kuwait, United Arab Emirates and Bermuda are not less developed than, for example, Portugal, Greece or Spain.

5. Payment Systems in Countries in Transition

5.1. Analytical framework

This chapter presents the major aspects of payment systems operations in Countries in Transition, and offers a critical evaluation of their present characteristics and possible future development. The subsequent sections investigate: a) *the institutional framework*, b) *the use and importance of cash and other payment instruments*, c) *the large-value payment systems* and d) *the monetary and banking system aspects of the payment systems reforms* in CIT.

The aims of the analyses are to:

1. Identify the major characteristics of the payment systems of CIT.
2. Identify the major problems of the payment system reforms.
3. Suggest possible solutions for the problems and adequate payment system designs.

Because of limited data availability and depth for transitional countries, the analysis resorts to a combination of different research techniques, namely a mix of qualitative and quantitative analytical methodologies. Depending on the type and quality of available information, the identified critical aspects of a payment system are assessed by descriptive statistics, statistical tests, secondary analysis or case studies approach or a combination of these methods. The main data sources are the countries' central banks, The World Bank, IMF and EBRD.

The institutional framework analysis is based on descriptive statistics on main institutional factors provided by the World Bank, EBRD and to a lesser extent the central banks. The cash holdings analysis uses the International Financial Statistics data (IMF 1998) and the central banks' responses/evaluation of their countries' respective systems. The information on other payment instruments, payment system reforms and monetary policy is mainly provided by the central banks in the form of special reports or answers in response to the survey. The large-value payment systems of particular countries are analysed by a case-study approach. The analysis also refers to the results of the previous analytical chapter. Final conclusions and recommendations for the CIT payment systems are postponed until the analysis of the Yugoslav payment system is presented.

5.2. Institutional framework

5.2.1. The economic environment

At the beginning of the analysis it should be clarified which countries can be classified as transitional. In general, all former socialist/communist countries, that have discarded that form of socio-political organisational structure, and which are embracing a capitalist economic system qualify as members of "The Countries in Transition" – CIT group. As there are some prerequisites for a fully-fledged capitalist system that take time to fulfil, these countries are in a specific process of transition. However, not all of these countries have started the transition from the same position, nor have they passed the same distance. Moreover, for some countries it is not clear whether they are heading to the same destination[1].

Without going into philosophical or political debate about what makes a country a transitional one, it will be accepted that all Eastern European and former Soviet Union countries that were a part of so-called "eastern block", as well as the former Yugoslav republics, are CIT. This is also in line with the literature on transitional economies and the World Bank classification (1998b). In line with the Bank of England (Fry et al. 1998) classification, China, Vietnam and Tanzania are also treated as transitional economies. Table 5-1 shows that the great majority of transitional countries are either (Eastern) European or Central Asian (former Soviet Union) countries and that they are mostly middle income countries.

Table 5-1 CIT - Regions and Income

Country group	Africa	East Asia	Central Asia	Europe	Total
Low income	1	2	4	2	9
Middle lower	-	-	4	11	15
Middle upper	-	-	-	6	6
Upper income	-	-	-	-	-
Total	1	2	8	19	30

Data Source: IBRD/The World Bank (1998c)
Note: Economies are divided among income groups, according to 1996 GNP per capita in USD, calculated using the World Bank Atlas method. Income groups are low income, $785 or less; lower-middle income, $786-$3,115; upper-middle income, $3,116-$9,635; and high-income, $9,636 or more.

[1] For example, in case of China it is arguable that the objective of the reforms is to form a capitalist economic and political system.

As these countries have followed certain patterns in their developments, whereby the emphasis was on: collective rather than individual ownership and responsibility; material production rather than services; and centralised planning rather than private initiative, there are also some similarities in their financial and banking systems developments. Thus, other aspects of the institutional infrastructure, such as legal framework, overall technology and emphasis on inter-companies payment transactions seem to be similar.

CIT form a huge economic region in terms of the territory, population (even excluding China) and production. Table 5-2 (on the next page) shows the relative sizes and strengths of the economies and the group as a whole.

The relative economic strength of the group, however, as measured by average GNP per capita and income group indicators and the proportion of the world's total production, is not in line with the 'size' of the economies. The transitional countries are mostly lower-middle income economies, with a GNP per capita at purchasing power parity rate of, on average, $3,350[2], and are "less indebted". Their overall production is about seven percent of the world's total. Nonetheless, the size of the market, especially when measured at purchasing power parity rate, makes the CIT group an attractive area for business and research.

Based on the World Bank (1998a, 1998b) and EBRD (1997, 1998) reports, it can be concluded that the economic and financial sector reforms in CIT were not implemented with the same vigour and determination in all countries. The explanations lie in various social and political considerations as well as the balance of power between 'new' and 'old' political and economic forces. In general terms, the overall financial reforms in CIT so far, where conducted, have resulted in increased competition and transparency of the rules, improvements in technology and necessary banking and financial skills, and government income as a result of privatisation of the state owned financial institutions. On the minus side, however, there were numerous lay-offs that resulted in increased unemployment rates in some countries, and instances, e.g. in Russia, of the negative influence of movements of capital, that was also driven by global capital markets dynamics and was possible because of the new openness and integration in the world markets.

Table 5-2 CIT basic statistics

Country	Population million	GNP per capita in USD- purchasing power parity rate	Income group – World Bank Atlas Method	Indebtedness
Europe				
Albania	3.28	1,398	2	1
Belarus	10.3	4,380	2	1
Bosnia	4.38		1	3
Bulgaria	8.35	4,280	2	3
Croatia	4.77	4,290	3	1
Czech R.	10.32	10,870	3	1
Estonia	1.47	4,660	2	1
Hungary	10.19	6,730	3	2
Latvia	2.49	3,650	2	1
Lithuania	3.71	4,390	2	1
Macedonia	1.98	2,147	2	2
Moldova	4.33	1,440	1	1
Poland	38.62	6,000	3	1
Romania	22.61	4,580	2	1
Russia	147.74	4,190	2	1
Slovak R.	5.34	7,460	3	1
Slovenia	1.99	12,110	3	1
Ukraine	50.72	2,230	2	1
FR Yugoslavia	10.57		2	1
Central Asia				
Armenia	3.77	2,160	1	1
Azerbaijan	7.58	1,490	1	1
Georgia	5.41	1,810	2	2
Kazakhstan	16.47	3,230	2	1
Kyrgyz R.	4.58	1,970	1	1
Tajikistan	5.93	900	1	1
Turkmenistan	4.6	2,010	2	1
Uzbekistan	23.23	2,450	2	1
East Asia				
China	1,215	3,330	1	1
Vietnam	75.35	1,570	1	3
Africa				
Tanzania	30.5	640	1	3
Memorandum items:				
CIT population millions:	1,736	excluding China:	521	
% of the world population	30.20%		9.10%	
CIT	GNP per capita PPP 1996	$3,348 weighted average	Production - % of the world total	7%
G-10 countries	GNP per capita PPP 1996	$24,303 weighted average	Production - % of the world total	66%

Data sources: World Bank Atlas 1998

Notes: *Income groups* are: 1- low income, $785 or less; 2 - lower-middle income, $786-$3,115; 3 -upper-middle income, $3,116-$9,635; and 4 - high-income, $9,636 or more.

Indebtedness groups are: 3 - severely indebted (either the present value of debt service to GNP ratio exceeds 0.8 or the present value of debt service to exports ratio exceeds 2.2); 2 – moderately indebted (either of the two key ratios exceed 0.6 of, but does not reach, the critical level); 1 – less indebted (all other economies).

[2] This is the population-weighted figure. The thirty countries arithmetic average is $3,660.

5.2.2. The institutional factors

Major payment systems institutional framework indicators for the CIT are shown in table 5-3 (on the next page). Columns 2 and 3 give the evaluation of the banking and legal systems development, as assessed by The European Bank for Restructuring and Development - EBRD (1997, 1998)[3]. Column 4 gives the assessment of the technical infrastructure in the respective countries, based on the data on the number of telephone mainlines and personal computers per capita, length of paved roads and use of electricity per capita[4]. Additional information on banking systems is provided by the countries' central banks and the World Bank (1998b), and is presented in columns 5 and 6. Despite the relatively high number of banks in many CIT, the banking systems in CIT are highly concentrated, with two to six large (mainly state owned) banks accounting for overwhelming portion of total assets, loans and deposits (from 50 to 95 percent). These large non-privatised banks also hold almost all of the 'bad debts' and are, as a rule, insolvent and/or in need of financial and business restructuring.

The banking system problems in CIT are also emphasised by interconnected ownership and lending, with non-performing loans as a major consequence. Persistence of the ties and practice, whereby the state-owned, loss-making enterprises are both the shareholders and major debtors to state-owned, loss-making banks and vice versa, is one of the major hindrances to the banking sector restructuring. Moreover, given the weak state of capital markets and volatile foreign capital movements, the banks remain the main source of finance and assistance in CIT which is why banking system reforms are both important and necessary.

[3] The explanation of the classifications is given in the appendix 2.
[4] The data is provided by the World Bank. Explanation of the classifications is given in the appendix 2.

Table 5-3 Institutional Framework (1997)

Country	Banking system development (1-5)	Legal system adequacy (1-5)	Technical Infrastructure (1-6)	Two-tier banking system established	Number of banks to 1million population	Population per branch
Europe						
Albania	2	2	2	1992	2.7	
Belarus	1	2	4	1991	3.1	
Bosnia		1	3	1971	10	
Bulgaria	3	3	5	1989	6.1	2,000
Croatia	3	4	5	1971	7.1	
Czech R.	3	4	5	1990	5.6	3,000
Estonia	3	4	4	1992	11	
Hungary	4	4	4	1987	4	
Latvia	3	3	4	1992	12	3,000
Lithuania	3	3	4	1991	3.2	18,000
Macedonia	3	2	4	1971	8.5	
Moldova	2	2	4	1991	5.6	
Poland	3	4	4	1989	3	15,000
Romania	3	3	4	1990	1.7	7,000
Russia	2	3	4	1991	13	45,000
Slovak R.	3	3	5	1990	5.4	5,000
Slovenia	3	3	5	1971	14.5	3,400
Ukraine	2	2	4	1991	1	
Yugoslavia	3	2	4	1971	10	7,000
Central Asia						
Armenia	2	3	4	1988	8.5	
Azerbaijan	2	1	3	1992	16	
Georgia	2	2	4	1991	9.2	
Kazakhstan	2	2	4	1991	6	
Kyrgyz R.	3	2	3	1991	3.7	38,000
Tajikistan	1		3	1991	4.5	
Turkmenistan	1		3	1993	3.2	
Uzbekistan	2	2	3	1988	2	
East Asia						
China			3	1985	0.01	App. 150,000
Vietnam			2			
Africa						
Tanzania	1	1	1	1993	0.5	150,000

Data Sources: Columns 2 and 3 – EBRD (except for Tanzania – The Bank of Tanzania); column 4 - World Bank, column 5 – EBRD and World Bank, columns 6 and 7 – the central banks' reports and the World Bank.
Note: Explanation of the classifications is given in the appendix 2.

It can also be observed that some countries are more advanced in terms of the institutional infrastructure that supports their payment systems. Thus, Poland, Czech Republic, Slovakia, Hungary, Baltic States and Slovenia form a group of 'advanced' transitional economies. The progress also coincides with higher GNP per capita in those countries relative to other transitional countries. The starting date of the reforms, as

indicated by the year of establishment of a two-tier banking system, is not necessarily a decisive factor in the progress of the reforms. The somewhat better starting position of former Yugoslav republics[5], which had a longer practice of commercial banking and a market economy, was not built upon in all the cases because of the civil war in the region. In general, 'European' transitional countries have much larger relative income per capita, more advanced banking, legal and technical infrastructure than other transitional countries (see appendix 2, table 9-21).

The summary of the relevant descriptive statistics for the group of 30 countries, with regard to the institutional infrastructure, is shown in Table 5-4.

Table 5-4 The CIT group* Institutional framework 1997 - descriptive statistics

Category	Mean	median	standard deviation	Minimum	maximum	Q1	Q3
GNP per capita in USD at PPP	3662	2865	2744	640	12110	1750	4438
Consumer price Index	160	115	123	104	678	109	142
Banking system (1-5 scale)	2.46	3	0.76	1	4	2	3
Legal system (1-5 scale)	2.68	3	0.9	1	4	2	3
Telephones per 1000 inhabitant	162.6	161.5	99	13	333	76	263
Computers (1-6 scale)	2.93	3	1.35	1	6	2	3.25
Electricity (1-6 scale)	3.33	3.5	1.55	1	5	3	4
Overall Technical (1-6 scale)	3.7	4	0.95	1	5	3	4

Data sources: World Bank (1998a), EBRD (1997)
*Group of 30 CIT

Current loss of confidence in transitional countries (starting from mid-1998) and, thus, the diminishing activity of foreign banks and investors in CIT banking systems may slow down the driving forces behind the banking system improvements and legal system changes needed to spur the payment systems' development. Conversely, endogenously-induced improvements and changes are the best solution not only for the efficient payment system but for restructuring the confidence of both domestic and foreign participants in the markets. There is a case for active public policy. The activism of the policy makers can relate either to the statutory, supervisory, co-ordination and prudential activities in the banking and payment system or increased operational involvement. In the countries that are identified as more advanced in the transitional processes, the optimal policy option may be the former, that is, the dominant role of central banks in payment systems should be gradually reduced.

[5] Bosnia and Herzegovina, Croatia, Macedonia, Slovenia, and Serbia and Montenegro (FR Yugoslavia).

Further analysis of the institutional framework for payment systems, especially relating to the public policy measures, is presented with other analytical categories in the subsequent sections.

5.3. Retail Payment Systems in CIT

5.3.1. Cash Holdings in CIT

The analysis of the Bank of England Group payment systems in the previous chapter showed that in the transitional countries there are higher cash preferences than in industrial countries and that the CIT cash holdings are roughly the same as those in developing countries. This section investigates whether the transitional economies can be classified as "cash economies" in terms of the payment systems functioning. This is done through the analysis of:

- Cash holdings data for the 30 transitional economies.
- The BOE group data and tests' results.
- The central banks' responses to the questions relating to the retail payment systems.
- Descriptive statistics and illustrations on the use and importance of cash in selected CIT, for which the data is provided mainly by the central banks.

Tables 5-5 to 5-7 show summaries of descriptive statistics on cash holdings captured by the three measures in the group of 30 CIT and the BOE group analysis results for 1997. For analytical purposes, the transitional countries are divided into two groups. The first group is formed from Russia, former Soviet republics (excluding Baltic republics), China, Vietnam and Tanzania. The second is formed by other European CIT. The test results are also shown in the appendix 2.

The cash in circulation to narrow money ratio for all CIT countries (Table 5-5), indicates an even higher importance of cash than previously shown by the analysis of the BOE sample of CIT (chapter 4). The CIT group as a whole has, on average, roughly the same proportion of cash in circulation and deposits in the narrow money, i.e. the ratio of cash to deposits is approximately 1. This is even higher than for the BOE sample of developing countries. Further breakdowns of the results shows that the ratio

is the highest in the non-European transitional countries. The difference between the two CIT groups is not statistically significant (see table 9-22 in appendix 2)

Table 5-5 Cash in circulation to narrow money (1997)

	The CIT group analysis			The Bank of England Group Analysis		
category	The CIT group	CIT Europe	Other CIT	Transitional	Developing	Industrial
mean	52%	45%	59%	39%	40%	22%
standard deviation	21pp	14pp	27pp	15.5pp	14pp	12.5pp
Number of countries	30	15	15	11	38	21
% of the overall population	100%	50%	50%	36%	31%	88%

The average *cash in circulation to gross domestic product ratio* for the group of 30 CIT is higher than in the BOE sample of eleven transitional countries, at 7.4 percent. This is much higher than in the industrial countries, and somewhat higher than in the developing countries (the difference is still not statistically significant). The initial inference from the comparison of the two CIT groups – Europe and Others – is that, on average, cash holdings as a proportion of GDP is higher in "other" transitional countries. The tests show, however, that the difference is not statistically significant[6].

Table 5-6 Cash in circulation to GDP (1997)

	The CIT group analysis			The Bank of England Group Analysis		
category	The CIT group	CIT Europe	Other CIT	Transitional	Developing	Industrial
mean	7.4%	7.0%	7.8%	6.7%	7.1%	5.0%
standard deviation	4.5pp	4.2pp	4.7pp	4.7pp	7pp	2.3pp
Number of countries	30	15	15	11	38	21
% of the overall population	100%	50%	50%	36%	31%	88%

The third measure of cash holdings for the 30 CIT, defined as *cash in circulation per capita in US dollars at purchasing power rate*, is in line with previous results. All the comparison inferences, therefore, remain the same. The transitional countries have, on average, the lowest level of dollar value of cash holdings. The level of the cash holdings is significantly higher in European transitional economies than in other CIT. This is also in line with the previous findings on cash holdings as captured by that measure. Thus, the CIT with higher relative wealth (GDP) and lower inflation (CPI) have larger dollar values of cash in circulation.

[6] It should be noted, however, than when Albania is excluded from the sample of "European" countries the difference between the groups is higher and becomes statistically significant.

Table 5-7 Cash in circulation in USD at purchasing power parity rate 1997

	The CIT group analysis			The Bank of England Group Analysis		
category	The CIT group	CIT Europe	Other CIT	Transitional	Developing	Industrial
mean	270	351	167	287	475	1000
standard deviation	181	166	147	207	642	523
Number of countries	30	15	15	11	38	21
% of the overall population	100%	50%	50%	36%	31%	88%

In countries with more detailed payments statistics available, for example, Czech Republic, Yugoslavia and Hungary, the cash transactions represent a significant proportion of overall transactions recorded within the respective systems. These cash transactions represent money/postal orders transmitted through the 'giro' system but resulting in cash transactions (money paid in or taken out) at one or both ends of the payment orders processing. They are indicative of a lack of available substitute retail-payments instruments for the transfer of monetary claims.

In the Czech Republic, the value of cash receipts recorded within the system was about 50% of the value of the annual GDP in 1995. In Hungary, the ratio was about 40% in 1994. The figure for Yugoslavia for 1991 was about 33%. The figures for 1997, however, show a decline in relative value of the cash transactions. In Hungary, the ratio declined to 16 percent, and in Yugoslavia to 12 percent. When compared to the total value of large-value payments processed by the systems, the value of cash transactions is one fifth of the total value of LVTS payments in Yugoslavia, on average for the period 1991 to 1997.

It is also evident from the central banks' responses to the questions on cash holdings that in every single transitional country cash transactions dominate in both volume and the value of retail payments. In Hungary although card transactions have shown a significant increase in volumes and values cash remains the major payment instrument. Moreover, according to the central bank information, only one seventh of all card transactions are 'cashless', i.e. refer to transactions other than ATM cash withdrawals.

In addition to local currency holdings and transactions, there is the phenomenon of currency substitution, i.e. relatively significant values and volumes of foreign currency in circulation and in savings accounts. Anecdotal evidence for Russia and former Soviet republics, Bulgaria, FR Yugoslavia and former Yugoslav republics is in line with the assumption of high foreign currency significance for payment transactions.

Although large cash holdings, especially in hard currency, are indicative of grey and black market operations and criminal activities they primarily relate to lack of trust and inefficiency in the financial systems. Moreover, cash - especially if denominated in a stable foreign currency or used as a real-time medium of exchange - is the most effective antidote to a combined influence that high inflation rates and inadequate interest rates, payment lags and float (inefficiency) have on idle or trapped balances in the institutions.

The central banks' information on cash payments and other payment instruments is unambiguous. Cash is still the dominant retail payment instrument both in volume and value in CIT. Comparison with the G-10 countries' cash holdings measures (appendix 3-2, table 9-27) also confirms this.

In summary, the first two measures of cash holdings confirm the high importance and use of cash in CIT. The third measure shows a relatively low value of cash in circulation in USD, influenced by low income and wealth in the CIT. Descriptive statistics and illustrations provided by the central banks of the representative transitional countries, confirm the findings of high use and importance of cash in CIT. Furthermore, cash preference is confirmed by the central banks' evaluation of their countries retail payment systems.

5.3.2. Retail payments and non-cash payment instruments

Based on the information provided by CIT central banks on the payment systems, the separation of payment flows into "corporate" and "households" streams was one of the prominent characteristics of the CIT payment systems prior to the reforms. This was also in line with the priority of material production over services and investments and development over private consumption and standard of living in national plans and politics. The distinction was not made according to the values of the payments, although, the payment streams coincided with large-value and small-value payments, respectively. The separation had a different but important implication for systems functioning. The retail payment methods and services were neglected and had a low priority in the payment systems functioning and development.

Given the choice of priorities and the need for centralised control and execution of payments, the provision of major payment system services was, as a rule, centralised within a single institution (usually the central bank and its branch network). Transfer of small value transactions, other than face-to-face cash transactions, was usually left to the national post system. With the underdeveloped retail banking systems and competition, little progress has been made in introducing new payment instruments and improving retail payments efficiency. Thus, credit instruments - money (cash/postal) orders and credit transfers – as opposed to debit instruments (such as cheques of different credit institutions) dominated the volumes and values of transactions within the centralised and monopolised systems. On the plus side in some countries the credit transfers, evolved from paper-based to electronic, enabling also rather fast giro-retail systems' functioning. The choice, costs, transparency and privacy of retail payments remained the issues of lower priority. The statistics on retail payments was also undeveloped and in line with the 'importance' of these payments.

In recent years, coinciding with the payment systems reforms, the introduction and importance of non-cash instruments for retail payments began to rise. However, as this is a gradual process, overall credit transfers[7] remain dominant in the volume and value of the payments. Thus, in the group of the 30 CIT countries, according to the central banks survey, this payment instrument typically accounts for 95 percent of overall value and 70 percent of overall volume of retail payment transactions in 1997.

Another feature of 'transitional' retail payment systems is the low use of cheques and, in reformed systems, the increased use of plastic cards (mainly debit cards). Given the advantages of electronics and plastics over cheques in speed, risks and costs (as discussed in the previous chapters), it is to the benefit of transitional countries to leap-frog into a 'chequeless' society. Also, the relatively small number of plastic cards in the system and their late introduction could mean that the transitional countries do not have to go trough the process of replacing too many of their magnetic stripe cards with the 'chip' cards. Nevertheless, it is hard to enthuse banks to start thinking of new payment instruments development when traditional products (but new to the systems) are profitably expanding. This and other issues are examined separately in the section 8.1.4.

In general, in European CIT there has been more progress in the introduction and use of cash-alternative payment instruments, in particular direct debits, ATMs and cash-cards and, to a lesser extent debit cards. Most has been achieved in The Czech Republic, Slovakia and Hungary. The introduction and use of ATMs, debit cards and international credit cards, seems greater in countries with a higher presence of foreign banks.

5.4. Wholesale payment systems in CIT

5.4.1. Introduction

The sources of information for the analysis of CIT payment systems design are mainly the countries' central banks. Being involved in both systems regulations and operations, the central banks are the most knowledgeable entities in respect of the payment systems' past and reforms. Given the poor statistical coverage of payment transaction volumes and values in the past, and the relatively short life of new payment systems, the information is of a rather 'qualitative nature'. However, in order to get a more objective picture of the state and future of the payment systems, the information has been checked from other sources, namely the EBRD, World Bank, local bankers associations and commercial banks operating in the markets. The information gathered from the central banks and other institutions was mainly in the form of specially prepared reports or publications on the countries payment systems that the central banks sent in response to the survey.

The eleven systems for which substantial meaningful information was provided by the central banks or other institutions are analysed next in form of 22 mini case studies[8]. The analysis is presented in the two analytical sections – payment systems developments and payment systems within the monetary policy framework.

[7] Cash-related, electronic or paper based.
[8] In general, these are advanced countries in terms of financial and monetary systems reforms or countries that have started the payment system reforms as such.

5.4.2. Payment system developments in eleven CIT

The payment system reforms were a necessary part of banking and monetary system restructuring in transitional countries as they shifted towards market-oriented economies. As the "monobanking" systems with dominant central banks were being replaced with two-tier banking systems, and with the larger number of financial intermediaries present, the changes in payment systems had to reflect the less-controlled, multiparty, payment flows. However, not all of the countries had the same institutional arrangements, level of banking system development or had followed the same transitional and privatisation paths. The payment system reforms were also not uniform. The differences lay in whether a particular reform was:

- part of a broader banking and monetary system restructuring programme or not,
- accompanied with adequate institutional and legal changes or not,
- incremental or 'strategic'; thorough or superficial,
- with the involvement of different stake-holders (especially banks) or top-down imposed;

and in the choice among available technical and organisational solutions for a system's design[9].

Bulgaria

Bulgaria adopted a strategic approach to its payment system reform. The objective of the reform was the creation of a SIC-like RTGS system by the year 1999. Instead of sequencing the steps of the reform, the envisaged system was both the starting and the end point of the process. Thus payment system is being reformed in its entirety, and the existing gross system is going to be enhanced into an RTGS system. The system, called "Bisera" is operated and owned jointly by the central bank and the commercial banks through "Bankservice", the system operator. In 1997 the total volume of the payment transactions processed by the system was about 16.5 million.

There are, however, other more fundamental impediments for the efficient payment system functioning. First, according to the central bank, the large amounts of non-performing loans and the insolvency of some banks is reflected in the illiqudity of

the system and in payment delays. Second, there is anecdotal evidence of high foreign currency holdings in Bulgaria which, when coupled with high cash preference[10], result in lower utilisation of banking channels. Third, non-reformed banks and high inflation in the past are also responsible for a lack of trust in banking and payment systems. Finally, the reform came rather late during the process of financial system restructuring, i.e. it did not support new monetary policy nor money market development. These issues are analysed in section 5.5.2.

China

China has started the financial system reforms in the late seventies. By 1984 a monobanking system was replaced by the system consisting of four specialised banks and the central bank – People's Bank of China. This change was also reflected in the replacement of a centralised record-keeping accounting system by a payment and settlement system. The central bank provided settlement accounts for the banks and 2200 local clearing houses and the specialised banks operated their own inter-branch clearing for non-local payments. The system was paper based with manual operations. Between 1985 and 1993, new regional and national banks as well as other financial institutions were established which resulted in increased interbank transactions. The paper-based operations resulted in large amounts of float. In response, the central bank and four specialised banks introduced electronic interbank systems. The payment transactions' pricing policy has relied on subsidies rather than full-cost recovery.

Since 1993, efforts have been focused on creating a modern two-tier banking system, with a clear distinction between central banking and monetary policy on the one hand, and commercial banking on the other. This also included efforts towards the adoption of new accounting principles and modernisation of the payment system. Hence the increased importance of the Chinese National Advanced Payment System – CNAPS project, which started in 1991. It is now in a pilot stage and is expected to be operational by the year 2000.

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[9] An overview of the analysis is given in Box 5-1 on page 152.

[10] For example, cash in circulation to narrow money ratio is about 0.6, and cash to GDP is approximately eight percent.

From the information provided by the central bank, it can be concluded that the long time delays in implementing this, and other, payment system projects can be attributed to the following facts:

- First, there is no clear strategy for the payment system development as the country's financial system is in the process of transition, which, in turn, is also not clearly defined. The incremental but substantial development of banking and monetary systems require changes in the payment system design and operations, and the problem is that the payment system improvements are thus always one step behind. This is also reflected in an inadequate legal framework for payments and insufficient risk awareness of the system participants.
- Second, the payment system infrastructure in general and technical framework in particular are still undeveloped, and the payment system needs to be rationalised. As these factors are tackled in a centralised fashion, with little bottom-up initiative and/or contribution, the implementation of a programme is a substantial undertaking for the authorities -- time-wise skills-wise and money-wise.
- Third, the payment system is supposed to serve the most populated country in the world, surpass large distances and work for a rapidly changing and growing economy. The implementation of a programme of such proportions certainly takes time.

Croatia

Croatia has 'inherited' its payment system from former Yugoslavia, of which it was part until 1992[11]. Thus, in the current payment system credit institutions accounts, accounts of companies, juridical and natural persons, are still kept with the Agency for Domestic Payments (former Social Accounting Service/Bureau, so-called "SDK"). The Agency is a non-depository institution authorised for handling domestic payment operations. The Agency operates through 22 branches, with 120 sub-branches, and has 500 employees. In 1998 it kept more than 260,000 accounts and processed about 500,000 payments a day.

[11] The payment system of former Yugoslavia is described in more detail in "Payment system in Yugoslavia" section.

The payment system reform that started in 1995 was aimed at redesigning the system so that the credit institutions' accounts are transferred to the central bank's books, and the customers' (businesses and individuals) accounts are kept with the credit institutions - namely banks. Therefore, in the new system, the interbank payments are planned to be processed through an RTGS-type of clearing and settlement system, the inter-company payments will be processed via their banks through the RTGS system. The retail payments will be executed through the National Clearing System, a giro-type clearing house that will utilise existing Agency's facilities. Both systems are planned to go live by the end of first quarter 1999.

It is planned that all payment transactions between accounts kept with different banks, except large value payments, settle at the National Clearing House (NCS). The transactions will be processed on a multilateral net settlement basis. As for large value payments, the transactions will be settled on a gross basis in 'real-time', provided there are sufficient funds on the payer's bank account. The payment orders that are not fully covered will be sent in a queue and processed on either a first-in-first-out or priority basis once there are sufficient funds available. The LVTS transactions will be transmitted using the SWIFT proprietary network. All direct participants will be able to monitor executed transactions, account balances and unsettled transactions placed in the queue.

Given the nature of the system design, there may be a few problems in its operations. The successful functioning of the envisaged payment system may be affected by the following:

- First, the separation of payment instructions on large-value and retail payments transactions may not be a clear-cut one. The existence of two, obligatory, settlement systems may create ambiguities about which payment orders can and should be transmitted through each of the systems. Even with an adequate legal framework, the difficulty may be in deciding upon what is a large value payment and how often should the decision be revised. Furthermore, if, for example, the upper limit for small-value payments is set too low it will increase the need for the liquidity required for large value payments. If, on the other hand, the limit is proven by practice to be too high, the banks might want to utilise the net settlement

arrangements of NCS and increase the risks that are provided for by the RTGS system.

- Second, related to the first remark, obligatory centralised clearing and settlement of 'small-value' payments may unnecessarily complicate the day-to-day operations and increase reliance on the NCS's technical facilities. If the objectives of the reform are, among other things, to make banks the main retail payment services providers and to channel funds through the banking system, the control and financial discipline can be catered for by supervision and surveillance of the financial institutions (including licensing procedures). In that case, settlement of banks' net open positions resulting from all small-value payments can then easily be done through the large-value gross settlement system or NCS' facilities.
- Third, with regard to LVTS payments, the existence of the queuing arrangements, with no 'guarantee facilities' may be a contradiction to so-called real-time settlement. As indicated by the Swiss case[12], the gross system with queuing facilities may de facto function as a net, deferred time, settlement system, as the bulk of payments occur late in the day. The possibility to attach priority to payments and to decide on it ex-post in the Croatian payment system contradicts the nature of an RTGS system and has different policy implications.

However, the necessary changes may still be incorporated into the system design on time.

Czech Republic

In Czechoslovakia, until 1989, payments for the corporate sector were operated by the State bank of Czechoslovakia through its branch network while the retail payments were the responsibility of the Czech State Savings Banks and the Slovak State Savings Bank. A fully computerised 'real-time' clearing network began operations in early 1992. The central bank established the Clearing and Settlement centre to handle domestic currency payments between banks. After the split of Czechoslovakia in 1993 until 1995, the National Banks of the Czech Republic and Slovakia cleared and settled payments between the states. The systems effectively functioned like EU TARGET,

[12] In the literature review chapter.

with domestic clearing centres, but with the difference of two currencies present. Since 1995, when the arrangement was cancelled, the inter-states payments function on the conventional correspondent-banking arrangements basis.

In the Czech Republic, total volumes and values of payments processed by the national RTGS system, owned and operated by the central bank, are 175 million transactions, worth approximately 45,000 billion Czech Korunas. In 1995, the payment system services were provided by just below 3,500 bank operating units. Of the total number of accounts and transactions processed in 1995, the five largest banks accounted for about 90 percent.

The payment system reforms seem to have been approached strategically, with clear definition of the reform objectives and the payment systems' role in the monetary economy. There was, however, no involvement of commercial banks and other financial intermediaries in the reform process and all changes were introduced by the central bank. Also, the oversight of the system is formal and regulated by law. The central bank provides no overdraft facilities and there are queuing arrangements instead.

In spite of advanced technical solutions for the country's RTGS system there were liquidity problems reflected in the payment system functioning. A series of failures among small banks with a resulting liquidity crunch and collapse of the two largest fully private banks ("Kreditni banka" and "Agrobanka" in 1996) have brought the credibility of the Czech financial markets to its lowest point since economic reforms begun. Furthermore, the four largest banks that account for eighty percent of all assets of the banking system are yet to be truly privatised. The costs of borrowing are high and the industry is in a weak financial state.

Although the clearing and settlement system has improved[13], the interbank market faces many difficulties that are rooted in the banking system itself. For example, despite the improved technology that allows same-day settlement, banks often make delays that may amount to many days (according to international banks present in the system). Also, the system does not effectively function in real-time as many participants are not electronically linked to the settlement system. Thus, payments have been effectively cleared only after one to three days.

[13] There were a few technical hiccups though, including the late establishment of back-up facilities (in 1997).

Estonia

In Estonia, the majority of interbank payments are settled through the clearing centre of Eesti Pank (the central bank). The centre is responsible for 1/3 of overall payments[14]. The centre processes both debit orders and credit orders on a multilateral netting basis. The great majority of payment orders, which account for above 99% of the total value of payments, are electronic. The system does not distinguish between large-scale and retail payments. The multilateral netting falls into two phases. The first phase ends at 15.00 hours when the information on effected and rejected payments is sent to the participants. After that, the participants have two hours in which to provide the required liquidity to pay for the rejected orders. The money can be obtained from the interbank money market or through trading in the central bank's certificate of deposits. At a certain penalty rate, the banks can also use part of their reserve requirements. At 17.00 hours the final settlement takes place. The uncovered payments are rejected.

Since 1996 a fee for the payment services has been charged to indirect payment systems participants, namely the banks' subdivisions, in order to equalise the position of credit institutions with only one settlement account and put the liquidity management of institutions with several of the accounts in order. In 1997 the central bank decided to design a new interbank payment system, in order to prepare the country's payment system for LVTS payments for 'interlinking' with the EU TARGET and bringing its SVTS payments in compliance with the EU standards.

Two projects have started – one is to develop an RTGS system by September 2000, and the other is to develop a DNS system for retail payments by September 1999. These developments are accompanied with the already effected changes in the accounting principles, unified account statements and the replacement of payment order copies by electronic ones. According to the Eesti Pank, the final objectives of the reforms are to accelerate settlements, build confidence in the banking sector and reduce use of cash for high value transactions.

There are several conclusions that can be made about the Estonian payment system that can also serve as lessons on payment system design.

[14] Other are mainly intrabank payments and payments settled 'any other way' (according to the central bank).

- First, there is no account of/control over all large value payments by the central bank and the payment arrangements and rules of participation are ambiguous. This, although not necessarily risky in its own right, complicates the payment flows and may increase payment system risks as the autonomous flows in an immature or poorly supervised system may reduce financial discipline or neglect social costs.
- Second, some operational measures are used as substitutes for legal or statutory setting. Pricing policy, for example, is not the most effective measure for putting the use of the system or number of participants in order in a 'developing' banking system.
- Third, on the plus side, there is a parallel development of two types of settlement systems. However, although the DNS system is supposed to be for retail payments, there is no provision that it will be the case. What is the interest of the central bank in introducing two different competing systems? Is it not up to commercial banks to try and establish an alternative payment system if necessary? Also, the monetary policy and control consequences may prove to be rather complex for the central bank to deal with.
- Fourth, also on the plus side, the development of a DNS may be a central bank's contribution to retail payment system efficiency, choice and cost reduction. Still, the question is how to arrange it. It is possible to do it: a) in the way described for Croatia - obligatory and by making a distinction between LVTS and SVTS, b) by leaving both systems open for all payments, or c) by creating a giro institution instead of the DNS system - as an additional offering and thus to put pressure on banks to develop retail payment services.

Hungary

In Hungary, the development of a new Interbank Giro System - IGS, costing about US $30 million initially, began in 1987 and took seven years to develop. Settlement was on net basis against participants' accounts. Other clearing institutions include the card companies and "Giro Bankcard Ltd" and the central securities clearinghouse and depository – "Keler Ltd". Back in 1992, it was noted (Summers 1994) that the IGS was designed to be an 'all-in-one' system, handling a wide variety of

payments, intrabank and interbank, retail and wholesale, as well as non-value messages. It was a very ambitious task. However, the utility of (the retail arm of) the system ultimately depends on the willingness of non-bank customers to use bank transactions rather than cash (Scott 1993), which has been becoming the reality over the past five years. The National Bank of Hungary has assumed the leading role in the system development and regulation from the very beginning. The interbank clearing system, owned jointly by the central bank and commercial banks, started operations in the late 1994. It can be defined as a deferred (next day) settlement, gross clearing, batch processing, system. The central bank has also implemented two additional projects - uniform account numbering and standard paper form in 1995 and interbank clearing for direct debit and direct credit in 1997.

The IGS has direct and indirect membership. The direct participants are only the licensed banks that satisfy the procedural and technical standards set by the central bank. The institutions that do not meet the criteria may join the system through the central bank, as correspondent banks. As of mid 1997, 44 credit institutions, the National Bank, the Keler and the State Treasury were connected to the IGS. In 1996, for example, the system processed over 40.6 million transactions worth 2.7 times the annual GDP. Only credit transfer orders (in Hungarian Forint only) can be sent through the system, i.e. the payments are always payer's bank initiated. Electronic transfers account for 57 percent of the total volume and 63 percent of total value of payments. There are no limits on the value of transactions and all transactions[15] have the same priority. The prices are set per transaction and charged to debtor's bank, except in case of multiple direct debit. The pricing allows the full cost-recovery and is revised quarterly. The payments clearing cycle for the period 1992 to 1998 was from two to four days.

In line with the requirements for risk reduction and compliance with European Central Bank standards (connection to TARGET) are the efforts towards creation of an RTGS system. This will also require improvements to the accounting system at the central bank which is still inadequate for the task. These projects at the top of the agenda since early 1998.

[15] Bank to bank payments, customer payments and non-clearing (non-value messages) transactions.

The Hungarian payment system reform and functioning provides a few good lessons for other countries undertaking the reforms.

First, based on the information provided by the National Bank of Hungary, the payment system project suffered *long delays* because of the following problems:

- The task of separating the operations of a modern central bank and all other functions that the central bank carried out in the past, as a precondition for setting up a new clearing system.
- Some of the assumptions about the fundamentals turned out to be false. These regarded, for example, the availability and reliability of public telecommunication services and centralised intrabank accounting, and the persistence of old business practice and governance.

Second, the involvement of the *central bank and its relationship with commercial banks* was both crucial for payment reforms implementation and a sensitive issue during the reform. Commercial banks are reluctant to change both payment arrangements and co-operate in line with the reduction of other than their private costs (for better or worse) unless the central bank pressures them to do so. In an immature banking system as in a transitional country, this shifts the responsibility for 'strategic thinking', setting of the agenda, and ensuring the compliance with the rules and deadlines on the central bank. Moreover, the different interests of some large banks may jeopardise the success of the project, as was the case in Hungary when large banks started exchanging payment instructions bilaterally just before the new system was to go live.

Third, notwithstanding these private versus public cost considerations, the involvement of the commercial banks is critical for the success of the interbank payment system reform. Therefore, a clear balance between the central banks initiative/leadership and commercial banks involvement needs to be found. In the Hungarian case, the banks were less involved than they wanted to be. However, it was the *involvement of foreign banks* (bigger than in any other CIT) that contributed to better utilisation of the system, and thus was in line with the central banks policy intentions. The involvement has also contributed to a more mature banking system and better banking practice, the basic prerequisites for risk reduction and monetary policy efficiency with regard to the payment systems.

It can also be concluded that the clearing and settlement were considered for quite some time as a merely operational matter, which had nothing to do with the banking and monetary risks. Nonetheless, the risk awareness and control have gradually increased and the payment system was able to function without major disruptions over the years. In the very competitive market, with significant presence of foreign banks and investors, the system operated satisfactorily.

Lithuania

The Bank of Lithuania carries out interbank settlements via banks' correspondent accounts held with the Bank. It is done through the Bank's "Settlements Centre" that started operations in 1992 and was an independent entity up to mid 1994. The centre has about 60 employees that run the system responsible for about nine million payments, worth 82 billion Lithuanian Litas in 1997. All banks (12 banks in 1998) participate in the system and the banks' branches (160 of them) may also take part in it. Interbank settlements are performed twice daily – at 11 a.m. and 3 p.m. Banks are supplied by the information on the effected payments also twice daily by E-mail. The telecommunication network is public network, the protocol is "CC:Mail" and the hardware consists of personal computers both at the Settlement Centre and the participants. The membership for clearing and settlement services is open for domestic banks, their branches and foreign banks/branches. The pricing is per transaction, regardless of the value, and per computer system use, i.e. for each KB of information transferred and stored.

Since late 1997, if banks do not have sufficient funds on correspondent accounts for effecting payments at the time of the last clearing, they may use the loan of the central bank for pledged Government securities. The central bank is also an agent of the government in managing auction of Treasury bills. The preparations are under way for establishing an RTGS system.

In short, the Lithuanian payment system illustrates the following issues of interest:

- As the settlement system is based on correspondent accounts, there is the question of the cost of reserves and complexity of multilateral arrangements.

- Mixture of gross clearing and net settlement arrangements is not fully taken into policy considerations. As in other countries that use the same settlement formula, the potential ambiguities and lack of simplicity may be too much for the banking and monetary systems to deal with.
- The system is technologically underdeveloped and has inadequate security provisions.
- Participation of both banks and their branches, as in the Estonian case, increases the risks and reduces control and financial discipline.
- Centralised queue management with no guarantee of settlement may be contradicted by the possibility of overnight borrowing, as payment related borrowings may spill-over to overnight borrowings.

Poland

In Poland the reforms started in 1990 when a telex service for large-value payments was introduced. The reforms followed the macroeconomic adjustment programme and were aimed at reducing the settlement cycle and facilitating monetary policy and control. In 1991, the National Clearing House (NCH) company was appointed. Alongside the central bank, the clearinghouse became responsible for the payment system design and operations. The primary responsibility for the system regulation and supervision, however, remained at the National Bank of Poland. After two years of preparation, in 1992, the first concrete measures were initiated and the NCH was given the task of developing two clearing systems, one for paper and one for electronic payments, both with net settlement. The latter started operation in 1994.

In 1993, the bank accounts were consolidated at the central bank - centrally instead of at its 49 branches as before. Thus, interbank settlement at the central bank started. Meanwhile a need for RTGS system has been recognised and the settlement system at the central bank is being gradually improved to function in real-time. Therefore, the payment operations are effected through the three systems: a) "SYBIR" – paper-based DNS clearing system, operated by the NCH[16] b) "ELIXIR" – electronic clearing system, also operated by the NCH, and c) "SORBNET" – large-value interbank

[16] The NCH processing is DNS and the system is owned jointly by the central bank and commercial banks

settlement system, operated by the central bank. In addition, since mid 1995, the central bank processes and settles government bills transactions through its automated delivery-versus-payment, book-entry, system – "SKARBNET". Electronic credit transfers are still insignificant and account for about five percent of both value and volume of total payments. Large-value payments are now typically cleared within one to three days. The price of payment services is subsidised, i.e. the participants do not bear the full costs of the services.

Initially, it seems, the objective of the reform was not clearly defined. In eight years there has been several changes in strategies, designs, objectives and systems. This partly reflects the conflict of interest existing between customers, banks and central bank, as well as legal impediments. The slow start and delays were also a consequence of lack of resources and adequate skills. As the Polish case illustrates, a quest for quick results does not favour the execution of the reform and is usually expensive since much work turns out to be unnecessary. With the benefit of hindsight, it can be concluded that a clear vision and strategy can certainly minimise both the time and resources required for a new payment system implementation and reduce the need for constant changes and conflict among different stakeholders.

Russia

In Russia and the former Soviet Union there was only one bank until 1989. It was the State Bank of the USSR, which was responsible for money and funds distribution, tax collection, credit distribution as well as for keeping all the accounts and making all settlements in the economy. When the financial system reforms started in Russia in the late eighties, as many as 2,500 commercial banks mushroomed to fill the gap in the banking system. It, however, did not create substantial payment and settlement difficulties initially. As the banks had no branches and each of them operated in just its respective region (except for the Savings Bank), where they held the accounts at the one of the 80 regional branches of the central bank, the payment operations were settled locally. The payments were in paper form and mostly regional and, thus, bilateral.

Although simple, the payments took up to several weeks to clear. The banks then discovered the potential benefits of free float that resulted from long payment

delays and rudimentary payment system. The image of the inefficient payment system was used as an excuse for banks to hold free money. The delays became even longer. In response, the central bank established the system of Cash and Settlement Centres (CSC) and made it compulsory for banks and their branches to pay through the centres. This resulted in a shorter clearing cycle that is by law limited to five days (after that the centres pay penalty rates for delays). The clearing was still mostly regional as poor telecommunications and computer networks prevented both fast and truly nation-wide electronic payments. The establishment of the paper-based payment system has been followed by an incremental introduction of electronic payments with the ultimate aim of creating a national centralised RTGS system.

The process, however, is burdened with many problems and considerations and, as in China, is a substantial undertaking. Vast distances, eleven time zones, remote scarcely populated places, poor telecommunications networks, lack of interbank communication system and an inability of some customers to initiate payment orders in an electronic form are the obvious ones[17]. Also, the costs of transferring data are high as a consequence of both high demand and poor infrastructure that requires state-of-the-art solutions. As there is a demand for improvements, not only because the central bank pays huge penalty rates for clearing delays, there is no time to wait for improvements in the overall telecommunications infrastructure. Thus, the central bank has started building its own "VSAT" network, based on satellite technology. The first satellite, owned by the central bank, was launched in late 1997 and should start operations in late 1998[18].

There are, however, certain changes that need to accompany the reform of the system to start operating efficiently. Firstly, the legal framework is inadequate for electronic payments, and the authenticity of electronic documents is currently hard to prove in courts. Secondly, operating procedures need to be aligned with electronic payments as they are designed for paper-based payments. Thirdly, the computer infrastructure of the central bank needs to be improved. And fourthly, there is a problem

[17] Even in the European part of Russia there are very few reliable terrestrial telecommunication lines and, for example, in the places that can be reached only by plane or helicopters, a storm may result in these places being cut off for several weeks.

[18] Another satellite (planned to be launched in 1999) is needed for full coverage of the territory. The central bank has also signed the contract to buy necessary bandwidth on IntelSat satellite and use it as back up capacity.

of excess employees coupled with a lack of skilled staff. Moreover, the changes are opposed within the central bank's system from both employees and some managers.

The Russian payment system reform provides certain lessons, and raises a few questions.

- First, the Russian case is a good example of when and why *a central bank can take the leadership* in payment systems development and provision. It seems that the banks do not trust the central bank's announcements and policy consistency, i.e. the credibility of central bank is seriously undermined. On the other hand, the central bank does not trust the banks to be capable of implementing socially optimal solutions. Furthermore, the bottom-up approach has failed in Russia and banks showed hostility towards each other and no willingness to co-operate. Moreover, there is lack of financial discipline, an immature banking system, and financial and debt crises in the country. According to the central bank and foreign observers, the banks have shown no risk awareness. Regardless of whether some of this is of the central bank's own making or not, in those circumstances one may argue the case for more formal involvement and a regulatory rather than co-operative route.
- Second, notwithstanding the above mentioned circumstances, there are the questions of: a) *the right balance* of the central bank's involvement and private initiative (especially regarding the potential retardation of market forces), b) *costs*, i.e. use of public funds and deciding on priorities, and c) measure of involvement of the central bank in retail payments system development. In general, can some of the objectives relating to trust, discipline and risk reduction be *achieved through proper regulation and/or supervision* instead of operational involvement and huge investing? These issues are particularly sensitive when a market-based financial system is in its infancy.
- Third, the decentralised system with different standards in its 90 clearing centres (some gross, some net, some RTGS); regionalism and strong autonomy tendencies of the regions; accompanied by the popular preference/inertia for centralised services provision, have all contributed to the choice of centralised, nation-wide, RTGS system by the policy-makers. However, in terms of costs, potential bottlenecks, mistakes, overuse of capacity and system breakdowns, it might have been more effective to implement a so-called 'interlinking' solution as for EU

TARGET, whereby a particular local RTGS system could be located not on a regional but, for example, time-zone basis. In light of the current practice, for example, with 90 percent of payment orders being sent just before the closing time for payments, the technical robustness of the centralised system will be put to the test sooner rather than later.

Slovak Republic

The National Bank of Slovakia is responsible by law for payment system co-ordination, integrity and effectiveness. The central bank is the majority shareholder in the Slovak's National Clearing Centre (SNCC), an automated clearinghouse, which provides settlement services for all payments[19]. The clearing is gross but the settlement is not real-time. There are about thirty banks participating in the system and Bratislava Stock Exchange and Authorisation Centre of Slovakia (card payments clearing company) as indirect participants. The transactions processed by the system are either credit transfers or debit orders (collections). There is no discrimination between large and small payments. The system also clears cheques.

The system works on a 24-hour operating cycle and participants can send and receive payments for 21 hours while the remaining time is reserved for necessary processing and system maintenance. The final settlement takes at most t+3 days. The system processes 560,000 transactions on average a day and on peak days up to one million transactions. The average value of a payment order is about 250,000 Slovak Kronas. Since 1993 the average annual growth rate of the payment orders volume is about 20 percent. Approximately 110 million transactions were processed in 1997.

The payments are cleared on a gross basis, meaning that only if there are sufficient funds available to cover payments can the orders be executed. Otherwise, the payment orders are placed in a queue until sufficient liquidity has been achieved. The payments are processed on FIFO principle or rejected at the end of the day depending on funds availability. Banks are required to keep minimal balances on their settlement

[19] The Centre is jointly owned by the central bank, commercial banks and the ministry of finance, with the central banks owning 40 percent of the shares.

accounts that are equal to required reserves balances held at the central bank[20]. Banks can monitor their balances either electronically by using an interbank communication system or by telephone. The sources of additional liquidity available to banks are the interbank money market and sale of eligible securities to the central bank as part of the bank's open market operations.

There are a couple of points about the Slovak payment system that may indicate a non-optimal system design.

- First, one may wonder why there is a gap between clearing and settlement (instant clearing if funds are available versus three-day settlement)? According to the central bank information, and given the fact that the payment orders are checked for available funds each time, it is not a matter of technology, even though the technology may need to be improved. It leaves the payment system design/procedures and legal arrangements exposed to criticism. There are certainly risks and costs that arise from the gap and the queuing arrangements. These relate to possible gridlock and an inability of the system participants to rely on incoming cleared payment orders.
- Second, it seems that the system functions at its peak capacity (over 400,000 payments a day initially envisaged) and that the capacities are not used rationally. There is the practice to stop clearing day to process high priority orders instead of differentiating between LVTS and SVTS during the regular clearing hours.

Slovenia

Slovenia has the same payment system background as Croatia and FR Yugoslavia. The payment operations are handled by the Payments Agency directly, without the banks' 'intermediation'. The system functions as an end-of-day gross settlement system. Paper-based credit transfers dominate the system and account for about one half of the total volume of processed payments and over 90 percent of the payments value.

[20] The settlement accounts mirror banks reserve accounts. The former are held at the clearinghouse and the latter at the central bank. Therefore, the accounts at the clearinghouse are only provisional 'technical' accounts linked to the real settlement accounts at central bank.

The reforms are aimed at transferring the banks' accounts at the central bank and making banks the main payment services providers. However, not all banks will participate as the large-value payment services providers. An RTGS settlement of interbank payments is to start soon, after extensive preparations. Also, progress has been made in the area of subsystems of low-value payments' clearing, transfer of companies' accounts to banks, public finance and tax collection and changes in payment statistics.

Coincidence or not, the Slovenian payment system reforms and system design resemble those of Croatia and Yugoslavia. The analysis will focus on advantages and disadvantages of the proposed systems. The main remarks about the Croatian payment system also hold true in the Slovenian case. Some of the payment system design aspects are analysed further in the analytical chapter on the Yugoslav payment system.

What is different, however, is the state of these economies and their financial systems in particular. Thus, Slovenia has a more favourable macroeconomic environment and political stability than other former Yugoslav republics. Also, Slovenia is a small monetary economy both in terms of territory and population and its payment system reform may be a much smoother undertaking as compared to some other countries.

On the other hand, what may test the efficient functioning of the new system is low private ownership both in banks and the economy as a whole and a possible continuation of the 'good-old' relationship between the 'social' sector and non-privatised banks. Moreover, there are restrictions on foreign banks' participation and foreign investments, as compared to the other advanced transitional economies, which may mean reduced pressure on financial institutions to compete and function efficiently.

However, notwithstanding the pressures on Slovenia to privatise and relax the capital flow regulation by foreign investors and institutions, as well as the potential risks of non-privatised banking sector, the policy makers seems to have done a good job so far. Slovenia was able to control the influence of capital flows on domestic inflation and liquidity, alleviate the effect of the international emerging markets crisis, and carry on with the reforms. Nonetheless, the policy makers are faced with a choice of selecting an adequate policy for the future in relation to Slovenia's aspirations towards joining the EU and its competitiveness in the international capital host market.

Box 5-1 Overview of the payment system developments in select group of CIT

Bulgaria	**China**	**Croatia**
▪ Strategic approach to the payment system reform, aimed at establishing RTGS system from the outset of the reforms. Late start though. ▪ System operated jointly by central bank and commercial banks. ▪ The economic instability and banking and legal system infrastructure are the major impediments to the reform.	▪ Incremental changes aimed at improving speed and choice. Sluggish progress. ▪ Centralised approach towards establishing an RTGS system for large-value payments and an electronic netting system for retail payments by the year 2000. ▪ Payment float and lags are still substantial.	▪ Large-value payments operated by the Payment Agency on a net settlement basis. No bank participation. ▪ Aims of the reforms are to transfer the large-value payments at central banks books and establish an RTGS system by I-Q 1999. ▪ Dominant state ownership of the banks. No changes in the banks' management structure
Czech Republic	**Estonia**	**Hungary**
▪ Established (RT)GS system. ▪ Leading role of the central bank. It also regulates payment system and keeps banks settlement accounts. ▪ No overdrafts permitted; queuing arrangements. ▪ Obligatory participation of all commercial banks. ▪ Delays and risks in the payment system are the banking system borne.	▪ Bilateral interbank settlement dominante. Multilateral netting at central bank accounts for only 1/3 of payments. ▪ No distinction between inter-bank and retail payment orders processed by the central system. ▪ Aiming towards an RTGS system for LVTS by the end of 2000.	▪ Deferred gross settlement. End-or-day settlement but 'good-funds' required prior to payment orders. Queuing facilities offered. ▪ Took long time to develop. ▪ Ambiguities regarding small value and large value payments; and liquidity provision and risk reduction. ▪ Project to develop an RTGS system.
Lithuania	**Poland**	**Russia**
▪ Designated time settlement through the banks' correspondent accounts with the central bank. Twice daily. No daylight overdrafts. Queuing optimisation. ▪ Participation ambiguities. ▪ No on-line liquidity monitoring by the banks. ▪ Use of open public network, PCs and e-mails raise the questions of the security.	▪ No clear strategy and/or consensus among the stake-holders resulted in long delays and inefficiencies in the new system design and functioning. ▪ Reliance on manual processing and use of fax and telex. ▪ Towards the establishment of an RTGS system, with no queuing or guarantees.	▪ Decentralised system, long delays and poor discipline. Some 90 settlement systems across the country. No standardisation. ▪ Poor regulation and supervision. ▪ No risk sensitivity at banks. ▪ Efforts towards centralised orders processing versus poor technical infrastructure and vast distances.
Slovakia	**Slovenia**	**Yugoslavia**
▪ Single clearing centre – independent legal entity; but central bank is a majority shareholder. ▪ Gross clearing with queuing arrangements. Long settlement. ▪ Use of capacities can be rationalised. ▪ Aim to establish an RTGS in order to get connected with TARGET.	▪ The same payment system's background as for Croatia and Yugoslavia. ▪ Extensive work towards the establishment of an RTGS, including improvements in payments standardisation and statistics. ▪ Aim to connect to TARGET. ▪ Sound economic and financial fundamentals. ▪ Low private ownership.	▪ The same payment system past and plans towards establishing an RTGS systems as in Croatia and Slovenia. ▪ Many postponements and delays in the new payment system implementation reflect lack of consensus and unstable economic and political environment. ▪ Non-reformed banking.

5.5. Payment system and monetary policy in CIT

5.5.1. Introduction

The experience of transitional countries with the payment system reforms provide illustrative examples of both positive and negative influences that payment system and monetary policy and control have on each other. As a rule, payment system changes were initiated to support new monetary policy and banking system platforms. However, the payment systems and monetary policies were not always compatible or without frictions.

The 'conflict' was a reflection of one of the following factors or their combination:

1. Lack of payment system reform to support monetary policy reform or measures.
2. Lack of a payment system development strategy.
3. Lack of control over the payment system by the monetary authorities.
4. Lack of consistency in monetary policy measures and/or turbulent macroeconomic environment.
5. Lack of understanding of how the payment system influences or complements monetary policy and vice versa.
6. Lack of consensus or minimal co-operation between parties involved and/or political will to carry out the reforms.
7. Lack of resources and/or necessary skills for payment system development and operations.

As discussed in Chapter 2, the influence of payment system on monetary policy, and vice versa, is either from the money supply or money demand side and it manifests itself through:

- Demand for settlement reserves by banks and resulting systemic risk and liquidity provision considerations.
- Positive or negative payment float.
- Speed and reliability of transfer of monetary claims.
- Choice of monetary operations instruments dependant on payment technology.
- Potential 'spill-over' of intraday credits for payments into overnight borrowings and ability of monetary authorities to control it.

Against this framework, the payment system reforms in the transitional countries are analysed next. An overview of the findings is given in tables 5-8 and 5-9 in section 5.6.2.

5.5.2. Country case studies

Bulgaria

Bulgarian economic reforms, aimed at transition towards market-economy, were characterised by inconsistent macroeconomic polices and delays. The industry, especially manufacturers and exporters, were slow to adjust to the new economic reality and the loss of 'eastern-block' markets. The privatisation of state-owned enterprises, as well as banks, was partial, slow and was missing the political will to support it. Poor performance of the economy and banks' lending decisions were reflected in the banks' balance sheets, where the bad debts resulted in liquidity crisis that became insolvency crisis and finally resulted in runs on banks in 1996. The loss of confidence in banks was accompanied by high inflation and a substantial currency devaluation.

At the same time, the central bank was trying to accommodate the demand for additional liquidity but, as the credits were not covered by collateral, the proportion of unsound financial assets at the banks only increased. The non-privatised banks expected and asked for credits from the state – the owner, and the central bank was there to provide. The money was then poured back into loss-making state-owned enterprises but they were unable to put it to good use but used it for life-saving 'one-off' infusion(s) to pay out the wages and produce more non-selling goods. The financial authorities had also resorted to bailing-out distressed banks, but the interventions resulted in perpetuation of the problems. Thus, a systemic risk became a moral hazard problem, which became a systemic crisis.

According to the central bank, open market operations and the setting of basic interest rates have become main monetary policy instruments since 1994. But, as the central bank's policy was ineffective in stopping the inflation, the interest rates were inflation led and were getting higher and higher. The high interest rates did not

compensate nor stimulate savings, because of the high inflation and inflation expectations, but made it harder for debtors to service the debts.

How does the payment system fit into all this? Almost all of the previously mentioned generic factors exercised their influence on the relationship between the monetary policy and payment system in Bulgaria from 1991 to 1997. As the introduction of the new payment system started only after the full impact of the financial crisis was over, there was no adequate payment system to support the monetary policy based on interest rate setting. Without an effective payment system there was no efficient interbank money market and fast distribution of money to reduce pressure on the central bank as well as to enable better liquidity management and investment opportunities. On the other hand the monetary policy and economic environment would not have been a match even for the latest payment system technology, as the crisis was deeply rooted in the financial system itself.

In summary, the relationship between the payment system and monetary policy in Bulgaria from 1990 to 1997 was manifested through the following:

- First, the demand for settlement reserves was blurred by the demand for liquidity and actual insolvency. They were blended together and there were no procedures, or payment system for that matter, to discriminate between the two.
- Second, the actual debt-servicing difficulties and illiqudity were thus indistinguishable from payment delays. Also, payment system inefficiencies could easily hide behind the overall economic depression.
- Third, the payment system was inadequate to support the new monetary policy instruments as it was not quick or reliable enough. In the given circumstances, effective and efficient interbank lending was also impossible without a state-of-the-art payment system.
- Fourth, the Bulgarian case vividly illustrates the place and importance of a payment system in a monetary economy. There is no use of high precision electronic tools (say the latest payment system technology) in mending simple mechanical instruments (ineffective monetary policy). A good tool cannot compensate for poor maintenance or unskilful use of the instrument or for an inadequate instrument. Furthermore, a bad tool is a bad tool, no matter the instrument.

China

A decentralised organisational structure of approximately 2200 central banks' local clearing houses, three-level hierarchical intrabank clearing and mainly paper-based payment instruments and processing procedures have all resulted in an extremely large and variable payment float in the Chinese system. The net positions of bank's branches and local clearing houses were settled only periodically – after one to five days. Moreover, the payments were being finally settled at the central bank's books only once a month. The central bank did not provide intraday overdraft facilities but there is a central bank's guarantee in case of settlement failure.

The new, satellite-technology based, system that should go live by the next millennium provides for faster electronic clearing of payments and more centralised processing procedures. Thus, the system will no longer differentiate national from local payments and inter-bank from intra-bank payments. Given the high level of required reserves and the absence of a mature money market, the central bank intends to provide intraday credit to the participants in the system. The overdrafts will be acceptable within a given limit, but no 'spill-over' into overnight borrowing will be allowed. The central bank will charge for the credit. Also the banks' and branches' accounts will be consolidated into just one settlement account at the local clearinghouse for each bank.

From the monetary policy perspective, there are a few illustrative observations for both 'old' and 'new' payment systems.

- Firstly, in the current system there is a clear conflict between efficient, market oriented banking system functioning and long payment delays and a large float. It could be argued that the real competition in banking and liberalisation of the financial system are still missing and that these are the main obstacles for the efficient banking system. However, an inefficient payment system prevents both inter-regional banking competition and active liquidity management of profit oriented banks. On the other hand, monetary policy has to be able to reduce and to control the amount of float, which becomes a more serious matter in a market oriented competitive environment. In a monobanking financial system, with accounting instead of payment flows, the float may not matter significantly but in a market-oriented system it is certainly an issue. The main 'technical' problem may

be that the new electronic 'intrabank' system is procedurally and organisationally just the electronic version of the old 'paper-based' system.

- Secondly, the regional banking and clearing structure, as well as the decentralised banks' accounts make banking supervision more difficult. Financial discipline and particularly monetary policy effectiveness suffer form the segmented and complicated organisational structure. Financial institutions cannot manage their daily liquidity effectively as the autonomous flows from local branches may contradict the bank's overall cash flow/reserves position. This increases the pressure and dependence on the central bank's provision of liquidity and, thus, payment risks. Centralised electronic payment systems and consolidated bank accounts are likely to change that and contribute to the financial system upgrade.
- Thirdly, given the banking system structure with only four major players who have their 'in-house' national clearing on a net basis, the central bank would not have as much control over the payment flows as it would like to should the banks become more independent. It has been estimated that about 2/3 of non-local payments volume is cleared through the clearing systems of the respective banks. Therefore, the considerations include whether the banks will become independent systems within the system and will the central bank have the power and the skills to prevent monopolistic tendencies and preserve financial discipline. In the case of non-competitive oligopoly in an immature banking system, it may be difficult for the central bank to carry out consistent and effective monetary policy and to be free of the influence of major players (not to give in under 'systemic risk' liquidity requirements from banks). Moreover, banks may have no incentive to speed up the payments and reduce free float. These issues will be a considerable threat to the central bank's authority if the loosening of the Bank's grip and more liberalised financial arrangements in the system are not accompanied with the encouragement of competition and effective supervision and surveillance.
- Fourthly, the central bank's provision of liquidity in the new systems, i.e. guarantee of payments may induce a 'moral hazard' problem because of the strength of the major banks. Thus, unless there is timely and effective supervision of banks, the caps on intra-day borrowings and fees for credits may be inadequate measures to prevent 'spill-over' into 'inter-day' credits.

In conclusion, it seems that in the new Chinese payment and monetary system, the relationship between the central bank and the commercial banks as well as the effective supervision and surveillance are key to efficient, risk-less, payment flows.

Croatia

In former Yugoslavia, and in almost all of the newly formed states after their independence, the payment system was a separate organisational and functional entity, independent from the banks and the central bank. Thus, the former Social Accountancy Service[21], and newly re-named agencies and clearinghouses that were created from its operational units in the respective republics, had control over payment float and were able to create 'quasi-deposits'. Although non-deposit institutions, the clearinghouses held (giro) accounts for all enterprises and banks for payment purposes and were able to prioritise between the payments of different parties and decide on the speed of payment orders processing. The services provision monopoly and close ties with local governments, for which they collected taxes, made the clearinghouses (before the break-up of the country and the Service itself) even more detached from the central bank and commercial banks.

Just before the break-up of former Yugoslavia, the regional clearinghouses of some republics were caught red-handed when they started creating autonomous monetary flows, i.e. granting liquidity and effecting payments not covered by their customers giro account balances. It is assumed that the created revenues were transferred to the republic's budgets for whatever purposes. The central bank at the time was thus surpassed as a money-creating authority and was forced in some cases to sell foreign currency reserves in exchange for the newly created money because of the internal convertibility of the currency at the time.

In the newly formed states – including Croatia, as the both central banks and the clearinghouses were under direct control of the respective governments, the monetary authorities were finally put in charge of the payment and monetary systems. Thus, in Croatia, the payment system is being reformed in line with the reform of the monetary and banking systems, whereby the central bank holds the settlement accounts and

controls monetary flows and commercial banks are the main payment services providers.

However, the queuing facilities in the new RTGS system and bimodal processing of queuing orders, as discussed in section 5.4.2, can, under certain circumstances create gridlock and/or enhance liquidity risk. Therefore, the system may resemble a DNS rather than an RTGS system, hence different monetary policy considerations. The issue is discussed in more detail in the next chapter.

In summary, the case of former Yugoslav republics, including Croatia, illustrates the importance of payment system and monetary policy co-ordination and of determining the ultimate authority for both. It is also an example of payment system potency and importance, as recognised by the policy makers in the respective former-Yugoslav republics both now and in the past.

Czech Republic

The Czech National Bank owns and operates the only, national, LVTS settlement system. It is also involved in retail payment systems development and cheques clearing. In addition, the central bank took the leadership in E-money institutional framework establishment and debate. The Czech Payment system reform is an example of timelines and strategy and central bank's leadership and involvement, and consequentially monetary policy co-ordination. The reform was a part of a thorough restructuring of the economy as a whole.

However, the reforms, and overall financial system, were not problem-free.

- First, there are the questions of measuring the central bank's involvement, type of involvement, and the scope of involvement. Apart from the immediate cost-effectiveness implications on public finances, the central bank's involvement raises a range of long-term policy implication issues. These include private markets development and competition, as well as the private initiative. Also, would the separation of supervision and operational involvement in the payment system benefit the Czech banking system in terms of human and financial resources allocation across the system? When is the right time to pull back from the

[21] SDK for short in Serbian/Croatian/Slovenian/Macedonian.

operational involvement and supervise, and when is the time right to limit the central bank's involvement? An illustrative example of potentially negative consequences of the central bank's involvement is the E-money initiative. The provisional rules and policy guidelines, that approach the issue from the risk-to-the-central-bank point of view, may kill the E-money schemes before they even started in The Czech republic.

- Second, the five largest, still predominantly state owned, problem, banks account for 90% of payments volume and value. The situation exaggerates potential gridlock and moral hazard or systemic risk problems, i.e. there is a threat that a crisis in the banking system can both spread fast through the payment system and affect the payment system functioning. The banking and financial system problems reflected, inter alia, in a shortage of liquidity, put the payment system and monetary policy consistency at test each time there are no sufficient funds for a large-value payment execution. Furthermore, a concentrated system (with, say, a few dominant large banks) with an underdeveloped money market and non-restructured banking system, allows banks with a larger market share to drain the liquidity from the system and/or obtain the funds easier than the other banks. Thus, for example, there may be a situation whereby insolvent but liquid banks are the pivots of a payment system. The sooner the future of the institutions and policy actions regarding the issues become transparent the better.
- Third, the Czech 'RTGS' payment system still cannot claim the Real-Time in its name as the payment orders are not cleared or settled in 'real-time'. A gradual on-line connection of banks to the system is nonetheless progressing. In addition, one may argue that the queuing and payment monitoring arrangements make the system less RTGS than the policy makers have made provisions for. As there are different priority levels assigned to each payment order and on-line payment monitoring by the banks, the system can be affected by similar risks as a DNS system. Namely, a party may rely on incoming payments and send a payment order in a queue to be settled when the incoming payment arrives. Although the central bank has been careful not to assume these risks itself, the banking system characteristics and potential systemic crisis may force it to do so eventually.

Estonia

Since the 1992 monetary reform, monetary policy in Estonia has been based on the currency board system whereby the "Estonian Kroon" is pegged to German Mark. The domestic currency is freely convertible and the exchange rate can only be changed by the approval of the Parliament. Therefore, the money in circulation has to be fully backed by foreign currency reserves. The principle holds not only for the base money but all Eesti Pank's liabilities and guarantees provided. Thus, the use of other monetary policy instruments, including short-term interest rates, is limited. Under the circumstances the credit institutions' liquidity management is effected through their foreign-exchange reserves. In turn, the central bank's monetary policy is almost entirely effected through the "forex" market. However, in order to minimise the effect of international capital flow risks on system liquidity, the central bank introduced additional measures to strengthen the domestic 'liquidity buffers'.

The most significant step in that direction was made in mid 1996, when reserve requirements were allowed to be used for payment purposes. Moreover, the central bank pays interest on excess reserves (over minimum required reserves). The other liquidity buffer was the inter-bank money market, which, however, has had a limited impact on the system's liquidity. The banks found it hard to rely on the highly volatile market that is also dependent on the overall liquidity position of the market determined by external reserve fluctuations. In late 1997, the central bank enforced a provisional additional liquidity requirement, which was 3 percent of the reserve requirement base. Also, the interest paid on excess reserves was increased to be equal to The German Bundesbank's discount rate.

The introduction of the Estonian monetary policy framework has had specific payment system implications. The potential and real influences of the payment system on the monetary system in such circumstances are also evident.

- First, the currency board arrangements determined the choice and use of monetary policy instruments. As the system's liquidity depended on foreign exchange reserve balances and transactions, the banking system's liquidity management was constrained to the forex market. Great fluctuations in overall liquidity, due to the mobility of capital and system arrangements, also shifted the responsibility for

liquidity management to the financial intermediaries. Under the circumstances, from the banks' point of view, the deferred net settlement system provided an optimal payment system solution regarding the liquidity provision and smooth functioning of the system. Thus, the fixed foreign exchange rate and currency board catered for low inflation and interest rates, and the DNS system contributed to the reduced need for liquidity/reserves.

- Second, from the system point of view, the DNS system, as well as the monetary policy measure to allow the balance of deposited funds over borrowed funds with foreign institutions to count towards banks' reserves, made the system exposed to both liquidity and credit risks. The settlement uncertainties and possible unwinding are the price to pay for 'increased liquidity' provided through a DNS system, even more so when the system is not adequately protected.
- Third, the currency board arrangement increases the probability of a run on local currency in case of both internal and external disturbances to the system. Reliance on external liquidity makes the system prone to the attack of speculators. Also, as the central bank cannot manipulate interest rates effectively it cannot create a credit crunch in order to deter the speculators. In the system dependent on the level of foreign currency reserves in such a way, all is well while the confidence and other macroeconomic indicators are favourable to the system. However, if the table is turned, the impact of capital flight can be devastating for the immature banking system, especially as the central bank has little space for manoeuvre. For example, the loss of confidence in emerging markets as a whole in 1998 resulted in substantial withdrawals of investors from the local market.
- Fourth, there were other payment and monetary policy arrangements that provided a counterbalance to the threats. The central bank did not provide the intraday credit for payments that can be potentially used for an attack on the currency. Also, the required reserves regulations contributed towards liquidity management for payments in the immature banking system. Furthermore, the central bank paid interest on reserves, thus preventing reserve requirements evasion and stimulating creation of the liquidity buffer. What was ambiguous, however, was charging a penalty for the use of reserves for payment purposes during a period of system reforms. Moreover, it is unclear whether the policy makers have accounted for the

potential influence of the sale of eligible assets, namely central bank's certificate of deposits, in case of currency attack, as there are no 'haircuts' on the securities.

Hungary

In line with the leading role of the central bank in the payment system reform, was the formal oversight policy and risk reduction measures implemented by the central bank. The central bank does not provide liquidity nor guarantee for payments and thus has no risk exposure. The additional liquidity is available for pledged securities at the central depository institution, i.e. the overdrafts are 'collateralised'.

Nonetheless, for a long period since the reform started, the Hungarian payment system arrangements did not take payment system risks and costs into account.

Firstly, although the payee banks have the information on payments pending in the queue, they cannot assume that the payments will be settled. Thus, even though the clearing is on a gross basis, which is supposed to eliminate the *credit risk*, the system is prone to the creation of liquidity, and consequently credit, risks because of the deferred settlement system with little additional risk provisions.

Secondly, also related to the settlement arrangements, the FIFO processing of payment orders was clearly prone to gridlock, not less so because there was no intraday liquidity credit facility. Furthermore, as the payment limits are set at the beginning of the day, based on the amount of reserves, the participants had to rely on overnight borrowing for payment purposes and had no intraday flexibility in raising additional liquidity.

Thirdly, the cost of reserve requirements and gross settlement that the banks incurred in the system with no efficient money market were, thus, not fully appreciated by the central bank.

In summary, settlement delay - gridlock and a possibility of 'unwinding' can occur in a 'gross' system if the settlement is not immediate, i.e. real-time. The combination of deferred settlement and full cover for payment orders (gross clearing), denies the participants the advantages of both reduced liquidity requirements of a net clearing system and elimination of credit risk in a gross settlement system. It may be good as a temporary measure aimed at introducing financial discipline but is certainly

unsuitable for advanced clearing and settlement in an economy. The gap created, coupled with the non-discrimination between transactions, complicates the liquidity management of the participants and the functioning of the system. Also, in view of the inadequate queuing arrangements, an ambiguous, hybrid, payment system cannot be treated as a tailor-made solution.

Some of the mistakes, however, were made due to the lack of precedents and consensus on the system design in the payment system theory and practice at the time when the reforms started. Furthermore, the existing system technology can be transformed so that the new system is not built from scratch, there are established rules and disciplines in the system and the reform as whole can be viewed as a natural progression and a learning process.

Lithuania

As in Estonia, the currency board was resorted to as a monetary policy anchor in Lithuania. The Lithuanian policy makers, however, came to view the 'anchor' arrangements as something that holds them back from pursuing more adequate, up-to-date, monetary policy and from 'sailing' towards the EU harbour. The changes introduced in 1997, however, have had to be gradual, because the policy has been associated with low inflation, stable macroeconomic conditions, and confidence in the system.

The main points about the Estonian reforms apply to the Lithuanian case too. Thus, among other things, commercial banks were required to keep required reserves at the bank of Lithuania[22] which provided necessary liquidity management flexibility into the system.

Nonetheless, the constraints of the currency board arrangements became evident during the banking system crisis when the central bank was unable to help otherwise solvent banks with the liquidity credits. Thus, according to the central bank, the crisis spread from insolvent to illiquid but solvent banks. This, however, was due in part to

[22] Estonia, for example has followed more rigid currency board arrangements, and introduced the 'liquidity buffer' at a later stage of the reform.

the lack of focus and separation between banking supervision and monetary policy functions from the central bank's side.

The Lithuanian experience shows that: a) central bank's lender of last resort function is invaluable in an immature (transitional) market in case of the systemic crisis and b) there is a need for an additional liquidity facility other than interbank money market. During the Lithuanian banking system crisis the money market stopped functioning and there was a run on the banks. It is also evident that the banking system supervision and surveillance were not up to the task and that there is a clear role for ex ante policy measures and/or system arrangements. The payment system arrangements, as described in section 5.4.2, only increased the risks without contributing to reducing required liquidity for payments.

Poland

Payment system reform in Poland, part of broader monetary system reforms, was aimed at increasing the reliability and speed of payments to support a market-oriented monetary policy. The reforms, however, were far from frictionless and are illustrative of the payment system and monetary policy relationship in a transitional economy.

Firstly, as illustrated by frequent design changes and implementation delays, there was no clear payment system development strategy and the payment system was not up to the task of reducing payment float, uncertainties regarding timing and execution of payments, i.e. supporting the reformed monetary policy.

Secondly, this was partly a reflection of a lack of understanding of the relationship between the payment and monetary systems. The payment system risks and inefficiencies only became an issue after the major payment frauds in 1991.

Thirdly, the incompatibility of monetary policy and the payment system during the first few years of the reforms was also a consequence of a lack of adequate resources and skills that needed to be accumulated first.

In terms of the influence that the payment system had on monetary policy, and vice versa, the following characterises the Polish experience:

- Before the reforms, and for some time into the reforms, there were the problems of substantial and erratic payment float as well as the long and unreliable transfer of monetary claims[23]. According to the central bank, the transition to a two-tier banking system transformed an internal float between the central bank's branches into a float involving different institutions. Consequently, the technical difficulties and the lack of competition between the newly formed state-owned banks resulted in long payment delays. According to the IMF, the payment transactions took on average about one to two weeks to be completed during the period 1990 to 1995. The central bank's ability to control the float was further limited by the decentralised organisational and accounts structure at the central bank.
- From the system/central bank's point of view, credit float exceeded the debit float, i.e. on average the payee bank's account was debited before the payer bank's account was credited. Therefore, the central bank held large values of funds on its books. There were, however, both credit and debit floats present in the system. The float was both large (about 10% of reserve money on average) and variable. The central bank found it hard to set the size or the direction of appropriate monetary operations because they were unable to forecast demand for bank reserves, money and credit aggregates. Therefore, the liquidity risk was significant.
- The introduction of new payment system in 1994, resulted in a decrease of credit float over debit float in the central bank/commercial banks relationship. The increased liquidity, however, was not extended to the banks' customers and there was an excess of credit float in the bank/customer relationship. The lack of competition and, partly, inadequate regulatory framework enabled banks to benefit from the free float.
- At the same time, the required reserves were set high at about 20 percent of the eligible assets and banks were allowed to use them for payments. This, the mentioned banking practice and the consequently increased speed of payments to a few days, all resulted in excess liquidity of the banks. The banks were unable to put the money to better use than to invest in government securities.

[23] The float can be a result of payment lag but it is also a consequence of operational, i.e. accounting procedures. They are particularly relevant in case of paper-based payments, when clearing is not real-time.

In summary, both the payment system and monetary policy had a negative influence on each other. The payment system arrangements, with dominant manual procedures and the predominant use of fax and telex, prevented the central bank from measuring the demand for settlement reserves and thus assessing the risks created by the payment system. Also, the monetary policy could not rely on the system to transfer the monetary claims in a fast and reliable fashion. Furthermore, the choice of monetary policy instruments (especially indirect ones) i.e. their effectiveness was, therefore, limited. On the other hand, it was a duty of the monetary authorities to set up the framework and decide on what would they prefer the system to be like, especially as they had authority over the payment system functioning. For example, the debiting and crediting accounting practice, regulatory framework and system design were all under the central bank's control. In addition, the central bank failed to control inflation, which, for example, in 1996 exceeded 600 percent.

It is tempting to criticise the 'learning by mistakes' process. The costs of the trial-and-error approach could have been mitigated by an adequate system development strategy. However, as noted for Hungary, the countries that led the transition process were prone to making the mistakes because of the gaps in the theory, lack of precedents and, not least, lack of skills and resources.

Russia

The new fully centralised RTGS system will operate from 4a.m. till 8p.m. Moscow time, in order to function in real-time in all eleven time zones. All the participants will be able to check their accounts and make or receive payments. All the payments will be treated as irrevocable and final. The intraday credit will be provided at no charge but should be covered by collateral. Only the state bonds will be accepted for the purpose. The intraday credit provision will be automatic upon pledging of the securities, as the National Depository Centre and the settlement centre will be connected on-line. The overall amount of daily liquidity and collateral will be set every day in advance for the system as a whole. If a bank fails to pay back the credit at the end of the day, the intraday credit will become a three-day credit with a penalty rate, which is twice the bank's lending rate.

The central bank should be given credit for the effort put into the establishment of the new system and the strategic approach to the matter, even though the real quality of the new system will only be tested once the system is fully operational. There are, however, certain issues that seem likely to emerge in the day-to-day functioning of the system and that may worry the monetary authorities.

Firstly, real-time gross settlement will put a pressure on banks for higher reserves and/or better liquidity management, and thus may result in a high demand for additional liquidity from the central bank, especially as the money market will take some time to develop. Moreover, the current practice of late payment orders delivery to the system (towards the end of the working day) is likely to continue because banks will try to compensate for the loss of intraday incoming payments liquidity. The potential gridlock situation may become a serious matter every time there is increased uncertainty or macroeconomic turbulence (not an unlikely event in Russia), as any bank may fear making the payments first[24]. Also there may be some technical difficulties in executing the concentrated payment orders. These problems will require a) a policy aimed at spreading out the payment orders during the day, say through pricing, b) firm and timely supervision and surveillance, and c) probably a payment optimisation mechanism[25].

Secondly, because the overall amount of intraday liquidity available through the pledge of collateral will be determined in advance and limited, some banks may drain out all the liquidity for themselves. Auctions, for example, leave the possibility for some large players to corner the market. Therefore, the immediate task is to set up a policy or guidance for liquidity allocation. Possible criteria for the allocation range from the bank's asset size to average payment values, but are potentially burdened with 'side-effects', i.e. discretionary decisions or flexibility restraints.

Thirdly, as there is no charge for the intraday credit, the central bank should consider the introduction and daily revision of 'hair-cuts' on the collateral to account for potential fall in value of the securities. For example, the state bonds will be significantly reduced in value in case of political and/or economic crisis, even more so

[24] The system does not provide for a queuing mechanism and there is no guarantee of payment orders by the central bank.

[25] The options range, for example, from banks' internal queues or even a private DNS system to introduction of centrally located queue.

if the central bank wants to prevent inflation or preserve the value of the currency by increasing the interest rates. Moreover, a bank's default is more probable in those circumstances calling for a significant discount on the collateral in the turbulent macroeconomic environment.

Fourthly, even though there will be stiff penalty rates charged for a spill-over of intraday to interday borrowing, the central bank needs additional mechanisms to prevent the possibility in case of the system crisis. Therefore, the role of supervision of financial institutions is both significant and critical for the efficient payment system functioning.

Slovakia

The Slovak and Czech payment and banking systems share the same origins and, thus, possess similar characteristics regarding the payment system and monetary policy relationship. The most significant similarity is the banking system ownership and the assets structure, i.e. the dominance of a few large state-owned banks in the system. Therefore, as in the Czech Republic, the best share of the payment orders volume and value is effected through these banks, which are affected by bad debt and X-inefficiency problems. The bad debt problem genesis is similar to that of Bulgaria, only with less severe consequences to date. According to the central bank, the share of non-performing loans reached over 50 percent of the total banks' credits in 1995 and is still estimated to exceed one third of the credits in 1998.

Therefore, the Slovak monetary authorities should also worry about a potential banking system crisis spreading fast through the payment system and affecting the system as whole as well as the liquidity and competition issues, as described for the Czech Republic.

In addition to the bad debt problem, system concentration and related issues, a similarly important factor was the lack of consistency in monetary policy and the turbulent macroeconomic environment that characterised the system. Thus, monetary policy was simultaneously pursuing two, to a large extent conflicting, goals – money supply targeting and currency convertibility and a fixed exchange rate. Furthermore, the proportion of autonomous money supply (beyond the central bank's control), comprising of net foreign assets and net credits to the government, ranged from 90 to

100 percent of the monetary base. The efforts towards sterilisation of the effect of foreign capital inflows on the money supply were both expensive[26] and, to a large extent, unsuccessful.

As noted for Estonia and Lithuania the influence of capital inflows and outflows have different and serious implications on the monetary system and its relationship with the payment system. Under the circumstances the payment system in Slovakia, described in section 5.4.2, was open to liquidity, credit and systemic risks relating to the institutional arrangements and legal constraints. This is partly a reflection of a lack of understanding of the payment system/monetary policy relationship as well as lack of skills and resources for developing technically advanced and unambiguous payment system.

The similarities with other countries do not end there. The Hungarian payment system was also organised on a gross clearing, batch processing, deferred settlement basis. The remarks regarding the need for increased transparency, simplicity and efficiency of the Hungarian system can be repeated for the Slovak system too.

Finally, as with some other Eastern European countries, Slovakia aims at surrendering its monetary policy to the European Central Bank by becoming an EMU member. This is, of course, coupled with the efforts towards developing a national RTGS system.

Slovenia

Slovenia is an open and small monetary economy, prone to exogenous monetary shocks. The ability of the Bank of Slovenia to regulate the exchange rate by sale and purchase of foreign currency is certainly limited. With an excess supply of foreign currency through the foreign investments, the central bank was only partly successful in sterilising the effect of the capital inflows on inflation. Pursuit of a low inflation policy, when successful, resulted in restrictive monetary policy and exchange rate appreciation. Relative stability of the monetary system and not very high interest rates were only possible because the central bank had strong indirect control over the state-owned banks, which had a dominant market share. Also, there were restrictions on the foreign

[26] The central bank had to issue and service its own bills at competitive rates.

investments and foreign bank entrance. In light of the likely privatisation of the banking sector, pressures for the liberalisation of capital flows and preparations for Slovenia to join the EU, it is difficult to achieve both the desired level of interest rates and exchange rate stability. For example, should exchange rate stability become a prime target of monetary policy, interest rates are bound to increase.

In relation to the payment system, the monetary policy and banking system settings in Slovenia illustrate the following issues.

- The central bank's control and involvement in the system as well as concentration of different responsibilities in the central bank should be reviewed against:
  a) the implication on the private sector initiative and development,
  b) foreign investments in the banking system,
  c) the preparations for joining the EU, and
  d) the cost-effectiveness of the arrangements.

  For example, the central banks' discretion in granting licences to foreign banks was assessed (OECD 1997) as the most important factor in preventing foreign banks from entering or investing in the market.
- Also, separation of supervision and monetary policy functions, i.e. the appointment of another institution for the supervision of the system may be a viable and effective option. This may both strengthen supervision, and help the preparations for joining the EU. For example, the central bank would focus on the monetary policy and its compliance with the requirements for entry into EMU, and the supervisory body would be acting in line with the financial discipline and present and future banking system stability, in line with the BIS requirements. Thus, the payment system would be a) an explicit responsibility of the supervisory body and b) more integrated into the monetary system through the potential reduction of payment risks and costs. If the responsibility for Slovenian monetary policy is handed over to the European Central Bank, the reward for the separation of the functions would be reaped.
- In light of the banking system concentration, ownership structure, bank/client relations, as well as slow privatisation, there is certainly a threat of systemic risk should the main players fail. As banks will become the main providers of the payment services the payment system implications are evident. Political considerations have slowed the privatisation and liberalisation processes in the

banking sector, but as the processes may be 'externally' driven, completion of banking system restructuring is a matter of urgency. A sound banking system, clear of bad debts and political lending decisions, with effective ownership and management structure, is the best guarantee of financial stability, a favourable monetary policy environment and risk reduction in the payment system.

5.6. Payment systems in CIT - summary and conclusions

5.6.1. Institutional framework

There have been some achievements in the market-oriented banking and legal systems developments in CIT. The telecommunication and computer infrastructures are also improved. There is, however, plenty of room for improvement.

CIT still need to advance their banking and legal systems as well as the technical infrastructure to support optimal payment system functioning in line with the public policy requirements. The level of development of the three factors is significantly lower than for industrial countries, and at par with the levels in developing countries. As the latest payment system technology is increasingly becoming the only acceptable option from the policy makers' point of view, the current institutional frameworks need to be improved further. Development of a mature banking system practice and advanced telecommunications certainly take time. The adequate legislation, although seemingly easier to achieve, has also been lagging in implementation and efficiency.

5.6.2. Cash holdings and non-cash payment instruments

Cash holdings in transitional countries are high compared to the benchmarks used for the analysis. Possible explanatory factors are the lack of efficient alternative payment instruments, lack of trust in the banking systems, high inflation rates, black market activities and tax evasion, and slow and unreliable payment systems. Therefore, the properties of cash as a familiar, immediate, real-time settlement instrument, that enables fast, reliable, certain, finite, non-recorded, transfers of monetary values, make cash so attractive in CIT.

Retail payment instruments other than cash still account for relatively small volumes and values of transactions. Not all instruments are available to the majority of customers. However, there has been some progress, especially in the Czech Republic, Hungary, Slovakia, Slovenia and the Baltic states.

5.6.3. The Payment Systems' Characteristics

The analysis has shown that the critical elements for successful of a payment system reform are its compatibility and co-ordination with the monetary and banking systems' restructuring. The central banks played and still play the lead-roles in the respective systems and reforms. The reforms were all top-down initiated and supervised.

The *main characteristics* of the CIT payment systems can be summarised as follows:

- Great use and importance of cash; i.e. with regard to the retail payment systems' characteristics and development, CIT can be characterised as "cash-economies".
- Use and importance of other payment instruments is low but increasing. The exception has been money/postal orders, which, however, involves cash at one or both ends of a payment transaction.
- Wholesale payment systems have been dominated by credit transfers due to the 'giro' nature of the systems, emphasis on inter-company payments, and provision of the clearing services by a central national institution (either central bank or clearinghouse). Paper-based credit orders are being replaced by electronic credit orders.
- There is a definite trend towards establishing national RTGS systems. This is a logical consequence of the central banks' engagements in the reforms. In European CIT, especially those that plan to join the EU, the process is motivated further by the 'convergence compliance', the preparations for the 'interlinking' of the payment systems with the TARGET.
- In general, because of the centralised payment provision function, credit based payments - e.g. money orders and credit orders, traditionally dominated debit based payment instruments (provided by credit institutions) - e.g. cheques and direct

debits. In the past, this helped avoid the inefficiencies related to cheque payments and helped the development of potentially faster giro-based payment systems. On the other hand, this reduced further the importance of debt related financial instruments, banks' initiative and involvement in the payment system and, thus, the development of alternative instruments, competition and overall efficiency.

- Monetary policy considerations were the main motives for the payment system reforms. Monetary policy and payment systems compatibility was, however, not achieved in many cases.
- Given the 'monobanking' past and monetary policy modernisation impetus and concentration of power, skills and resources in the central banks, it came as no surprise to find that the central banks initiated and led the payment system reforms. The operational involvement of the central banks in payment systems is also significant.

5.6.4. The payment system reforms

The payment systems reforms in the eleven transitional countries provide many examples of and lessons on the reform process, potential obstacles, design choices and the payment system/monetary policy relationship and other related issues. The experiences are invaluable for transitional and other developing countries that have not yet started or completed the reforms. This also refers to the analysed countries, which can learn from their own reforms. In general, the eleven countries have made a substantial progress in the payment systems development since the transition started but their payment systems need to be improved further to satisfy the efficiency requirements. Furthermore, the state and development of their banking and monetary systems, which are still in transition, critically affect the payment system. The main issues and findings of this part of the research are discussed further in the concluding chapter (Chapter 8 – Conclusions and Recommendations).

6. The Yugoslav payment system – exploratory and explanatory analysis

6.1. Analytical framework

6.1.1. Methodology and data

The following sections investigate the relative performance and characteristics of the Yugoslav payment system. The analysis starts with an overview of the institutional framework. The payment system is put in a broader context of banking and monetary systems. It is followed by an analysis of cash holdings, which indicates the payment system's development and instrument choice. Next, other payment instrument use and their importance are examined. Finally, clearinghouse efficiency is investigated to illustrate the characteristics of the large-value payment system and evaluate its functioning so far.

The main period under investigation is 1993-1997, although references are also made to the period 1990-1992. The major identified issues are: the performance of the clearinghouse and settlement system in terms of volume, value and efficiency of payments processing; importance of cash holdings and transactions versus various payment instruments use; and institutional aspects of the payment system functioning. The approach was to combine descriptive statistics and qualitative analysis. The primary sources of data and information on Yugoslavia are The National Bank of Yugoslavia, SDK/ZOP - the clearinghouse, and Yugoslav Statistical Office.

The purpose of this part of the research is to describe the Yugoslav payment system and investigate whether it was efficient in the past. In addition, the analysis is aimed at identifying the main problems and suggesting possible solutions for their resolution.

6.1.2. The hypotheses

The main assumptions about the system used as a basis for this part of the research are:

- The Yugoslav payment system was not efficient in the past and particularly in the period 1993 to 1997. It was slow, expensive, with many risks involved and it offered inadequate choice of payment instruments and methods.
- New payment system design, as envisaged by the policy-makers, *may not be appropriate* for the economic environment and state of the economy and banking system.
- In the long run, the monopoly of the clearinghouse should be replaced with *competition* among different payment system services providers and instruments.

6.2. Institutional framework

6.2.1. Introduction

The main aspects of the institutional framework that are presented here are the financial system characteristics, legal framework, banking system structure and performance, monetary policy management and how does the payment system relate to those aspects of performance of a monetary economy. The Yugoslav institutional setting is also described in section 2.7.

The value of *net payment float* has an influence on the amount and distribution of reserves available to the banking system for the purposes of making loans. In the previous system in Yugoslavia, the clearinghouse (SDK) -- instead of the National Bank -- had the control over the amount of float for grants to the banks (as well as to the firms!). Although there were loopholes in the regulatory framework that enabled the practice, the very activity of SDK undermined the monetary policy and contributed to the hyperinflation. In effect, the institution acted as a financial intermediary, i.e. a credit institution, and, therefore, had perverse incentives and sub-optimal efficiency from the social best-practice perspective.

Because SDK had a monopoly on payments, the longer the delays the more float at its disposal, and the bigger the float, the more powerful and profitable the institution became. On the other hand, 'controlling' for the inefficiency of the payment system, the payment system users built into the prices of goods and services the opportunity costs, which were becoming bigger and bigger as the inflation was becoming a psychological

phenomenon. Therefore, as payees feared that a delay resulting from the payment system itself would help inflation to 'eat up' the receipts, the higher the inflation rate the higher the adjusted prices, and the higher the inflation adjusted prices the higher the inflation. It should be stated, however, that the payment system in its own right was not the major contributor to the hyperinflation in Yugoslavia[1].

One can note, therefore, that the payment system in Yugoslavia was: a) synonymous with the clearinghouse and b) not only a channel for payment transactions (as it was designed as non-profit institution) but also a powerful and profitable system. As the clearinghouse built its power on its monopoly, the occasional improvements in efficiency were the result only of constant political pressure from the users (companies) and from potential competition (banks). On the other hand, because of the centralised organisational structure of the payment system, the investments and improvements benefit all the participants and the system as a whole. By the same token, however, the organisational inefficiency and internal optimisation strategy negatively affect the whole of the payment system.

During the past five years the banks have lobbied intensively for a total abolition of former SDK because of both the frustrations of the past, when SDK had monopoly over the payments, and costs charges and fees that go to the institution. Therefore, beside the issues of efficiency and costs, the banks had a hidden agenda of taking a slice (if not the whole) of the payment fees cake for themselves. Eventually, the debate about the payment system became a battle about who should run it. With the loss of the deposit base, due to the drastic decrease in savings, and the bigger importance and potency of transactions money the stakes became higher for the banks.

The illustration of the institutional structure is given in Table 6-1. It can be seen, when compared to the total population (appendix 3-1) that only every fifth inhabitant has an account with financial institutions, that there are about 3,000 people per branch and that there are about one million people per bank. Initial inference, given the indicators for other countries (as discussed in the previous sections), show that the system is 'over-banked' and inadequately 'branched'. This may support the argument

[1] The major reasons, as discussed in section 2.7, are a) huge public expenditures, caused by the war and sanctions (which resulted in high unemployment, number of refugees and claims on other social benefits) and b) the political lobbying of the banks and their owners - loss making enterprises for additional funds from the central bank.

that the banks are not ready to become the main service-providers. The banking system will be more thoroughly analysed in the survey chapter.

Table 6-1 Institutional framework (1997)

Categories	Number of institutions	Number of branches	Number of accounts	Value of accounts (Dinar millions)	Number of employees
Central bank	1	3	291	1,779	
Commercial banks	108	app. 1,000	app. 2million	18,815	32,146
Post office	1	1,574	181,543	230	3,629
SDK/ZOP giro system	1	189	344,176	2,538	1,761
TOTAL	121	2,767	app. 2,500,000	23,362	

Sources: National Bank of Yugoslavia, Quarterly Bulletin, December 1997; ZOP - The clearing and settlement house

6.2.2. The payment system and monetary system

The payment system reform was initiated mainly to strengthen monetary control. Although some organisational changes and technical improvements started back in 1992, the real institutional changes came about only in January 1996, when the former SDK (now ZOP[2]) became an organisational part of the National Bank of Yugoslavia. It was planned for the transition programme to be implemented in two phases. During the first phase the payment operations would be conducted within the National Bank (utilising the ZOP facilities), and in the second phase the payment operations were to be handled by commercial banks. This was supported by the new legislation[3] and the official policy of the central bank.

The following principles are, or are planned to be, incorporated into the regulation of the payment system. The first major provision in the regulatory framework and NBY policy is that of tying the ability of the users to make payments to the liquidity of the institutions they have the accounts with. Second, there is no provision for the central bank's guarantee of the finality of the payments. In that sense, it seems that the model for the new payment system was the Swiss settlement system - SIC. In

[2] The new name of the institution is "Clearing and Settlement House" or "Zavod za Obradu i Placanja" - ZOP in Serbian.

[3] The Official Gazette of FR Yugoslavia ("Sluzbeni List SR Jugoslavije") issues no. 53/92, 6, 16, 31/93, 32/94, and 61/95. The laws are accompanied with a range of the central bank's regulations.

line with the principles and desire to strengthen monetary control and discipline is also the regulation on the licence withdrawals[4].

In view of the monetary system functioning so far, whereby the monetary authorities are under constant pressure to provide additional liquidity to the system, a consistent implementation of the intended policy will be the acid test of the reforms. In addition to the frozen foreign exchange deposits of the households to the amount of 4.5 billion US dollars, and the somewhat higher amount of debt to international investors and institutions, there are non-performing assets estimated to be about 50 to 60 percent of the overall banking assets. Furthermore, even though the estimated capital to weighted assets ratio is approximately 9 percent for the period 1993 to 1997 (as compared to the minimum of 8 percent set by legislation) some of the largest banks are de facto insolvent[5]. In those circumstances, the question that arises is whether the banks are ready and capable of taking over the payment services provision. Given tight monetary policy and liquidity provision principles, underdeveloped money market and new payment arrangements the odds against banks are high. This question, however, will be analysed further in Chapter 7.

Monetary policy management and control is perceived as inefficient, outdated and self-serving. This is, among other things, reflected in high inflation rates (see appendix 3) and a continual and accelerating devaluation of national currency in the foreign exchange black market, even during the low inflation periods. The inefficiencies of both banking system and monetary policy have resulted in a lack of trust in the systems and 'banking' outside the official financial institutions - currency substitution instead of banks deposits and cash transactions being preferred to any other payment instrument. Although there have been several attempts to restructure the financial system, they have not been consistent and thorough enough. They have ultimately failed.

An illustration of both money market development and the payment system's 'size' is the payment system 'turnover' to the country's annual GDP which is 6.5 times a year, i.e. it takes 38.5 days for amounts equal to annual GDP to pass through the payment system (on average from 1994 to 1997). This is 3 to 15 times less then in

[4] The national bank's regulation introduced in December 1996, stating that a bank's license will be withdrawn if it is illiquid for three days in a row or any three days during a single week.

developed countries (see table 2-1). The illustration is indicative of underdeveloped money market and overall financial transactions in the economy.

6.2.3. Institutional framework, new payment system and monetary policy issues -summarised

In respect of the new payment system design principles and legislation, there are a few points to be raised. Although these principles and provisions are not controversial in their own right, there are certain considerations that arise as a consequence. Firstly, the freedom of choice of a payment operations provider, and the parallel existence of the clearinghouse's (SDK/ZOP's) giro and banks' current accounts systems, leaves businesses the option not to transfer their transaction balances to the banks to date. If their ability to make payments is tied to the institutions' liquidity, the users will prefer the SDK network and system of accounts, as SDK, by definition, cannot lose a licence (i.e. it cannot become illiquid). In 1996, out of 2.6 billion Dinars of transaction money in giro-accounts (on average a day), only 114 million Dinars (about 4 percent) was held at the banks' accounts (Nesic 1996). The lack of trust in the soundness of banks will discourage (and did discourage) the transformation of the payment system because the transfer of transaction deposits from SDK to banks cannot be done by a decree as a non-restructured banking system may not be capable of performing the task.

Secondly, if there is no central bank guarantee of finality of payment transactions, i.e. no overdraft facilities from the central bank, could there be trust in banks or the transfer of the payment operations to the banking system? The provisions appear to be in line with the restoring of financial discipline, but they may hamper the development of an efficient monetary system and money market. Although the moral hazard is, therefore, supposed to be reduced to a minimum, there is still a constant threat of systemic crisis that inversely influences trust and discipline. The economy with weak firms and many insolvent banks may not be well suited for any queuing system and/or potential gridlock problems, because:

a) There is no efficient money and interbank market to provide liquidity.

[5] If the provisions were made for the "bad debts" many non-privatised banks would be classified as insolvent

b) The system users and their banks will fear making the payments first as there may not be planned incoming funds later in the day.
c) The payees may prefer cash or even barter as the delivery-versus-payment is not ensured because of a possibility that a financial institution, not a payment counterpart - payor, becomes illiquid[6], and
d) Queuing arrangements resemble a DNS system and may not discharge the risks (unless there are additional risk provisions) that are supposed to be eliminated by a RTGS system.

The payment system design, however, should not be confused with the banks restructuring and the restoring of the monetary control. Provision of intra-day liquidity by a central bank in a system which efficiently sanctions against insolvent and risky banks wouldn't mean loosening of the monetary discipline. Furthermore, the central bank can limit the risks of daylight overdrafts by charging fees and limiting the overdrafts like, for example, US Fed. Finally, the rationalisation of number of the banks and the establishment of their viability should be a part of a thorough restructuring plan not a by-product of the liquidity control measures and payment system design. These considerations will be taken into account when drawing final conclusions and recommendations for the Yugoslav payment system.

6.3. Use and importance of cash

6.3.1. Cash Holdings

The use of cash is investigated to find how important this and other, cash substitute, payment instruments are. It could be argued that in CIT, as opposed to developed countries, the greater the use of cash, the less developed a payment system, and the more limited the payment instrument choice are[7]. Initial assumptions are that the use of cash in Yugoslavia was extensive, and that it reflects, among other things, a

[6] Lack of liquidity and bad debts have resulted in so-called 'compensations' (obligatory debt netting for banks and companies occasionally organised by the clearinghouse) or bilateral or multilateral exchange of goods and services between the companies.
[7] The differences with regard to large cash holdings in developed countries relate to the influence of crime on cash holdings and cash holdings as a measure of public wealth (store of value function of money). See also Chapter 4.

limited choice of other payment instruments and methods as well as an inefficient clearing and settlement system.

The three indirect indicators of cash use for Yugoslavia are shown in Table 6-2. Row 1 show US dollar value (at year-end exchange rates) of cash held by the public divided by population for each year respectively. Cash held by public is defined as notes and coins in circulation, i.e. as total currency and coin outstanding minus the value held in the banking system and in reserve by the government. Another measure of cash use, the ratio of currency value to GDP (which shows the importance of cash regardless of a country's inflation and wealth) is shown in Row 2. The third indicator of relative importance of cash in a monetary economy, the ratio of currency value to narrow money supply (M1 in Yugoslavia), which may indicate the importance and use of cash relative to transferable deposits used for payments, is shown in Row 3. The use of cash as a settlement media and local currency values, according to BIS methodology, are shown in appendix 3-3 (tables 9-30 to 9-32).

Table 6-2 Notes and coins in circulation (end of year)

	1990	1991	1992	1993	1994	1995	1996	1997
In USD, per inhabitant	23	35	58	45	66	67[1]	55	75
As percentage of GDP	10	11	11	11.5	9.9	10	8	8
As percentage of narrow money - M1	44	35	37	31	44	44	54	52

Data sources: The Yugoslav Statistical Office 1997, The National Bank of Yugoslavia 1997
Calculated according to Bank for International Settlements methodology
[1)] Year average. The year-end figure is 29 USD. The average amount of notes and coins in circulation in 1995 (monthly amounts were translated in USD at month-end exchange rates and averaged for the year) is calculated to make the adjustments for the currency devaluation made in November 1995. Monthly data are not available for the period prior to 1994.

The first measure shows that each person in Yugoslavia holds about $60. The cash holdings figures for the developed countries, for example, are on average 20 times higher and range from $440 to $2670[8]. The year 1993 witnessed a 300 million percent monthly inflation, one of the largest in world economic history. The inflation rates for the other years in the period were also high and the annual rates approached or exceeded 100 percent[9]. The initial inference of low cash holdings per person is in line with the theoretical predictions of a direct relationship between cash holdings and per

[8] See appendix 3-2 - Comparative tables and Chapters 4 and 5.
[9] See also appendix 3-1 - Yugoslavia, the statistics

capita income, and an inverse relationship between cash holdings and inflation and/or interest rates, even more so for the years 1990 to 1993.

As expected, the second and third measures are inconsistent with the first one. Cash holdings as percentage of GDP figures are, on average, much higher than in the developed countries and at par with less-developed countries (see Chapters 4 and 5 and appendix 3-2). The third indicator shows a relatively high proportion of cash in narrow money supply for all the years. The proportion of cash in the narrow money supply, using BIS statistical methodology and definitions, is above the figures for any G-10 country. However, comparison with other countries, with regard to the monetary aggregate, is not straightforward because of the different definitions of the narrow money monetary aggregates across countries. Nonetheless, it should be noted that as compared to a developed country that uses similar definitions of the monetary aggregates, for example Germany, the percentage of notes and coins in M1 in Yugoslavia is on average one and half times higher.

The resulting high ratios could not be explained by the generally accepted rationale behind the theoretical predictions for developed countries -- high cash holdings/high income per capita nor high inflation (interest rates)/low cash holdings. How then can one explain high currency holdings, as generally perceived by the public and economists, in Yugoslavia? Might it be that the general perception was an illusion (caused by the litter of worthless banknotes that filled the pockets), as indicated by the first measure, or that the second and third measure provide better explanations? It has been argued (Petrovic 1997) that the cash holdings are low in comparison with other countries. The comparative analysis and illustrations shown in chapters 4 and 5 clearly show that this is not the case and that the cash holdings indicators in Yugoslavia are indeed high.

There are a few additional points that may help reconcile the opposing findings of the three measures and explain the issues further:

- First, as illustrated in Chapter 4, the first measure captures the *low income per capita* and standard of living (see also appendix 3-1). Also, as the cash in circulation to GDP -- CCGDP -- may be influenced by the year-end prices statistical measurement it should be used in combination with the cash in circulation to narrow money ratio --

CCM1-- as the indicator of cash use. These two measures show high relative importance of cash in Yugoslavia.

- Second, the domestic currency holdings do not capture total currency holdings as the *currency substitution* is resorted to as a solution for the lost functions of national currency of a store of value and a unit of account. The major hard currency holding in Yugoslavia was in Deutsche Marks, mainly due to the large number of expatriates that have been working in Germany. One indicator of the value of foreign currency holdings in period 1991 to 1994 is the amount of foreign exchange demand deposits in banks outstanding in 1994 and collected during the period 1992 to 1994. Two newly formed banks Yugoskandik and Dafiment Bank, for instance, having attracted foreign exchange deposits with high interest rates (about 10% a month), declared bankruptcy. Estimates of outstanding liabilities that are not recovered by the receivership procedure range from $400 million to 700 million[10]. This amount of money can be regarded as cash holdings prior to depositing it into the banks. As most of the deposits were for one to three months (and relate to the period June 1993 - April 1994) the whole amount can be treated as a 'foreign currency in circulation' during the period 1990-1994, especially in 1993 when most of the small value transactions were in foreign currency. In addition, various domestic experts estimate the amount of foreign currency holdings with households in the range of $700 million for the year 1997. These estimates, if correct, would raise the value of cash holdings per person four and three times for the periods 1990-1994 and 1994-1997 respectively.
- Third, with regard to the first measure, *the real purchasing power* of any specific amount of money varies across countries and is particularly distinct between the developed and developing countries. Therefore, adjusting for the differences, by using PPP, the amounts in Row 1 in Table 6-2 would increase twofold[11]. A further

[10] As the banks have not been treated as bankrupt so far by the officials, the exact amount of foreign exchange deposits is not published. The deposits are treated as frozen adding to the $4.5 billion foreign exchange deposits of the households that are frozen back in 1990. However, the foreign exchange deposits prior to and after 1990 are treated differently as the former were explicitly guaranteed by the Federation.

[11] The estimate steams from the World Bank Atlas (various issues 1991 to 1998). In their computation of GNP and GDP at PPP exchange rates, the countries' nominal GDPs or GNPs are divided by the Purchasing Power Parity rate, which is defined as the number of goods and services in the domestic market as one dollar would buy in the United States. However, as there is no data on Yugoslav purchasing power parity in the recent reports, one should treat the estimates only as indicators. In the very turbulent economic and political environment, the auditing and statistical

approximation of the purchasing power of the specific amounts and, therefore, real and relative importance of the cash holdings can be a ratio of the cash holdings as defined in Table 6-2 to the average monthly wages denominated in US dollars. This indicator would show much higher relative importance of the cash holdings in Yugoslavia than in some of the developed countries for the respective years (see also appendix 3-2).

Although it would be tentative to calculate fully adjusted amounts according to the estimates, the points raised above show that the relative volume and importance of cash holdings in Yugoslavia were relatively high. Additional analysis, however, will be conducted to test the assumption further.

In conclusion, it has been confirmed that the first measure is inappropriate for measuring the relative importance of cash holdings in 'lower' income and/or high inflation countries due to the overwhelming effect of low standard of living and GDP on it. Conclusions based on combined results of the second and third measure would provide a better explanation for the relative importance of cash holdings in the Yugoslav case. As the second measure controls for inflation, and the third measure shows importance of cash relative to transferable deposits[12], they may be more suitable indicators of the relative importance of cash in Yugoslavia and other CIT than the cash in circulation, not least because of the lower per capita income in those countries. These measures indicate the relatively high importance of cash in Yugoslavia, even without taking 'the foreign currency in circulation' into account.

6.3.2. Cash holdings and transactions explained

Several important facts about the payment and monetary system during the period may be used as explanations and/or evidence for cash preference in Yugoslavia.

First, given the payment instrument choice, it is clear that cash payments *did not have* an adequate *alternative*, as far as the SVTS payments were concerned. For households, the only close substitute available were cheque payments and paper based

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records and practice may have suffered, especially during the hyperinflation periods. Furthermore, the data used for calculation vary from one official publication to another.

[12] Which are used for payments by other payment instruments, such as cheques, credit and debit cards etc.

credit transfer orders. As far as the SVTS payments are concerned, the use of credit transfers was limited to bills' payments and these were only possible at the branch that a customer had an account with. The illustrations given in table 9-33 in appendix 3-4 can be used as indicators of use of credit transfers for small/retail payments.

Second, the combined effect of *inflation and float* would leave the clearing system users at loss if they relied upon the official payment system channels. A one day clearing cycle was the norm. In practice, however, there were instances of 2,3 and 7 days clearing. In the high inflation environment the float can devalue the funds sent from 0.4 up to 40 percentage points a day for a given monthly inflation rates of 13 and 3,000,000 percent respectively (see appendix 3-1). Therefore, the one-day clearing cycle combined with settlement uncertainty could not satisfy the customers and resulted in a lack of trust in official money channels. Given the inflation rates for the period it is obvious why. During the hyperinflation period many businesses and the majority of households resorted to currency speculations and product stocking, resulting effectively in diminishing trading activities and industrial production. This only perpetuated the constant decrease of monetary funds transferred through banks and the system, let alone the use of payment instruments that are based on transferable deposits.

Third, the *nominal interest rates* on deposits during the period were well *below the inflation rates*. High inflation rates in 1992 and 1993 decreased the proportion of transferable deposits in total deposits with the banks (see the following section). At the same time the amount and proportion of savings, which started to diminish in 1991, almost disappeared in 1993. This illustrates, among other things, a shattered trust in banks and the non-existence of the credibility of the state, which guaranteed the deposits.

6.4. Non-cash payments

6.4.1. Deposits with the banks

The reverse side of a high proportion of cash in narrow money is a low level of deposits, which serve as a basis for non-cash payments. Tables 6-3 and 6-4 illustrate the trends in banks' overall deposits. The most striking is a decrease of savings and an

increase in the proportion of foreign exchange liabilities. The proportion of foreign exchange deposits on the banks' balance sheets has been rising since 1992. This, of course, was not because of the new deposits but decreasing overall deposits with the banks[13].

Table 6-3 Deposits with banks and other financial institutions

	in USD million (year-end exchange rates)								
	1989	1990	1991	1992	1993	1994	1995	1996	1997
Total deposits	922	1257	1453	6250	3747	5623	5435	5565	5945
Transferable deposits	152	300	638	1033	73	877	382	495	750
% in total deposits	17%	24%	44%	17%	2%	16%	7%	9%	13%
Other Demand deposits	17	47	76	54	4	34	18	49	54
% in total deposits	2%	4%	5%	1%	0%	1%	0%	1%	1%
Restricted deposits[1)]	8	38	56	49	0	33	20	39	81
% in total deposits	1%	3%	4%	1%	0%	1%	0%	1%	1%
Time deposits up to one year	110	113	127	845	6	240	152	269	334
% in total deposits	12%	9%	9%	14%	0%	4%	3%	5%	6%
Foreign exchange demand deposits	288	375	263	2204	1992	2313	2533	2430	2547
% in total deposits	31%	30%	18%	35%	53%	41%	47%	44%	43%
Savings deposits	68	103	76	139	5	36	34	61	81
% in total deposits	7%	8%	5%	2%	0%	1%	1%	1%	1%
Foreign exchange savings deposits	279	281	218	1926	1667	2088	2296	2221	2099
% in total deposits	30%	22%	15%	31%	44%	37%	42%	40%	35%

Data source: National Bank of Yugoslavia, Quarterly Bulletin, various issues 1995-1997. [1)] Includes deposits for specific purposes which, under legal or specially agreed provisions, may not be withdrawn during a specified period of time (reserve assets, deposits relating to foreign trade transactions etc.).

[13] The absolute amounts of deposits expressed in dollars, in tables 2 and 3, that show increase in dollar terms of total deposits from 1992 onwards, may well be inflated because of the unrealistic official exchange rates, especially for the year 1992. Since 1994 the national currency has been pegged to the German mark at the exchange rate that may be above realistic purchasing power parity or interest rate parity rates (as indicated by much lower black market rates).

Table 6-4 Deposits *-excluding 'frozen' foreign exchange deposits-* with banks and other financial institutions

	USD million (year-end exchange rates)								
	1989	1990	1991	1992	1993	1994	1995	1996	1997
Total Dinar deposits	355	601	972	2120	88	1222	606	913	1299
Transferable deposits	152	300	638	1033	73	877	382	495	750
% in total deposits	43%	50%	66%	49%	83%	72%	63%	54%	58%
Other Demand deposits	17	47	76	54	4	34	18	49	54
% in total deposits	5%	8%	8%	3%	4%	3%	3%	5%	4%
Restricted deposits[1)]	8	38	56	49	0	33	20	39	81
% in total deposits	2%	6%	6%	2%	0%	3%	3%	4%	6%
Time deposits up to one year	110	113	127	845	6	240	152	269	334
% in total deposits	31%	19%	13%	40%	7%	20%	25%	29%	26%
Savings deposits	68	103	76	139	5	36	34	61	81
% in total deposits	19%	17%	8%	7%	6%	3%	6%	7%	6%

Data source: National Bank of Yugoslavia, Quarterly Bulletin, various issues 1995-1997

[1)] Includes deposits for specific purposes which, under legal or specially agreed provisions, may not be withdrawn during a specified period of time (reserve assets, deposits relating to foreign trade transactions etc.)

Decrease of deposits with the banks was caused by three factors.

First and foremost, the interest rates that were offered to depositors could not compensate for the inflation rates, let alone produce a positive yield for the depositors. With no bond and equity markets, an underdeveloped real-estate investment market, and a slow and expensive payment system that hindered both conversion between monetary and illiquid asset and financial speculations (through the banking channels), only the fury of the hyperinflation induced withdrawals of the deposits leaving the oligopolistic banks dry.

Second, delays in payments and debt servicing with the resulting float, have killed the last incentive for the customers to channel, if not save, the funds with the banks. The practice has also killed the trust in banks from which they may not recover for many years. Huge losses, bad debts and negative NPV projects in a highly risky economic environment, have all created the incentive for banks to delay/restrict payments and withdrawals and, therefore, benefit from the float. The evidence for increased savings rates in high inflation periods in developed countries may raise a question whether banks in Yugoslavia could have benefited from inflation if they

played a fair game by transparent rules, however unfavourable the conditions for the depositors. By adopting a short-term, brute force, approach during the period, the 'old' banks committed themselves to spending much of their resources and putting huge effort into getting their customers back at this moment. The success of this, however, is not certain at all.

Third, the non-servicing of foreign exchange deposits has brought the credibility of both state and banks to its lowest point. The high proportion of foreign currency denominated deposits (table 6-3) can be used as an indicator of both non-servicing of those deposits and the low overall deposit base. Without a meaningful and committed programme of foreign exchange deposits repayment it would be almost impossible to restore trust in deposit taking institutions and encourage further savings - the essential ingredient of further investments and indeed recovery of the economy as a whole.

All of the above mentioned point out the significance of cash a) in terms of surpassing inefficient payment and banking system channels and b) for transaction and liquidity purposes, as adequate alternative instruments were missing. This cash preference has implications for monetary policy, i.e. measures for controlling inflation, establishing the demand for money and velocity of money and choosing among the right monetary instruments and measures. This will be discussed in more detail in the concluding section.

6.4.2. Non-cash transactions: paper versus electronics

While cash transactions were in great use in small businesses and the household sectors, the credit transfers in the so-called 'giro-based system' dominated in the corporate sector and, of course, for the inter-bank payments. However, it was not a rare instance for the payment obligation between the domestic and domestic and foreign trading partners to settle in a foreign currency (notes), for the period 1992-1994. Nonetheless, it is impossible to quantify the volume and value of the payments, and these instances will be treated as an anomaly of the period[14]. This part of the analysis

[14] There are two explanations for these 'grey' payment operations in foreign currency. First, towards the end of 1993 domestic currency lost its functions and the businesses preferred not to trade at all if the payment or exchange was not in hard currency or immediate, as even the end of day settlement in domestic currency would leave them at loss. Second, because of the UN sanctions against Yugoslavia (1992-1995), all the nostro correspondent accounts of

will concentrate on the use of available payment instruments and the clearinghouse performance in their clearing and settlement.

Credit transfers, due to the payment system design, dominated the number and value of all transfers recorded in the system. They account for about 80% of the value of all fund transfers and about 76% of total number of transactions processed by the clearinghouse, on average a year for the period 1991-1997. The percentage of electronic credit transfer instructions is about 16% of total number of payment instructions or 21% of the number of credit transfer instructions. The electronic funds transfers between the clearinghouse branches is approaching 100%. Further examples are given in the appendix 3-4 (tables 9-30, 9-31 and 9-32).

The use of *credit and other plastic cards*[15] during the period 1992-1997 was minimal because both the domestic and international issuers found inflation too high for the instrument to be profitable. In addition, during the period of economic sanctions, middle 1992 to late 1995, the foreign issuers withdrew the licences and guarantees for their cards to be issued in Yugoslavia. It is estimated by The Bankers Association that starting from 1984, when the first major credit card companies introduced their cards to the market, until 1992 there have been about 60,000 cards in use[16], with about 6,000 points of sale (POS). The most widespread domestic card is the Post Savings' cheque guarantee card (in some instances with a combined function of a credit card) with 180,000 users.

In recent years, the use of various plastic cards has started to increase. However the use and the choice are still limited. For example, domestic banks have issued various plastic cards in amounts of approximately 10,000 units. There is also a limited number of loyalty and retailer/store cards. Eighty percent of all credit card transactions were made in the supermarkets and groceries for food purchases (The Bankers Association 1997). The figure reflects both the low standard of living and the small number and diversity of POS. Therefore, all but the immediate settlement media - i.e. payments with domestic and hard currencies - suffered from the inflation and other

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Yugoslav banks, state and companies at foreign banks were frozen. The only way to pay for the imports and conduct trade (for the goods that were not included under the sanctioned trading activities) was from the domestic reserves, that is in cash (or gold).

[15] The credit cards functioned effectively as debit cards as no overdraft limit was available for payments both home and abroad.

[16] Mostly VISA credit cards. Other issuers were American Express, Diners and Eurocard.

macroeconomic instabilities (which includes the war in the region and a vast number of refugees).

Cheques. There is no published data on use of cheques during the period. However, some estimates (ibid. 1997) show there were fifty thousand cheque payments cleared on average each day, which is equal to 1.25 million cheque payments a month or fifteen million a year. ZOP - the clearinghouse started publishing the number and value of cheques processed only from January 1997. Their reports generally support the estimates (see also appendix 3-4). The cheque payments relate to SVTS payments and were used mostly by the household sector. The instrument was not in wider use for business purposes, and by the institutions or authorities. The average amount of money per cheque was generally small due to the restrictions on the maximum amount written per cheque as well as limits on the number of cheques issued to each customer and accepted for payments from retailers. These restrictions, however, were not coupled with encouragement of use and availability of other payment instruments.

From early 1992 until 1995, both the banks and the retailers discouraged the use of cheques by imposing various restrictions and limitations on the payments. This was done to limit the huge losses that retailers, and to a lesser extent banks, suffered due to the float. The float had a significant influence because of the increased use of cheque payments (and therefore time for their processing) and, most of all, the hyperinflation (see appendix 3-1).

In conclusion, credit transfers, due to the payment system design, dominated the overall payment transactions. The potential advantages of such centralised and paper-less funds transfer system, however, seem not to be realised during the period. Possible explanations are:

- a relatively small number of customers being electronically linked to the clearinghouse's clearing and settlement system,
- lack of additional 'paperless' instruments such as various plastic cards and electronic terminals (including EFTPOS and ATMs) and
- high rates of inflation, which punished the users for even slightest inefficiencies of and/or delays in the system.

These considerations are investigated further in the subsequent section.

6.5. Efficiency of the clearinghouse

Since the clearinghouse had a monopoly on payments, the efficiency of the wholesale, and to a lesser extent, retail payment systems can be evaluated by analysing the efficiency of the clearinghouse. Unfortunately, the transparency and detail of the available data seems to be poor. The clearinghouse statistical publications tend to lack frequent longitudinal data, omit relevant data (for example more detail on value of payments, electronic payments and cheque processing) and use obsolete methodologies and indicators, which date back to the 1980's. It is also hard to distinguish SVTS and LVTS payments as the ZOP/SDK data breakdowns were made to satisfy the need to evaluate fund transfers among the regions[17] and overall processing efficiency in terms of number and value of funds cleared but not necessarily settled[18]. However there is enough data for exploratory data analysis and descriptive statistics which can blaze the trail for the further analysis, if not provide the conclusive evidence.

As illustrated in table 9-29 (appendix 3-4), the total number and structure of payment instructions processed is relatively stable over the years. Credit transfers dominate in the total number, as well as value, of transactions due to the characteristics of the giro-based payment system, i.e. the monopoly of the clearinghouse and non-existence of alternative payment instruments. The number of 'cash' transactions processed, i.e. money/postal orders, is about 22% of the overall payments on average. This is also consistent with the assumptions made in previous sections about the high use of cash for payments. Telex instructions have become insignificant in number and value since 1993.

The value of processed payments (when adjusted for inflation) and its structure (tables 9-30, 9-31 and 9-32, appendix 3-4) varies little over the period. Credit transfers dominated in the giro-based system because of both its relative advantage in speed of clearing and the lack of an alternative. The value of transactions that initiated, or resulted in, cash payment or withdrawal, respectively, is high given the nature of giro

[17] The methodology in use was established when Socialist Federal Republic of Yugoslavia consisted of six republics, i.e. political and economic regions (Serbia, Montenegro, Macedonia, Bosnia and Herzegovina, Croatia and Slovenia).
[18] In all fairness, during the period of disintegration of the country, economic sanctions against FR Yugoslavia and poor liquidity and performance of financial sector and overall economy, there were other, day to day, priorities in running the clearinghouse than improvements of analytical tools for evaluating and presenting the payment system (in)efficiencies. Hopefully, with the improvements of the system this will change.

system as a cashless fund transfer system. This again was due to the poor choice among other payment instruments that would allow the use or deposit of funds once they were transferred. Since the introduction of a direct communication link between the clearinghouse and some customers in 1994, the value of electronic payment instructions has been rising relative to the total value of payments. It can also be noticed that, albeit marginally, the value of funds transferred between the ZOP/SDK branches is rising compared to inter-branch fund settlements. Furthermore, the fund transfer and payment instructions between the processing units/branches have become almost entirely electronic thus making the use of telex and telephone inter-branch fund transfers marginal. The three have contributed to a significant rise in the proportion of electronic payment instructions.

Nonetheless, there has been a significant number of paper based payment instructions, together with cash initiated or resulting transactions, even after 1994. This can be explained as a consequence of the combined effect of: a) insufficient numbers of customers being linked electronically to the clearinghouse and b) for the SVTS payments, lack of use or existence of other payment instruments that could initiate the electronic fund transfer (such as various plastic cards and ATM terminals).

6.5.1. Efficiency of the clearinghouse - summarised

Table 6-5 gives summaries of available indicators of the clearinghouse efficiency. Paper-based payment instructions are dominant in the total number of instructions, but these started to decrease in 1994. The decrease coincides with the introduction of electronic message processing between the clearinghouse and its customers. It can also be noted that the percentage of instructions processed without delays has increased since 1994, and now approaches 100 percent of total value. A delay is defined by the clearinghouse as a clearing cycle longer than one day, for any particular payment. The percentage of orders sent and received without delays seems relatively high and is, on average, 99 percent of the total number of payment orders. The average clearing cycle is, on average for the period, in line with the one day clearing benchmark set out by the clearinghouse. Despite the high number of paper payment instructions, which does not necessarily mean subsequent processing

inefficiency, the clearinghouse would seem to be doing a very good job. Also given the length of clearing cycles in other transitional countries (chapter 4), one-day clearing is reasonably fast.

Given the apparent efficiency, one wonders why did the customers and competitors put pressure on the clearinghouse to invest, back in 1993, in introducing the changes (electronic fund transfer between the units and electronic communication network).

However, it is obvious there are major flaws in measuring efficiency in such a way, especially in light of the payment system technology evolution in the past four years. The major remark relates to the definition of delay, as a payment order cleared after one working day. For large payments, and all other electronically transmitted payments by the clearinghouse, the technically optimal clearing cycle is now about one to two hours, including all necessary preparations and checking, in light of the illiquidity of the system and the insolvency of many users. Therefore the one day clearing cycle benchmark is not only outdated but gives a false sense of efficacy which can deceive no one.

At the same time, the payment orders settlement standard is ill-defined, adding to the confusion. It is often the case that the clearing and settlement cycle are treated as synonymous in the clearinghouse's reports regardless of the different legal treatment of cleared and settled funds. Even though the system is supposed to function as a gross system, deferred one-day clearing and settlement cycles are used as a norm. This means a) although the funds can be cleared within an hour (or sooner) the delays of several hours in clearing the funds are not treated as such, and; b) the funds are irrevocably settled at the end of the day thus making the system a deferred net settlement system. The possible logical explanation of the settlement practice could be the transition adjustments, whereby the funds are de facto settled at the moment they are cleared (as in a gross system) but the de jure settlement occurs at the end of the day, which was supposed to be abolished in 1996.

The practice of measuring and treating the clearing and settlement cycle in such a way, if not changed, is a major hindrance (along with the inefficient money market)

to establishing the proposed payment and settlement system[19]. The introduction of a system similar to SIC[20] in Yugoslavia, with gross real-time settlement and no guarantees from the central bank or other institution of finality of payments, requires precise and fast, genuine real-time, clearing and settlement of funds with no exceptions. In addition, with ever present high inflation rates (on average forty times as high as the inflation rates in Switzerland, where the SIC operates, even excluding the hyperinflation years) the costs and risks to payment system users of even a few hour delay are significant.

The costs to the users, and benefits to the payment services provider, of float are striking for the year 1993. If a one day clearing and settlement figure is accepted as accurate (1.03 days in table 6-5), the resulting reduction in the value of funds sent in 1993 was (typically) approximately 3 to 23 percentage points after a single day, for given monthly inflation levels of 340 percent (three percent daily inflation rate) and 262,000 percent (30 percent daily inflation rate) respectively[21] (see also appendix 3-1). Even after early 1994, if one assumes full day clearing of the funds, as shown in table 12, the payment system users would lose on average 0.2 percent of the value of each payment (assuming six percent monthly inflation) just because of the effect of the inflation during the clearing cycle and excluding the fees and opportunity costs. This is a huge cost to pay for the payment system services. Therefore, clearing in minutes should become a standard for all large value payments and, if there is no guarantee from the central bank, at most one-hour settlement (for fully covered payment orders at the moment of their sending) should be a norm too. Even if one does assume a monetary economy with no or minimal inflation, a fast clearing and settlement system is necessary to reduce the opportunity costs of both delays and the holding of non-optimal portfolios.

The labour efficiency indicators at the clearinghouse are shown in table 6-6. It can be seen that the total number of employees that handle payment operations and the number of those who handle cash transactions are basically the same over the period January 1993 to December 1996. The number of total transactions and cash-based

[19] As discussed under the heading "Payment system in Yugoslavia".
[20] Swiss Interbank Clearing system

transactions processed per employee per day, i.e. the labour productivity varied over the years. The employees who handle cash transactions (cash payments and withdrawals) have been improving productivity over the period. However, it is also evident that there is a huge potential for improving the overall efficiency of the clearinghouse. First, if there was a reduction in the number of cash-based transactions[22] and persons handling those transactions (who account for about 75 percent of all people employed at payment transactions processing at the clearinghouse) this would result in a significant reduction in the cost of wages. Second, as cash transactions are labour intensive, and electronic transactions are technology intensive, the reduction would result in an increase in the total number of payment orders processed per person.

These illustrations indicate two recommendations. The first is for the overall payment system (the clearinghouse, financial institutions and the monetary authorities) to start to introduce or encourage the use of cash alternative, paperless, instruments. The second is for the clearinghouse to support the banks in overtaking the control and handling of small value payments regardless of the battle for payment system provider dominance. Firstly, banks are more likely to introduce the alternative instruments in their competition for customers and secondly, some of the labour force that handles cash payments at the clearinghouse can be employed at banks. As the clearinghouse was a not-for-profit institution and now is an organisational part of the National Bank these changes are not only desirable but also possible.

In conclusion, the exploratory data analysis indicates that the clearinghouse, and therefore to a large extent the overall payment system, was *not efficient in the past* and there are huge potentials for improvements. It seems that the clearing and settlement was *slow, risky and costly* and there was a *poor choice* of payment instruments and providers. It also seems that either the proposed changes are not being introduced at the desired pace or that they are counterproductive and as such naturally opposed by the system users and providers. However, the evidence is still not conclusive and those and some other issues will be investigated further in the subsequent chapter.

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[21] $1.03^{30} = 2.42 = 242$ percent inflation (342 percent price level as compared to the previous month), hence 1/1.03 = 0.97 of initial value of 1 after a day; $1.30^{30} = 2{,}619 = 262{,}000$ percent price level as compared to the previous month, hence 1/1.30=0.77 of initial value of 1 after a day, i.e. twenty three percent devaluation of funds;

Table 6-5 Payment orders - processing efficiency

Year	Paper payment instructions - of total number	Cash payment instructions[1] - of total number	Electronic payment instructions[2] - of total number	Instructions processed without delay - of total value	% of orders sent processed without delays	% of orders received processed without delays	Duration of clearing in days
1991	75.90%	24.10%	-	97.00%	n/a	n/a	1.2
1992	75.40%	24.60%	-	98.00%	99.54%	98.95%	1.05
1993	81.50%	19.50%	-	99.00%	96.61%	98.01%	1.03
1994	77.30%	22.70%	-	99.40%	97.49%	99.30%	1
1995	60.80%	23.20%	16%	99.85%	99.24%	99.99%	1
1996	62.30%	21.70%	16%	99.50%	98.12%	99.99%	1
1997	61.30%	21.70%	17%	99.88%	98.90%	99.99%	1

Data source: ZOP - The Clearing and Settlement House
(1) These transactions refer to money (postal) orders, which involve cash at one or both ends of the transactions, but involve cashless (inter-bank) clearing and settlement.
(2) Payment orders sent electronically by the customers to the clearinghouse.

Table 6-6 Labour efficiency at the clearinghouse

Year	Total number of employees that handle payment operations	Number of payment orders processed per employee a day	Number of employees that handle cash transactions	Daily average of number of cash transactions per person employed	Number of banknotes processed -daily average per teller
1993	1,833	456	1,346	31	30,100
1994	1,792	357	1,322	39	14,300
1995	1,812	388	1,357	48	17,800
1996	1,761	453	1,379	54	29,446

Data source: ZOP - The Clearing and Settlement House

6.6. Summary and conclusions

The findings of the analysis are the following:

- The clearinghouse was a synonym for the payment system in Yugoslavia, as it had a monopoly on large-value payments. Credit transfers, due to the 'giro' payment system design, dominated the number and value of all transfers recorded in the system.
- The new payment system design is not adjusted to the inefficient interbank money market, non-restructured banks and a lack of trust in the banking system. As the

[22] For example by introducing alternative payment instruments for paying in and withdrawing money before and after the transactions. These instruments are credit and debit cards, ATMs, electronic purses and other forms of e-money.

design changes are way ahead of the banking practice, the postponement of the implementation of the changes is now five years old.

- There is evidence for cash preference in Yugoslavia that is indicative of an undeveloped payment system, inefficient banking system and ineffective monetary policy.
- In order to reduce the cash holdings and/or encourage transactions through the system, the banking system should offer an alternative, i.e. a range of payment instruments, which are attractive to the users with regard to the conveniences and costs. They have failed to do that so far.
- The retail payment system is assessed as both undeveloped and inadequate. As the banks were not prevented from providing and developing retail payment services they have no excuse for the state of the system.
- Paper-based payments dominated the wholesale payment system but there is some improvement towards electronic fund transfer. The clearing was relatively slow given the 'giro' payment system structure. There were many risks and high costs involved that were exaggerated by the ever-present inflation. Overall, the wholesale payment system (the clearinghouse) was assessed as inefficient.
- Competition among payment system providers, both in retail and wholesale payment systems should result in better payment instruments choice, faster clearing, cheaper payments and risk reduction. A way forward, of course, is not in the abolition of the clearinghouse but its monopoly.

In terms of the hypotheses tested, the results go in favour of accepting hypotheses one to three. Therefore, the clearinghouse and the system as whole were not efficient, the new payment system design has some major drawbacks and the monopoly of the clearinghouse should be abolished. The results, however, are not conclusive. Consequently, the final acceptance or rejection of these hypotheses is postponed until the survey chapter results are presented.

A prologue to the survey chapter

So far, the research has identified major problems of the system and some possible solutions for them. As the evidence is not conclusive for rejecting or accepting the proposed hypotheses, they are looked at once again in the next section. The preliminary conclusions and recommendations regarding Yugoslav payment system reform are, therefore, incorporated into the following propositions:

Proposition 1: *In the long run, the monopoly of the clearinghouse should be replaced with competition among different payment system services providers, instruments, costs and risks.*

Proposition 2: *The best practice and experience of both developed and Countries in Transition should be incorporated in the payment system design.*

Proposition 3: *Overall banking and monetary system reform is necessary and payment system design is only a part of it.*

7. Yugoslavia's Payment and Banking System Past, Present and Future - A Survey

7.1. Introduction

The survey "*Bankers' Opinion on Burning Issues and Future of Yugoslav Payment and Banking System*" was conducted between late September and the first half of December 1997. The questionnaires were sent to the senior managers of all Yugoslav banks, National Bank of Yugoslavia - NBY, ZOP - the clearinghouse, and two bourses ("Trziste Novca" and "Montenegroberza"). The survey of the banks was conducted in association with The Yugoslav Bankers' Association which resulted in the excellent response rate and sincerity of respondents. The response of the managers and experts from the NBY, ZOP, and bourses (further " the institutions") was exceptional, which contributed to a wide coverage of the various parties involved in the functioning of the financial system by the survey.

As the Yugoslav banks are not obliged to publish their accounts, and the financial results are in many cases treated as 'confidential', the accounting data and financial statements are not readily available and in investigating the Yugoslav banking system one needs to rely on survey data, estimates and the central bank's or the bankers' association own records or publications (which are not always publicly available or rely on estimates themselves).

The purpose of the survey was to shed more light on the payment and banking system issues investigated in the research. In view of the limited official data availability, and the emphasis on the future functioning of the financial system, the survey was chosen as an optimal research methodology. The aim of the survey was to investigate bankers' attitudes towards the payment and banking systems reforms and design as well as to find out what banks and the institutions plan to do, or are doing, with regard to the payment and banking systems improvements.

7.2. The main large Yugoslav Banks

Based on the central bank's records at the time of the survey, the seven major players in terms of the asset size, (estimated) market share and (nominal) amount of risk-weighted capital in the respective order were: Beogradska Banka, BB Investbanka, Jugobanka[1], Beobanka, Vojvodjanska Banka, Jubanka and Montenegro Banka.

These banks are all so-called old banks (established before 1991), organised as "shareholders associations" (as all other banks in the system), 'socially' or state owned, major debtors to the population (with the frozen foreign exchange deposits), and non-performing assets - due mainly to the insolvency of their major, state-owned, clients (i.e. the corporations which were, at the same time the banks' major shareholders). Their combined asset size was approximately 70% of the total banking assets and their combined (nominal) capital accounted for approximately half of the total capital funds.

Given the large banks' influence, political ties and clients base, interconnected shareholdings and interests of the banks and their clients (coupled with the influence of/interference from the state on both), and undeveloped money and capital markets and other financial institutions, these banks are both the focus of, and the main obstacle, to the reforms.

It has been difficult for corporate clients to switch between banks, for banks to restructure and/or collect debts, for creditors to initiate bankruptcy procedures, or for policy makers to initiate and effectively carry out restructuring of the economic and financial systems. Furthermore, because of their size and importance, as well as the ability to exercise political and/or 'systemic-risk-threat' pressure on the monetary authorities, the large (in many cases insolvent, if the bad debts were provided for) banks were more likely to ensure credits for liquidity and provide timely payment services.

The large banks are both the main driving force behind the payment system reform (competitors to ZOP - the clearinghouse) and the major focus of the financial system reforms.

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[1] The one with the Head-Office in Belgrade. It used to be the largest Yugoslav bank in terms of the asset size, number of customers, branches and accounts, but was split into eight different entities. There are seven other Jugobankas, differentiated by the head office locations, and legally treated as separate entities (banks).

7.3. Methodology and Data Collection

The population studied by the survey were senior managers and experts of Yugoslav banks and institutions (NBY, the clearinghouse, and the bourses), i.e. the decision-makers and the advisors on the banks' and the institutions' policies and activities. They were chosen as both adequate representatives and knowledgeable entities with regard to the issues investigated.

The population was defined as senior managers of Yugoslav financial institutions, which participated in the payment system operations, functioning and design from January 1993 to December 1997.

The survey population was stratified in two groups - the banks and the institutions. The questionnaires were sent by mail to a total of 106 banks and they were addressed, by name, for the attention of the president/chief executive of the respective bank[2]. The institutions' representatives - 15 from the central bank, 15 from the clearinghouse, and 2 from the respective bourses - were either interviewed in person or, in some instances, sent the mail questionnaires. Therefore, the survey sample was designed to cover the main representatives of the population. The decision not to treat those representatives as a population was made because: a) they might have delegated other senior managers to respond to the questions and b) there may be other influential entities with regard to the banks'/institutions' policies and operations. The results from the two sample clusters were analysed both individually and, to a lesser extent, as a unit.

The main method of data collection in the survey was the mail questionnaire, accompanied by telephone and personal interviews. The choice of the method was governed by the subject matter, the unit of enquiry and the scale of the survey. Being a simple enquiry among an educated section of population, for the professional group of bank managers the mail questionnaire was opted for as an appropriate and effective data collection tool. The follow up interviews of a sample of the banks' executives was

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Combined, they would account for 16% of the total banking assets which would make Jugobanka 'the largest' bank and increase the share of the 'big' banks in the total assets to nearly 80%.

[2] The mailing list was the Bankers' Association 'banks members list', which was identical to the National Bank of Yugoslavia Banks Registry List.

conducted to test the results of the questionnaires and give a more complete picture of the investigated matter.

The questionnaire was designed to ensure anonymity of the respondents, thus catering for some potentially politically-sensitive questions. In addition, a pilot study along with wide consultations with experts was made to ensure a good response rate, thus minimising both questionnaire and item non-response bias.

Two assumptions were made with regard to the sample. First, it was assumed that the senior managers and experts surveyed were responsible for the decisions and policy that have an effect on the present and future activity of the respective institutions. Second, it was assumed that they can evaluate the payment and banking system during the period investigated. Both assumptions, however, should not, if violated in individual cases[3], change the essence of the results.

Ordinal and nominal scales of measurement were dominantly used for scaling purposes. There are a certain number of questions that use a ratio scale. Open-ended questions were also represented. See appendix 4. T-statistics was used for testing the hypotheses.

7.4. Hypotheses and Propositions

The main hypotheses and propositions[4] tested by the survey are:

- The Yugoslav payment system was *not efficient* in the period 1993 - 1997. It was slow, expensive, with many risks involved and it offered a poor choice of payment instruments and methods. The null hypothesis is:

  ***Ho 1**: Yugoslav payment system was efficient in the past period with regard to the speed, risks, costs and choice.*

[3] One possibility is that the managers' decisions are overthrown later if they are not in charge any longer. The other possibility is that the current executives were only recently appointed to the posts and have spent the period in question outside the banking system (e.g. came straight from school, form abroad etc.)

[4] The survey hypotheses complement the main research hypotheses and proposals (as stated in Chapter 3).

- *The payment system should be reformed,* because either it was proved to be inefficient or it would be inadequate for the future efficient functioning of the financial system. The type and role of payment system providers, clearing and settlement system arrangements, and, therefore, roles of the clearinghouse, central bank and banks all need to be revised and changed. The hypothesis will be tested as:

  Ho 2: *The status quo, with regard to the payment system providers, functioning and design, is the best option and the roles of banks, central bank and clearinghouse should not change significantly.*

- Banks are ready and capable of performing the payment operations and the ZOP-clearinghouse monopoly should be replaced with competition among different payment system services providers, instruments, costs and risks. Banks can, therefore, provide cheaper, faster, more versatile and reliable services than the clearinghouse with less risks involved.

  Ho 3: *Banks are not ready to take over the payment services operations, i.e. ZOP can perform them more efficiently and effectively than banks in the future.*

- Yugoslav banking system as a whole is inefficient and inadequate from the best social practice perspective. Given the number and size of the problems it needs *larger scale, organised, restructuring*. Payment system reform, although important, can achieve little or nothing on its own. The null hypothesis is composed of two sub-hypotheses.

  Ho 4: *Yugoslav banking is efficient and does not need overall planned restructuring. Payment system reform is a sufficient part of the system restructuring.*

- The involvement of foreign banks, investors and institutions in the functioning of the Yugoslav banking system, i.e. the process of banking system liberalisation, is key for

the recovery of the payment and banking systems. Increased entry and involvement would result in competition, investment, better quality and more versatile services.

Ho 5: *Increased entry of foreign banks and/or attracting more foreign investors (by changes in legislation and/or granting special concessions) are not important for the efficient functioning of efficient payment and banking systems in Yugoslavia, i.e. they would have a neutral or negative effect on the domestic payment and banking system.*

The survey questions are concerned with payment system performance and efficiency, payment system reform and design, bank's present and future involvement in the processes, and the roles of the various financial institutions. There are seven groups of questions[5]. The first set of questions is general in nature and is concerned with the characteristics of the respondents. The second set of questions investigates how informed, involved and influential the banks were regarding the payment system functioning and changes. The third set of questions refers to the performance of the payment system, dominated by the clearinghouse as a major provider of the large value payments services. The fourth group of questions is concerned with payment system reform, its design and potential outcomes. The fifth subsection looks at what banks are doing, or plan to do, regarding the payment operations as a part of their business strategy and in limiting the risks and costs and enhancing the speed and choice of the payment system services. The sixth group of questions is aimed at establishing what bankers think is the role and importance of payment system reform in the overall banking restructuring and what should be the roles of government and monetary authorities in the reform. Finally, there are the questions about the role of foreign competition and international integration regarding the payment services.

[5] Which do not necessarily coincide with chronological appearance of individual questions and subsections in the questionnaire.

7.5. The Results of the Survey

7.5.1. Response to The Survey

From the 106 banks originally contacted, a total of **51 banks (48%) responded** to the survey and returned completed questionnaires. This very high response rate, for a mail survey, is even more impressive when we take into account the number of banks which effectively do not function - approx. 25% of all banks (registered but not functional and/or banks from whom the banking licence has been withdrawn but have not been officially closed yet). Given the 'census' approach the sample bias should be minimal. This is confirmed by the adequate "geographic" and "bank type" coverage[6]. Without going into speculation about how many banks really operate, it will be accepted that the sample is representative and the response rate adequate for making reasonable inferences for the given population. From 35 **'institutional' representatives 32 (91%) returned completed questionnaires.** The results are shown in table 7-1.

Table 7-1 Response to the survey

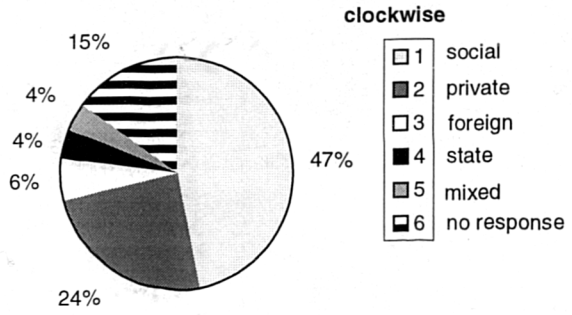
	institution				
	Banks	NBY	ZOP	Bourses	total number of respondents
Category	No. / %	No. / %	No. / %	No. / %	No. / %
Returned completed questionnaire	51 / 48%	15 / 100%	12 / 80%	2 / 100%	80 / 58%
not able / not willing to respond	0	0	3 / 20%	0	3 / 2%
no response	56 / 52%	0	0	0	56 / 40%
Number of questionnaires sent	106	15	15	2	138

[6] All FR Yugoslavia regions, 'old' and 'new' banks (established before and after 1991, i.e. with or without frozen foreign exchange savings), 'big' and 'small', and all types of ownership were proportionally represented. The parameters were checked against NBY and The Bankers' Association records.

7.5.2. Characteristics of the Banks

1) In terms of the ***"ownership structure"***, 47% of the banks are 'dominantly'[7] "socially"[8] owned, or their shareholders are firms which are socially owned (see Figure 1). 24% are dominantly private, six percent of the banks are owned by foreigners, four percent are state owned banks and in four percent of banks none of the types of ownership is dominant -- so-called "mixed" ownership structure (any single type of ownership in those banks does not exceed 40% percent of overall shareholders funds). When compared to, for example, total banking assets concentration and market share criteria[9], socially owned banks, about 50% of all banks, 'run' about 90% of Yugoslav banking. Analysis of individual banks in this survey have confirmed those findings. These survey results and the previous findings indicate that **the population of Yugoslav banks is dominated by socially owned** (non-privatised) **banks,** which has certain implications on the scope and way of banking system restructuring, if it is proved necessary.

Figure 7-1 Ownership structure of the banks



[7] A dominant ownership form in a bank was defined as a certain type of ownership that exceeds 60% of shareholders funds of the respective bank. In terms of legal status all banks are by law "shareholders associations"- S.A's, i.e. "firms limited by shares".

[8] The classification of social, state and private ownership stems from the previous, so-called, "self-management" system, that Yugoslavia was unique for. This type of socialism was reflected in the ownership structure whereby the employees of the 'social' companies (majority of companies) were their 'owners' but without the right to sell their stake on market. The participation of employees in executive decisions was emphasised by a power of veto on the management's decisions.

[9] The Bankers' Association own records.

2) ***The amount of the shareholders funds*** *of the banks,* is in line with some previous findings[10] (Ekonomska Politika, 1997). 60% of the banks have permanent capital in amount up to 60 million Yugoslav Dinars (about 10 million US dollars, at 1997 year-end exchange rate), and the amount of capital in almost three-quarters of the banks does not exceed 100 million Dinars. The total amount of capital of about nine percent of the 'biggest' banks equals the amount of capital that the remaining 91% of the banks share together (see Table 7-2). The average amount of capital in the sample is 117 million Dinars, which means that, on average, a Yugoslav bank has shareholders funds nominally worth from 65 to 167 million Dinars (95% confidence interval; t=4.55; 0.000 two tail significance). The frequency distribution is significantly positively skewed with significantly positive kurtosis.

Table 7-2 Amount of capital

Category - million Dinars[1)]	percent of total number of banks	percent of total number of banks - cumulatively	percent of total amount of banking capital	percent of total capital cumulatively
up to 20	23	23	3	3
from 20.01 to 40	24	47	7	10
from 40.01 to 60	13	60	5	15
from 60.01 to 80	8.5	68.5	5	20
from 80.01 to 100	4	73.5	3	23
from 100.01 to 200	13	86.5	15	38
from 200.01 to 500	6	92.5	16	54
Above 500	8.5	100	46	100
total	100		100	

[1)] Dinar/Dollar ratio at the time was about 1 to 6

All this, and the findings on assets concentration, are in line with the previous findings (Jeremic 1996) of the high concentration of Yugoslav banking. The findings, of course, tell us nothing about the solvency of the banks, especially in light of the realistic assumption of unrealistic amounts of assets and capital as shown in the accounts[11]. This, on the other hand, does not alter the conclusion about the concentration of Yugoslav banking and the probable concentration of problems in small numbers of 'social' banks.

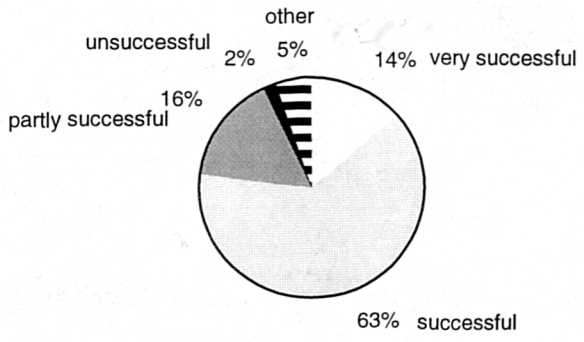
[10] As there is no obligation to publish the accounts, the accounting data is not readily available.

[11] It is estimated in various domestic studies that the amount of 'non-performing' loans totals about 50% of banks' total assets on aggregate, and that there are many technically insolvent banks. Given the magnitude of the problem,

3) When asked about ***their banks' individual profiles*** the bankers assessed the following:

a) *With regard to the business success,* 14% of banks were "very successful", **63% "successful"**, 16% "partly successful" and only 2% "unsuccessful" (See Figure 7-2). Five percent of banks did not answer. As the successes criteria were not defined the intention was to establish how do bankers view themselves according to their own success criteria[12]. Successful banks make up the statistically significant majority. However, when compared to some other 'success criteria' classifications, the number of partly successful and unsuccessful banks together is statistically significantly smaller than, for example: a) the number of banks which have ended the tax year 1996/97 with net loss; b) the number of banks that didn't satisfy the particular requirements of, for example, "capital/liability ratio", "ratio of large and the largest possible loans in total loans", or "ratio of investment of permanent funds (capital) in tangible assets"; or c) the number of banks that didn't satisfy a total of 4 or more requirements (out of 10), set by the Banking Act paragraphs 26 and 27, at the end of 1996/97 tax year. It could be that the bankers think that being able to survive in the given environment was a success.

Figure 7-2 Business Sucess

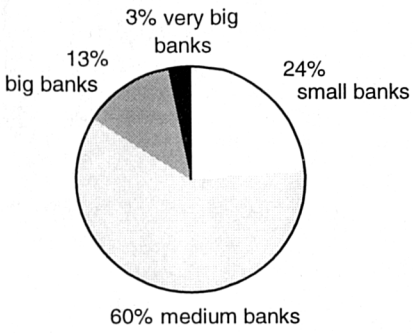


b) *Regarding the asset size,* 23% of banks in the survey view themselves as small, **62% are medium-sized bank**, 12% are big and 2% are very big banks (see Figure 3.). This, when checked against the asset size in Dinars for the respective banks, means that the bankers consider a small bank to be one which has total assets worth up to 50 million Dinars (nine million dollars); medium bank up to one billion Dinars (167

and the low level of economic activity, the central bank is reluctant to put pressure on the banks to write-off their bad debts before there is a sound restructuring programme either for a particular bank or the banking system as a whole.

million dollars); big bank from one to seven billion Dinars (from 167 to 1100 million dollars); and very big bank above seven billion Dinars worth of balance-sheet assets (above 1.1 billion dollars). It seems that bankers are reluctant to classify their banks as small. If, for example, the lower limit for a medium bank is set at 100 million Dinars (16 million dollars) worth of assets, as many as 50% of the banks would be classified as small. These 50% of the banks possesses 3% of total assets value of all banks. The classification would also be supported by other characteristics of the banks.

Figure 7-3 Asset size



For comparison purposes, total assets of all Yugoslav banks are worth 110.3 billion Dinars - 18.4 billion US dollars (source NBY, 1997), the largest 15% banks hold 80% of the assets, and the six largest banks hold 60% of all assets (see Table 7-3). However, in light of the amount of bad debts and inflated assets side of frozen foreign exchange savings, as well as the unrealistic foreign exchange rate (Dinar was pegged to German Mark at 3.3 to 1 exchange rate) a scrutiny of an independent audit would halve the amounts presented in most banks' balance sheets.

[12] For review of the banking system performance, evaluated on the basis of the set of criteria set by the legislation see Seskar and Milatovic 1997 and Jeremic 1996.

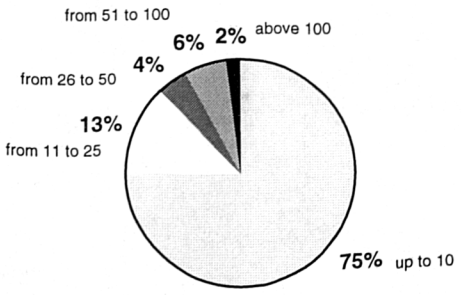
Table 7-3 Banks' asset size, 1997

category - million Dinars	percent of total number of banks	percent of total number of banks - cumulatively	percent of total assets	percent of total assets - cumulatively
up to 25	10.3	10.3	0.2	0.2
from 25.01 to 50	12.3	22.6	0.6	0.8
from 50.01 to 75	16	38.6	1.2	2
from 75.01 to 100	9.4	48	1	3
from 100.01 to 200	16	64	3	6
from 200.01 to 500	11.3	75.3	5	11
from 500.01 to 1000	9.4	84.7	9	20
from 1000.01 to 4000	10.3	95	25	45
above 4000.01	5	100	55	100
total	100%		100%	
memo item: total assets in billions	110.3 Dinars	US $18.4	GBP 11	DEM 33.4

Data sources: National Bank of Yugoslavia, Quarterly Bulletin, 1997; Ekonomska Politika, 1997.

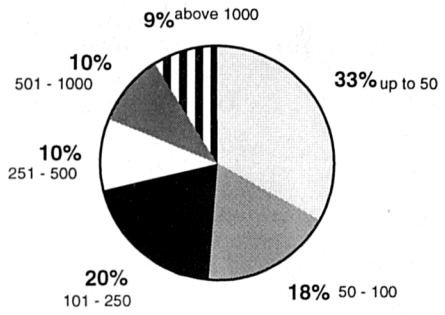
c) As far as *the number of branches* is concerned, **74% of banks have between 1 to 10 branches**, 13% - from 11 to 25, four percent - from 26 to 50, six percent from 51 to 100 and two percent more than 100 branches (see Figure 7-4). The estimates lead to a conclusion that **one fifth of the banks** (so-called 'big' banks) **owns two thirds of total number of bank branches in Yugoslavia.** That leaves 80% of banks with 33% of total number of branches. Given a negligible number of ATMs and cash-dispensers, even less developed telephone banking, and the absence of electronic banking, the results show significant implications of branch concentration on retail banking and payments. The result is significant for assessing the proposed design changes regarding the number payment services providers, competition, choice of payment instruments and banking system restructuring.

Figure 7-4 Banks by number of branches



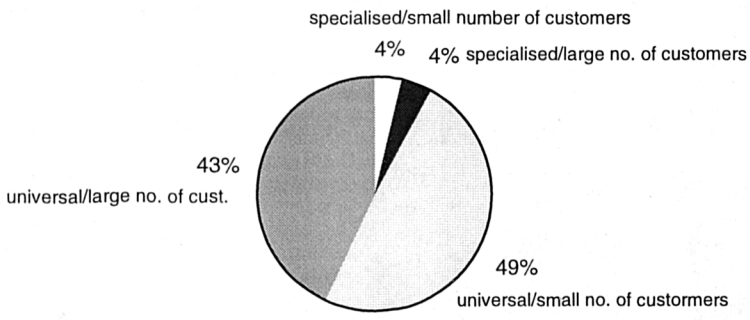
d) regarding *the level of employment,* 32% of banks have up to 50 employees, 18% from 51 to 100, 20% from 101 to 250, 10% from 251 to 500, 10% from 501 to 1000, and 4% over 1000 employees (see Figure 7-5). 75% of banks employs 25% of total number of persons employed in the banks. The results imply that the **26 'largest' banks possess about 75% of total number of banks' employees.** The results are in line with The Bankers' Associations own estimates.

Figure 7-5 Banks by number of employees



e) Classified according to *the type of banking activities and number of customers*, a total of 8% of banks are specialised and **92% are universal banks**, one half have a 'small' number of customers and the other half have a 'large' number of customers. The largest proportion of the sample are **universal banks with smaller number of customers** - 48.5%, statistically, this is not significantly different from 43.5% of universal banks with large number of customers. (see Figure 7-6)

Figure 7-6 Type of bank



A typical Yugoslav bank would, therefore, be "socially" owned, 'successful', 'medium sized', with about 18.3 million dollars worth of capital, possesses 10 branches,

employs about 50 employees, it is universal and has a relatively small number of customers. However, for some variables the modes (the largest number of banks with a certain characteristic) are significantly different from the respective means (this measure for all banks) – referred to as *the banking system concentration.*

7.5.3. Bankers' Involvement in The Payment System Debate

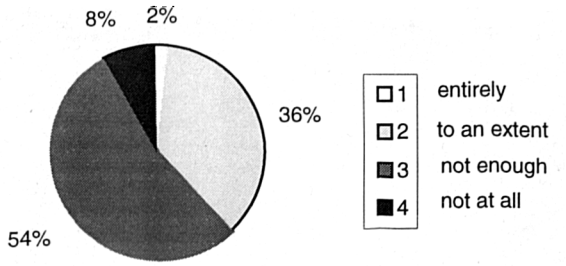
1) As many as ***82.3% of the commercial bankers in the survey "have participated, in a professional capacity, in the debate about the payment system"***, some of them have participated more then once and in different forums. The percent of the 'institutional' bankers who participated in the debate is about 95%, which is in line with the assumptions about their expertise and involvement in the payment system functioning. As *organisers* of various debates and forums the following institutions were named: The Bankers' Association - 70% of the cases, ZOP - the clearinghouse - 35% of the cases, National Bank of Yugoslavia - in 20% instances, Yugoslav Chambers of Commerce and Industry and four other institutions - in 25% of the cases. Those who did not have a chance to participate expressed their wish to do so in 90% of the cases.

2) When asked *"have **the banks' standings and interests,** regarding the payment system functioning, been taken into account for payment system design and legislation in the last five years"*, 38% of the bankers answered they have been taken into account - of which 36%, "yes to a certain extent", and 2% "yes entirely"; *while 62% thinks they have not been taken into account satisfactorily* - 54% "not enough", and 8% "not at all". (See Figure 7-7) It could be argued that according to the bankers their standings and interests **have not been taken into account satisfactorily** for payment system design and legislation in the last five years (the difference is statistically very significant, α=0.01). The opinion of the representatives of the institutions is that the banks were treated fairly, i.e. they generally opted for the first two answers.

The comments range from the statements that "only the interests of 'politically favourable' banks were taken into account", "there is a long wait for the final statutory solutions (legislation)", that "the payment system development concept was ill-defined", to the remark that "different banks have different interests, all of which cannot be

incorporated in the payment system design". Nonetheless, it is significant that more than a half of the commercial bankers were not pleased with how their interests were incorporated in the payment system design in the past five years.

Figure 7-7 Incorporation of banks' interests in the system design



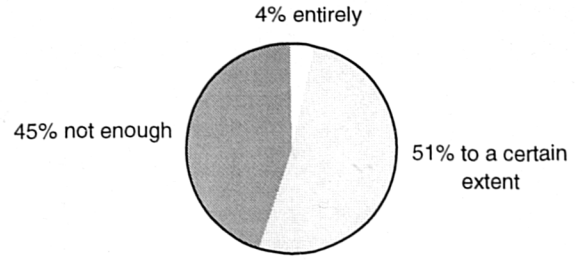
7.5.4. The Payment System Efficiency

1) When asked a general question: "*were you, as a banker,* ***satisfied with functioning of the payment system*** *from 1993 to 1997?*", 55% of the commercial bankers answered they were satisfied in principle - 4% "entirely" and 51% "to a certain extent"; while 45% were "not satisfied" (see Figure 7-8). The difference is not statistically significant (not even for α=0,10), which means that **the opinions are split**. Nonetheless, the system where only 2% of the banks were entirely satisfied and 45% of banks were not satisfied with "the financial system blood vessels", cannot be regarded as a well-functioning system.

The reasons given for the bigger or smaller *dissatisfaction* related to the system design, where the clearinghouse performs the large value payments beyond the control of banks, were as follows: unequal treatment of the customers (banks), lack of information about inflowing and outgoing funds and balances of the banks' customers accounts when it is needed, that the banks' customers/debtors were able to make payments outside the banks' control, inability to monitor their daily liquidity and perform satisfactory liquidity management. It was also stated that there were occasional mistakes in order processing, system breakdowns and other operational problems, outdated equipment in some ZOP branches, as well as insufficient electronic netting between the banks and the clearinghouse.

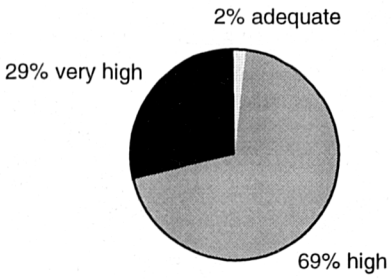
On the other hand, the following was stated as *positive* about the system: professionalism of the staff, precision, speed and efficiency of orders processing by the clearinghouse as well as a good co-operation with local branches of the clearinghouse. The institutional bankers were generally satisfied with the payment system functioning so far. Remarks from the central bank related to the period when it did not have control over the payment float which had hampered an effective monetary management.

Figure 7-8 Satisfaction with the payment services



2) ***Payment system costs*** *(commission and fees)* were generally assessed as **high - 98% of the answers**, i.e. 29% as "very high" and 69% as "high", which, of course, is statistically very significant (at α=0,01). Only 2% of the respondents thought that the costs were appropriate. The respondents from the central bank and bourses made a similar assessment, while those from the clearinghouse viewed the costs as adequate (See Figure 7-9). The respondents from the clearinghouse also thought that the revenues generated from the fees and commission, after deduction of the government's share, did not cover the expenses generated by the payment system services. There was a consensus that 0.3% commission for a non-urgent credit transfer was too high, and that the costs are unjustly increased by including a government tax as a source of the budget revenue. The bankers thought that "what we pay is far more than the optimal costs of the payment system services", "there are instances of double charging (of both payer and payee) for the same transfer", "for the quality of services the price is too high", "the fees are uniform and non-discriminating regardless of the type (value) of payment", and that "the various budget requirements should be transparent and their financing should be from transparent sources, i.e. from basic forms of taxes instead from the tax on payment transactions orders".

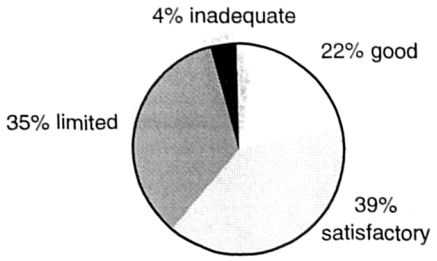
Figure 7-9 Payment system costs



3) With regards to *the versatility of* ***payment instruments*** *and* ***the choice among them*** *in the period 1993 to 1997,* 22% of bankers thought that the choice was "good" (0% "excellent"), 39% that it was "satisfactory", 39% that it was generally poor, i.e. - 35% "limited" and 4% "inadequate" (see Figure 7-10). The respondents from NBY and the bourses were more critical of the instruments choice, and the opinions are split between "satisfactory" and "limited". The clearinghouse representatives assessed the choice as being "good" and to a lesser extent as "satisfactory".

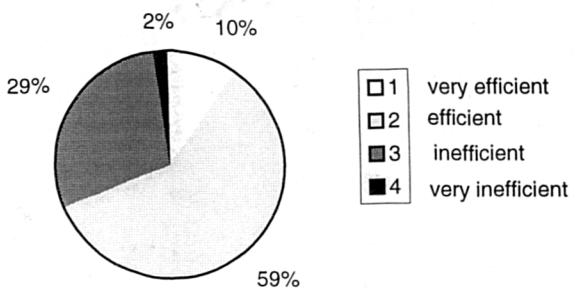
The comments were: "the problem is not only the choice of instruments but the (in)efficiency of their clearing", "there is a high use of cash which is not good", "there is a low proportion of cashless payments" and "the cashless payments should be encouraged", "electronic payments are insufficient in volume and number" and "the number and use of various plastic cards is very low". On the other hand, some thought that "the choice is just right for the state of the economic and banking system development", "it is good enough to cover all business transactions", "it is in line with the current payment system design" as well as that "the choice was inadequate because there are too many payment instruments, hence lack of transparency". Even without statistical evaluation of the divided opinions (to avoid possible bias regarding the choice of assessment criteria), it could be argued that 39% is a high percentage of banks that were not satisfied with the versatility of payment instruments offered and choice among them.

Figure 7-10 Payment instruments choice



4) The payment system efficiency during 1993 to 1997, regarding *"**the speed** of payment orders processing and use of funds transferred"* **was assessed as high**. Ten percent of bankers thought that with regard to speed it was "very efficient", 59% "efficient", 29% "inefficient" and only 2% "very inefficient" (see Figure 7-11). Sixty-nine percent of respondents who assessed the system as efficient, is statistically very significant (at α=0.01). It could be, therefore, concluded the system was fast in processing the banks' payment orders which enabled fast subsequent use of funds by the payees.

Figure 7-11 Payment orders processing speed



5) However, a perception about what is fast and what is slow differs from bank to bank. Some respondents who assessed the system as very efficient stated the time of processing of one day, some others viewed the system as inefficient although they stated the processing time was 2 hours. When asked what was *"**the average time** for a payment to reach the counterpart, i.e. from the moment of payment instruction by the payer till the payee can use (make payments) with the funds"* the answers differed. For *interbank payments* the average (arithmetic mean) was **about 2 hours**, the most

frequent answers (mode) were 1 hour and 4 hours, and the answers ranged from "10 minutes" to "one day". For *businesses* the average time from the moment the order was sent until the funds can be used is also **about 2 hours**, the mode was 4 hours and 1 day (bi-modal), and the answers range from 10 minutes to one day. As for the *retail payments* average speed, as well as the most frequent answer, was **one day,** and interval of answers ranged from half an hour to several days.

The bi-modality of the most frequent answers regarding the speed of large value payments, both interbank and for businesses, and intervals of the answers for all three categories of payments deserve additional attention. There are two possible explanations. First, this fact could mean that different payment services users were treated differently by the payment services providers, mainly the clearinghouse. Second, it could also mean that the respondents to the survey understood the question in different ways. Namely, they could have confused the payment clearing process (payment order processing) with the settlement process (legal discharge of the payment obligation).

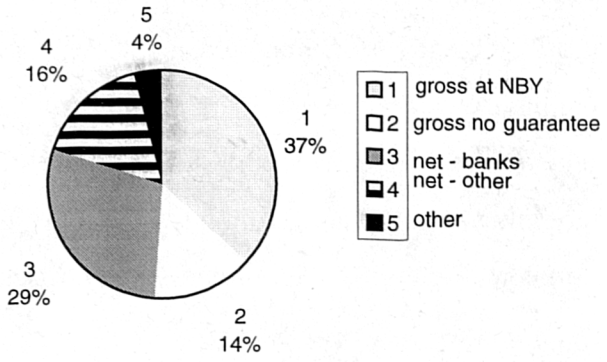
The control interviews, however, confirmed that the speed in question was understood as "the time period from the moment the payer initiates the payment instruction for funds to be transferred until the moment the payee can use the funds for further payments or withdraw cash". This means that the respondents assessed the time of orders processing (clearing) and/or that the funds can be used for further payments before their final settlement (which is one of the main characteristics of a net settlement systems) Therefore, the assumption about the different treatment of various payment services users cannot be excluded. It also seems that the respondents in general see no relationship between liquidity and speed of payment processing.

7.5.5. New Payment System Design

1) The answers to the question "***which settlement system*** *(of discharging payment obligations) do you view as adequate for Yugoslav banking and payment system* " were **equally divided between gross and net settlement system** (there is no statistically significant difference). However, the choice among the four particular

categories differs and goes more in favour of "gross settlement system at the central bank and with a central bank's guarantee" with 37% of the answers. The second is "net settlement system in a commercial banks' network" - 29%, followed by "net settlement at some other institution or a clearinghouse" - 16% and "gross settlement without the counterpart" - 14%. Four percent of the respondents stated they were not sure or did not answer. (See Figure 7-12.) The answers of the 'institutional' bankers are split between gross settlement system with or without the counterpart.

Figure 7-12 Adequate settlement system



The fact that more than half of the bankers opted for a gross settlement system, where the settlement is immediate at the time of the payment order[13], shows that many thought the risks of discharging a payment obligation at the end of the day (the social costs in case of deferred net settlement system), are greater than the costs of liquidity management and keeping non-interest-bearing balances for the payment purposes (in case of a gross settlement system). It also interesting that a small percentage of the bankers would like to see gross settlement without the counterpart, i.e. the system that does not offer daily overdrafts or credits or a guarantee by the central bank. This was in spite of the emphasised problem of illiquidity, i.e. lack of adequate liquidity generating mechanism and underdeveloped interbank (or any other) money market, by almost all the bankers.

One possible explanation is that those banks are self-confident, with good liquidity management and they thought that other banks should become the same or fail under the market pressure. It could also be that the banks in question are afraid that in

[13] For each and every payment order the funds should be in its full amount on the payers bank account at central bank at time the payment order was made.

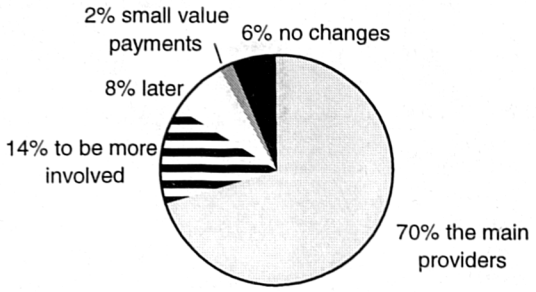
the Yugoslav case "daylight overdrafts" can easily become "overnight credits", that there would be double standards for different banks, and that the banking system can and should create an efficient money market without help from the central bank. However, it seems that the majority of banks needs the additional facility of liquidity provision: - either a net settlement at the end of the day or daylight credits by an efficient institution (in this case NBY). This does not necessarily mean those banks are not disciplined or confident enough but that they may think the financial discipline regarding the daylight overdrafts can be achieved by, for example: adequate pricing of the credits, collateral requirements, caps and limits of bilateral and multilateral exposures, and NBY's supervisory role of banking licence issuance and withdrawals.

2) *Forty seven percent of banks are ready to* ***"participate in costs of establishing a clearing and settlement system they view as adequate"***, 8% of banks would not finance such a system, and 45% does not know (the answers did not depend on the type of system chosen, as asked in the previous question). The reasons given for the "don't know" answer were unclear and uncertain terms and condition of participation, the individual banks' stakes etc. The clearinghouse representatives stated that the clearinghouse is ready to finance establishment of a gross system in general, and that the clearinghouse should be controlled and operated by the central bank.

3) As far as *the new payment system design is concerned,* there seems to be a consensus of opinion regarding ***"the participation of commercial banks as payment services providers".*** 70% of banks (statistically very significant majority) thinks that "**banks should become the main providers of all types of payment services**, 14% of banks is of the opinion that "the banks should be involved more (as providers) than they are now" and 8% "they should be involved at a later stage". The majority of comments on the latter two statements were that the banks should gradually (eventually) become the main providers of the services. Only 8% of the respondents were in favour of the status quo, i.e. that "there should be no changes in the payment system organisation" and/or "the banks should be providers of small-value/retail payments". (See Figure 7-13.) Overall, about 30% of the respondents expressed a concern about the readiness and ability of the banks to perform those services successfully at the time of the survey. The institutional representatives expressed an even bigger concern, even though they do not

disagree with the commercial bankers' opinion in principle. There seems to be an agreement that the banks should eventually become the main payment service providers. The banks generally advocated that it should happen immediately, while the institutions were more reserved.

Figure 7-13 Banks' future involvement in the payment system



4) In view of *"**the number and type of banks** that should carry the payment services"*, 74.5% of banks supported the solution whereby "**all banks should be allowed to participate in the provision of the services on the same terms**" and to have the accounts at the central bank for those purposes (statistically very significant); 21.5% were in favour of "appointing only certain banks as the clearing banks"; 2% did not answer and 2% thought that first the number of the banks should be reduced and then all banks should carry the payment services in its entirety. The answers of the "institutions" are similar to those of banks. The bankers who favour the selective approach, i.e. are for the appointment of the clearing banks (as it is the case in the UK) are the representatives of "big" banks, who regard themselves as optimal providers that would utilise the economies of scale and economies of scope. The majority of bankers, however, think that in order to increase the efficiency of the system, the existing concentration of the payment system services should be replaced with the competition among different payment services providers.

5) The next question was "*What do you think about the proposition that **ZOP - the clearinghouse acts as an agent or principal for banks**, i.e. to facilitate the payment services in the name and on account of banks?*" The answers were in line with the previous answers regarding the banks as payment services providers. Twelve percent of the respondents approved it and assessed that "the solution should be obligatory for all

banks", and 26% "do not approve the proposition". The majority, however, thought that either "it is good as a temporarily measure and should be obligatory for all banks for some time" - 33.3% or "it could be a good solution for some banks and it should be on a voluntary basis - 29%. The answers and comments point out that the proposition **should be either a temporary measure or an additional choice for banks,** which cannot perform the payment services successfully at the moment. That, as well as one quarter of the respondents who do not approve the proposition, means the banks want to take over the payment services and feel ready to do it. The respondents from NBY and the bourses have similar opinions as the bankers, and the clearinghouse representatives are in favour of the proposition that is in line with their negative assessment of banks readiness to become the payment services providers. A certain number of banks expressed a concern about the proposition (put forward by the clearinghouse) that it would lead to "double charging (increase of costs)" and/or "conflict of interests" which could lead to inefficiencies and gridlock in the payment system functioning.

7.5.6. Banks as Payment System Services Providers

1) When asked explicitly ***"do you think the banks are ready to become the main payment services providers"*** 17.6% consider that "banks are ready for efficiently providing payment services", 19.6% "banks are not ready", 6% that some banks are ready and some not or that the level of preparedness varies; the majority opted for the statements which express some form of reservation about the readiness. Namely 37% of the respondents consider that "banks haven't got enough skilled staff", 55% that "banks lack adequate technical facilities and equipment" and 39% that "banks haven't got enough branches or that there is no adequate network of the branches" (it was allowed to choose more than one statement). It seems that the opinions are divided and the majority thought that the banks lack some of the resources for efficient payment system services provision. It also seems that the **major problem is that of technology,** although a significant number of respondents consider human and branch-network resources of the banks as potential obstacles for efficient functioning of the payment system. It has also been noted that if the existing clearinghouse's resources are to be

'transferred' to banks (as expected by many banks) the problems would be mitigated. The institutional bankers generally do not consider that the banks are ready yet.

2) "*If your bank plans further involvement in payment operations,* ***which payment system services do you plan to introduce/expand in the next 12 months?***" was the next question. Banks responded that these are "all services currently offered by the clearinghouse", "current accounts for businesses and individuals and the accounts' transactions statements services"; "liquidity and cash flow monitoring and advice services for the customers"; "establishment/expansion of electronic communication (receiving payment orders electronically) with the clients"; "establishment/expansion of electronic communication (making payments order electronically) with the clearinghouse"; introduction, and services related to, various plastic cards; introduction of ATMs / cash-machines; telephone banking. Twenty percent of the banks had no plans regarding the payment services for the next twelve months at the time. Banks, therefore, plan, if it will be institutionally and statutory possible, to **take over the large value payment services from the clearinghouse** that would enable them to manage their liquidity and control their customers (especially the debtors) accounts more efficiently. Besides, the banks plan to expand, update and introduce some new retail payment services.

3) In view of the introduction of new payment services, banks had plans for "***additional investments*** *in the next twelve months*" (from the time of the survey) mainly in the equipment, and to a large extent in the training of staff and opening of new branches. Some banks were less vague and stated particular projects and the costs involved, such as "the new information system", "connecting to SWIFT communication network and upgrading the equipment", "use of the REUTERS information and communication system and purchase of the necessary equipment", "opening of a specific number of branches at specific locations" etc. The number of banks that do not plan to commit any additional funds is equal to the number of banks that did not have any plans to introduce new payment services - 20% of the banks. A certain number of banks also count on buying or getting a part of the clearinghouse's technical, network and human resources. The impression was that of 80% of the banks that plan additional investments, **40 percentage points are banks with concrete investment projects** and

the other half are banks that feel they can and should invest. A possible explanation for the lack of concrete plans in those banks could be the uncertainty about the type and timing of introduction of new systemic solutions regarding the payment and banking system.

4) Out of sixteen categories of "***payment instruments/services that the bank offers***", Yugoslav banks do not offer only two -- so-called electronic cash and electronic banking. Nonetheless, many of the other services are offered by a small number of banks and to a relatively small number of customers. The results are summed in Table 7-4.

Table 7-4 Payment services offered

No.	Payment system services	offers - % of banks	rank	doesn't offer - %	plans to offer - %	rank
1	cheques/cheque books	80	1	20	6	13
2	paper credit orders	80	1	20	6	13
3	large value cross-border payments	76	3	24	2	16
4	retail cross-border payments	63	4	37	10	10
5	statements sent to home address	63	4	37	10	10
6	electronic payment orders	59	6	41	**27**	**3**
7	standing orders and direct debits	45	7	55	14	8
8	credit/ debit cards for domestic payments	29	8	71	**33**	**1**
9	"travellers" cheques	27	9	73	**24**	**4**
10	credit/debit cards for payments abroad	23	10	77	**33**	**1**
11	other plastic cards	8	11	92	10	10
12	ATM's	6	12	94	**22**	**5**
13	ATM's with built-in payment orders feature	4	13	96	12	9
14	telephone banking	4	13	96	18	6
15	electronic cash	0	15	100	16	7
16	electronic banking	0	15	100	6	13

The vast number of banks offer: "cheques/cheque books"- 80%, "paper credit orders"- 80%, "cross-border large value payments"- 76%, "cross-border retail payments"- 63% and "statements sent to home address - 63%. It comes as a surprise that such a number of banks offer the last mentioned two services, but it seems that those services are limited to a relatively small number of customers. The number of banks that can receive "electronic credit transfers orders" from its customers- 59% and "standing orders and direct debits"- 45%, is also high but again only a small percent of customers

felt the benefits of using them[14]. The next group of services is offered by only a quarter of (usually not the same) banks, and these are: "credit/debit cards for domestic payments" - 29%, "Travellers cheques" - 28% and "credit/debit cards for payments abroad"- 24%. There are 8% of banks which offer "other plastic cards (for cash withdrawals or cheque guarantee cards)". The percentage of customers that use various plastic cards is, however, small[15]. About 6% of banks has some ATMs, 4% of banks has a small number of more advance ATMs with the payment instructions facility, and 4% "telephone banking". The percentage of customers that use those services is alas insignificant.

From the services that some banks do not offer the following are ***planned to be introduced within next two years*** (expiring just before the new millennium): the largest number of banks plans to introduce credit/debit cards for domestic payments - 33% and credit/debit cards for payments abroad - 33%; electronic payment orders (received from the customers) with 28% are just behind; followed by "travellers" cheques - 24% and ATMs - 22%. A number of banks were about to introduce telephone banking - 18% and electronic cash - not less than 16% of the banks by the year 2000. Standing orders and direct debits appeal to 14% more banks, and statement of accounts that are sent to home address will be provided by additional 10% of banks. "Other" plastic cards will be offered by another 10% of banks and retail cross-border payments will be provided by another ten percent of banks who will join 63% of banks that already provide the service. Lagging behind with 6% of banks each, are cheques and paper credit orders (already offered by majority of banks) and electronic banking. The last is introduction of large value cross-border payments services - 2% of the banks, who will join the 76% of banks.

[14] The data on the number of customers that use particular services are treated as confidential or a 'trade secret' but were estimated from the personal interviews and the Banker's Association records.

[15] It is estimated by the Bankers' Association that starting from 1984, when the first major credit card companies introduced their cards to the market, till 1992 there have been about 60,000 cards in use, with about 6,000 points of sale. Recently, domestic banks issued various plastic cards in amount of approximately 10,000 cards. For example, in Hungary, a country in transition with similar number of inhabitants, there are 200,000 credit/debit cards (1998).

7.5.7. Payment System as a Part of Banking and Monetary Systems

1) **Importance of payment services as a part of banks' business strategies** was investigated with a series of questions, the first of which was - *"what **new services/activities** are planned to be introduced within next two years by your bank?"*. 80% of banks had plans and the answers have been grouped in four groups. ***The payment system services*** seem to dominate - about **one third** of the new services that will be offered by the banks are new payment services. These are: various plastic cards for payments both domestically and internationally, large-value payments - currently done through the clearinghouse, and the expansion of ATMs and ATM networks.

The other group of services, about **20%** of the total number, relate to trade and safekeeping of ***securities,*** and those distil down to forming stock exchange dealers, brokers and custodian businesses departments. The third group, about **15%** of the new services, will be ***'investment' bank's activities,*** i.e. "advising on and supporting privatisation programmes of the companies", "valuation, marketing, registry, underwriting and distribution of new share issues", "(involvement in) management buy-outs, leveraged buy-outs, mergers and acquisitions", "guarantees and other foreign trade and syndicated loans activities".

The remaining one third of the new activities is composed of: insurance business, expanding the activities to retail/wholesale banking, home telephone banking, geographic expansion domestically, "factoring" activities, support of "franchising" and "leasing" activities of the companies, and mortgage services.

It seems that payment services are an important part of banks' business strategy for the next two years. It also seems that banks will seek other than traditional 'deposit-taking/credit institution' activities to compensate for low savings and lack of trust of depositors as well as high risk of investments. As many banks predict that the low level of economic activity, lack of foreign investments and low level of savings may continue for some time, it is probable that the struggle for control over transaction money and non-interest revenue businesses will intensify.

2) *With regard to* ***the quality and efficiency***[16] *of banking services and financial intermediation in Yugoslav banking (as of Autumn 1997),* the system has been classified as follows: a) **inefficient by 61% of respondents** and efficient by 39% of respondents, and b) that it offers a **medium quality of services - 93%** of respondents, and poor quality - 8% of respondents. From the possible combinations of categories, 55% of bankers consider the system "inefficient with a medium quality of services", 39% opted for "efficient, medium quality", and 6% for "inefficient, poor quality". The institutions' representatives made similar assessments. Results are given in Table 7-5.

Table 7-5 Efficiency and quality of services provided by the banks

	efficient	inefficient	total
high quality of services	0	0	**0**
medium quality	39%	53%	**92%**
poor quality	0	8%	**8%**
total	**39%**	**61%**	100%

The representative comments were: "inefficiency is partly a consequence of the inefficiency of the economy as whole", "50% of Yugoslav banks is non-functional", "inefficiency and poor quality of services results from unclear ownership structure and owners/management relationship", "the quality of service will be increased as soon as the systemic (institutional) prerequisites are firmly established", "inefficiency and medium quality stem from the illiquidity of banks caused by a high level of bad debts", "banks are constrained from functioning in an efficient manner by the economic environment and banks' shareholders", "non-existence of adequate legislation and high risk of placements (hence high required return on investments) prevent introduction of new services and consumer credits to the customers", "poor cash flow management of the companies (illiquidity), lack of financial discipline, inefficient legal system are the causes of the banking system inefficiencies".

The majority of comments, therefore, emphasise **the problems of "liquidity", "debtors", "ownership structure", "inefficiency of the legal system" and "inefficiency of the economy".** Could such a banking system provide efficient payment

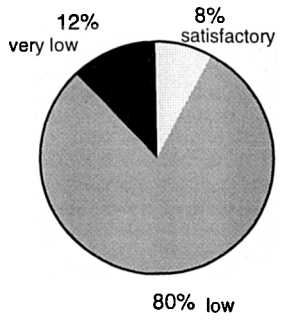
[16] Efficiency was defined as "right timing and speed of a banking service required".

services (or more efficient than the clearinghouse) will be looked at in the subsequent sections.

3) When asked about *"**the quality of placements and assets composition** of Yugoslav banks as whole"* at the time of survey, nobody rated it with "high level", eight percent feels that it is at a "satisfactory level", but as many as **80% of the respondents thinks the quality is at a "low level"**, and 12% at "very low level" (see Figure 7-14). The responses of the institutions do not differ significantly. The bankers commented that this is because: " the inability to charge the interest and get the principal amount back from the debtors when they are due", "bad debts", "ownership structure, whereby the owners are the debtors and because the legal system protects the debtors", "it reflects the quality and credit worthiness of the economy i.e. the founders/shareholders of the banks", "banks are not completely independent when making credit decisions but cannot force debtors to repay the credits", "there is a high influence of politics on the credit placements", "high risk of investments", "inadequate collateral requirements and guarantees" and because of "low level of economic activity, non-servicing of frozen foreign exchange deposits and foreign credits".

It is, therefore, no wonder that banks want to explore other avenues of business activities and get away from traditional deposit institution role. Payment system services seem an obvious choice.

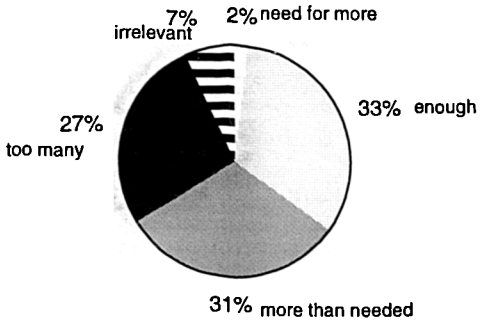
Figure 7-14 Quality of placements and assets structure



4) ***Adequacy of the number of banks** in relation to the needs of the businesses and efficiency of financial intermediation* has also been looked at. Two percent of the respondents think that "there is a need for more banks in the system", 31% that "there is

an adequate number of banks", and **59% is of the opinion that there are more banks in the system than necessary,** i.e. 31% thinks that "there is a larger number of banks than optimal", and 28% thinks that "there are far too many banks". Eight percent of the respondents have chosen "other", i.e. that number of banks is irrelevant or that this is not a meaningful indicator. See Figure 7-15. Those who think that the system is overcrowded are the statistically significant majority only at α=0.10 confidence interval. The institutional bankers think that there are more or too many banks in relation to the efficiency of the financial intermediation.

Figure 7-15 Adequacy of the number of banks



Those who were in favour of a smaller number of banks stated: "fifty percent of banks is de facto closed but they produce costs of the labour force and implicit financial subsidies", "for the existing level of the economic activity there are too many banks", "because of the inadequate payment system legislation, with regard to discharging of payment obligations and problem of debtors, companies seek or form new banks to deal with their needs instead of paying back the debts", "there are many insolvent banks", "the majority of the banks cannot keep up with the developments of banking industry". Others, however, think that: "there is a sufficient number of banks but they lack financial strength to support the needs of the economy", "market forces should deal with the issue", "the number of banks has no influence on efficiency of financial intermediation" and "the number of banks would be irrelevant if there was a favourable environment for competition and customer pressure".

5a) For those who thought that there are more banks than necessary or that the system can be rationalised the question was ***what would be the adequate solution in regard to the improvement of the system?"***. 85% of the bankers that responded to this

question was more than 59% of bankers who agreed with the relevant statements in the previous question. Sixteen percent of the banks remained consistent in relation to the answers to the previous question and opted for the statement "let the market forces deal with the number and quality of the banks". Those 16% and 15% of the bankers who did not answer totals 31% of respondents who think the system has adequate number of banks or that the number is irrelevant. However the percentage is statistically significantly different from 41% of respondents who have agreed with those statements in the previous question[17].

From the given statements or their combination 16% of bankers have chosen "bank mergers and acquisitions facilitated/helped by the government", 28% agreed with "sell/privatise or liquidate certain number of socially owned banks" 39% thinks that "there should be tougher licensing procedures (more prudent requirements)", 42% is in favour of "tougher surveillance and supervision of banks liquidity and capital requirements (license withdrawals)", and as many as 59% of the bankers think "let the market forces deal with the number and quality of banks" but in combination with some of the other 'measures'. The favourite combinations were: "tougher licensing procedure" and "tougher surveillance and supervision measures", then "sell/privatise 'social' banks" and then "let the market forces...", followed by "tougher surveillance and supervision" and "let the market forces...". Therefore, the banks think that there should be **tougher licensing and licence withdrawal procedures and then the banks should be left to organise according to market principals.** The representatives of the institutions agreed but placed an emphasis on the need for tougher requirements and on the more prudent competitive environment.

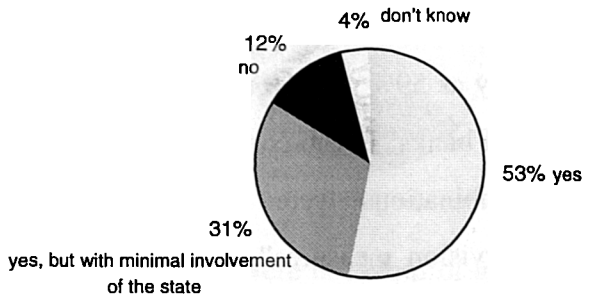
This has implications for the number and type of banks that could operate as payment services providers, hence the other considerations such as technical, human and branch facilities.

6) The next important issue was whether there was **a need for the banking system restructuring.** The bankers were asked whether an overall organised restructuring was required. 53% answered "yes", 31% "yes, but with minimal

[17] It is tentative to conclude that the real number of those who think that the system can be rationalised regarding the number of banks, i.e. that the market forces in Yugoslavia cannot solve the problem, is bigger and, therefore, statistically very significant.

involvement of the government", 12% said "no" and 4% "don't know" (see Figure 7-16). Therefore, the majority thought that **the organised restructuring is required,** but a large percentage were concerned with the involvement of the state in the process. The expressed concern and reservation about the government's involvement were explained by: "inefficiency of the state administration", "unequal treatment of the banks", "pushing for certain solutions of certain banks", "lack of trust in the government's objectivity and efficiency" and "uncertainty about the future role of the government". The replies of some of the bankers who opted for "yes, but with minimal involvement of the government" were inconsistent with later responses to the subsequent questions. The inconsistency, however, is in line with the lack of trust in the state.

Figure 7-16 Need for organised restructuring



6a) For those who answered **"yes"** the question was *"how do you think it should be done?"*. 62% of the bankers responded. From the given statements or their combinations (not more than three) 25% of the respondents have chosen "restructuring[18] of majority of socially owned banks at the same time", 24% were in favour of "restructuring of only certain banks one at the time"; 18% 'voted' for "by selling/privatising (or liquidating) majority of those banks", 10% were for "selling/privatising some of the banks without the restructuring", and 18% for "selling/privatising some of the banks after the restructuring"; 20% would like to see "changing of the legal framework or banking system and operations"; and the favourite with 38% was "by attracting foreign buyers/investors with special concessions". The most frequent combinations included "attracting foreign buyers/investors" and the

[18] Restructuring was defined as: "... by depositing additional capital, shifting the banks liabilities to the state (i.e. to its agency), asset clearing, change of the management, merging and acquiring social banks - by the state and form its funds and/or by issuing new public debt".

winning combination (the most votes individually or in combination) was: **restructuring of some banks, the sale/privatisation of the majority of socially owned banks and the attraction of foreign investors (shareholders) with special concessions.**

The comments were that "the restructuring cannot be done without the involvement of the state", "in view of the heritage of the previous system, the government should 'clean' the banks' liabilities by accepting the frozen forex savings and foreign credits as it own liability", "the problem of frozen forex savings cannot be resolved without the state", "the state should be involved but only to facilitate the transition and help change the legislation", "additional foreign capital is necessary", "only the involvement of foreign banks and investors can put pressure on domestic banks to transform", "there are not enough real resources, we need foreign capital".

6b) The respondents who answered *"yes, but with a minimal involvement of the government" or "no"* were asked *"why?"*. The bankers expressed their **reservations and concern** because: "the state, based on the past experience, makes counter-productive moves and is inconsistent in its policies", "the government should provide an adequate legal framework that would enable market forces to deal with the matter", "unequal treatment of the banks", "the result will be inefficient bank that can be controlled by the state and certain entities", "the role of the state is to make stable social and political environment with low inflation", "the state should only be involved in resolving the frozen forex deposits problem" and "because it could be argued that a certain proportion of the social assets belongs to the state it should have a say in the restructuring.

7) The bankers were then asked *"what do you think is important **for establishing a sound and efficient banking system in Yugoslavia** within next three years?"*. Fourteen categories, and two 'other', were offered with an ordinal scale of importance (consisting of four degrees) next to each category. Only one degree of importance for each category was allowed. The weights 5,3,1,0, and 0 were allocated to each choice of "very important", "important", "unimportant", "very unimportant" and without answer, respectively. The results are presented in Table 7-6.

Table 7-6 Important for establishing a sound and efficient banking system

rank	Category	points scored	percent of maximum score
1	changes in regulatory framework to support modern market economy	228	89%
2	tough monetary policy and low inflation	224	88%
3	tougher terms of lending and credit rating assessment	223	87%
4	attracting foreign investors and shareholders	202	79%
5	investing in staff training and skills by the banks	189	74%
6	changes in the ownership and shareholders' structure	186	73%
7	banks involvement in securities and financial market activities	181	71%
8	quality and choice of services improvement	176	69%
9	investing in new technologies and new services development	173	68%
10	**improvement of the payment system (speed, choice, costs, risks)**	**169**	**66%**
11	banking system restructuring by the government	164	64%
12	banks' debtors (companies) restructuring by the government	155	61%
13	specialisation of banks in particular fields of activities	98	38%
14	concentration/enlargement of the banks (trough M&As)	89	35%

The highest ranked is **"changes in the regulatory framework to support market economy".** The ranking did not even include six more "other" categories added by the respondents (which were assessed as "very important") that distil down to "efficient legal system" or "efficient courts". The second and third most important categories were **"tough monetary policy (independent central bank) and low inflation"** and **"tougher terms of lending and credit rating assessment"** respectively. Just behind is **"attracting foreign investors and shareholders"**. High ranked are also "staff training by the banks" and "changes of the ownership and shareholders structure". At the very bottom with regard to the importance are "specialisation of the banks..." and "concentration/enlargement of the banks"[19]. It should be also noted that only the last two measures did not pass the trashold of importance set at 151 points[20] [21]. The institutions made similar assessments but ranked "changes of the ownership structure" higher at the fourth place.

[19] Interestingly it is one of the rare policy measures that the government supported or carried out so far and with some enthusiasm too.

[20] The treshold was set at the level of possible polarisation in relation to the importance of a certain category, whereby: 26x **1 (unimportant)** + 25x **5 (very important)** = 151 , which is also 60% of the maximum score.

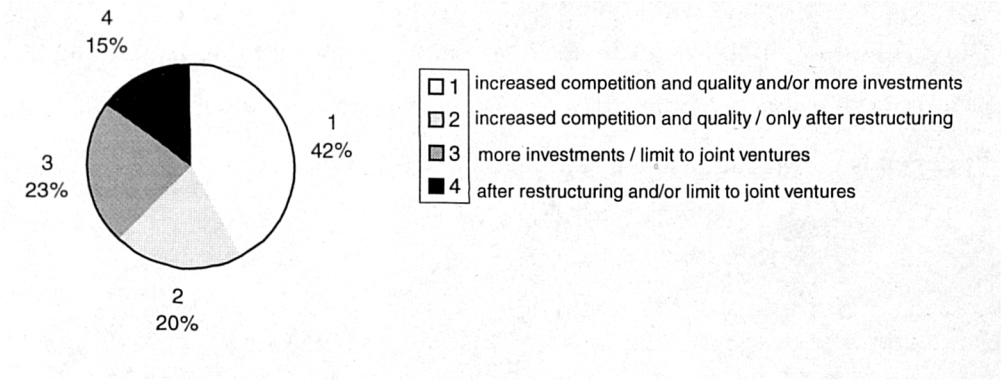
[21] It should be noted that the rank list of answers is not different from those that use weights of, for example, /4,3,2,1,0 /, /5,3,1,-1,0/ and /10,6,2,1,0/ allocated to the degrees of importance.

7.5.8. Foreign Banks, Investors and Competition

Besides the answers to the previous questions which identified the involvement of foreign banks and investors as important for the banking system, and implicitly payment system, restructuring, the issue was explored further with two more questions.

1) When asked "*what do you think about allowing foreign financial institutions to do the banking business in Yugoslavia on the same terms as domestic banks?*" (with a choice of combination of maximum two statements), 50% of banks agrees that **"it would increase the competition and overall quality of the services",** 63% agrees with **"it would encourage foreign investments in domestic banks and the economy",** 37% think that "it would be desirable only after the domestic banks are restructured" and 27% that "the entry should be limited to joint ventures". Nobody opted for "it would jeopardise the survival of the domestic banks" or that "current terms and conditions regarding foreign banks should not change" (0% each). As many as 42 percent of the banks chose only one or a combination of the first two statements. The results are shown in Figure 7-17. The institutions generally agreed with the banks.

Figure 7-17 Increased entry of foreign banks



The bankers commented that: "new technologies should be introduced in the banks and economy with the help of foreign partners", "it will be only when foreign banks enter the system that it will be pushed with the processes of transition, restructuring and adaptation of Yugoslav banks to the internationally accepted banking practice", "without the foreign capital there could be no revival of Yugoslav economy and the banking system". However some were more reserved and stated that "the

restructuring of banks is a prerequisite for other changes", "domestic banks would probably not withstand the competition of foreign banks", and "during the transition process the foreign banks would acquire 'large values' with minimal investments".

2) The last question was: "*If you plan to establish or expand co-operation with foreign banks for offering financial services domestically or internationally in the next twelve months, what will it be in?*" **The largest number of banks plan some form of business alliance with foreign banks with regard to cross-border payment services - 77 percent.** Namely 55% of banks intend to "set up new correspondent accounts" and 22% "participation/membership in some of the payment networks (e.g. TIPA, DISCUS, IBOS, ECHO, EUROGIRO, etc.)". 47% of banks have plans for "staff training for providing services and/or use of relevant technologies" with a help of a foreign partner. 43% of banks intends to form more concrete alliances with foreign banks - 20% "setting up a joint bank/subsidiary in Yugoslavia", 14% "setting up a joint bank/subsidiary abroad", and 14% "some other form of joint venture, merger of acquisition". The total of 24% of banks has no plans for any form of co-operation with foreign banks until the year 1999.

As for co-operation *within next five years,* another 10% of banks have plans (excluding the establishment of new corespondent accounts). The banks who had no intention to form alliances with foreign banks expressed a 'reactive' attitude and stated that "the economic environment is not favourable for any long term planing", "we will accept any mutually acceptable offer for alliance from abroad if, and when, it comes" and "it depends on the interests of our customers".

7.6. Summary and conclusions

7.6.1. The results of the survey

1. Overall, the survey was considered to be a success. It covered a representative sample of the population and provided significant insights into the issues under investigation. Furthermore, the results of the research and some of its recommendations were used at different forums by the Yugoslav Bankers'

Association for formal and informal propositions towards the payment system's improvement.

2. Characteristics of the banks:

- *A typical Yugoslav bank*, given the profile of the banks surveyed, is **'socially' owned, 'successful', with 'middle' assets size** (about 184 million dollars on average), with **capital ranging on average from 65 to 167 million Dinars** (11 to 28 million dollars), possesses up to **10 branches**, has about **50 employees**, it is **'universal'** with small number of customers. The mean values, however, do not concentrate in majority of the banks - the modes are different from the means.
- **One fifth of banks possess two thirds of total number of branches. 25% 'big' banks employs 75% of all persons employed in banks.** The amount of shareholders funds at about nine percent of banks (big socially owned banks) is the same as at 91% other banks together. **Yugoslav banking is dominantly 'socially' owned.** The banking system is concentrated, hence the concentration of problems in a small number of 'social' banks which has implications on **the scope of problems** (identified by the survey) **and a way in which they may be resolved.**

3. Involvement of the banks:

- A great majority of the bankers surveyed had been **interested and involved in the payment system debate**. This indicates the importance of the issue and the respondents' knowledge of the matter.
- The bankers feel that **their interests were not satisfactorily reflected** in the payment system design and legislation in the last five years. The institutions think that the bankers interest have been taken into account and incorporated in the system's design.

4. The payment system efficiency:

- **With regard to the functioning of the payment system within 1993-1997, the opinions were divided** - one half of the bankers were generally satisfied and the

other were not. There is an indication the clearinghouse discriminated between users of the services.

- **The payment system costs** in 1993-1997 **are** almost unanimously assessed as **high.**
- **The payment instruments choice** during the period **was assessed positively** by many of the bankers, but there is a significant number of banks and institutional representatives who think the choice was limited. The remarks relate to the high percentage of cash transactions and low proportion of 'electronic' and plastic card payments in overall payment transactions.
- The payment system was generally assessed as **efficient with regard to the speed of payments** in 1993-1997 period. The perception of what is fast and what is slow differs from one bank to another.
- For *interbank and other large value payments* the average time of order processing was **about two hours,** and for *retail payments* **one day.** Bi-modality of the highest frequency of large value payments and ranges of processing time for all payments could point to the different treatment of some banks by the clearinghouse and discrimination between customers by the banks.

5. New payment system design:

- As for *the new payment system design,* **the answers were equally split between gross and net settlement systems.** Bankers would like to see the most "gross settlement system at the central bank", followed by "net settlement system in a commercial banks' network". The institutions favour gross system in general. The choice of a gross settlement system with so-called "real-time" clearing and settlement, would imply that the present "two hours" processing of the payment orders should be reduced to no more than five minutes.
- *About one half of the banks would finance a settlement system* they view as adequate. The other half were not sure because of unclear terms and conditions.
- It appears that bankers agreed **that banks should become the main providers of the payment system services.**
- A majority of the banks were in favour of **all banks becoming the providers on equal terms.** 'The institutions' felt the same.

- The proposal that the clearinghouse acts as the agent, or principal, for banks in providing payment services for their customers seems somewhat controversial. The answers and comments point out that it **should be only temporarily or an optional solution for the banks who choose to use it.**
- It can be concluded that the opinions about *preparedness of banks* for taking over payment system services are divided, and the majority of bankers assessed that banks lack some of the resources required for the successful provision of the services. It seems that non-readiness or a partial readiness of the banks is the **problem of technology and equipment**, although many bankers assessed that the *banking skills and inadequate branch network* add to the obstacles of a successful take-over. 'The institutions' assessed in principle that banks were not ready yet.

6. Payment system services and business strategy:

- Banks intend to **take over control over large-value payments** from the clearinghouse which would enable them to improve their liquidity management and control payments of their customers-debtors. In addition, banks intend to expand, update and introduce new retail payment instruments and services.
- Banks *plan to commit additional funds to the equipment and technology, and, to a lesser extent, in staff training and/or recruitment and branch expansion.* Uncertainties regarding the type and time of introduction of the new system were given as reasons of a lack of the concrete projects in some banks.
- Yugoslav banks can offer the majority of internationally existing payment system services, but a number of the services, *especially 'electronic' and 'plastic' payments, are provided by a small number of banks and to a limited number of customers.* Efficiency and quality of the banks' services were not investigated.
- From the services that some banks do not offer at the moment, the following are planned to be introduced by most banks within next two years: *ATM networks, credit/debit cards for payments home and abroad, credit transfer orders received electronically from the customers*, and "travellers" cheques.
- **The payment system services seem to be an important part of overall banks' strategies**. 80% of banks intend to introduce new services/activities by the year 2000.

One third of the services will copmprise payment system services, 20% securities trading or custody services, 15% are 'investment bank' activities. The remaining third is composed of miscellaneous services. It seems that Yugoslav banks want to get away from traditional deposit-taking activities.

7. Payment system as a part of banking and monetary systems:

- The banking system, which is likely to become the hub for the payment system services, was assessed by the banks as **inefficient** and that it offers **a medium quality of services**. The major problems identified are those of illiquidity, debtors, ownership structure and inefficient legal system.
- *Quality of placements and asset structure* of all Yugoslav banks at the time of survey were given **low marks** by the bankers. It is the bankers' opinion that the low level of economic activity, non-servicing of the frozen forex savings and foreign credits, are responsible for bad debts, the level of savings by the households and lack of foreign investments, respectively. It seems that "it is a reflection of the quality of the economy, i.e. banks' shareholders", "banks are not completely independent in making credit decisions but lack power to get their placements back", and that "the legal system protects debtors".
- The majority of respondents thought that **there were more banks than needed, which unnecessarily burdens the system**. A number of banks emphasised the poor quality of the banks' services and their overall assets and some others think that the number of banks is irrelevant. An *adequate solution for the problem* in bankers opinion is to **introduce a tougher licensing procedure and surveillance of the banks by the institutions and then to let the market forces take over.**
- Bankers agree that the Yugoslav banking system as whole **needs overall organised restructuring**, but many have expressed a concern about the involvement of the state. The 'social' banks would like to get the government's help and additional capital, but seem reluctant to let the government interfere in ownership and management structure and business decisions. They did not say what is in it for the state, but feel the state 'owes' them the help.

- **The reluctance and mistrust regarding the involvement of the state** was justified by: "inefficiency of the state administration", "arbitrary terms and conditions of the assistance and involvement", "the state's interests in certain banks or particular solutions", and "the later (continual) involvement of the state".
- The wining combination for dealing with the problems of 'socially owned' banks is: **restructuring of a few 'social' banks, sale-privatisation (or liquidation) of the majority of 'social' banks, and attracting foreign buyers and investors with certain concessions or more favourable terms.** In light of the heritage of communism it is considered that the frozen forex savings and foreign credits repayments should become the responsibility (liability) of the state. The involvement of foreign partners and investors is a key to starting a recovery of the financial system as a whole.
- *The most important factors for establishing a sound and efficient banking system by the new millennium are* **"changes in legal framework to support market economy", "efficient monetary control and low inflation"** and **"tougher terms of lending and credit rating assessment"** (financial discipline). Also important are "attracting foreign investors and shareholders", "investing in and training of the banks' staff" and "changes of the ownership and shareholders structure". The least important according to the respondents are "specialisation of the banks" and "concentration/enlargement of banks". Improvements of the payment system scored two thirds of the maximum possible score on the importance scale.

8. Foreign banks and investors:

- *Involvement of foreign banks,* by allowing them to do the business on the same terms and conditions as domestic banks, would **increase the competition and quality of services, and encourage foreign investments in domestic banks and the economy.** Some bankers thought that more favourable terms for the entry of foreign banks should be introduced only after the system's restructuring. In general, the involvement would help the introduction of new services and technology, the restructuring and modernisation of domestic banks, and the inflow of fresh capital.

- With regard to *establishing/expanding co-operation or alliance with foreign banks* by the end of 1998, **three quarters of the banks plan some form of business alliance with foreign bank in regard to cross-border payment services**. About half of the banks intend to train their staff with a help of foreign partners, and 43% of banks will be involved in certain joint ventures, mergers or take-overs. Only 15% of the banks have no plans for co-operation with foreign entities whatsoever within next five years.

7.6.2. The hypotheses testing results

- The system was assessed as efficient with regard to the speed, neutral or efficient regarding the payment instruments choice, costly and (implicitly) risky within 1993-1997 period. The results of the survey, based on the bankers responses, cannot confirm the assumption of the system inefficiency during the period in question, i.e. **Ho - 1 cannot be rejected.**
- Regardless of the previous conclusion, respondents think that the system should be reformed. The roles of banks, the central bank and the clearinghouse should change, so that they: a) become the providers of the services, b) have complete control over monetary policy implementation and c) limit their scope and number of activities, respectively. Therefore, from the survey results alone, **the hypothesis Ho - 2 is rejected**. It is not conclusive whether the answers regarding the payment system design can be used to test Ho -1, i.e. as to whether the answers reflected dissatisfaction with the payment system or the need to establish an adequate payment system for the future.
- Banks' willingness to take over payment system services, as well as the preparations for it, is evident. The evidence in relation to their readiness and capability are not convincing. There are, however, grounds for assuming that the banks will gradually and soon become completely ready. The respondents feel that the competition among the payment services providers, accompanied with an adequate institutional framework, would result in a much better payment system than in the last five years. Also, it is considered that with the help of institutions, the problems can be resolved

sooner rather than later. The null hypothesis **Ho - 3**, that banks should not take over the provision of the payment system services, **is, therefore, rejected.**

- The Yugoslav banking system as a whole is inefficient and inadequate from the best social practice perspective. Given the number and size of the problems it needs *overall organised restructuring*. Payment system reform, although important, can achieve little or nothing on its own. **Ho - 4 is, therefore, rejected.** An unresolved issue is the type and scope of involvement of the state.
- The involvement of foreign banks, investors and institutions in Yugoslav banking system functioning, i.e. the process of the banking system liberalisation, is crucial for the recovery of the banking and payment systems. Increased entry and involvement would result in competition, investment, better quality and more versatile services. Therefore, **Ho - 5 is rejected.**

Some of the hypotheses testing results are arguably biased because of the allocation of higher weights to assumed future functioning of the system than to the payment system efficiency, as it was assessed by the bankers. Nonetheless, the conclusions of the survey are in line with the earlier findings with regard to the payment system efficiency. Furthermore, the issue of the future payment and banking system, i.e. the system design, is critically determined by normative economics.

8. Conclusions and Recommendations

8.1. Payment Systems in CIT

8.1.1. The Main Findings

This research has identified the major payment systems' characteristics and problems in the eleven CIT and Yugoslavia and has put forward some suggestions. The payment system reforms in CIT illustrate the relationship between payment system and monetary policy and control. The specific economic environment in CIT made the relationship even more evident and transparent.

The analysis demonstrated that the critical elements of a successful payment system reform are its compatibility and co-ordination with the monetary and banking systems and their restructuring. A clear development strategy and an understanding of the place and role of the payment system in a monetary economy are the decisive factors for achieving that aim. The major obstacles are the lack of real political will to carry out the reforms and, to a lesser extent, lack of skills and resources.

Regardless of the timeliness and thoroughness of the payment system reforms in CIT, they were all initiated and supervised by the central banks. This has contributed to a relatively fast payment system development in transitional countries, on the one hand, and lack of private solutions and systems, on the other.

The retail payment systems remain an underdeveloped area. Cash is still the dominant means of payment, and the choice and availability of other payment instruments are limited. This is the case even in the more advanced transitional economies, such as Czech Republic, Hungary, Poland and Slovenia. Possible resolution of the problem may lie in either further involvement of the central banks or encouragement of private initiative and competition through the legislation, liberalisation and opening systems for the foreign financial institutions.

In summary, many *differences* across the transitional countries relate to:

- The levels of development of banking, legal and technical infrastructures.
- Approach to the reforms and thoroughness of the reforms.
- Payment system co-ordination with monetary policy.

8.1.2. The Main Problems and Inefficiencies

The *common problems* that CIT are faced with relate to monetary policy/payment system co-ordination, banking and legal system development, improvement of technical infrastructure and encouragement of competition. The inefficiencies, resulting from the poor system design and/or co-ordination of different public policies and authorities, are reflected in a 'non-optimal' trade-off between the payment system risks and costs. The public policy implications, thus, relate to how best to achieve overall risk reduction, financial discipline and trust in the system, trading off the policy objectives with long-term and secondary effects on competition, moral hazard and private initiative.

An overview of the findings for the eleven CIT and Yugoslavia is presented in table 8-1. These examples (the CIT experiences) can serve as references to decision-makers, in countries undertaking similar reforms, when dealing with potential problems, i.e. how not to repeat the same mistakes, what to do to shorten the process and reduce its costs, and what solutions may work given the particular circumstances.

Table 8-1 Payment Systems inefficiencies in the CIT during the reforms

Country	Clearing and settlement risks	Payment system costs	Payment float	Slow and/or unreliable transfer of monetary funds	Limited choice of effective monetary instruments	Spill-over of intraday into interday borrowing
Bulgaria	✓			✓	✓	
China	✓		✓	✓	✓	✓
Croatia	✓				✓	✓
Czech Rep	✓	✓				
Estonia	✓	✓			✓	
Hungary	✓	✓				
Lithuania	✓	✓			✓	✓
Poland	✓	✓	✓	✓	✓	
Russia	✓		✓	✓	✓	✓
Slovakia	✓	✓		✓	✓	✓
Slovenia	✓				✓	✓
Yugoslavia	✓		✓		✓	✓

8.1.3. Payment System and Monetary Policy Relationship in CIT

The analysis of payment systems in 11 CIT and Yugoslavia, against the monetary policy framework, illustrates the place and importance of payment systems in monetary economy and the relationship between the monetary policy and control and payment systems (and payment system reforms). Because of the underdeveloped money and capital markets and institutional infrastructure, as well as the early stages of systems' developments and/or reforms in CIT, the relationship (often hidden or implicit in developed financial systems), was transparent in CIT.

Some of the most illustrative examples of incompatibilities between the payment systems and monetary policies (and/or their reforms) in CIT are presented in table 8-2.

Table 8-2 Payment system and monetary policy incompatibilities in the CIT

Country	No (timely) payment system reform	Lack of payment system strategy initially	Autonomous payment system functioning	Ineffective monetary policy	Did not understand (or use to its advantage) the relationship	No co-operation or political will	Lack of resources and/or skills
Bulgaria	✓			✓	✓	✓	✓
China		✓			✓		✓
Croatia	✓		✓			✓	✓
Czech Rep		✓				✓	
Estonia		✓		✓	✓		✓
Hungary		✓			✓		
Lithuania				✓	✓		✓
Poland		✓	✓	✓	✓		✓
Russia	✓					✓	✓
Slovakia		✓		✓	✓		
Slovenia	✓		✓			✓	
Yugoslavia	✓	✓	✓	✓		✓	

The examples of both the payment system/monetary policy relationship in the 12 CIT, and of lessons for other countries that are undertaking the payment and/or monetary policy reforms, are summarised in the box 8-1.

Box 8-1 Payment system and monetary policy relationship – examples and lessons

Bulgaria	China	Croatia
The demand for settlement reserves was blurred by the demand for liquidity and actual insolvency. No adequate payment system, to discriminate between them. Debt-servicing difficulties and illiqudity were confused with payment delays. The payment system was inadequate to support the new/modern monetary policy instruments, as it was not quick or reliable enough.	**Long payment delays and large float** are at odds with efficient, market oriented, banking system. Inefficient payment system prevents both inter-regional banking competition and active liquidity management. **The central bank/ commercial banks relationship,** as well as the effective FIs' supervision and surveillance, are key to efficient, risk-less, payment flows in China.	The **clearinghouse** had control over payment float and was able to **create 'quasi-deposits'.** It was able to prioritise between the payments of different parties and decide on the speed of payment orders processing. This illustrates the **importance of** payment system and monetary policy co-ordination; of **determining the ultimate authority for both;** and of competition in payment system.
Czech Republic	**Estonia**	**Hungary**
Private markets development and competition, as well as the **private initiative may be hindered by the central bank's involvement.** Increased supervision role and reduced operational involvement of the central bank in the payment system may benefit the Czech banking system. **Causes for delays and risks** in the payment system (and its negative impact on monetary policy) can be found **in the banking system.**	With the **currency board,** the **DNS system** provided an optimal payment system solution regarding the liquidity provision and smooth system functioning. Fixed foreign exchange rate and currency board catered for low inflation and interest rates, and the DNS system contributed to the reduced need for liquidity /reserves. Also compatible were **(no) intraday credit and required reserves provisions.**	**Settlement delay** - gridlock and a possibility of 'unwinding' can occur **in a 'gross' system if the settlement is not real-time.** The combination of deferred settlement and full cover for payment orders (gross clearing), denies the participants the advantages of both reduced liquidity requirements of a net clearing system and elimination of credit risk in a gross settlement system.
Lithuania	**Poland**	**Russia**
The Lithuanian experience shows that in an immature (transitional) market: a) central bank's **lender of last resort** function is invaluable in case of systemic crisis and b) there is a need for an additional liquidity facility other than interbank money market. During the Lithuanian banking system crisis the money market stopped functioning. The payment system arrangements didn't provide **liquidity for payments.**	The payment system with dominant manual procedures and use of fax and telex, prevented the central bank from **measuring the demand for settlement reserves** and assessing the payment system risks. The monetary policy could not rely on the system to transfer the monetary claims in a fast and reliable fashion. Thus, **the choice and effectiveness of monetary policy instruments** (especially indirect ones) was limited.	In Russia, RTGS will put a pressure on banks for higher reserves and/or better liquidity management, and may result in a **high demand for additional liquidity from the central bank.** Gridlock may occur every time there is increased uncertainty or macroeconomic turbulence. With no charge for the intraday credit, there should be **'hair-cuts' on the collateral** to account for potential fall in value of the securities.
Slovakia	**Slovenia**	**Yugoslavia**
The Slovakian payment system was open to liquidity, credit and systemic risks relating to the **institutional arrangements and legal constraints. Monetary policy** was simultaneously pursuing two **conflicting goals.** The proportion of autonomous money supply was extensive and the sterilisation of foreign capital inflows effects on the money supply was expensive and unsuccessful.	With banks as the main providers of the payment services, and given the banking system characteristics, there is a threat of **systemic risk should the main players fail.** A sound banking system, clear of bad debts and political lending decisions, with effective ownership and management structure, is the best guarantee of financial stability, a favourable monetary policy environment and the payment risks reduction.	Economy with weak firms and many insolvent banks may not be well suited for any queuing system and/or potential gridlock problems, because there is **no efficient money and interbank market to provide liquidity;** the payees may prefer cash or even barter as the delivery-versus-payment is not ensured if a financial institution, not a payment counterpart – payor, becomes illiquid;

8.2. The Yugoslav Payment System: Conclusions and Recommendations

8.2.1. Conclusions

The Yugoslav payment system reform was an attempt to bring the operations and efficiency of the payment system as well as its legislation in line with the accepted international practice, standards and legislation. There are, however, some ambiguities and weaknesses regarding the proposed new system in view of the state of the banking and monetary systems. Firstly, the ability of the users to make payments will be tied to the liquidity of the institutions they have the accounts with. Secondly, there is no provision of the central bank's guarantee of the finality of the payments. In line with the principles and desire to strengthen monetary control and discipline is also the regulation on the licence withdrawals, based on the liquidity requirements.

Given the freedom of choice of a payment operations provider and the parallel existence of the clearinghouse's giro and banks' current accounts systems, it is no wonder that the businesses did not transfer their transaction balances to the banks. When their ability to make payments is tied to the institutions' liquidity, the users normally prefer the clearinghouse's giro system, as it cannot become illiquid.

Without the central bank's guarantee of finality of payment transactions, i.e. intraday credit facilities, it is difficult to restore the trust in banks and to transfer the payment operations to the banking system considering the underdeveloped money market.

Even though the moral hazard may be reduced to a minimum, system cannot restore trust and discipline as there is a constant threat of the systemic risk. The economy, with weak firms and many insolvent banks, is not well suited for potential gridlock problems, because there is no efficient capital, money and interbank market to provide liquidity, and the payees may prefer cash or even barter as the delivery-versus-payment is not ensured because of a possibility that a financial institution, not a payment counterpart - payor, becomes illiquid. Furthermore, there is not a single deposit protection scheme at the moment in the system and the foreign exchange deposits that were guaranteed by the Federation are frozen (are not being serviced), adding to the climate of mistrust in the banks.

The envisaged system may contribute to both the efficient monitoring of the financial institutions and, therefore, a reduction of agency costs in the banking system. This, however, seems more suitable for the *later stages of the reform* when there is an increased sophistication of both the reformed banks and financially strong clients capable of negotiation. The main advantages of a gross settlement system operated by a central bank, i.e. that of reducing systemic and credit risks and finality of settlement, could be missing from the system. Without the central bank's guarantee it would be hard to restore trust in the shaken banking system, without trust there is no restructuring of the banking system, without the restructuring of the banking system there is, alas, no effective monetary policy. Without the effective monetary policy, in turn, there could not be a favourable macroeconomic environment for the transition and restructuring of the economy.

Notwithstanding the importance of liquidity provision arrangements in a payment system and its reform, payment system reform cannot compensate for the banks' restructuring and the enactment of the monetary control, although, the system should help the achievement of the goals. Therefore, the banks' 'recapitalisation' and privatisation should accompany or precede the liquidity requirements measures. It seems too ambitious and somewhat inappropriate for the central bank to deal with the issues of the high number of banks and financial discipline with the mentioned measures, especially because the non-serviced FX deposits are guaranteed by the Federation and implicitly NBY. It is, therefore, in the government's and Central Bank's interest to help the banking system to start operating profitably and in restoring a customer base, making viable banks able to repay the loans and deposits.

Dealing with the number and quality of the banks should be a part of a thorough restructuring plan, not a by-product of the liquidity measures and payment system design, especially as there is no adequate and effective legal system in place. Therefore, the merits of separating monetary policy and the financial system supervision functions into two separate organisational entities should be considered. The separation could be

clear-cut as in the UK (a more permanent arrangement) or, indeed, as in some transitional and developing countries[1].

8.2.2. Recommendations

If the aim of the financial system reform in Yugoslavia is to strengthen monetary control and financial discipline, together with reconstruction of the banking sector, the issues of moral hazard, private monitoring and reduction of agency costs, are subordinate to those of systemic risk and rebuilding of the banking sector and trust in financial intermediaries - at least in a short run. As argued, the choice of a payment system has an influence on all of them.

The advantages of RTGS system with no queuing or guarantees over a DNS system in the Yugoslav case would be tight control and oversight of the payment instructions by the central bank. The disadvantages range from potentially postponed and more expensive transactions (in light of the opportunity costs of holding more liquid or idle funds) to unsuitability of the weak banking system to tight liquidity policy regarding the payment operations. Moreover, with the emphasis on tight liquidity measures and postponement of restructuring, i.e. untreated and unsanctioned insolvency, some insolvent but big and influential banks may insure the liquidity and attract further transaction balances, thus adding to the overall costs (of restructuring) when, and if, they go bankrupt. A further potential disadvantage of a RTGS system in general is a retardation of the private market from developing cheaper and more efficient processes.

There is also the issue of the involvement of banks as the payment system service providers, for both LVTS and SVTS, i.e. the influence on the overall *revitalisation of the banking sector.* Although it may seem that the SDK giro system can be improved much faster and with smaller investments than the banking system to operate electronic payments, this shouldn't discourage the improvements of the banking facilities and skills for the payment operations. As important as the issues of initial

[1] There are few examples of the arrangements where the responsibilities for the banking system restructuring, monetary policy and payment systems, lie within different agencies, ministries and central banks, and are co-ordinated by the respective governments. The details of the arrangements are beyond the scope of the thesis.

costs, speed and efficiency of the payment system are the implications on competition, customer choice and competitiveness of the banking system.

As market concentration may reduce the competitive pressure on the clearinghouse to perform as efficiently as possible, the banks should be assisted by the government and central bank in the process of the rejuvenation in order to offer more choice and put competitive pressure on the existing provider. It was not until the banks put a pressure for the change of the system that SDK started improving its practice in the first place.

Total abolition of the giro system (i.e., limiting the role of the clearinghouse to LVTS settlement agent) is also inappropriate. The development of *an efficient giro system within a single organisation* is in line with the European historical circumstances[2] and requirements of speed and efficiency. The parallel development of both improved SDK system and banking facilities and skills is in line with the best-practice payment system and banking reform.

In conclusion, if the Central Bank has aspirations towards controlling and regulating the systems, it should offer something in return. The first logical concession would seem to be the provision of 'day-light' overdraft facilities, especially as there is no efficient money market to cater for the liquidity requirements of the system. Moreover, even if the money market starts to improve it can only redistribute the existing liquidity and the central bank would remain the only source of additional liquidity as capital market and foreign investments are almost non-existent at the moment. Otherwise, the option of establishing a parallel DNS system should be considered by the banks. Secondly, the payment system reform cannot compensate for the banking system restructuring and there could be no efficient monetary policy without the sound banking system regardless of the monetary policy measures and payment system design.

Summarised, the recommendations for the Yugoslav payment system are as follows:

[2] In Europe, it was usually the postal system with nation-wide offices that assumed the role of developing nation-wide giro system for payments, and it was only much later that the banks started to develop a giro-system of their own. Humphrey et al. (1996), state that the development also helped the shift from paper to electronics, as the movements of the funds was centralised and all the improvements were an internal issue of a single organisation.

- **Recommendation 1**: *The monopoly of the clearinghouse should be replaced with competition among different payment system services providers, instruments, costs and risks.* The competition among the payment services providers, accompanied with an adequate institutional framework, would result in a much better payment system than was the case in the nineties.
- **Recommendation 2:** *The roles of banks, the central bank and the clearinghouse should change*, so that they: a) become the providers of the services, b) have complete control over monetary policy implementation and c) limit their scope and number of activities, respectively.
- **Recommendation 3:** The central bank should consider a way of *providing intraday liquidity or establishing a centralised queuing mechanism*[3]. Alternatively, banks may consider establishing their own 'internal' queuing mechanism or a DNS system.
- **Recommendation 4:** *The separation of monetary policy and supervision functions*, and not necessarily into two separate institutions, would help concentrate and even co-ordinate the efforts towards the system reform.
- **Recommendation 5:** *Overall banking and monetary system reform is necessary and payment system design is only a part of it.* Given the number and size of the problems the system needs *overall organised restructuring*. Payment system reform, although important, can achieve little or nothing on its own. Improvements in the legal framework for both the banking and payment system are identified as the major prerequisites for the restructuring processes. A sensitive issue, that needs to be balanced, is the type and scope of involvement of the state.
- **Recommendation 6:** *Involvement of foreign banks, investors and institutions* in Yugoslav banking system functioning, i.e. a process of banking system liberalisation, would help the recovery of the banking and payment systems. Increased entry and involvement would result in competition, investment, better quality and more versatile services.

[3] One that would not allow banks to cancel queued payments and that provides additional payment processing optimisation mechanism for matching interbank payments instead.

8.3. Payment systems in developed and transitional countries - A comparison

8.3.1. Similarities

If there is an overall agreement on *the fundamental objectives and values* of banking and payment systems, there should be no difference between the *basic principles* that apply to developed countries and countries in transition, as far as payment systems are concerned. Therefore, if the countries aim at efficient market economy systems, banking competition and customer satisfaction, monetary discipline and control, global competitiveness, integration into the world trade and payment networks, efficient and effective payment services to the public and businesses, then the payment system fundamentals should be the same. An efficient and effective payment system should, therefore, facilitate smooth and fast monetary transactions between the parties in an economy with minimal risks and costs involved. Basic groups of costs, risks and benchmarks of efficiency are also generally the same in all market economies. Thus, the basic standards and the approved practice and technology ought to be accepted as the objectives, if not the norm, in transitional countries too.

In summary, the identified similarities between the two groups of countries relate to:

1. Increased payment risks awareness of the central banks and measures to reduce risks.
2. Trends towards establishing RTGS systems, use of latest LVTS payment technologies and efforts towards reducing clearing cycles and float.
3. Slow but clear 'convergence' of transitional countries' monetary policies and payment systems' arrangements with open market operations, international trade and integration, as in developed countries.

The experience of developed countries, together with the technology and expertise of the payment system providers, is what can help CIT when making decisions on a payment system design. Lessons from the West make it easier for the policy makers in CIT to adopt the best practice and techniques and not to go through all the stages of payment system evolution.

The problem, however, is that no single payment system in developed countries is the same, and they are all products of different historical circumstances. Furthermore, there is still no agreement on which clearing and settlement system offers the best results with minimal risks and costs. There is also no agreement on what is the optimal balance between moral hazard and systemic risk when weighing the issues of the regulation and supervision of and, competition in, the banking and payment systems. In addition, a country in transition faces a reform of the overall monetary and banking systems that a payment system is only a part of.

Nonetheless, CIT can 'pick-and-mix' the best solutions and technologies available as there are more than a few best-practice solutions available, regardless of the type of system chosen. Thus, the approved solutions and experience of both developed and transitional countries can be 'cherry-picked' and incorporated in a particular payment system design to help focus the efforts and shorten the deliberation processes.

8.3.2. Differences

What is different, therefore, is the macroeconomic environment and state that a particular economy is in, current practice and the legacy of past, that all influence the decisions about a payment systems design and operation. As for *the economic environment*, CIT are undergoing a unique transition, which is not made easier by the state of their economies. Generally, there has been a high level of uncertainty, lower standard of living, and a poor state of banking facilities and fundamental infrastructure. These factors, especially when coupled with high inflation, hamper both development of efficient payment systems and overall financial reforms.

In addition, CIT face a difficult task of choosing *priorities* that could be supported with very limited resources. The choice of a payment system design is determined not only by the economics but by the overall institutional and political considerations. Therefore, the priority of rebuilding the monetary and banking system, by restoring financial discipline and trust in banks, may determine the choice of a gross settlement system at the central bank and a bigger role of the monetary authorities in a payment system design and operation. Furthermore, development of a system to support large value interbank transfers has a priority over a system for small value payment

transactions which, when coupled with the insolvency of many cash-drained banks, can delay development of new payment instruments and the enhancement of a customer's choice in the short to medium run.

There are, therefore, many institutional considerations, the need for choosing priorities and fitting the particular reforms into the overall restructuring, when deciding on an appropriate payment system in a country in transition. All those issues are more in the domain of normative than positive economics.

8.3.3. Cash preference in CIT

Phenomena also exist in CIT that differ from the observations for developed countries. The most striking is the *preference for cash,* i.e. high proportion of cash, relative to the income and money supply in CIT. There is the evidence for developed countries[4] that a level of cash holdings in an economy are: a) positively related to the value of national income and wealth[5] and the magnitude of illegal activities and b) negatively related to the interest rates, inflation rate and a rate of violent crime[6]. The evidence for the high cash holdings in CIT[7] contradicts the generalisations for the developed countries. A lower level of national income and wealth, high level of cash holdings and transactions by consumers and retailers despite the higher crime levels, and, finally, high cash holdings and low deposits and savings despite high inflation and high interest rates in CIT are all opposite to the findings for the developed countries.

The research results and secondary analysis provide some insights into the phenomena. Firstly, with *inefficient payment systems* and poor business practice of the banks, the payments are conducted in cash and outside the banking and payment systems. Secondly, nominal interest rates lagged far behind *high inflation* rates, resulting in a decrease in already low savings. Uncertainty and economic turbulence then led to the currency substitution (so-called 'Dollarisation') and speculations, which are seen by the public in some CIT as the answer to the lost functions of a national currency of a store of value and a unit of account. This, however, only perpetuates

[4] For example, Humphrey et al (1996), Santamero and Seater (1996), Wood (1993).
[5] See also Lipsey and Chrystal (1995)
[6] In general, more cash use by the criminal element can be offset by less cash use by consumers and retailers who fear theft (Humphrey et al. 1996).

inflation and further increases demand for cash. Finally, if there is *no adequate alternative* for cash, i.e., no cheap and efficient payment instruments that can replace cash, there could be no offsetting effect of the cash holdings related to crime and inconveniences of handling large amounts of cash.

In conclusion, *cash as* a:

- *familiar* - the only reliable,
- *off-line* - outside the inefficient banking and payment systems,
- *immediate* - real time,
- *delivery-versus-payment* - in the world of uncertainty,

medium of exchange (payment instrument), is hard to beat in CIT. And, once again, payment system reform is important, but only one element of monetary and banking system reforms that a transitional economy is faced with.

8.4. E-money, Electronic SVTS and CIT: a SWOT Analysis

8.4.1. Intorduction

Apart from the improvements in large-value payments, a great amount of consideration should be given to the efficiency of small-value retail payments, as the efficient SVTS increases customer's choice and contributes to smooth trading activity with small transaction costs. In light of the high relative cash holdings and preference for cash, in CIT (also discussed in section 5.3.2), there is a possibility that e-money products could bring some efficiency gains. The gains could range from reducing high cash holdings ratios[8], grey market operations, currency substitution, and crime rates related to cash holdings[9], to increasing a percentage of payment transactions that pass through the banking systems. These issues are presented next with a view to encouraging electronic money in CIT debate and research.

[7] In addition to the research results there are many illustrations of the phenomena. See, for example, Scott (1993), Topinski and Struzynski (1995), Nesic (1996).
[8] In Yugoslavia in 1995 and 1996, the proportion of currency to total money supply, measured as M3 minus frozen FX deposits, was about 30 percent. In Poland in 1994, the proportion was about 20 percent.
[9] For more details on cash/crime relationship see Humphrey et al. (1996) and Wood (1993).

8.4.2. Strengths

It is difficult to identify any particular strength of the banking systems, but there are certain advantages that the systems might have, in introducing new technologies, compared with banking and payment systems in more developed countries. Firstly, it is easier for countries that have only just started building new payment systems to start introducing new electronic payment products, both in terms of economies of scale (utilising the fixed investments that are going to be undertaken anyway by reducing cost per unit of service) and economies of scope (by adding additional offers with little or no additional cost, therefore sharing costs per offer)[10]. Secondly, the users are hungry for improvements which is an advantage in overcoming possible resistance due to the habitual practice. The practice was so bad that even inventions of questionable quality may become a necessity[11]. This is not to say that CIT should select any new technology unconditionally, but that there might be a fertile ground for these.

8.4.3. Weaknesses

In order to succeed, those new technologies, particularly e-money and electronic banking, require good computing and communication infrastructure. It is costly to set up and operate infrastructure needed for nation-wide cashless retail payments, in the first place. Therefore, it might be difficult to dig deeper into already empty public pockets, let alone require consumers to bear the costs of introducing the new technologies. Those technologies require substantial numbers of households with a PC and modem, and/or electronic devices that will use a reliable telecommunications network. Given the fact that the computer penetration rate in those countries lags behind the computer penetration in developed countries, it is difficult to introduce electronic banking on a larger scale.

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[10] "In other countries like the US there is such a large installed base of magnetic stripe that it will take some time ... We are probably talking 10 years," Mr Jensen said. (Mr Ed Jensen, president and chief executive of Visa International), Financial Times, March 26 1997

[11] To illustrate customers' willingness to pay for quick access to reliable services, there is a growing demand for the development of cellular telephone networks. European Bank for Reconstruction and Development - EBRD (1996), state that the cellular network penetration rates have reached, for example in Estonia, Hungary and Slovenia, the levels which approach those in Belgium, France and Spain. This level of demand has been achieved despite the substantially higher charges for the services in those countries compared with the charges in the EU (ibid. 1996).

Secondly given the poor state of existing telecommunications networks and network penetration rates[12], the introduction of efficient, profitable and reliable e-money and/or electronic banking schemes, may prove to be too expensive in the short to medium term. Furthermore, from a commercial bank point of view, the incentives for introducing new electronic instruments may be reduced by the profitability of conventional, but new to the market, payment services – such as credit cards business. From a business opportunity perspective, however, in each of the countries there is a niche in the market (for both wealthy and new technology eager customers) and the opportunities for excessive profits[13].

Finally, there is inadequate financial regulation and supervision and lack of financial discipline in the systems, also resulting from the lack of resources and skills on the part of the financial authorities (mainly central banks).

8.4.4. Opportunities

There are certain aggregate level gains that CIT can reap by introducing e-money products. Firstly, if we take the acceptance (which is not all that certain) of the new products by customers for granted, the e-money technology can help reduce the high cash holdings ratios in those countries. For this to be achieved, and if we assume high and constant substitution for cash, the limit on the maximum amount that can be held on smart-cards have to be significantly higher in the initial stages. This is because cash is extensively used for large as well as for small, retail, payments. Secondly, the smaller cash holdings and/or improved monitoring enabled by these schemes, can reduce cash related crime rates and help fight crime altogether[14].

Thirdly, by enabling banks to issue e-money, there could be overall positive effects both on the level of deposits in and proportion of payments that go via the banking systems. In order to get e-money, customers have to pay for it either by cash or

[12] The number of telephone lines relative to the size of population. The World Bank Atlas data show that the rates are between one-quarter and one-half of those in the European Union.

[13] A prospect of banks issuing private money may, however, be at odds with central bank's perception of how to establish financial discipline in an economy. This issue is discussed in section 2.4.4.

[14] Anecdotal evidence sugests that crime rates in CIT are intolerably high (particularly in Russia). Cash as an anonymous means of payment is the 'conditio sine qua non' for efficient functioning of a criminal world. However, the prospect of re-establishing a 'big brother' supervision/control, whoever is in charge of it, may be an even bigger concern for the public in those countries than the issue of privacy in the developed countries, especially because the democracy is in its infancy and can be easily abused.

from an existing deposit account. The substitution can help withdraw certain proportion of currency from circulation and encourage higher deposit holdings. A major problem, however, is that customers don't trust domestic banks with their deposits[15] and are sceptical about the banks' ability to handle efficient clearing and settlement, let alone trust the banks to issue 'cash'. Until the banking system is fully reformed and new business practice is fully established, there could be no effective and efficient payment system that resides on the banking system and private banking arrangements.

Finally, the instant settlement feature of smart-cards can contribute to the overall efficiency, compensating, to some extent, for underdeveloped on-line clearing systems for debit and credit cards[16]. The e-money products and access products in conjunction with schemes that enable immediate settlement (for instance, Mondex, Unisource and Milicent), may, therefore, help overcome the problem of delayed clearing and settlement. To help surpass the X-inefficient[17] banking clearing and settlement system, the e-money users may use the infrastructure provided by the international payment card organisations. This, however, should be weighed against the long-term implications on domestic financial systems and the ability to successfully supervise foreign and multinational financial institutions.

8.4.5. Threats

Apart from the obstacles and counter-arguments presented above, there are several issues of particular concern to a monetary system as a whole. All the mentioned drawbacks of e-money[18], as far as central banks and financial regulators in developed countries are concerned, hold true for the monetary authorities in CIT. The most important are: *monetary policy implications; seigniorage and deficit issues; multicurrency cards; security and supervision considerations, including fraud and control over foreign issuers; and systemic risk.*

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[15] Because of the bad past experience. In Yugoslavia, for example, there are blocked (so called 'frozen') foreign exchange deposits in amount of $4.5 billion, which is more than eighty percent of all private deposits in the banks. Poland banking has a similar problem.

[16] "...Russia, too, is likely to move early to chip cards because there is considerable demand for payment services but inadequate telecommunications infrastructure to handle the sort of on-line payment authorisations used in western Europe or north America." Mr. Jensen of Visa International said. Financial Times, March 26 1997.

[17] The X-inefficiency in countries in transition is sometimes referred to as "perverse incentives".

[18] As discussed under the heading "The new payment technologies".

The risks of implementing the new payment technologies are even more evident in CIT, as the systems in those countries are more susceptible and vulnerable to threats. Reconstruction of monetary control and discipline, protection of domestic banks and seigniorage are particularly sensitive issues during the transition. Furthermore, *inadequate regulatory frameworks and lack of financial discipline* may add to the negative implications that could arise from the threats.

On the other hand, excessive and/or inappropriate regulation is the major treat to development of electronic money in CIT, and may send a wrong message about the public policy as regards innovations and business opportunities.

Box 8-2 - SWOT Analysis of New Payment Technologies in Countries in Transition

Strengths	**Weaknesses**
• Investment impetus in new payment systems • Little 'old' cards in the system • Reform momentum • Customers' willingness to pay for quick access to reliable service	• Poor computer & communication infrastructure • Low standard of living • Lack of public resources • Lack of financial discipline and trust in banks • Lack of incentives for commercial banks
Opportunities	**Threats**
• Reduction of cash holdings • Cash related crime reduction • More transactions under banking system's control • Instant settlement to compensate for underdeveloped on-line systems	• Unknown impact on velocity of money • Loss of seigniorage • Multicurency cards & supervision of foreign vendors • Money laundering, fraud & privacy issues • Security and systemic risk

8.4.6. Other electronic SVTS

It should be added that more *conventional electronic payment mechanisms*, i.e. those of credit and debit cards and electronic giro, can also reduce cash holdings. Debit card payments in particular are close substitutes for cash since both are used to initiate small-value payments[19]. Given the state of computer and telecommunication facilities of the households, those conventional schemes might be more acceptable for the customers in a short run. A successful operation of these schemes, however, requires

[19] In European countries known for their relative emphasis on card-based payments, such as Finland, France, Denmark and the United Kingdom, cash holdings per person are relatively low – see e.g. Humphrey et al (1996).

improved on-line clearing and settlement by the banks, which is the objective of the reforms in the first place. Thus, with improved banks' and overall facilities for large-value and interbank payments, a conventional retail electronic payment can be conducted via those new facilities with a small additional cost for the banks.

The incentive for merchants, with reduced inconvenience of holding and handling cash and/or cheques, is taken for granted, although the process of acceptance has its difficulties. In addition, the credit cards payments in particular can contribute to a higher level of sales by giving more favourable terms of payments to customers.

8.4.7. Conclusions

In conclusion, the new payment instruments, e-money in particular can contribute to cash substitution and development of more efficient payment and banking practice CIT, and inspire competition among financial intermediaries. However, one may note that, although the opportunities for, and advantages of, both conventional and new electronic payment mechanisms are evident, the first and most important step is to improve both the overall banking practice and facilities and the macroeconomic environment. A particular macroeconomic variable that hampers development of an efficient banking and payment system is *a high rate of inflation.* With high inflation there could be no trust in banking and monetary systems or cash substitution, as cash is used for currency substitution and grey market trade and commerce. In addition, financial and banking system 'liberalisation' should be accompanied by improved institutional infrastructure, especially financial supervision and surveillance.

All this may call for active, but balanced and moderate, public policy with regard to small-value payment systems, in the short to medium term. The case for public policy intervention with regard to the mentioned shortcomings and the system restructuring objectives relates to: (i) deregulation, and/or privatisation, of telecommunications industry, with a view to increasing competition and improving payment system infrastructure; (ii) legal system improvements, needed to protect payments counterparts; (iii) encouragement of competition and/or innovations by the adequate e-money regulatory framework; (iv) improvement of financial supervision and surveillance to accomplish/preserve monetary and financial system stability.

8.5. CIT Payment Systems' Designs and Reforms - The Main Lessons and Recommendations

It is evident that monetary and financial authorities in Countries in Transition assumed and will continue to assume both active and significant roles in their countries payment systems' reforms. The following lessons and propositions for policy makers in CIT can be extracted from the evaluated payment system reforms and developments:

1. It is very important to get the reform process right from the start to avoid expensive and unnecessary corrections because of both very limited resources and potential opposition to the reforms. The first major step is to *determine objectives and priorities* of a payment system reform and how it fits with overall banking and monetary systems and/or reforms. A clear payment system *development strategy* compatible with the present and/or envisaged monetary policy will help the policy makers reap the reward for being involved in the payment system design. Also a successful start of a payment system reform may initiate and/or facilitate faster overall monetary system restructuring.
2. If the objectives of the payment system reform are to promptly strengthen monetary policy and control and facilitate efficient large value transactions, this requires a *major involvement of the central bank* in the process of establishing and operating the system. As domestic commercial banks in CIT may not be strong, disciplined or risk-aware enough for initiating the process, a top-down approach would seem to be in line with a faster achievement of the objectives[20].
3. The engagement, however, *must be transparent and balanced* with a view to the long-term implications on private initiative, competition, and for motivating banks' involvement in the process. In addition, the reforms were originally initiated because of the need to replace 'monobanking' systems and centralised payment services provision in consideration of the new market-orientation paradigm. Therefore, the central banks' leadership and operational involvement can be subsequently[21] replaced with a system oversight and regulation. Also, involvement

[20] Given the 'monobanking' past of majority of transitional countries and still immature banking systems it is no wonder that the skills and resources are still concentrated within the central banks.
[21] When there is a more mature banking system in place and/or the system has run successfully for some time.

in, and 'ownership' of, the payment system reforms by the commercial banks is critical for the success of the reforms.

Thus, the engagement of financial authorities can fall into *two stages* – the first, where the active role of the central bank is aimed at initiating and co-ordinating the payment and monetary systems' reforms and the second, when the central bank steps back and puts emphasis on financial stability and competition implications of the already in place payment system, rather than operational involvement and monetary policy tasks for a payment system. The challenge is to find the right type, timing and measure of involvement at each of the stages. The experience of the more advanced transitional economies can certainly help.

4. The payment system and associated banking arrangements *depend on credit as a normal part of financial operations.* The extent of provision of liquidity by the central bank depends on the money market, banking system and overall financial system development; type of settlement system; and financial discipline (i.e. lack of it or potential moral hazard problems). If there is an underdeveloped money and interbank market, it is the central bank that is responsible for providing liquidity to the system. If RTGS system is imminent in the payment systems' development, than a central bank should offer something in return for the increased reserves required from banks. If, on the other hand, there is no guarantee of the finality of payments, i.e. credit facilities provided by central bank, the system may as well be designed as a DNS system (possibly on private banks' own initiative) as it provides banks with the needed flexibility and liquidity.

   The results of a payment system reform can only be as effective as the success of both *imposing monetary discipline and banking system restructuring.* Therefore, the settlement system design comes only third in the debate about moral hazard, and a DNS system can function effectively in a sound financial system. The risk control in a DNS system can be then achieved through caps, collateral, penalty rates and most importantly through regular supervision and surveillance of the institutions. The oversight is also indispensable for achieving trust and discipline in RTGS type of system.

5. Thus, *system oversight* – that includes licensing, prudential requirements and supervision – may be an important part of the answer to the systemic risk/moral

hazard dilemma, i.e. it can contribute to the effective balancing of the two considerations relating to the payment system policy. Provision of intra-day liquidity by a central bank in a system which efficiently sanctions against insolvent and risky banks does not necessarily threaten monetary discipline, especially if the risks are limited by, for example charging fees and limiting the overdrafts. Therefore, if a central bank provides 'daylight' liquidity, in response to a lack of efficient money markets and/or market-based monetary policy instruments, the moral hazard issue can be catered for, inter alia, by supervision. This may also require a *separation of monetary policy* and control function and the regulation and *supervision* function in order to focus the efforts and make rules simpler and more potent in achieving the public policy goals whilst taking care of encouraging competition and private initiative.

6. A choice of *RTGS type of settlement system* may be an optimal solution because of, or could be driven by, some additional considerations. Firstly, there are the issues of *compatibility and interoperability* between various national payment systems, as well as potential *payment systems convergence requirements.* For example, in European CIT that deal extensively with EU and/or aim to join it, in favour of selecting a RTGS system goes the EMU TARGET system arrangements, i.e. interlinking between the national RTGS systems. Secondly, RTGS system may provide *confidence to foreign banks*, involved (or considering involvement) in a CIT's banking and payment system, *that their payments will not go astray or be delayed.* Therefore, a choice of RTGS settlement system may be a part of a public policy strategy aimed at encouraging foreign financial institutions' involvement in the system[22].
7. Even the latest payment system technology cannot compensate for poor *technical infrastructure* and inadequate or feeble *legislation* and its implementation. A just and effective legal framework is a milestone of trust and certainty needed for stable payment system functioning. Notwithstanding, regulatory flexibility is required to prevent shocks to the system and to enable the development of new instruments and

[22] For example, this may be done with a view to increasing financial system efficiency and competition; encouraging introduction of new payment technologies and banking products; improving technical infrastructure; or for encouraging financial discipline and promoting best banking practices.

services, especially in a young market economy. Also, technical (telecommunications) infrastructure needs to be improved and not only because of the payment system requirement. However, payment system cannot be too far ahead of the infrastructure if it is to be fully and effectively used. As the world cannot wait for the fundamentals to be improved to start functioning, the integration of the technology and infrastructure is needed in a short to medium term.

8. Reform of large-value, interbank, transfer system has a priority in payment system design and operations, as it facilitates monetary policy and control and enables liquidity management by financial intermediaries. However, apart from the improvements in large-value payment systems in transitional countries, the efficiency of small-value 'retail' payments also deserves some attention, as the efficient retail payments increase customer's choice and satisfaction, price transparency and contribute to smooth trading activity. Furthermore, fast and efficient retail payment systems may encourage greater use of (legal) banking channels and reduce reliance on cash and resulting risks and inefficiencies in CIT.

   The advent of new electronic payment instruments and infrastructure, and electronic money in particular, may present the policy makers in CIT with an opportunity to improve their payment systems relatively quickly, but is also burdened with potential threats. However, these developments cannot be ignored, as they will affect the CIT payment and financial systems in one way or another sooner rather than later - through (opted for) financial liberalisation, globalisation and/or regional integration processes. The public policy activism in retail payment systems should, however, be minimal and, ideally, constrained to improvements of technical and legal facilities and encouragement of competition between payment services providers.

9. *Banking system restructuring* in CIT is essential for risk and cost reduction and speed, reliability and choice improvements. Only a system without significant proportion of bad debts, unclear or ineffective ownership and/or management structure on the one hand, with improved skills and risk control on the other, can establish discipline and trust in the financial system. An increased capital base, risk provisions and risk awareness, new management and shareholders' structure, better liquidity management and market based incentives may, however, be hard to

achieve without government/central bank's support. An additional option, compatible with an organised system restructuring, is the encouragement of the involvement of foreign service-providers and competition. The experience of some transitional countries with the banking system reforms, foreign competition and investors and integration of payment and banking systems show the opportunities and threats of the processes.

10. Regardless of the type of settlement system and general arrangements chosen, payment system reform involves *'fine tuning'*[23] for bringing the system design into the policy objectives function. Thus, successful monetary policy and control, risk reduction and efficient interbank money markets can be achieved only if: a) the choice of clearing and settlement arrangements is accompanied with various risk reduction measures available for different systems, b) there are adequate supervision and surveillance, licensing procedures and clear and consistent rules regarding the services providers, c) legal framework and technical infrastructure and the selected system are in tune with each other, and d) the banking system practice and efficiency are accounted and provided for in the system design.

In summary, the payment systems reforms lessons can be grouped into six generic recommendations for policy makers in Countries in Transition:

1. *monetary policy and control have priority in a system design;*
2. *subsequent emphasis should be on supervision and surveillance;*
3. *strengthen supervision of the financial systems but retain regulatory flexibility;*
4. *reduce operational involvement and concentrate on improving the legal, technical and institutional infrastructure for payments;*
5. *financial institutions' involvement and competition should be encouraged;*
6. *overall banking system restructuring is the key to risk reduction and efficiency of the payment system.*

[23] The term refers to precision and sophistication of the measures, rether than frequency of interventions.

8.6. Future research

As payment system reforms and statistical coverage of payment transactions in CIT and other non-industrial countries progress, some of the analytical results should be revisited in order to establish if the used categories and identified differences are indeed true and robust. Such an exercise would also help assess the reform processes and test for the new systems' efficiencies. Particular variables for which longer time-series, more frequent and reliable data would be required are payment system costs (providers profit/cost efficiency), payment instruments volumes and values and clearing and settlement times.

In terms of the general payment system research topics, the most pressing seem:

- In Europe, introduction of Euro payments and EMU wholesale and retail payments clearing and settlement, i.e. TARGET, EBA and different retail payment systems' costs, risks speed and reliability (optimal choice, combination of the systems etc.);
- Cross-border payments in general, i.e. risks and costs reduction in an international context and related issues of cross-regulation, deregulation, spill-over of effects between different national markets etc.;
- Securities settlement systems and their integration into efficient (inter)national clearing and settlement, including the issues of alternative purposes and priorities of use of collateral in monetary, banking and payment systems;
- Electronic money and electronic banking implications on payment systems and monetary policy (including the future of money and money supply and distribution, central banks and banking industry);
- Involvement of non-banking institutions in payment services provision and financial intermediation – including the opportunities and threats for payment systems (and banking systems) that arise form the development of the Internet, financial 'disintermediation, and potential financial stability risks (and/or need to change the focus and instruments for financial systems' supervision and surveillance).

9. THE APPENDICES

9.1. Appendix 1 - The Bank of England Group Analysis Tests' Statistics

Cash in Circulation in USD, at purchasing power parity rate, per capita

Table 9-1 Comparison tests results for Cash in Circulation ($CCppp 1997)

method used	test statistics	significant at	implications
Analysis of Variance	F=8.28	0.00	significant differences across the three groups
Kruskal-Wallis test	H=19.37	0.00	significant differences across the three groups
2-sample t-statistics	t =		
Developing & CIT	1.28	0.21	not significantly different
CIT & Industrial	-5.50	0.00	significantly different
Developing & Industrial	-2.91	0.00	significantly different
Mann-Whitney tests	W =		
Developing & CIT	363	0.52	not significantly different
CIT & Industrial	85	0.00	significantly different
Developing & Industrial	308	0.00	significantly different
Regression Analysis	Constant	Devdummy	Citdummy
Coefficients	993	- 537	- 726
t-statistics	8.63**	-3.25**	-3.60**
R^2 = 0.26	R^2adj. = 0.23	F = 8.40**	N=67

*significant at α=0.05; **significant at α=0.01

Table 9-2 Tests for regression: CCpppPC = f(GDPpppPC, Velocity, Real interest)

Panel A - Statistics					
Ordinary Least Square Est.		Constant	GDPpppPC	Velocity	RealInter
Coefficients		442	0.05	-16	-.00006
t-statistics		5.35	8.01	-6.02	-2.82
Probability		0.000	0.000	0.000	0.008
R^2	0.80				
R^2adj.	0.79				
S.E. of Regression	255.355				
F stats	48.04				
F prob	0.000				
N	64				
DW Statistics	1.819				
Panel B – Diagnostics					
Test Statistics	F-Statistics	Probability			
Breusch-Godfrey	2.0674	0.1421			
Ramsey RESET	3.0019	0.0929			
Jarque-Bera	1.6309	0.4424			
White	1.7385	0.1440			
Condition Index	5.2970	-			

Cash in Circulation to M1 ratio

Table 9-3 Tests results for Cash in Circulation to M1 ratio

method used	test statistics	significant at	implications
Analysis of Variance	F=10.57	0.00	significant differences across the groups
Kruskal-Wallis test	H=15.70	0.00	significant differences across the groups
2-sample t-statistics	t =		
Developing & CIT	0.16	0.88	not significantly different
CIT & Industrial	3.01	0.01	significantly different
Developing Industrial	4.50	0.00	significantly different
Mann-Whitney tests	W =		
Developing & CIT	431	0.69	not significantly different
CIT & Industrial	271	0.00	significantly different
Developing & Industrial	320	0.00	significantly different
Regression Analysis	Constant	Devdummy	Citdummy
Coefficients	0.219	0.178	0.169
t-statistics	7.32**	4.33**	3.20**
R^2 = 0.29	R^2adj. = 0.26	F = 10.57**	N=67

*significant at α=0.05; **significant at α=0.01.

Table 9-4 Tests for regression: CC/M1= f(GDPpppPC, Clearing, Legal System)

Panel A – Statistics						
Ordinary Least Square Est.		constant	GDPpppPC	CCpppPC	Clearing	Technical
Coefficients		0.37	-0.000015	0.00018	0.018	-0.018
t-statistics		6.95	-6.26	6.30	3.05	-1.71
Probability		0.000	0.000	0.000	0.004	0.100
R^2	0.70					
R^2adj.	0.69					
S.E. of Regression	0.107					
F stats	30.46					
F prob	0.000					
N	67					
DW Statistics	2.209					
Panel B – Diagnostics						
Test Statistics	F-Statistics	Probability				
Breusch-Godfrey	0.6677	0.4142				
Ramsey RESET	0.2102	0.6471				
Jarque-Bera	5.1383	0.0696				
White	1.1223	0.3669				
Condition Index	9.3670	-				

Cash in circulation to GDP (local currency) ratio

Table 9-5 Tests results for Cash in Circulation to GDP ratio

method used	test statistics	significant at	implications
Analysis of Variance	F=0.95	0.39	no significant differences across the groups
Kruskal-Wallis test	H=0.76	0.68	no significant differences across the groups
2-sample t-statistics	t =		
Developing & CIT	0.65	0.52	not significantly different
CIT & Industrial	0.76	0.46	not significantly different
Developing & Industrial	1.3	0.21	not significantly different
Mann-Whitney tests	W =		
Developing & CIT	341	0.84	not significantly different
CIT & Industrial	196	0.58	not significantly different
Developing & Industrial	447	0.92	not significantly different
Regression Analysis	Constant	Devdummy	Citdummy
Coefficients	0.05	0.023	0.013
t-statistics	4.76**	1.53	0.70
R^2 = 0.04	R^2adj. = 0.01	F = 1.18	N=67

*significant at α=0.05; **significant at α=0.01

Table 9-6 Regression: CC/GDP= f(GDPpppPC, Interest rates, $CCpppPC, Legal System)

Panel A – Statistics						
Ordinary Least Square Est.		constant	GDPpppPC	Interest	CCpppPC	Legal
Coefficients		0.09	-0.000005	-0.0006	0.000086	-0.01
t-statistics		7.72	-8.53	-2.28	11.65	-2.00
Probability		0.000	0.000	0.027	0.000	0.050
R^2	0.80					
R^2adj.	0.78					
S.E. of Regression	0.024					
F stats	41.67					
F prob	0.000					
N	64					
DW Statistics	2.226					
Panel B – Diagnostics						
Test Statistics	F-Statistics	Probability				
Breusch-Godfrey	1.1203	0.290				
Ramsey RESET	2.8647	0.096				
Jarque-Bera	5.6383	0.059				
White	2.7841	0.095				
Condition Index	8.6040	-				

CLEARING

Table 9-7 Tests results for Clearing Cycles

method used	test statistics	significant at	implications
Analysis of Variance	F=5.49	0.00	significant differences
Kruskal-Wallis test	H=20.14	0.00	across the groups
2-sample t-statistics	t =		
Developing & CIT	-0.38	0.71	not significantly different
CIT & Industrial	2.25	0.04	significantly different
Developing &Industrial	4.22	0.00	significantly different
Mann-Whitney tests	W =		
Developing & CIT	837	0.72	not significantly different
CIT & Industrial	256	0.00	significantly different
Developing &Industrial	1239	0.00	significantly different
RTGS and clearing			
Analysis of Variance	F=11.28	0.00	In a country where RTGS system exists the
Kruskal-Wallis test	H=10.65	0.00	clearing cycle is shorter
RTGS system use			
Analysis of Variance	F=13.05	0.00	significant differences across the groups in use
Kruskal-Wallis test	H=14.47	0.00	of RTGS
Regression Analysis			
country dummy	Constant	Devdummy	Citdummy
Coefficients	1.02	3.29	2.75
t-statistics	1.28	3.26**	2.02*
R^2 = 0.14	R^2adj. = 0.12	F = 5.39**	N=70
RTGS dummy	Constant	dummy	
Coefficients	4.5	- 2.9	
t-statistics	7.45**	-3.32**	
R^2 = 0.14	R^2adj. = 0.13	F = 11.05**	N=70

*significant at α=0.05; **significant at α=0.01

Table 9-8 Tests for regression: logclearing= f(logGDPpppPC, logCPI)

Panel A - Statistics				
Ordinary Least Square Est.		constant	loggdp	logcpi
1.1.1. Coefficients		3.9	-0.71	-0.37
t-statistics		4.65	-4.89	-2.32
Probability		0.000	0.000	0.022
R^2	0.43			
R^2adj.	0.41			
S.E. of Regression	0.509			
F stats	12.28			
F prob	0.000			
N	65			
DW Statistics	2.173			
Panel B - Diagnostics				
Test Statistics	F-Statistics	Probability		
Breusch-Godfrey	0.3564	0.550		
Ramsey RESET	0.5913	0.442		
Jarque-Bera	5.2882	0.071		
White	1.8812	0.170		
Condition Index	18.553	-		

RESERVE RATIOS

Table 9-9 Comparison tests results for Reserve Requirement ratios

category / method	test statistics	significant at	implications
Analysis of Variance	F=5.45	0.00	significant differences across the groups
Kruskal-Wallis test	H=12.20	0.00	significant differences across the groups
2-sample t-statistics	t =		
Developing & CIT	0.02	0.98	not significantly different
CIT & Industrial	4.88	0.00	significantly different
Developing &Industrial	3.09	0.00	significantly different
Mann-Whitney tests	W =		
Developing & CIT	407	0.24	not significantly different
CIT & Industrial	175.5	0.00	significantly different
Developing &Industrial	246	0.00	significantly different
Interest on reserves			
Analysis of Variance	F= 0.31	0.73	no significant differences across the groups in
Kruskal-Wallis test	H=0.37	0.83	proportion of countries that pay the interest
Used for payments			
Analysis of Variance	F=0.92	0.40	no significant differences across the groups
Kruskal-Wallis test	H=1.34	0.51	in use of reserves for payments

BANKING SYSTEM MATURITY

Table 9-10 Banking system maturity[1)] comparison test results

Category / method	test statistics	significant at	implications
Differences across the three groups			
Analysis of Variance	F=17.78	0.00	significant differences across *the groups* in
Kruskal-Wallis test	H=20.5	0.00	banking systems maturity
Clearing cycle			
Analysis of Variance	F=10.53	0.00	significant differences across *countries* with
Kruskal-Wallis test	H=10.54	0.00	different banking system maturity
Reserve ratios			
Analysis of Variance	F=7.7	0.00	significant differences across *countries* with
Kruskal-Wallis test	H=14.65	0.00	different banking system maturity
$CC per capita (ppp)			
Analysis of Variance	F=9.25	0.00	significant differences across *countries* with
Kruskal-Wallis test	H=20.7	0.00	different banking system maturity
CC/M1			
Analysis of Variance	F=1.82	0.17	no significant differences across *countries*
Kruskal-Wallis test	H=4.53	0.10	with different banking system maturity
CC/GDP			
Analysis of Variance	F=0.83	0.44	no significant differences across *countries*
Kruskal-Wallis test	H=3.21	0.20	with different banking system maturity

[1)] The central banks' evaluation of their countries' respective systems. The responses were classified on an ordinary scale, where "poor" = 1, "developing" = 2, and "satisfactory" = 3.

LEGAL SYSTEM ADEQUACY

Table 9-11 Legal system adequacy[1)] comparison tests results

Category / method	test statistics	significant at	implications
Differences across the three groups			
Analysis of Variance	F=2.58	0.08	no significant differences across *the groups*
Kruskal-Wallis test	H=4.23	0.12	in legal systems adequacy
Clearing cycle			
Analysis of Variance	F=1.94	0.15	no significant differences across *countries*
Kruskal-Wallis test	H=3.71	0.16	with different legal system adequacy
$CC per capita (ppp)			
Analysis of Variance	F=0.78	0.46	no significant differences across *countries*
Kruskal-Wallis test	H=2.57	0.27	with different legal system adequacy
CC/M1			
Analysis of Variance	F=2.19	0.12	no significant differences across *countries*
Kruskal-Wallis test	H=3.39	0.18	with different legal system adequacy
CC/GDP			
Analysis of Variance	F=2.78	0.05	significant differences across *countries*
Kruskal-Wallis test	H=5.86	0.04	with different legal system adequacy

[1)] The central banks' evaluation of their countries' respective systems. The responses were classified on an ordinary scale, where "poor" = 1, "developing" = 2, and "satisfactory" = 3.

TECHNICAL INFRASTRUCTURE

Table 9-12 Technical infrastructure[1)] comparison tests results

category / method	test statistics	significant at	implications
Differences across the three groups			
Analysis of Variance	F=9.08	0.00	significant differences across the groups
Kruskal-Wallis test	H=15	0.00	in technical infrastructure
Clearing cycle			
Analysis of Variance	F=6.72	0.00	significant differences across countries with
Kruskal-Wallis test	H=9.58	0.00	different technical infrastructure
$CC per capita (ppp)			
Analysis of Variance	F=6.37	0.00	significant differences across countries with
Kruskal-Wallis test	H=16.57	0.00	different technical infrastructure
CC/M1			
Analysis of Variance	F=5.60	0.00	significant differences across countries with
Kruskal-Wallis test	H=9.76	0.00	different technical infrastructure
CC/GDP			
Analysis of Variance	F=0.19	0.83	no significant differences across countries
Kruskal-Wallis test	H=1.22	0.54	with different technical infrastructure

[1)] The central banks' evaluation of their countries' respective systems. The responses were classified on an ordinary scale, where "poor" = 1, "developing" = 2, and "satisfactory"=3.

Table 9-13 Descriptive Statistics and Normality Distribution tests

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis		Kolmogorov-Smirnov Z*	Asymet. Sig. (2-tailed)
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error		
CCpppPC	67	2959.95	12.57	2972.52	647.1789	608.0913	1.704	.330	3.834	.650	1.164	.133
CC/M1	67	.69	.05	.73	.3281	.1612	.428	.325	.078	.639	.529	.942
CC/GDP	67	.29	.01	.30	6.115E-02	4.913E-02	2.784	.330	10.366	.650	1.519	.020
CLEARING	70	23.50	.00	23.50	3.1014	3.8726	2.999	.289	11.815	.570	2.067	.000
REQRESE	67	35.00	.00	35.00	7.6201	6.5952	1.715	.327	5.077	.644	.966	.308
CPI	65	4667776.00	107.00	4667883.00	101850.4130	688185.8185	6.782	.350	46.000	.688	3.625	.000
INTERRAT	64	81.90	1.00	82.90	10.1522	11.5050	4.426	.302	25.820	.595	1.692	.007
VELOCITY	67	87.69	3.36	91.06	25.0104	16.9493	1.722	.330	3.748	.650	1.326	.059
GDPpppPC	70	26340.00	640.00	26980.00	10292.7857	7977.0910	.538	.287	-1.145	.566	1.624	.010
MATURE	68	2.00	1.00	3.00	2.3929	.6790	-.679	.319	-.603	.628	2.353	.000
LEGAL	67	2.00	1.00	3.00	2.1774	.8001	-.335	.304	-1.354	.599	2.106	.000
TECHNICA	68	2.00	1.00	3.00	2.3824	.7732	-.790	.291	-.868	.574	2.858	.000

9.2. Appendix 2 – Countries in Transition's Payment Systems

Note on EBRD institutional factors measurement and classification

In their "Transition Report 1997", EBRD assess the progress in market-oriented transition.

Banking reform progress is assessed on an ordinary scale, where: 1= little progress beyond establishment of two-tier system; 2 = significant liberalisation of interest rates and credit allocation; 3 = substantial progress in establishment of banks solvency and of a framework for prudential supervision and regulation, full interest rate liberalisation, significant lending to private enterprises and significant presence of private banks; 4 = significant movement of banking laws and regulations towards BIS standards, well-functioning banking competition and effective prudential supervision, significant term lending to private enterprises, substantial financial deepening; 5 = standards and performance norms of advanced industrial economies, full convergence of banking laws and regulations with BIS standards, provision of full set of competitive banking services.

Legal transition is classified on an ordinary scale as an average measure of overall extensiveness and effectiveness of pledge, bankruptcy and company laws. Mark 1 relate to legal rules that are very limited in scope and impose substantial constraints on the creation, registration and enforcement of security over movable assets, and may impose significant fees on pledges. Also, adequate corporate governance or shareholders' rights protection is not ensured. As for the effectiveness, the rules are usually unclear and sometimes contradicting and administration and judicial support of the laws are rudimental. At the other end, mark 5 stands for comprehensive legislation in all areas of commercial low that resembles those in developed countries. Laws are clear and readily ascertainable.

Note on the Technical Infrastructure Measurement and Classification

The World Bank Atlas (1998) provides data on number of telephone mainlines, use of electricity per capita, number of personal computers per capita and percentage of pawed roads in a country. The first step in constructing the technical infrastructure indicator was to classify the interval scale data into groups and then to form an ordinal scale from the grouped data. This was done according to the statistical rules of classification and by following the World Bank's own group categories. Then, the indicator was constructed through the "factor analysis" statistical procedure. The data reduction exercise resulted in creation of one instead of four potential indicators of technical infrastructure in a country. The illustration of the procedure is presented bellow. It can be seen that the "telephone" component explain more than a half of the total variance.

Table 9-14 Technical Infrastructure Indicator - Correlation Matrix

		TELEPHONE	COMPUTER	ROADS	ELECTICITY
Correlation	TELEPHONE	1.000	.177	.298	.666
	COMPUTER	.177	1.000	.168	.269
	ROADS	.298	.168	1.000	.478
	ELECTICITY	.666	.269	.478	1.000
Sig. (1tailed)	TELEPHONE		.175	.055	.000
	COMPUTER	.175		.283	.176
	ROADS	.055	.283		.005
	ELECTICITY	.000	.176	.005	

Table 9-15 Technical Infrastructure Indicator - Component Matrix

	Component 1
TELEPHONE	.799
COMPUTER	.452
ROADS	.676
ELECTICITY	.892

Table 9-16 Technical Infrastructure Indicator - Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.095	52.369	52.369	2.095	52.369	52.369
2	.887	22.163	74.532			
3	.723	18.068	92.599			
4	.296	7.401	100.000			

Table 9-17 Differences between the two CIT groups – Institutional framework

Category/Method	Test statistics	Significant at	Null hypothesis	Implications
$GDP ppp Per Capita				
t-statistcs	3.241	0.003	Reject Ho	Significantly
Mann-Whitney	161	0.002		different
Consumer Price Index				
t-statistcs	0.388	0.701	Cannot Reject	Not significantly
Mann-Whitney	171	0.239	Ho	different
Banking System Maturity				
t-statistcs	6.103	0.000	Reject Ho	Significantly
Mann-Whitney	89	0.000		different
Legal System Adequacy				
t-statistcs	2.739	0.012	Reject Ho	Significantly
Mann-Whitney	87	0.016		different
Technical Infrastructure				
t-statistcs	2.763	0.010	Reject Ho	Significantly
Mann-Whitney	171.5	0.010		different

Table 9-18 Differences between the two CIT groups – Cash holdings

Category/Method	Test statistics	Significant at	Null hypothesis	Implications
Cash in Circulation				
t-statistcs	2.891	0.008	Reject Ho	Significantly
Mann-Whitney	89	0.002		different
CC to M1				
t-statistcs	1.646	0.113	Cannot Reject	Not significantly
Mann-Whitney	151	0.095	Ho	different
CC to GDP				
t-statistcs	0.483	0.633	Cannot Reject	Not significantly
Mann-Whitney	131	0.536	Ho	different

9.3. Appendix 3: Yugoslavia and Comparative Tables

Appendix 3-1: Yugoslavia - statistical data

Table 9-19 Yugoslavia - Basic statistical data

	1990	1991	1992	1993	1994	1995	1996
Population (millions)	10.53	10.41	10.45	10.48	10.52	10.55	10.57
GDP (USD millions)	28,390	25,754	18,696	13,169	13,862	14,681	15,548
GDP per capita (USD)	2,696	2,474	1,789	1,256	1,318	1,392	1,471
Exchange rate (domestic currency vis-à-vis USD) year-end	10.66	19.73	750	1053*	1.55	4.74	5.13

Sources: The Yugoslav Statistical Office 1997, The National Bank of Yugoslavia 1997
*In billion of dinars

Table 9-20 Monthly Consumer Price Indices

								(t-1)=100*
	1990	1991	1992	*1993*	1994	1995	1996	1997
January	141.6	105.7	127.7	*200.8*	302760900	112.6	109.6	101.3
February	115.4	110.9	146.9	*311.2*	2288.9	101.6	104.6	100.6
March	104.8	102.1	141.2	*326.9*	92.6	102.2	107.5	100.9
April	102	104.8	177.2	215.2	101	108.2	103.1	100.1
May	99.1	113.2	180.5	299.8	99.9	105.1	101.8	100.2
June	99.9	108.6	202.8	473	99	105.6	103.5	99.9
July	102	106.6	162.5	537.9	98.6	106.7	106.9	100.1
August	103.1	107.8	142.4	1958.8	99.4	107.7	102.2	101.2
September	107.7	116	163.6	745.1	100.2	110.1	101.1	101.1
October	110	115.3	149.2	1943.4	101	110	101.3	100.1
November	102.6	118.8	133.3	206886	106.5	105.3	101.7	102.3
December	102.1	119.2	147.8	176362	102.3	107.6	104.7	103.6

Source: Yugoslav Statistical Office 1997
*Notes: Each previous month is used as a base. 100 means that there were no changes. The values are approximately one month lagged due to the statistical methodology.

Table 9-21 Annual Retail price Index

Year	(t-1)=100*
1990	691.2
1991	221
1992	9,359
1993	108,636,349,415,883
1994	71,050,620,550
1995	174.8
1996	194.1

Source: Yugoslav Statistical Office 1997

*Notes: Each previous year is used as a base. 100 means that there were no changes. The 1994 figure is dominantly influenced by January inflation as illustrated by the February inflation rate in table 2.

Table 9-22 Average monthly earnings[1] and cash holdings

Year	Average monthly earnings in USD	earnings/ notes and coins in circulation p/c ratio
1990	130	17%
1991	124	27%
1992	62	95%
1993	24	2%
1994	106	62%
1995	123	55%
1996	124	44%

Source: Yugoslav Statistical Office 1997

[1)] The net receipts accruing from employment, including self-employment, pensions and social benefits. The receipts account for 83.4 of available resources of households in 1995, sixteen percent of all receipts is consumption in kind and remaining 0. 6 percents is capital gains (YSO, 1997)

Appendix 3-2 Comparative tables

Table 9-23 Notes and coins in circulation

	1991	1992	1993	1994	1995
			USD per inhabitant		
Belgium	1,331	1,239	1,164	1,229	1,391
Canada	846	627	636	637	662
France	863	828	739	807	891
Germany	1,411	1,534	1,511	1,790	2,025
Italy	1,168	1,023	921	1,032	1,082
Japan	2,789	2,739	3,243	3,736	3,873
Netherlands	1,438	1,344	1,267	1,428	1,541
Sweden	1,587	1,207	1,042	1,120	1,312
Switzerland	2,802	2,748	2,638	2,985	3,394
United Kingdom	509	446	455	504	528
United States	1,070	1,167	1,272	1,385	1,443
			AS percentage of GDP		
Belgium	6.2	5.9	6	5.2	5.3
Canada	3.1	3.3	3.4	3.4	3.5
France	3.7	3.6	3.5	3.4	3.7
Germany	6	6.5	6.7	6.8	6.9
Italy	5.4	5.7	5.8	5.9	5.5
Japan	9.4	9	9.5	9.7	10.4
Netherlands	6.8	6.5	6.5	6.3	6
Sweden	5.3	5	5.3	5	4.7
Switzerland	8	8	7.9	7.9	7.7
United Kingdom	2.7	2.9	2.8	2.8	2.8
United States	4.6	4.8	5	5.2	5.2
			As percentage of narrow money		
Belgium	31.2	31.5	29.6	27.1	27.2
Canada	46.1	47	44	44.2	42.8
France	15.8	15.9	15.3	15.1	14
Germany	28.4	29.9	29.2	29.6	29.1
Italy	14.2	15.7	15.5	16	16.3
Japan	33.1	31.2	31.1	30.7	29.2
Netherlands	28.6	27.4	25.1	25	22.1
Sweden	11.5	10.8	10.7	10.7	10.5
Switzerland	21.6	21.6	19.7	19.7	18
United Kingdom	5.6	4.8	4.5	4.6	4.6
United States	29.5	28.5	28.5	30.7	33

Source: Bank for International Settlements 1996 (d)

Table 9-24 Annual Paper and Electronic Transactions per Person[1]

(Fourteen developed countries, 1993)

Country	No. of paper based transactions p/p	No. of electronic transactions p/p	Percent electronic payments
Italy	23	6	20%
Japan	9	31	78
Switzerland	2	65	97
Sweden	24	68	74
Norway	58	40	41
Belgium	16	85	84
United Kingdom	57	58	50
Finland	40	81	67
Denmark	24	100	81
Canada	76	53	41
Germany	36	103	74
Netherlands	19	128	87
France	86	71	45
United States	234	59	20

Source: Humphrey, Pulley and Vesala (1996)

[1] Countries are ranked by the number of non-cash payments per person, lowest first. Numbers have been rounded off.

Table 9-25 Payment flows and GDP in G10 countries

1994 data

Country	Annual turnover in payment systems ($000 billion	Ratio of payment system turnover to annual GDP	Number of days to turn over annual GDP[2]
Belgium	10.9	47.5	5.25
Canada	11.6	20.7	12
France	58.3	43.9	5.5
Germany	129.1	63	4
Italy	20.4	29.9	8.35
Japan	463.4	100.9	2.5
Netherlands	12.4	37.5	6.75
Sweden	6.4	32.6	7.75
Switzerland	24.5	93.9	2.75
United Kingdom	42.9	41.9	6
United States	506.5	73.6	3.25
memorandum item:			
Yugoslavia[1]	0.1	6.5	38.5

Source: Bank for International Settlements (from Sheppard, 1996)

[1] Data Sources: Yugoslav Statistical Office (1997) and ZOP - The Clearing and Settlement House (1997) on average a year.

Appendix 3-3 Yugoslav payment system – settlement media

Table 9-26 Settlement media used by non-banks (end of year)

YU Dinar millions*

	1990	1991	1992	*1993*[1]	1994	1995	1996	1997
Notes and coins	2,500	6,900	458,300	*5,200*	1,073.8	1,444.9	2,956.8	2,336.5
Transferable deposits	3,200	12,600	774,800	*130,300*	1,361.3	1,811.2	2,538.5	2,821
of which held by								
households	600	2,100	158,800	*16,200*	149.1	276.5	515.5	369.7
corporate sector	1,000	5,300	368,200	*66,200*	568.8	777.9	1,134.6	1,276.4
social services	700	1,700	95,800	*15,900*	326.8	428.5	509.5	588.1
other	900	3,500	152,000	*32,000*	316.6	328.3	378.9	586.8
Narrow money supply (M1)	5,700	19,500	1,233,100	*135,500*	2,435.1	3,256.1	5,495.3	5,157.5

Source: National Bank of Yugoslavia, Quarterly Bulletin, various issues 1995-1997
(1) YU Dinar million billions
*Note: Data for 1990-1992 are fully comparable. Adjustments were made to allow for the 1992 denomination (one zero deleted). Data for 1993 are in million billions of dinars and adjustments were made to allow for 1993 denomination (six zeros deleted). From 1994 all data are in millions of new dinars and fully comparable.

Table 9-27 Settlement media used by deposit-taking institutions (end of year)

YU Dinar millions*

	1990	1991	1992	*1993*[1]	1994	1995	1996	1997
Required reserves held at central bank	200	1,300	115,900	*n/a*	40.1	4	277.5	354
Free reserves held at central bank	300	4,500	158,800	*68,000*	129	460.6	220.3	306.7
Transferable deposits held at other institutions	200	1,300	115,900	*neg.*	40.1	115.6	315.2	362.6

Source: National Bank of Yugoslavia, Quarterly Bulletin, various issues 1995-1997
(1) YU Dinar million billions
*Note: Data for 1990-1992 are fully comparable. Adjustments were made to allow for the 1992 denomination (one zero deleted). Data for 1993 are in million billions of dinars and adjustments were made to allow for 1993 denomination (six zeros deleted). From 1994 all data are in millions of new dinars fully comparable.

Table 9-28 Notes and coins (end of year)

YU Dinar millions*

	1990	1991	1992	*1993*[1]	1994	1995	1996	1997
Total notes and coins issued	2,600	7,500	474,400	*7,800*	1,091.2	1,480.8	3,028.5	2,374.1
Notes and coins held by credit institutions	100	600	16,100	*2,600*	17.4	35.9	71.7	37.6
Notes and coins in circulation outside credit institutions	2,500	6,900	458,300	*5,200*	1,073.8	1,444.9	2,956.8	2,336.5

Source: National Bank of Yugoslavia, Quarterly Bulletin, various issues 1995-1997
(1) YU Dinar million billions
*Note: Data for 1990-1992 are fully comparable. Adjustments were made to allow for the 1992 denomination (one zero deleted). Data for 1993 are in million billions of dinars and adjustments were made to allow for 1993 denomination (six zeros deleted). From 1994 all data are in millions of new dinars and fully comparable.

Appendix 3-4 SDK/ZOP - The Clearinghouse data

Table 9-29 Volume of the payment system transactions processed by the clearinghouse

Year	Number of payment instructions	Credit transfers - paper and electronic	%	Cash transactions[1]	%	Telex instructions	%
1990	236,000,000	n/a		n/a		n/a	
1991	213,979,778	161,019,250	75.25	51,530,028	24.1	1,430,500	0.67
1992	224,739,119	167,880,121	74.70	55,285,823	24.6	1,573,174	0.70
1993	269,686,943	216,691,663	80.34	52,662,844	19.5	332,436	0.25
1994	204,437,800	157,765,854	77.20	46,469,918	22.7	202,028	0.10
1995	232,223,000	178,451,355	76.84	53,688,535	23.2	83,110	0.04
1996	257,180,759	201,295,024	78.26	55,854,396	21.7	31,375	0.01

Data source: ZOP - The Clearing and Settlement House
(1) These transactions refer to money (postal) orders, which involve cash at one or both ends of the transactions, but involve cashless (inter-bank) clearing and settlement.

Table 9-30 Value of payments processed by SDK/ZOP by instruments

Year	Value of payments - billions of dinars[1]	Credit transfers - paper and electronic	Cash[2] transactions	Other transactions[3]
1991	5,005	76%	20%	4%
1992	52,500	75%	20%	5%
1993	852,000	84%	9%	7%
1994	140	76%	19%	5%
1995	350	77%	17%	6%
1996	520	79%	16%	5%

Data source: ZOP - The Clearing and Settlement House
(1) The amounts before and after January 1994 are not comparable.
(2) These transactions refer to money (postal) orders, which involve cash at one or both ends of the transactions, but involve cashless (inter-bank) clearing and settlement.
(3) Includes value of cheque processed.

Table 9-31 Value of payments processed by SDK/ZOP by means of instruction

Year	Value of payments – billions of dinars[1)]	Paper based payment instructions	Cash based[2)] payment instructions	Electronic payment instructions[3)]	Telex fund transfers[4)]	Telephone fund transfers[4)]
1991	5,005	49%	20%	16%	6%	9%
1992	52,500	45%	20%	21%	8%	6%
1993	852,000	56%	9%	26%	2%	6%
1994	140	39%	19%	40%	1%	1%
1995	350	37%	17%	45%	1%	-
1996	520	35.5%	16.5%	52%	-	-

Data source: ZOP - The Clearing and Settlement House

(1) The amounts before and after January *1994* are not comparable.

(2) These transactions refer to money (postal) orders, which involve cash at one or both ends of the transactions, but involve cashless (inter-bank) clearing and settlement.

(3) Include electronic fund transfers between the units and payment orders sent electronically by the customers to the clearinghouse. Prior to 1994 the values are identical to electronic fund transfers between the units (shown in table 7).

(4) The instructions were in use only by the SDK units for payment orders that settle between them.

Table 9-32 Structure of payments processed by SDK/ZOP (of total value)

Year	Total value of payments	Payments settled within SDK units	Payments settled between the units	Electronic fund transfer between the units	Telex fund transfer between the units	Telephone/ Other fund transfers between u.
1991	100%	69%	31%	52%	18%	30%
1992	100%	65%	35%	60%	22%	18%
1993	*100%*	*66%*	34%	76%	5%	19%
1994	100%	59%	41%	95%	3%	2%
1995	100%	61%	39%	98%	2%	-
1996	100%	60%	40%	99.6%	0.4%	-

Data source: ZOP - The Clearing and Settlement House

Table 9-33 Number of the 'cash' transactions[1] within the giro-system

Year	Total Cash Transactions	Clearinghouse	At Post Offices	Initiated by Cash Payment	Resulted in Cash Withdrawal
1991	51,530,028	12,934,037	38,595,991	43,336,754	8,193,274
1992	55,285,823	15,093,029	40,192,794	46,218,948	9,066,875
1993	52,662,844	13,276,854	39,385,990	42,024,949	10,637,895
1994	46,469,918	17,191,937	29,277,981	37,372,003	9,097,915
1995	53,688,535	22,841,115	30,847,420	42,839,255	10,849,280
1996	55,854,396	24,341,494	31,512,902	45,492,526	10,361,870

Source: ZOP - The Clearing and Settlement House

(1) These transactions refer to money (postal) orders, which involve cash at one or both ends of the transactions, but involve cashless (inter-bank) clearing and settlement.

Table 9-34 Structure of the 'cash' transactions processed (% of the total number)

Year	Total Cash Transactions %	Clearing-house - cash inflows	Post Offices - cash inflows	Initiated by cash payments	Clearing-house - cash outflows	Post Offices - cash outflows	Resulted in cash withdrawals	At clearing-house	At Post Offices
1991	100	20.00	64.10	**84.10**	5.20	10.70	**15.90**	**25.10**	**74.90**
1992	100	20.00	63.60	**83.60**	7.30	9.10	**16.40**	**27.30**	**72.70**
1993	100	17.10	62.70	**79.80**	7.94	12.26	**20.20**	**25.05**	**74.95**
1994	100	27.60	52.90	**80.50**	9.40	10.10	**19.50**	**37.00**	**63.00**
1995	100	30.30	49.50	**79.80**	12.30	7.90	**20.20**	**42.60**	**57.40**
1996	100	32.86	48.59	**81.45**	10.72	7.83	**18.55**	**43.58**	**56.42**

Source: ZOP - The Clearing and Settlement House

Table 9-35 Value and Number of cheques processed by the clearinghouse - ZOP in 1997

Number of cheques processed	Cheques processed - on average a day	Value of cheques processed - in Dinars	Average amount per cheque – in Dinars	Postage and fees charged - in Dinars	Postage per cheque - Dinars	No. of payment orders	Daily average of payment orders
13,002,740	50,010	2,015,425,170	155	1,040,220	0.08	3,310,154	12,730

Source: ZOP - The Clearing and Settlement House

9.4. Appendix 4: Yugoslav Payment and Banking Systems Survey Questionnaire

Circle a number or numbers in front of the answer chosen, and/or make a comment. All of the information supplied by you will be kept strictly confidential with complete anonymity given to respondents. To avoid possible ambiguities some definitions, according to Bank for International Settlements, are given in the text or footnotes. This questionnaire should take you approximately 30 minutes or less to complete.

State the name of your bank/institution: _____

SECTION I - PAYMENT SYSTEM

1) Have you **participated**, so far, in a professional capacity in a forum or debate about Yugoslav payment system?

1. YES
2. NO
3. DON'T KNOW

1a) If you did not, would you like to?

1. YES
2. NO
3. DON'T KNOW

1b) If you did, who organised the event?

_____

2) In your opinion, have the **banks standings and interests,** regarding the payment system, been taken into account for the payment system design and legislation in the last five years?

1. YES ENTIRELY
2. YES TO A CERTAIN EXTENT
3. NOT ENOUGH
4. NOT AT ALL

Comment:_____

3) Were you, as a banker, satisfied with the payment system services that you used in period 1993-1997?

1. YES ENTIRELY
2. YES TO A CERTAIN EXTENT
3. NOT COMPLETELY
4. NOT AT ALL

3a) If you were satisfied state why (what would you single out as positive about it)?

_____

_____

3b) If you were not entirely satisfied or not satisfied at all state why?

_____

_____

4) How do you view payment system **costs** with regard to SDK-the clearinghouse services you used in period 1993-1997?

1. VERY HIGH
2. HIGH
3. ADEQUATE
4. LOW
5. VERY LOW

Comment:_____

5) From your institution's point of view, and from contacts with your customers, how do you view versatility of payment instruments offer and choice among them during 1993 to 1997?

1.EXCELLENT OFFER (OR CHOICE AMONG) OF PAYMENT INSTRUMENTS
2. GOOD CHOICE
3. SATISFACTORY CHOICE
4. LIMITED CHOICE
5. INADEQUATE CHOICE

Comment:_____

6) How would you assess the payment system efficiency during 1993 to 1997, regarding the **speed of payment orders processing** (from the moment order is sent by payer till it can be used for further payments by payee)?

1. VERY FAST
2. FAST
3. ADEQUATE
4. SLOW
5. VERY SLOW

7) From your experience during the period, **what was the average time** (how many minutes, hours or days) for a payment to reach the counterpart, i.e. from a payment order instruction by the payer till the payee can use (make payments with) the funds?

a) interbank payments:_____; **b) corprorate payments:**_____;
c) retail payments:_____;

8) In light of payment system costs, risks and efficiency - **Which settlement system** (system of transferring money, i.e. of discharging the payment obligation) do you view as adequate for Yugoslav banking and payment system?

1. GROSS SETTLEMENT AT THE NATIONAL BANK. With gross processing and settlement, i.e. on transaction by transaction basis, and with the intervention of settlement agent (central bank) who provides additional liquidity or the guarantee of settlement (BIS 1997).

2. GROSS SETTLEMENT WITHOUT THE COUNTERPART. Instead of the intra-day overdrafts granted by the central bank, it employs queue management, i.e. orders are processed only if there are funds at the payer bank's account, on, for example, the first in first out mode (BIS 1997).

3. NET SETTLEMENT IN A COMMERCIAL BANKS' NETWORK. With net processing and settlement of the banks' net position (usually) at the end of the day (BIS 1997).

4. NET SETTLEMENT AT SOME OTHER INSTITUTION OR A CLEARINGHOUSE (e.g. ZOP)

5. OTHER (state) _____

Comment:_____

9) Would your bank/institution participate in costs of establishing such, in your opinion adequate, clearing and settlement system?

1. YES
2. NO
3. DON'T KNOW

10) With regard to the debate on **the new payment system design**, what do you thing about the involvement of commercial banks in payment system operations?

1. THEY SHOULD BE THE MAIN PROVIDERS OF THE PAYMENT SERVICES
2. THEY SHOULD BE THE PROVIDERS OF LARGE VALUE PAYMENTS (interbank payments and large corporate payments)
3. THEY SHOULD BE THE PROVIDERS OF SMALL VALUE PAYMENTS
4. THEY SHOULD BE INVOLVED MORE THAN THEY ARE NOW
5. THEY SHOULD NOT BE INVOLVED AT THE MOMENT BUT AT A LATTER STAGE
6. THERE SHOULD BE NO CHANGES OF THE ORGANISATION OF THE PAYMENT SYSTEM
7. (OTHER)_____

Comment:_____

11) What should be the legal framework regarding the **number and type of banks/institutions** that carry the payment system services?

1. ALL BANKS SHOULD BE ALLOWED TO PARTICIPATE IN THE PROVISION OF THE SERVICES ON THE SAME TERMS
2. ONLY CERTAIN, APPOINTED, BANKS SHOULD BE ALLOWED TO BE PROVIDERS (CLEARING BANKS) FOR PAYMENT CLEARING AND SETTLEMENT (FOR OTHER BANKS AND CUSTOMERS)
3. (OTHER)_____

Comment:_____

12) How would you assess the proposition that **ZOP - the clearinghouse acts as an agent or principal for banks**, i.e. to facilitate the payment services in name and for the account of banks?

1. I APPROVE IT AND THINK IT SHOULD BE OBLIGATORY FOR ALL BANKS
2. IT IS GOOD AS A TEMPORARILY MEASURE AND SHOULD BE OBLIGATORY FOR ALL BANKS
3. IT COULD BE A GOOD SOLUTION FOR SOME BANKS AND THE MEASURE SHOULD BE ON A VOLUNTARILY BASIS
4. I DO NOT APPROVE THE PROPOSITION
5. OTHER_____

Comment:_____

13) Do you view **banks as ready for becoming the main payment system providers**, in light of the facilities, branch network and skills of staff? Chose as many answers as you think appropriate.

1. BANKS ARE READY FOR PROVIDING THE PAYMENT SYSTEM SERVICES
2. BANKS HAVE NOT GOT ENOUGH SKILLED STUFF
3. BANKS LACK ADEQUATE TECHNICAL FACILITIES
4. THEY HAVE NOT GOT ENOUGH BRANCHES (OR THERE IS NOT AN ADEQUATE NETWORK OF THE BRANCHES)
5. THEY ARE NOT READY
6. (OTHER) _____

Comment:

_____

14) If your bank/institution plans further involvement in payment operations, **which payment system services do you plan to introduce/expand in the next 12 months?**

_____

_____

_____

15) Have you got plans for committing **additional funds** (for example in equipment, technology, staff training, opening of new branches) for payment operations provision in the next 12 months? If yes, what do you plan to invest in?

_____

_____

16) Which of the bellow listed payment instruments/services your bank offers to its customers at the moment? Choose all appropriate answers.

1. **CHEQUES / CHEQUE BOOKS**
2. **ELECTRONIC CREDIT ORDERS (customers can give the instruction electronically)**
3. **PAPER CREDIT ORDERS**
4. **CREDIT CARDS FOR DOMESTIC PAYMENTS**
5. **CREDIT/ DEBIT CARDS FOR PAYMENTS ABROAD**
6. **ELECTRONIC CASH - ON A PLASTIC CARD WITH THE EMBODIED COMPUTER CHIP**
7. **DEBIT CARDS**
8. **OTHER CARDS (e.g. cheque guarantee cards or cash/ATM cards)**
8. **TRAVELERS CHEQUES IN FOREIGN CURRENCY**
9. **CROSS-BORDER PAYMENTS FOR BUSINESS**
10. **RETAIL CROSS-BORDER PAYMENT SERVICES**
11. **CASH DISPENSER**
12. **AUTOMATED TELLER MACHINES THAT CAN PROCESS A PAYMENT ORDERS**
13. **TELEPHONE BANKING**
14. **ELECTRONIC HOME BANKING**
15. **DIRECT DEBIT PAYMENTS**
16. **STANDING ORDER PAYMENTS**
17. **FREE BANKING STATEMENTS SENT TO A HOME ADDRESS**
18. **(other)** _____
19. **(other)** _____

Comment:_____

16a) State the numbers of the above listed services that you do not offer at the moment but plan to **introduce** within next two years**:**

_____

17) Your additional comments about the payment system design and problems:

_____

_____

_____

_____

_____

_____

SECTION II - BANKING SYSTEM

1) What is the ownership structure of your bank/institution in percentage?

a) "social" ownership _____%; **b)** state_____%; **c)** private_____%; **d)** foreign investors_____%

2) State the amount of capital of your bank: _____(dinars or state the currency) and capital ratio _____ (as a percentage of risk weighted assets).

3) How would you assess/rank your bank according to the certain indicators and in comparison with other Yugoslav banks? Tick one field for each category.

a)MARKET SHARE: ❑ **up to 5%** ❑ **from 5.01 to 10 %** ❑ **from 10.01 to 20%** ❑ **above 20%**

b)AMOUNT OF ASSETS: ❑ **up to 1million dinars** ❑ **from 1.01 to 5 million** ❑ **from 5.01 to 10 million** ❑ **from 10.01 to 20 million** ❑ **above 20 million**

c) NUMBER OF BRANCHES: ❑ **from 1 to 10** ❑ **from 11 to 25** ❑ **from 26 to 50** ❑ **from 51 do 100** ❑ **from 101 to 200** ❑ **above 200**

d) NUMBER OF EMPLOYEES: ❑ **up to 50** ❑ **from 51 to 100** ❑ **from 101 to 250** ❑ **from 251 to 500** ❑ **from 501 to 1000** ❑ **above 1000**

e) SPECIALISATION AND NUMBER OF CUSTOMERS :

❑ **specialised/ small number of customers** ❑ **specialised/ large number of customers**
❑ **universal/small number of customers** ❑ **universal/ large number of customers.**

4) What new services/activities do you plan to introduce within next two years?

_____

_____

5) How would you assess ***Yugoslav banking system*** regarding the ***quality*** of services (other than speed) and ***efficiency*** of financial intermediation in the economy at the moment? (efficiency relates to timing and speed of banking services)

1. EFFICIENT, HIGH QUALITY OF SERVICES
2. EFFICIENT, AVERAGE QUALITY OF SERVICES
3. INEFFICIENT, AVERAGE QUALITY OF SERVICES
4. INEFFICIENT, POOR QUALITY OF SERVICES
5. (other) _____

State why?: _____

6) What do you think about the quality of placements and asset composition of Yugoslav banks as a whole at the moment?

1. HIGH ASSET AND PLACEMENTS QUALITY
2. SATISFACTORY QUALITY
3. LOW QUALITY
4. VERY LOW QUALITY
5. (OTHER)_____

Comment:_____

7) What do you thin about **the number of banks** in relation to the businesses' needs and financial intermediation efficiency?

1. THERE SHOULD BE EVEN MORE BANKS IN THE SYSTEM
2. THERE IS AN ADEQUATE NUMBER OF BANKS
3. THERE IS A LARGER NUMBER OF BANKS THAN REQUIRED
4. THERE ARE FAR TOO MANY BANKS
5. (OTHER)_____

Comment: _____

7a) If you thing there are more banks than necessary or that the system could be rationalised to become more efficient, what would be the **adequate solution regarding the improvements on quality and speed, and reduction of costs and risk of banking intermediation**? Chose not more than three solutions and/or make a comment.

1. BANK MERGER AND ACQUISITIONS FACILITATED/HELPED BY THE GOVERNMENT
2. SELL/ PRIVATISE CERTAIN NUMBER OF STATE AND SOCIALLY OWNED BANKS
3. TOUGHER LICENSING PROCEDURE (TOUGHER AND MORE PRUDENT REQUIREMENTS)
4. TOUGHER SURVEILLANCE AND SUPERVISION OF BANKS' LIQUIDITY AND CAPITAL REQUIREMENTS (LICENSE WITHDRAWALS)
5. LET THE MARKET FORCES DEAL WITH THE NUMBER AND QUALITY OF BANKS
6. (OTHER)_____

Comment: _____

8) Do you think that Yugoslav banking (especially the 'old' banks) needs overall planned restructuring, i.e. organised transformation facilitated and financed by the state?

1. YES
2. YES, BUT WITH MINIMAL INVOLVEMENT OF THE STATE
3. NO
4. DON'T KNOW
5. (other)_____

8a) If the answer to question 8. is "**yes**", how do you think it should be done? Chose one to three most appropriate ways or their combination. (N.B. option 1. excludes option 2.)

1. BY RESTRUCTURING[1] MOST OF THE STATE/SOCIALLY OWNED BANKS AT THE SAME TIME
2. ONE BY ONE BANK RESTRUCTURING, NOT ALL BANKS INCLUDED
3. BY SELLING /PRIVATISING (OR LIQUIDATING IF NOT POSSIBLE) MAJORITY OF THE BANKS
4. BY SELLING/PRIVATISING OR LIQUIDATING SOME OF THE BANKS BEFORE THE RESTRUCTURING
5. BY SELLING/PRIVATISING SOME BANKS AFTER THE OVERALL RESTRUCTURING
6. BY CHANGING THE LEGAL FRAMEWORK OF BANKING SYSTEM AND OPERATIONS
7. BY ATTRACTING FOREIGN BUYERS/ INVESTORS TROUGH SPECIAL CONCESSIONS
8.(OTHER)_____

Comment:_____

[1] For example by depositing additional capital, shifting the banks liabilities to the state (e.g. to a specially appointed agency), asset cleaning, change of management, merging and acquiring state/social banks by the state and from its funds and/or by issuing new public debt.

8b) If the answer to question 8 is **"yes, but with minimal involvement of the state "** or **"no"**, why?

_____

_____

9) What do you think is important for establishing a sound and efficient banking system in the country within the next three years? Please choose only one degree for each category.

(VI) very important; (I) important; (U) unimportant; (VU) very unimportant

	Importance
1. CHANGES IN THE LEGAL FRAMEWORK TO SUPPORT MARKET ECONOMY	**1. (VI) (I) (U) (VU)**
2. CHANGES IN THE OWNERSHIP AND SHAREHOLDERS STRUCTURE	**2. (VI) (I) (U) (VU)**
3. INVESTING IN NEW TECHNOLOGIES AND NEW SERVICES DEVELOPMENT	**3. (VI) (I) (U) (VU)**
4. INVESTING IN BANK STAFF TRAINING AND SKILLS OD BY THE BANKS	**4. (VI) (I) (U) (VU)**
5. RESTRUCTURING OF THE BANKS BY THE STATE	**5. (VI) (I) (U) (VU)**
6. RESTRUCTURING OF THE BANKS' DEBTORS BY THE STATE	**6. (VI) (I) (U) (VU)**
7. ATTRACTING FOREIGN INVESTMENTS AND INVESTORS/SHAREHOLDERS	**7. (VI) (I) (U) (VU)**
8. IMPROVING THE QUALITY AND CHOICE OF SERVICES	**8. (VI) (I) (U) (VU)**
9. BANKS SPECIALISATION IN PARTICULAR FIELDS	**9. (VI) (I) (U) (VU)**
10. EXPANDING BANKS ACTIVITIES TO SECURITIES AND CUSTODY	**10. (VI) (I) (U) (VU)**
11. BANKS CONCENTRATION/ENLARGEMENT (e.g. through M&A)	**11. (VI) (I) (U) (VU)**
12. IMPROVING THE PAYMENT SYSTEM (i.e. its speed, cost and risk)	**12. (VI) (I) (U) (VU)**
13. IMPROVING THE PAYMENT INSTRUMENTS CHOICE	**13. (VI) (I) (U) (VU)**
14. TIGHT MONETARY CONTROL (including liquidity and solvency surveillance)	**14. (VI) (I) (U) (VU)**
15. LOW INFLATION	**15. (VI) (I) (U) (VU)**
16. INDEPENDENT CENTRAL BANK	**16. (VI) (I) (U) (VU)**
17. TOUGHER TERMS OF BOTH LENDING AND CREDIT RATING ASSESSMENT	**17. (VI) (I) (U) (VU)**
18. OTHER (state what) _____	**18. (VI) (I) (U) (VU)**
19. OTHER (state what) _____	**19. (VI) (I) (U) (VU)**

Comment:_____

10) What do you think about **allowing foreign financial institutions to do the banking business in Yugoslavia** on the same terms as domestic bank? Chose only two answers.

1. IT WOULD INCREASE THE COMPETITION AND OVERALL QUALITY OF SERVICES
2. IT WOULD ENCOURAGE FOREIGN INVESTMENTS IN DOMESTIC BANKS AND ECONOMY
3. IT WOULD JEOPARDISE THE SURVIVAL OF THE DOMESTIC BANKS
4. IT WOULD BE DESIRABLE ONLY AFTER THE RESTRUCTURING OF DOMESTIC BANKS
5. THE ENTRY SHOULD BE LIMITED TO JOINT VENTURES
6. CURRENT TERMS AND CONDITIONS REGARDING FOREIGN BANKS SHOULD NOT CHANGE
7. (OTHER) _____

Comment:_____

11) If you plan to establish/expand ***co-operation with foreign banks for offering financial services home or abroad*** ***in the next 12 months***, what will it be in? Chose all applicable answers.

1. ESTABLISHING NEW CORESPONDENT ACCOUNTS
2. PARTICIPATION IN SOME OF THE PAYMENT NETWORKS
for example: TIPA, DISCUS, IBOS, ECHO, EUROGIRO etc.
3. SETTING UP A JOINT BANK/ SUBSIDIARY ABROAD
4. SETTING UP A JOINT BANK/SUBSIDIARY IN YUGOSLAVIA
5. SOME OTHER KIND OF JOINT VENTURE, MERGER AND/OR ACQUISITION
6. STAFF TRAINING FOR PROVIDING SERVICES AND/OR USE OF RELEVANT TECHNOLOGIES
7. (OTHER)_____

11a) Have you got plans for some of the modes of co-operation in the next three years? State which and when.

_____

_____

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THANK YOU VERY MUCH FOR ALL YOUR ASSISTANCE IN COMPLETING THIS QUESTIONNAIRE!

In return for your time and co-operation in completing this survey we would be glad to send you a complimentary copy of the survey's key findings. If you would like a copy of this report then please attach one of your business cards to the front of this questionnaire when returning it. The report will be sent to you as soon as it becomes available.

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