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Hong Kong Monetary Authority
GLOBAL PAYMENT SYSTEMS

Hong Kong Monetary Authority
# Global Payment Systems

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The rapid increase in the volume of interbank and cross border fund transfers and securities trading has drawn much attention to the robustness and efficiency of payment systems. This is of concern not only to central bankers or government officials who aim at providing a sound infrastructure for the market, but it is also the focus of commercial bankers who want to gain competitive edge by providing their customers with efficient and reliable payment services.

It is against this background that the Hong Kong Monetary Authority organized the Seminar on Global Payment Systems, the first of this kind in Asia, on 2-3 November 1995 in Hong Kong to exchange views on the development and operation of payment systems.

Central bankers, top-level government policymakers and market practitioners from Australia, China, Germany, Hong Kong, Italy, Japan, Korea, Switzerland, Thailand, the United Kingdom, the United States and Vietnam shared their experience and views on the subject.

We are grateful for their valuable contribution, which made this seminar a success. In light of the high quality of papers produced, we have decided to make this wealth of information available on a wider basis by publishing the speeches given by the speakers.

I believe this book will serve as a useful source of reference to the central banking community, market professionals and academics and contribute to further work on global payment systems.

Joseph Yam
Chief Executive
Hong Kong Monetary Authority
INTRODUCTION

Andrew Sheng
Deputy Chief Executive
Hong Kong Monetary Authority

This Seminar on Global Payment Systems has been held at a time when the rising global volume of interbank and cross-border financial transactions is stretching the capacity of the underlying infrastructure. The world today has an estimated US$27 trillion worth of securities, with annual foreign exchange transactions of US$280 trillion, compared with annual physical trade flows of US$4 trillion. The objective of this forum was to enable the exchange of expertise and experience in the design and operation of high value payment systems from a global perspective. A key theme underlying almost every presentation at this Seminar was the need to manage payment risks.

PAYMENT SYSTEM RISKS

In his Welcoming Address, Mr. Donald Tsang, the Financial Secretary stressed that the role of the government in risk management fell in three key areas. The first was the provision of a stable and predictable macroeconomic environment for business to operate, with strong monetary and fiscal discipline. The second was to ensure a high degree of integrity of the financial system, including effective supervision. The third was to work hand in hand with the market participants in the development of a robust financial infrastructure.

Mr. Ernest T. Patrikis, First Vice President of the New York Fed, referred in his Keynote speech to a quote by his former President, Mr. Gerald E. Corrigan that the payment system is like the plumbing of the financial system: taken for granted until it presents a problem. There are major risks underlying the payment system which should be identified and controlled. These include: credit risk, Herstatt risk, market risk, liquidity risk, operational risk, security risk, reputational risk, intellectual risk, official risk, systemic risk and legal risk. These risks must be minimized in order to maintain reliability and confidence in the financial system. A co-operative effort between the private sector and central banks is vital to the efficiency and effectiveness of the operation of a large-value payment system.

Payment system issues have traditionally been domestic and local in nature. But global markets require global links and cross-border flows, leading to an import or export of risks. This dilemma is fittingly depicted by Mr. Peter Allsopp's adaptation of the sixteenth century poet John Donne’s famous passage: “No payment system (man) is an island, entire of itself”. Until the present systems are reformed, we are all vulnerable to problems in each other’s systems. Indeed, time has come for more concerted action on cross border settlement issues.

The emergence of global networks of payment systems raises the fundamental question of system design in order to address the issue of risks. Although a number of existing high value payment systems are on a net settlement basis, the European community and major central banks have already opted for real time gross settlement (RTGS) systems.
Dr. Christian Vital of the Swiss National Bank demonstrated how the Swiss Interbank Clearing (SIC), with a clear architecture allowing queuing of payments can enable the achievement of high turnover with low risks. The advantages and disadvantages of gross versus netting were surveyed by Dr. Hermann-Josef Persé of the Bundesbank. His view was that gross systems will co-exist with netting systems. Netting solutions require robust legal infrastructure, and was ruled out in the case of the European high value payment systems because of the danger of transfer of risks between countries.

TECHNOLOGY AND PRIVATE SECTOR SOLUTIONS

Nonetheless, the elimination of settlement risk in large-value payment systems generally incur high costs, so proposals for a new system ought to be weighed against the costs and benefits of a low-risk alternative. A strong market case is developing for efficient, low-risk, cross-border system linkages to satisfy the service needs of large-value payment systems participants. Ms. Jill M. Considine of the New York Clearing House Association recommended that private-sector participants and central banks should co-operate and focus on their respective core competencies, with central banks providing oversight for prudence and fair access, final settlement and the ultimate source of liquidity for the system, while private banks and private systems should be best at efficient operation, risk management, and credit provision and allocation.

Technology has become a critical basis of competition in financial services. With the price-performance of core technology doubling every eighteen months, Mr. Donald R. Hollis of First Chicago Corporation has aptly termed the present era as a technological discontinuity: a true paradigm shift from stand-alone (local) transaction processing systems to near paperless integratable systems that interoperate with customer and supplier systems (globally). In the U.S. alone, the annual spending on technology by banks has grown to nearly US$17 billion. As technology and markets advance rapidly, legal and regulatory barriers are falling. Strong leadership is required to build a safe and sound set of global payment mechanisms. His message to the public sector was “it is time to lead, follow or get out of the way”.

The impact of technology and shifts in global savings and investment patterns as a result of population aging was stressed by Mr. Marshall N. Carter of State Street Bank and Trust Company. The rise of global investments has changed the global securities clearance and custodianship. As volumes have exploded, the goal is to automate the process by providing real-time reporting and market information to the global custodian, thereby minimising manual intervention and risk. Those companies that integrate flexibility, creativity and focus on customer service with technology will thrive. This message was echoed by Mr. Stuart Gulliver of HSBC Markets, who said that technology in payment systems has enabled the time value of money to become measured in minutes rather than days. Just as there was concentration in the global custody business, there may be the eventual development of “super-correspondent” banks, whose superior technology, capital and operating procedures enable them to stay ahead of the market.

Mr. Israel Sendrovic of the New York Fed reminded the Seminar that technology is being taken for granted. As systems have grown more complex, we cannot lose sight of security. Modern payment systems have zero tolerance for intrusion, fraud or failure.
REGIONAL DEVELOPMENTS IN PAYMENT SYSTEMS

The Seminar was most useful in bringing international experience in dealing with the payment system risks. Dr. Tommaso Padoa-Schioppa, Chairman of the Basel Committee on Banking Supervision, shared his views on European payments integration. The European central banks have agreed to interlink their RTGS payments systems in stage three of EMU, to form a single EU-wide system called TARGET. This would require a high degree of harmonization, such as conditions of access, risk management policies, legal issues, technical standards, pricing policies and operating hours. In contrast to the Chinese principle of “one country, two systems”, the EU payment system solution is: “one system, many countries”.

Mr. Chen Yuan, Deputy Governor of the People’s Bank of China, gave an overview of the development of the China National Automated Payment System (CNAPS), an unprecedented development of a new national system in terms of size. He took the opportunity to reiterate that “after 1997, there will be one country, two currencies, two monetary systems, two monetary authorities and therefore two independent payment systems”.

The development of the new Hong Kong payment system was used by Mr. Ian Wilson, Chairman of the Hong Kong Association of Banks, as a good example how banks maintain their competitive edge by being “best in class” in the area of payments. They have done so by working closely with the Hong Kong Monetary Authority (HKMA) in establishing the joint-venture, the Hong Kong Interbank Clearing Limited (HKIC), to manage the new RTGS system. Mr. Joseph Yam, Chief Executive of the HKMA, said that there were three guiding principles that are critical to the design and implementation of the new RTGS system: confidence, credibility and consensus. To attain confidence, full compliance with international standards is vital. Credibility in the new system is ensured by adopting an evolutionary instead of revolutionary approach. Consensus was achieved by full co-operation between the public and private sectors, in the form of a 50:50 ownership of HKIC. The development of the new RTGS system by 1997 will help to maintain Hong Kong’s status as an international financial centre.

Within the East Asian region, the Japanese system already operates an RTGS system through BOJ-Net, as presented by Mr. Takashi Anzai of the Bank of Japan. Mr. Hoon Shim of the Bank of Korea reported that the Korean RTGS system called BOK-Wire went live in December 1994. Thailand has undergone a major modernization of her payment system with the introduction in May 1995 of BAHTNET, which also operates on RTGS basis, according to Dr. Tarisa Watanagase. Like Hong Kong, Mr. Neil C. Mackrell of the Reserve Bank of Australia reported that Australia would introduce its RTGS system in 1997. Mr. Nguyen Toan Thang of the State Bank of Vietnam reported on the reforms of the Vietnamese payment system.
ACKNOWLEDGEMENTS

This Global Payment Systems Seminar has shown how a technical subject can be fun to organize as well as to participate. We would like to acknowledge the hard work put in by Norman Chan, Esmond Lee, Lydia Chan, James Lau Jr., Julia Leung, Fiona Chan, Loretta Wong and other colleagues in the HKMA for helping to put the Seminar together. The presence of more than 350 participants, including 18 central bankers from around the world, have made the Seminar a great success.

The development of any major project is a partnership. Mr Peter Allsopp said quite rightly that no man is an island. Mr Don Hollis said that we must either lead, follow or get out of the way. In reply, we can only use the words of the Late John Lennon, who said that consensus really means “let’s get together, yeah, yeah, yeah” and “we can work it out.”

On behalf of the HKMA, we would like to thank all the participants for coming to the Seminar, and would like to welcome everyone to the 1997 World Bank/IMF Annual Meetings in Hong Kong.
Good morning. It is my pleasure to welcome all of you to Hong Kong. This is one of a series of international seminars on central banking organized by the Hong Kong Monetary Authority to focus on issues of great importance to Hong Kong’s development as an international financial centre. The theme of this Seminar - Global Payment Systems - is timely and appropriate. Today, the global financial market is the largest single market in the world. In the past 10 years, global trade flows have doubled to US$4 trillion a year, but world foreign exchange transactions have increased by a factor of nearly 10 to US$280 trillion, or roughly US$1.2 trillion per working day. All these payments are channelled through domestic payment systems, which someone has likened to plumbing, taken for granted unless they present a problem.

Managing a huge financial system poses great challenges for governments and regulators. We need the imagination to identify the main sources of risks, and the courage to reform the financial system to minimize such risks. Some of the risks are unique to the financial structure in individual economies while others are present in nearly all financial systems. In addition, there is the systemic risk of contagion in the global network. This Seminar provides an excellent forum to share our experience.

As I see it, the role of the Government in risk management falls in three key areas:

First, to provide a stable and predictable macroeconomic environment within which businesses operate. This requires strong monetary and fiscal disciplines. Firmly anchoring the monetary system of Hong Kong is the linked exchange rate system, which we adopted in October 1983. In the past twelve years, the maximum deviation of the exchange rate from the linked rate of 7.80 has been less than 1%. On the fiscal side, we have an impeccable record. Growth in government expenditure is never allowed to exceed trend economic growth. As a result, the Government’s share of GDP stays well below 20%.

Secondly, to ensure a high degree of integrity of the financial system. This means effective supervision and regulation of financial business and financial institutions.

Thirdly, to work hand in hand with market participants. The Government must put in place a robust market infrastructure that minimizes the various types of risk in financial transactions, including risks relative to payment, securities clearance and settlement.

Private sector initiatives, coupled with public sector efforts to ensure a stable and healthy financial system, are bearing fruit in Hong Kong. Our economy is mature and growing. We forecast a healthy 5% growth for 1995/96. As the fourth largest international banking centre in terms of external assets of banks, the fifth largest foreign exchange market in the world, the eighth largest trading economy, and the eighth largest stock market in terms of market capitalization, Hong Kong is an important hub in the global financial market. To maintain our status as a world-class...
financial and trading centre, we continue to upgrade and improve our competitive edge. In respect of physical infrastructure, we are completing the new airport at Chek Lap Kok which is scheduled for completion in 1998, with a total investment of US$20 bn. Our new Extension to this Convention Centre is being completed, where we hope to host the 1997 World Bank/IMF Annual Meetings. As a more comprehensive attempt to strengthen our role as a service centre, I have established a Task Force to look at how we can further assist the development of our service economy.

Some investors are concerned that the change in sovereignty in 1997 has presented Hong Kong with a unique set of risks. Their concerns are understandable because this is an unprecedented change. But I would view the 1997 factor as an opportunity, rather than a risk. In case you forget, Hong Kong thrives on risks. The Sino-British Joint Declaration and the Basic Law provide the guarantees and the constitutional framework within which Hong Kong will operate as a Special Administrative Region of China after 1 July 1997. Hong Kong will enjoy a high degree of autonomy under the “one country, two systems” concept. Hong Kong will be able to maintain its present social, economic, monetary, legal and judicial systems after 1997. In particular, we will continue to enjoy autonomy in fiscal and monetary policies. China will not and cannot impose tax on Hong Kong, nor will they have access to our reserves. The Hong Kong dollar will remain the legal tender of Hong Kong and remain freely convertible. There will be no exchange control policy and there will be free flow of capital into and out of Hong Kong. In short, there will be one country, two systems, two currencies, two monetary authorities, two tax regimes and separate reserves.

I would like to add that one of the key tenets of the Basic Law is that the Hong Kong Government shall provide “an appropriate economic and legal environment for the maintenance of the status of Hong Kong as an international financial centre”. In keeping with this spirit, we are pursuing a number of specific initiatives. First, as you are aware, we are embarking on an ambitious project to build one of the most modern, robust and stream-lined Real Time Gross Settlement high value payment systems in Asia. We will complete this project by the end of next year. I am delighted that we are making good progress so far and have received the support and advice from many of the leading international experts in payment systems. I would like to acknowledge particularly the generous help of the Bank of England, the Federal Reserve Bank of New York and the Swiss National Bank in this important work.

The second initiative concerns the transparency of data. The Mexican crisis has raised concern about the timeliness and consistency of international data, especially data on the balance of payments and external reserves. In the past, Hong Kong has operated with large hidden reserves. It was the culture at the time. We started to disclose the size of the Exchange Fund in 1992. For good reasons, the world today feels that full disclosure and transparency is preferred, and as an international financial centre and a good global citizen, Hong Kong will undertake to provide the full picture of our success story. By the end of this year, we will have Gross National Product (GNP) data. We are already working on balance of payments estimates, with some technical assistance from the IMF. With regard to our external reserves, I have decided, in consultation with the Exchange Fund Advisory Committee, to publish the size of our external reserves every quarter, instead of the current half-yearly data, beginning with the September quarter.
Another important initiative aims at promoting the further development of the local debt market. I am pleased to announce that the Hong Kong Monetary Authority will be launching the first quarterly issue of 7-Year Exchange Fund Notes later this month. Our Monetary Authority introduced the Exchange Fund Notes Programme in 1993 as a monetary discipline and to foster local debt market development. We have no budgetary need to borrow. The development of Exchange Fund Notes has provided a reliable benchmark yield curve for HK dollar debt. We have successfully issued Exchange Fund paper up to 5-Year maturity since 1993, and the tight spread above US Treasuries yield indicates no significant premium required by the market for the 1997 factor. With our unique market-making arrangements and an efficient clearing system, the Exchange Fund Bills and Notes market is already one of the most active debt markets in Asia. We believe that now is the right time to extend the yield curve by issuing 7-Year Notes. This will be another milestone in our efforts to develop Hong Kong’s debt market. As a reliable benchmark yield curve across a wide spectrum of maturities is a key component of the market infrastructure.

Finally, let me congratulate the Hong Kong Monetary Authority for organizing this important Seminar. I wish this Seminar great success and all of you a pleasant stay in Hong Kong.

Thank you.
KEYNOTE ADDRESS

GLOBAL PAYMENT SYSTEMS

THE CHALLENGES FOR CENTRAL BANKS

Ernest T. Patrikis
First Vice President
Federal Reserve Bank of New York

It is indeed my pleasure to be here with you today to discuss payments issues from the perspective of a central banker. I congratulate Joseph Yam and his colleagues for putting together a program that has drawn so many experts from the public and private sector, around the world. I hope that, over this day and a half, we can challenge you.

This morning I would like to start off with some general observations regarding payment systems and central bankers. Then, I would like to make some observations on payment systems issues. I will do this in the context of risk analysis. If there is a message that I want to convey to you, it is that these issues seem to be universal. That said, the solutions do not need to be uniform. Each jurisdiction will resolve those issues in the context of its social, political, and economic state of affairs. For us in the United States, we are in the unenviable position of taking a system created some time ago and getting it right. For those of you now moving to real-time gross-settlement systems for the first time, I envy your ability to learn from our mistakes.

WHY ARE CENTRAL BANKS CONCERNED WITH PAYMENT SYSTEMS?

Central banks are concerned with price stability and market stability. These two goals are directly related to the three main functions of a central bank or monetary authority (I use these terms interchangeably). The three main functions of a central bank (and not all central banks have the same degree of direct involvement in each of these functions) are: (1) formulation and implementation of monetary policy, (2) bank supervision, and (3) provision of banking services.

Price stability, of course, refers to the formulation and implementation of monetary policy. Central banks are concerned with payment systems because many central banks implement monetary policy through their payment system. There can also be other linkages between monetary policy and payment issues because payments can affect the monetary base. For example, in the near term, if smart cards were to be issued by non-bank firms not subject to Federal Reserve deposit reserve requirements, there would be some erosion of the monetary base, but it is anticipated that that erosion would be quite small. It is, nonetheless, a matter that will need to be under continuous review.

Market stability refers to those functions that relate to the smooth, efficient, liquid, and safe-and-sound functioning of financial markets. A central bank’s major concern will be with systemic risk because of its potential for destabilizing the economy. A central bank will be concerned with lesser risks as well. Shocks in the financial markets are likely to have serious consequences for the payment system. Bank supervision plays a role here in ensuring that banks and payment systems are designed to and operate in a
safe-and-sound manner. The banking services provided by the central bank play a role by either providing payments or settlement services for banks or by providing funds liquidity to payment system participants to help ensure settlement of transactions.

Of course, all of this serves to help ensure that savings can be channelled through the economy into investment which, in turn, will result in the provision of goods and services to the economy. Those of us who devote a substantial amount of our time to payment issues must always remember that a payment system is a means that supports that end. It is a service. Indeed, it is the foundation of our financial markets and economies. This foundation must be an especially firm one. My former colleague Jerry Corrigan referred to the payment system as the plumbing of the financial system. I do not know about Hong Kong, but in the United States plumbers are in short supply and are highly paid and must be available around the clock. The same might be said of those in central banks who participate in payment systems, except they might have some doubts about the highly paid characterization.

Much of the focus today is on electronic payment systems. Now I will focus on those systems. But the concerns of central banks regarding payment systems start with that most simple payment tool — currency — moves on through other paper means of payment, including checks and drafts and continues on to the most complex electronic clearing and settlement systems. The means have changed, but our concerns have not changed. I will try to prove that point. The solutions will vary, but the issues have not changed very much. What we are concerned with is the payment aspects of money. Whether we talk about central-bank notes, commercial-bank notes, checks, travelers checks, automated-clearing-house transactions, securities delivery-against-payment systems, wire transfers of funds, or even payment-against-payments systems, we are talking about the uses of different forms of money. Money serves as a store of value and can serve as a payment mechanism. A payment mechanism can be used to discharge an obligation. That is, if I am obligated to you in a stated amount, I will use money to convert my obligation to you into a more acceptable obligation, from your point of view. At the conclusion of the payment, you will want to have as your debtor a bank whose creditworthiness is acceptable to you. You are responsible for determining the creditworthiness of your bank.

What is the purpose of these introductory remarks? It is to indicate that we are dealing with bank credit. Credit can mean risks. What I would like to do for the balance of this presentation is to see how payments and payment systems relate to various forms of risk.

CREDIT RISK

This is the risk that a counterparty — a net debtor in a payment system — will be unable to settle. This is a worse-case analysis, involving the financial failure, the insolvency, or bankruptcy of a payment system participant. There is little credit risk with currency. Indeed, in the United States, under commercial law, the obligee's underlying obligation to the obligor is discharged when currency is accepted in payment. Currency does not, however, involve systemic risk. Other payment mechanisms do. Even the check-collection system can involve systemic credit risk. But there are not many large-value
checks in circulation. I am aware of an instance where the chargeback of a single large-
value check resulted in the failure of the small bank in which the check was first
deposited for collection. In addition, as you know, bank failure is not an unusual event,
in the United States. The Federal Reserve Banks, in addition to be the lenders of last
resort, are also the correspondent bank of last resort. As the financial condition of a
bank deteriorates, it will lose its correspondent banks, who will shy away from the
credit risk presented by a failure. In these cases, the Reserve Bank steps in as
correspondent bank. The Reserve Bank will protect itself from credit risk by taking
collateral and other measures. More significantly, the Reserve Bank and the Federal
Deposit Insurance Corporation, the Federal deposit insurer, will work together, when a
bank fails, to lessen the potential for unwinding myriads of consumer transactions. Our
chief concern is retention of consumer confidence in the payment system.

In the United States, we are still assessing the credit risk inherent in the automated
clearing house (or ACH) system. While the great number of payments over this system
are smaller value consumer payments, it is used for large intra-corporate transfers —
funds concentration. It is not perfectly clear that this system can adequately cope with
credit risk.

I think that most of you are aware of the credit risk inherent in large-value payment
systems such as the CHIPS and CHAPS net-settlement systems and in real-time gross-
settlement systems. You are no doubt familiar with the means used in Fedwire and
CHIPS to manage credit risk — including caps and charging a fee for daylight
overdrafts.

The G-10 central bank governors helped focus our concerns here. These are reflected in
the so-called Lamfalussy standards. While those standards are directed at cross-border
clearing and settlement systems, they are equally relevant to domestic systems as well.
A clearing and settlement system should be able to cope with the failure of at least the
largest net debtor. Some payment systems are seeking to go beyond this standard.

Credit risk can be lessened or eliminated with the use of collateral. Credit exposure can
be secured by the pledging of collateral. Liquid collateral can be used to provide funds
to be applied to complete settlement. However, I have observed that, over the past few
years, collateral has been viewed as a cure-all for credit risk. This raises several issues
that will need to be considered. First, it can have competitive (or should I say
anticompetitive) implications. If a payment system participant can only use, for
example, securities issued by the government of the country in which the payment
system is located, then there will be a tendency for that payment system to foster the
involvement of domestic banks at the expense of foreign banks which would have
relatively smaller amounts. Second, an institution might not have sufficient collateral to
participate in clearing and settlement systems around the world. Its participation in
systems will be limited by the amount of collateral available at a given time.

Third, think of the nature of a commercial bank — a commercial bank is a firm that is a
supervised and regulated, unsecured debtor with respect to its creditors/depositors. The
bank’s assets are to be applied to satisfy its creditors/depositors. If a material amount
of assets are pledged to secure a particular type of non-depositor creditor, such as a
clearing and settlement system, this can have an effect on the creditworthiness of the institution. The credit evaluation of a firm by analysts might lead some to conclude that the institution has a greater credit-risk profile and, therefore, should have a lower credit rating. That is, how well the depositors of the bank will do if the bank fails could depend in a significant measure whether the bank fails during the operating banking day where it has pledged a significant or material amount of assets to participate in clearing and settlement systems or whether it fails later in the day, after those systems have closed. In addition, those providing equity and longer term non-deposit debt financing to the bank may require higher compensation.

One other issue here is that banks and other financial intermediaries participate in a number of clearing and settlement systems around the world. The failure of a major multinational bank will not affect just one system but would likely affect many. There is also the potential here to reduce risk across different systems. Excess collateral pledged for one system might be used to cover an exposure in another. These cross-margining arrangements can be used for securities, futures, and options clearing and settlement systems. This interrelationship among systems offers the opportunity for greater cooperation cross border and could lead to cooperation agreements among authorities.

As I stated earlier, credit risk is not just a large-value payment issue. The use of stored-value cards or smart cards also raises novel credit-risk issues. Will the individual consumer be subjected to greater risks if the issuer of the smart-card obligation is not a bank and is not subjected to supervision?

FOREIGN-EXCHANGE SETTLEMENT RISK – A SPECIAL CREDIT RISK

Herstatt risk is a special form of credit risk. It arises because of the lack of simultaneity between payment systems in different countries and currencies. With due regard for the sensitivities of our colleagues at the Deutsche Bundesbank, I note that foreign-exchange settlement risk existed and occurred long before the 1974 Herstatt failure. But, it was sizable enough in the Herstatt case to bring several payments issues to the attention of commercial and central bankers. Foreign-exchange settlement risk does not simply involve the temporal risk of payment for one leg of a foreign exchange transaction in an eastern time zone and awaiting payment in a more western time zone. Indeed, in the Herstatt case, a bank that made a final CHIPS payment in New York but received an earlier provisional payment in Germany took the risk that the provisional payment could be revoked.

Those of us who regard ourselves as having some expertise in this area were in for a surprise. We learned that foreign-exchange settlement risk involved more than moonlight risk of a day’s payment in two separate payment systems. The Foreign Exchange Committee sponsored by the Federal Reserve Bank of New York demonstrated to me how much we are still learning about payment issues (and why programs such as this are so necessary). The Committee defined foreign-exchange settlement risk more accurately as beginning when an irrevocable instruction to pay is issued and ending when knowledge is received that the payment received has become final. Thus, this risk is more than moonlight risk and can extend for over a five-day
period for each payment. Having quantified this risk as much larger than viewed before, the Committee noted that it could be reduced through improved services from correspondent banks.

The Group of 20, which I believe consists of 19 multinational commercial banks (which shows that commercial banks count as badly as central banks where the G-10 consists of eleven central banks) is considering three arrangements to eliminate foreign-exchange settlement risk. The first is what I refer to as a double-escrow arrangement. The second is a self-collateralized payment-versus-payment system. The third is a bank which would make payment against payment. As my colleague Bill McDonough has stated, we want to see foreign-exchange settlement risk eliminated by Herstatt’s 25th birthday, which I believe is June 1999. We would hope and expect the private sector to develop a solution.

MARKET RISK

Market risk is the risk arising from the volatility of the price of a product in the market. For our purposes, it consists of interest-rate and foreign-exchange volatility. We typically do not associate these with clearing and settlement systems. But they are features of securities, futures, options, and foreign exchange clearing systems. A key variable here is futurity - risk increases in direct relation to the length of time between the consummation of the trade and the final settlement of the transaction. Incidental market risk is associated with collateral, whose value can fluctuate.

This is one of the goals of ECHO in London, which is operational, and Multinet in New York, which is still in its planning stages. These are foreign-exchange clearing and settlement systems. Participants to a transaction can reduce their market risk by use of a multilateral clearing and settlement system. Interestingly, the greatest risk encountered by the designers and managed by the operators of these systems is not market risk but much greater settlement risk.

LIQUIDITY RISK

Liquidity risk relates to a firm’s short-term lack of funds (funds liquidity) or its inability to enter into transactions necessary to carry out the firm’s business (market-access liquidity). Central banks can address a bank’s or the market’s funds liquidity needs through discount-window facilities and open-market operations. Central banks do not, however, as a rule provide transactions liquidity to banks. Bankers need to have contingency plans to deal with these risks.

OPERATIONAL RISKS

This is a well-known risk. It relates to whether payment system participants and the system in which they participate are robust enough to weather a storm, literally and figuratively. The Fedwire system has more than three levels of contingency. Each of these levels of contingency is supported by contingency arrangement for telecommunications and electrical power. We believe that Fedwire is such an essential part of our financial markets that prolonged down time is not acceptable. I am sure that the same could be said about CHIPS.
Security risk is also an aspect of operational risk. The ability of an interloper to cause a system to crash or to initiate fraudulent transfers will be a matter of continuing concern. Many of you have probably heard about the individuals from St. Petersburg, Russia who managed to penetrate a major United States bank's system, with fortunately small loss to the bank. There is a constant need to reconsider access control – whether that money is in paper or electronic form. In part this is a matter of cost/benefit analysis; in part, this is a matter of payment system confidence.

Throughout this conference you will hear much about the operational side. One of my functions is to serve as the Product Director for Wholesale Payments for all of the Federal Reserve Banks. The one thought that stays with me is that, once established, these systems are not easily changed. They are like large supertankers. Much testing must go into each change. A lot of thought and action must go into each change.

LEGAL RISK

I am not referring to the high costs of lawyers. Legal risk can be defined as the risk that the payments made and/or settle over the system will not be valid and binding. This can result from an ultra vires transaction – the entity does not have the authority to engage in the transaction. It can result from the fact that the individual authorizing the transaction for a corporation does not have the authority to do so. It can result from the provisions of bankruptcy statutes.

Bilateral settlements typically present little difficulty from a legal perspective. Multilateral arrangements have proved to be more difficult to address. While logic tells us that a multilateral settlement should be as valid as a bilateral one, there tends to be little statute or case law on point. A number of countries have amended their laws to eliminate any ambiguity here. That was done in the United States. One of our chief goals was to eliminate any lingering questions regarding the validity of CHIPS settlements.

Legal problems become more complex in a multinational arrangement. There are still many issues to be explored regarding the bankruptcy of a multinational bank operating through branches.

Smart cards raise issues of legal risk. While in the United States we have specialized commercial-law legislation to deal with the collection of paper instruments and with wire transfers of funds, and we have consumer legislation to deal with many aspects of ACH, debit card, and ATM transactions, we do not have a specialized law to address many of the issues posed by smart cards. Should we prevent the implementation of smart card arrangements until we can adopt that legislation? The answer is “no”. We need to allow these experiments to grow. Some will survive; some will not. We will study these arrangements and look to devising solutions to problems. On the other hand, we expect the providers of these new consumer payments services to adequately inform their customers of their rights and obligations and risks.
REPUTATIONAL RISK

This is the risk that a significant erosion of the reputation of a firm or a payment system will cause counterparties to refuse to do business or have transactions with the firm or over the system whose reputation is impaired. One part of a firm’s reputation will be its history of dealing with others honestly, fairly, and in good faith. For example, a bank receiving an erroneous payments from another should promptly notify that bank and promptly return the funds as requested.

Another aspect of reputational risk may be a bank’s reputation of being able to meet customer needs.

INTELLECTUAL RISK

This is the risk that can result from the failure of a market participant or system operator to have on hand individuals with the requisite skills. A colleague of mine recently retired from the Federal Reserve Bank of New York. She had worked at the Bank for over 20 years, a good number of them on the transfer against payment of book-entry United States Government securities over Fedwire. To me, one of her outstanding traits was that, in times of stress, she was the captain of her ship, standing on the deck giving orders to her staff calmly, while bullets and cannon balls were flying around her head. She is not easily replaced.

This is also true of the applications staff, who with enormous pressures on their backs need to analyze a problem and devise the best solution as promptly as possible. Keeping such a staff on board when an institution itself is going through a difficult financial situation is extremely important.

OFFICIAL RISK

Official risk is the risk that official policy will cause market or payments system participants to act in a less than prudent manner. The potential for official risk can be reduced by the public and private sector working hand in hand. New policies or procedures can be proposed in a transparent manner.

It is best, I believe, for the public sector to allow the private sector to address a problem before the public sector does so. Instead of mandating the solution to a problem, the Federal Reserve can nudge the New York Clearing House to devise its own solution to a CHIPS problem. Indeed, that is how many of the improvements in CHIPS over the years came about.

SYSTEMIC RISK

This is the risk that the failure of one participant could lead to the failure of others. For large-value payment systems, this risk is significant. One could ask the question whether this risk is so great in net-settlement systems that net-settlement systems should be prohibited and only real-time gross-settlement systems should be permitted.
to handle large-value payments. My answer is: “It depends”. That may not be entirely clear from what you see in the United States. To me, it depends on whether both systems are operating in a safe-and-sound manner. The Federal Reserve has devoted considerable resources over the past 15 years to helping ensure that CHIPS (and by this I really mean the CHIPS participants) are operating in a safe-and-sound manner. Federal Reserve “nudging” resulted in the move to same-day settlement and then to having that placed on a safer basis. The solutions were devised by the payment-system participants, who without the central bank’s nudging appeared to have difficulty reaching a consensus. In fact, considering the larger number of U.S. dollar payments made, I am not sure that all of those payments could be made over Fedwire within existing constraints. I would be interested in seeing that modeled. In addition, having a private-sector alternative also serves to inspire those responsible for Fedwire to keep that system under continuous improvement and to keep costs as low as possible. Finally, we believe that the risks associated with net-settlement systems can be managed adequately by system participants and operators.

To help ensure that this is the case, the bank supervisors have a key role here. Payment systems, such as CHIPS, are regarded as providers of services to banks. The Federal bank supervisors have the authority to conduct on-site examinations of such systems and do so annually. Copies of that report of examination are provided to participating banks. Of course, bank examiners also examine the operations of banks participating in payment systems.

Significant efforts to help eliminate the potential for systemic risk have emanated from the G-10 central bank governors. The Lamfalussy report, which I mentioned earlier, sets out minimum standards for evaluating cross-border clearing-and-settlement systems and went on to set out how central banks should interact in judging new systems. The G-10 central bank governors payment committee has gone on to explore delivery-versus-payment systems. For those of you who have not read these various reports, I commend them to you.

CONCLUDING REMARKS

But in the end, risk management is not the responsibility of the official side. That responsibility falls largely on the management and directors of firms. We on the official side recognize that we cannot expect the directors of a major or minor bank to have detailed working knowledge of clearing-and-settlement systems. But the directors and senior management of a bank do have a responsibility to ensure that the bank’s staff is managing participation in these systems worldwide prudently. That is an awesome task. I like to think that we on the official side are there to help you in that process.
The title of my speech this morning is 'Interbank exposures in the international payment systems'. Before addressing the cross-border dimension of interbank exposures and payment system risks, it is perhaps worth taking a few moments to consider what we mean by international payment systems or even the international payment system.

If by an international payment system we mean a formal interbank clearing and settlement arrangement which operates on a cross-border basis and is not tightly linked to a single jurisdiction, then the number of available candidates is distinctly limited. The only genuine international system for high-value payments that comes to mind is the ECU Clearing, which is run by the ECU Banking Association in Paris, and settles across accounts in the Bank for International Settlements in Basle, in Switzerland. In due course, the proposed TARGET system, for handling cross-border payments in the European single currency in Stage III of Economic and Monetary Union, would also fall in this category. For retail transactions, VISA and Mastercard can also reasonably claim to be international payment systems. Otherwise we are faced largely by interconnected national payment systems.

There is, however, a sense in which it is entirely appropriate to speak, like the title of this Seminar, about a global payment system or systems. Large international banks (and many which are not so large) need to process payments in a range of currencies, and to do this they need to participate in some way in all the relevant payment systems around the world. Probably the most common form of participation is an indirect one, in which banks utilise the services of correspondent banks to process payments on their behalf in the local currency. A less common, but nevertheless significant, approach is direct participation in a foreign payment system, through a branch in the country concerned. Either way the result is that a very large number of banks, all round the world, have some form of participation in the large-value payment systems of the world's traded currencies.

And whether they opt for direct membership or indirect access, banks can direct huge volumes of payment orders around the world using electronic message carriers such as SWIFT. Together, these relationships create a recognisable global payment system.

Nevertheless, it is important to recognise that the key linkages between systems take the form of common membership and usage, and not of direct links between the systems themselves. For high-value transfers the basic model is still one centred on...
self-contained national payment systems, each handling its own currency and only that currency, and each having its own distinct rules and technical features and operating in a unique legal environment. These differences between systems may often be fundamental; they need to be studied carefully if we are to have a proper understanding of the risks which banks incur when they handle international payments for themselves or for their customers. While we may debate quite what we mean by the international payment system, the potential undoubtedly exists, unless countermeasures are taken, for problems which emerge in one financial centre to be magnified due to settlement arrangements and practices and to be transferred to other economies through cross-border payment linkages which involve a series of inter-bank exposures. We should never forget that payment systems can transmit shocks, as well as, or perhaps instead of, transmitting payments. At the international level, these shocks can be transmitted through the common membership and usage of our national payment systems.

From the perspective of a central banker, therefore, the over-riding policy concern is to ensure first that these inter-bank cross-border exposures are fully understood, and second that effective steps are being taken to reduce them and even, where it is possible and cost-effective, to eliminate them. We all, central bankers and commercial bankers alike, have to work together to eliminate “systemic risk” – the risk that a settlement problem in one country’s domestic payment system can, through the linkages I have described, create settlement problems around the world.

THE SOURCES OF INTERBANK EXPOSURES

Let me now turn to discussing possible sources of interbank exposures in the global payment systems. I will look at 3 possible sources – exposures arising from the design of the relevant domestic payment systems; exposures resulting from the provision of correspondent services; and exposures resulting from the settlement of banks’ own transactions in the financial markets, and in particular in the foreign exchange market. In discussing each of these sources, I will try to show how an exposure that may seem on the face of it to be a purely bilateral matter between two banks can in fact have a multilateral and multinational dimension.

(i) Payment System Design

I will start by looking at the way in which the design of a domestic payment system can generate interbank exposures. For simplicity, let us consider an electronic funds transfer system handling credit transfers. In such a system, there are, in essence, two processes which occur. First, throughout the day there is an exchange of payment instructions between member banks; second, interbank settlement takes place. This may be continuously in real-time throughout the day, as the payment instructions are exchanged, or at fixed points. Under the latter approach, the settlement, which typically occurs at the end of the day once all payment instructions for that business day have been exchanged, is based on the transfer of net balances between all the banks in the system, usually across their accounts with the central bank of issue of the currency. (If the transfers settle across accounts with a commercial bank, an additional, but avoidable, element of inter-bank credit exposure is created.)
This delay between the exchange of information and the subsequent interbank settlement, in a net settlement system, causes an immediate funding, or liquidity, problem in the event of a default by a system participant. If that default occurs before settlement has taken place, the surviving banks in the system are likely to end up with larger deficits, or smaller surpluses, than they were expecting, since their anticipated receipts from the defaulting bank would simply not materialise. The surviving banks would need to borrow, if they could, and at any price, to cover this liquidity shortfall so that they could meet their own commitments to the other banks in the system. In such circumstances, the central bank would be likely to come under strong pressure to lend, with or without collateral, if it was to prevent a wholesale default by the survivors frustrating the settlement of all payments in that currency that day. It is not clear to me that this is a proper burden for the central bank to accept (even leaving aside the impact of such a potentially massive lending operation on its monetary policy or other objectives). I recognise, however, that if the central bank does not accept that burden, and the payments due in that currency that day are not settled, the impact will be felt by all those banks and other institutions around the world with short-term liabilities or claims in that currency. I emphasise this point because it is a liquidity problem that is in the first instance most likely to trigger a general systemic problem.

There are of course ways to address this potential liquidity problem in a domestic payment system. One way is to retain end-of-day settlement but to have in parallel a system of limits to control the interbank exposures during the day. This is an approach which is favoured by CHIPS in the USA. It has its undoubted advantages, where it is supported by collateral through a liquidity-sharing and loss-sharing arrangement, but it has its drawbacks also, in respect of the amount of collateral required, if all the requisite payment flows are to be handled in timely fashion – potentially a costly burden if the system is the only large-value payment system for the currency in question. It can also be subject to important legal vulnerabilities, which could make it an unacceptable approach, on public policy grounds, in some countries.

An alternative approach to tackling interbank settlement risk, which seeks to eliminate the fundamental cause of the problem rather than to control it, is to bring forward the time of settlement, so that payment processing and settlement take place in real time on a transaction-by-transaction basis. A property-structured real-time gross settlement system (RTGS), based on accounts at the central bank, offers settlement banks and their customers the assurance that all payments received ahead of the default of a member of the system are final and will not be unwound. It eliminates the inter-bank exposures which are an inescapable element of a net settlement system.

RTGS has a number of benefits, but I will not go through them now, since I expect that several of my fellow speakers in this seminar will cover these benefits more fully than I can. I would like instead to point to one particularly important aspect of any RTGS system – namely the provision of intra-day liquidity to its members. In one way or another, this is normally the task of the central bank. Having eliminated interbank exposures by introducing RTGS, a decision on the part of the relevant central bank to provide unsecured intra-day overdraft facilities as a source of liquidity would simply serve to transfer credit risk from every bank in the system to the central bank. If these
overdraft facilities were also unlimited in size — as, of course, in theory they could be, since the central bank can create money without limit — all liquidity constraints would be eliminated. Such an approach has, however, understandably failed to recommend itself to most central bankers and the preferred options have therefore been (i) to cap the scale of intra-day overdrafts through limits, and to charge for the use of those overdrafts (e.g. Fedwire in the USA), (ii) to provide ‘daylight’ funds against collateral or repos (e.g. CHAPS in the UK and TBF in France, and the reformed CHATS here in Hong Kong) or (iii) not to provide additional intra-day credit at all (e.g. SIC in Switzerland). Whichever approach is chosen, it is necessary to ensure that it will provide sufficient intra-day liquidity to enable the payment business of the members of the system, and of their customers, to be handled in timely fashion. (That requires, of course, that there is sufficient high-quality collateral available to secure the liquidity needed.) If the liquidity, or the collateral, is insufficient, it may cause payments to be considerably delayed during the day — which could be inconvenient for the beneficiary, or his banker; it is even more problematic if a lack of liquidity on one day causes payments to be held over until the next business day.

If the design of an RTGS system, or the way in which it is operated, cannot accommodate the legitimate payment business of that currency, that may of itself be a serious situation for the currency, because it will provide an incentive for the market place to establish another payment system, which may be less secure and robust. If the RTGS system is linked to one or more securities settlement systems, to provide the most robust model of a Delivery versus Payment (DVP) facility, then a lack of liquidity in the RTGS system is definitely a serious matter, because it may block the settlement of transactions in the securities market, producing a form of national gridlock. If the RTGS system in one country were to be linked to the RTGS system in another country, to provide a Payment versus Payment (PVP) facility — a key feature of your plans here in Hong Kong — then a lack of liquidity in one of those two RTGS systems would become still more serious, because it would create a cross-border gridlock, which could go so far as to stop banks in two countries from making payments on the due day. All of us would, I think, classify that as a systemic problem.

Again, you see, the picture is of an international systemic problem being sparked off by a liquidity problem in one country’s payment system.

(ii) Correspondent Services

I would now like to turn to the second of the three sources of interbank exposures which I mentioned earlier — namely exposures resulting from the provision of correspondent services. The major banks in every country act as correspondents in the handling and settlement of payments in the local currency for other banks who are not members of the local payment system. Those other banks will include local banks, if the domestic payment system has a tiered membership structure (e.g. the UK, where there are only 16 direct members of CHAPS, and some 470 other banks operating in the UK make or receive their large-value payments through one of those 16); they will also include banks outside that country — indeed they may be almost entirely based abroad, as is I think largely the case for the correspondent customers of the US banks in Fedwire, or the Swiss banks in SIC.
Whether those customers are local or foreign, they can create substantial intra-day exposures for their banks. If the currency in question is paid through an RTGS system, the correspondent banker – the member of that system – is likely to be under some pressure to make payments for the other banks, which are its customers, as early as possible in the day. Indeed the tariff applied in the RTGS system may offer a positive incentive to make payments early. This risk is, however, that the originating customer will default after the payment has been released, and cannot be revoked, but before its cover payment has come in. The correspondent banker can try to manage that risk, by imposing an intra-day credit limit on each of its bank customers. It may even seek collateral to cover that intra-day exposure, but that is not necessarily an efficient process, for a very short-term exposure. The intra-day exposure can of course be eliminated if the correspondent bank only makes payments for its customers once the cover payments have been received. Experience suggests, however, that in practice competitive pressures between correspondent banks are usually too keen to allow this option to work. Moreover, it still raises a liquidity issue. If the cover payment is not received, the paying correspondent bank may be unable to make other payments due that day, with potentially adverse implications for the intended beneficiaries, local or foreign, who will themselves be unable to settle their own obligations by way of clean payments, or of payments in a DVP or PVP facility.

There may indeed be a case for arguing that some RTGS systems depend, for the smooth handling of their payment traffic, on the willingness of their member banks to create intra-day liquidity by releasing payments from their correspondent customers before the cover payments have come in. The scope for this is clearly limited by the overall amount of intra-day liquidity available from the central bank: but correspondent banks can certainly inject liquidity into their payment systems, if they are willing to accept the credit risk on their customers. So a system's liquidity problems may be eased, but at the expense of increasing credit exposures. Put the other way round, the elimination of an individual bank's credit exposures may create liquidity problems for many other banks, and for particular payment systems. It is potentially an uncomfortable situation for the relatively small number of banks who act on a large scale as correspondents in their domestic currencies, and who effectively channel the world's transactions in those currencies. Again, there is the potential for the global spread of a national liquidity problem.

(iii) The Settlement of Banks’ Own Transactions

The third source of inter-bank exposures which I would like to mention this morning concerns the exposures which banks incur when they settle their own transactions in the financial markets, and in particular the fx market. Discussion of cross-currency settlement risk, perhaps better known to some of you as Herstatt risk, follows neatly on from a discussion of correspondent banking, because one of the largest single sources of correspondent traffic is the need to settle foreign exchange transactions.

Cross-currency settlement risk is the risk that on the due date of an fx deal, spot or forward, one party to the deal pays away irrevocably the currency he has sold, but does not receive the currency he has bought because the counterparty has defaulted. The risk results from the inability, or unwillingness, of the parties to the deal; or their banks, to
co-ordinate the settlement of the two legs of the deal, so that either both legs are paid or neither is paid. A number of factors come together to create this risk: some can be controlled, at least in part, by individual trading and correspondent banks, while others are either industry-wide or global in scope. This is not the occasion to discuss these factors in detail. All I would like to do this morning is to say something about the nature and potential scale of this type of exposure.

There have been plenty of instances of market stress over the years to show that cross-currency settlement risk is not just a theoretical concept. The failure of Bankhaus Herstatt in June 1974 provides a useful example of how exposures can crystallise; it also, of course, provided a convenient name for the risk. You may recall that Herstatt got into difficulty through overtrading in forward foreign exchange. The German authorities closed the bank during the day, after it had received DM from some of its counterparties, on deals due that day, but before it had paid out the US$ it was due to deliver.

While the failure of Herstatt was a prominent example of its type, it was hardly an isolated cause. It is possible to point to a number of situations in recent years, which have either resulted in cross-currency settlement exposures turning into actual losses or where there have been near-misses. The most noticeable ‘tremors’ from the perspective of the wider market have been the problems associated with Drexel Burnham Lambert in 1990, the difficulties experienced by some Arab banks following the invasion of Kuwait later that year, the attempted coup d’etat in the former Soviet Union in 1991, the closure of BCCI in the same year and the Barings episode earlier this year. No doubt many of you can think of other, less well-publicised, examples, which may be specific to your own institutions.

When looking at cross-border settlement risk, we need to bear in mind the growth in fx settlement flows in recent years and the importance of such traffic in national high-value payment systems. Total turnover in the foreign exchange market is in the region of $1.2 trillion per day, which on some calculations would lead to daily settlement flows of $4 trillion or more. While in practice the daily flows will be lower than this as a result of netting arrangements, the flows still amount to trillions of dollars every day. Activity on this scale means that a significant proportion of the traffic in high-value payment networks of the widely traded currencies tends to be related to the settlement of foreign exchange trades. In the UK, the most recent estimates we have suggest that perhaps half the values passing across CHAPS each day represent settlement of the sterling leg of fx deals - perhaps £50-60bn. It is also about 50%, or $600 billion, in CHIPS. In other systems, the proportion may be higher, and in SIC this figure may approach 90%.

A lot of work is being done now in search of ways to eliminate, or at the very least to reduce substantially and permanently, the scale of cross-currency exposure arising from the settlement of fx deals. This work involves commercial banks in a number of ways, including through the Group of 20 and through schemes such as the multilateral foreign exchange clearing house, ECHO, which started operating in London in mid-August handling transactions in a range of currencies, including the HK dollar. G-10 central banks are also working on the subject, through a group which I chair and which meets
regularly in Basle. The reason we are all doing this work is that we all agree we cannot accept the indefinite continuation of settlement exposures on this scale. Cross-currency settlement exposure is primarily a liquidity exposure; although it originates as a bilateral inter-bank exposure it has by definition an international, not to say global, reach, potentially impacting on all our domestic payment systems.

ELECTRONIC CASH

If I can move briefly away from the subject of fx settlement risk before I conclude my remarks, one further topic which I should like to mention as being of potential interest in assessing risk for the international payment system is the subject of electronic money. Along with PVP, cyber-cash, quantum money, virtual money and other exotic concepts appear to be popular conference topics at present. I think this interest is timely, although we need to distinguish the reality from the media hype. The use of the Internet to collect and to transfer value and the possibility of the wide-scale use of ‘electronics purses’ has the potential to change very considerably the way in which the money transmission business is structured at the retail level, which is where millions rather than thousands of transactions take place each day. Again, this topic alone would justify a speech; all I wish to do at present is to indicate the variety of challenges before us and to note that while we have tended to think in terms of high-value payments when considering payment system risk, we cannot afford to let our attention drift away from what is happening in other sectors of the market.

CONCLUSION

Central banks and commercial banks no doubt have their own specific concerns when discussing high-value payment system issues but I hope I have been able to show that they also have some common interests. The agenda for each central bank is to ensure that each large-value payment system is both efficient and secure; that it meets the needs of the national economy and the financial markets and, in particular, of monetary policy; that the participants in the system understand, and are able to accept and to control, their credit and liquidity exposures without undue reliance on the central bank; and that linkages between its own domestic system and the large-value systems in other countries are not such as to create, or to magnify, shocks. The commercial bank agenda is to ensure that the payment systems in which they participate, or on which they rely for settlement of their own and their customers’ transactions, are efficient and cost-effective, and leave them scope both to manage their risks and to charge their customers for the risks created by, or on behalf of, those customers. The common goal – the vision which I think has in recent years increasingly come to be shared by central banks and commercial banks – is to ensure that these payment systems are designed to contain settlement problems, rather than to transmit them between national economies.

Perhaps I can leave you with a thought inspired by a 16th century English poet. John Donne wrote in a famous passage “No man is an island, entire of itself”. I would suggest, to the global banking community (and with humble apologies to Donne) – “No payment system is an island, entire of itself”. Until our systems are reformed, we are all vulnerable to problems in each other’s systems.
INTRODUCTION

The label "Real Time Gross Settlement System" (RTGS) is usually applied to electronic interbank funds transfer mechanisms, which settle large-value payments individually and sequentially via the books of the central bank. Settlement in such systems is final in the sense that it means an unconditional and irrevocable transfer of central bank money from the sending bank to the receiving bank. That is, the receiving bank receives a settlement medium which is free of credit and liquidity risks. The classic example of this arrangement is Fedwire, the wire transfer system operated by the Federal Reserve System in the United States. In net settlement systems, on the other hand, payment orders represent commitments to transfer funds. Settlement of these transfers occurs at discrete-time intervals – commonly at the end of a clearing day – on a net basis. The classic example of this arrangement is CHIPS, the large-value dollar transfer system operated by the New York Clearing House in New York.

The majority of the existing large-value interbank transfer systems are net settlement arrangements. If unprotected, important systemic risks can be created by such schemes. With the spectacular growth of financial markets in the past two decades and the associated growth of interbank payment flows, RTGS mechanisms have attracted – as an alternative – considerable attention from payment system designers in many countries. Prominent examples are the countries of the European Union, the People’s Republic of China, Hong Kong, Korea, Thailand and several other countries represented at this seminar. RTGS now seems to have become the norm for the renovation or development of large-value funds transfer mechanisms. The debate over what constitutes an optimal settlement arrangement, however, has only recently been started. So far, it has not led to conclusive results. The distinction between the two polar arrangements is not as clear-cut as one might expect. In reality, the issues are complex. The comparison of benefits and costs is a difficult task, and the results may depend on whether the analysis is made from the point of view of the central bank – the lender of last resort – or from the point of view of individual market participants. Therefore, the question is likely to remain controversial for some time to come.

In what follows, I will discuss key features of RTGS schemes. The focus will be on liquidity and credit risk aspects. The discussion will be based on a concrete example, the Swiss Interbank Clearing (SIC) system, which has been operating in Switzerland since 1987.

A CONCRETE EXAMPLE – SIC

SIC is used by banks located in Switzerland for interbank credit transfers of Swiss francs. It is a central facility to which presently 210 participating banks are linked on-
line by computer-to-computer connections. The system operates around the clock on bank business days. Settlement is limited to about 22 hours. A value day starts at around 6 p.m. and ends at 4:15 p.m. of the following bank business day. The system was designed for large-value transfers, but it is also being used for small-value transfers. In 1995, 382,000 payments were processed by SIC on an average day and about 1.2 million payments on the peak day.

The daily value of the SIC payment stream was 128 billion Swiss francs on an average day and over 250 billion Swiss francs on peak days. The balances needed for the processing of this payment stream presently amount to around 2.3 billion Swiss francs. This means that a Swiss franc is turned over around 60 times on an average day and over 120 times on peak days.

Demand deposit (or reserve) accounts of the participating banks with the Swiss National Bank (SNB) are administered on the central SIC computer. Debit and credit entries into these accounts are final, that is unconditional and irrevocable. Thus, funds transfers made through SIC represent final transfers of central bank money.

A payment order is settled by SIC if and only if the sending bank has sufficient balances in its account. Overdrafts are not allowed. Uncovered payment orders are automatically held pending in a “waiting queue” until sufficient funds have accumulated from incoming payments and are then automatically released for settlement. The settlement sequence is determined by the priority code which may be attached by the sending bank to the payment order and, for a given priority level, according to the first-in, first-out rule.

Queued payment messages are not released to the receiving bank and may be cancelled any time by the sending bank. The queuing mechanism has no netting or other optimization capabilities. Queue management is only possible through cancellation of a payment order and re-entering it. Payment orders for same-day settlement which are still pending at the end of a SIC day in the waiting queue are automatically deleted by the system and have to be re-entered by the sending bank for settlement on a later value day.

A participant has real-time access to all data available in the system relating to his account. Thus, a participant can monitor settled incoming and outgoing payments, the actual balance of his SIC account as well as queued incoming and outgoing payments.

Since March 1995 the real-time securities clearing system SECOM operated by SEGA, the Swiss Securities Clearing Corporation has been linked to SIC. This link provides a simultaneous delivery-versus-payment (DVP) procedure for securities transfers on a trade-by-trade basis. SECOM earmarks the securities to be transferred and sends the related payment message to SIC. SIC debits and credits the accounts of the buying bank and the selling bank respectively as soon as the buying bank has sufficient funds in its SIC account. The settlement of the transfer is then confirmed by SIC to SECOM, and SECOM transfers the earmarked securities irrevocably. Presently, about 20,000 securities transactions with a value of around 4 billion Swiss francs are settled on an average day through this DVP procedure.
In this outline of the system being operated in Switzerland I have mentioned features which shape the characteristics of RTGS systems. In practice, different designs have been implemented or are being implemented. The variations may result from historical circumstances, differences in the legal system, and so on. In the following I will discuss some variations of features which I believe to be important for the smooth functioning of an RTGS system.

### SIC - Automatic queuing mechanism

- Payment order released by A
- Funds?
- Debit/Credit
- Release payment to B

### SECOM & SIC - DVP, trade-by-trade

#### SECOM
- Earmark securities
- Transfer securities

#### SIC
- Transfer funds

**MESSAGE FLOW**

The design of the flow of payment and settlement messages has important implications for the characteristics of an RTGS scheme. Different designs have been proposed in the past few years. The simplest is the so-called V-structure. In this structure the payment message is sent by the sending bank to the central bank. After settlement, the central
bank sends the payment message to the receiving bank and thereby confirms the settlement of the payment order. Examples of this design are Fedwire and SIC.

In the Y-structure the payment message is sent by the sending bank to the node located at the joint of the “Y”. Settlement data is then stripped from the payment message and sent to the central bank for settlement. After confirmation of settlement by the central bank, the payment message is delivered to the receiving bank. This design is under consideration, for example, by the Banque de France and by other central banks which rely on the communication services of S.W.I.F.T. for implementing their large-value payment systems.
The so-called L-structure is being implemented in the CHAPS system operating in the United Kingdom. In this design, the sending bank first sends a settlement request to the central bank. After confirmation of settlement the payment message is then sent to the receiving bank.

Message Flow – L

Central bank

Sending bank

Receiving bank

The basic common element in these designs is that the payment message is released to the receiving bank only after settlement has occurred. An alternative design is the so-called T-structure. In this structure the payment message is sent to the receiving bank already prior to confirmation of settlement by the central bank. As a result, there will be a time lag – the “settlement lag” – between the receipt of the payment message and the confirmation of settlement. Since it may be difficult for receiving banks to distinguish between settled and unsettled payment orders in this scheme, they are likely to put them in the same basket and act upon this information. This would result in similar credit and liquidity risks as observed in unprotected net settlement systems.
SETTLEMENT MECHANISM

In an RTGS system, settlement of a payment order occurs by transferring reserve balances from the account of the sending bank to the account of the receiving bank. Since, as a rule, central banks do not pay interest on reserve balances, participating banks will economize their holdings of reserve balances as far as possible. The value of the daily payment flow may therefore exceed the stock of reserve balances by a wide margin. For example, in SIC reserve balances are turned over about 60 times on an average day and over 120 times on peak days. This means that incoming payments are an important liquidity source for outgoing payments. If incoming and outgoing payments cannot be synchronized to such an extent that outgoing payments are always covered by existing balances, there are three possible reactions by an RTGS system.

First, the balances needed can be created by allowing the account of the sending bank to be overdrawn, that is by extending credit from the central bank to the sending bank. The expectation is that these credits would only exist during short time spans and would be extinguished by balances resulting from incoming payments before the end of the processing day. Whether such daylight overdraft credits should be limited, priced and/or collateralized depends on risk, cost and monetary policy considerations.

Second, the uncovered payment order can be rejected by the RTGS system. The sending bank will then have to resubmit it again for settlement at a later time. For large payment volumes this solution presupposes the existence of automated queuing mechanisms within the participant’s own systems which interact with the RTGS system until the settlement conditions are fulfilled. The mechanism has the effect of delaying the settlement of an uncovered payment order until sufficient balances have been made available.

Third, an uncovered payment order can be held pending by a queuing mechanism implemented on the central RTGS processor until sufficient balances have accumulated.

The common element of the second and third options is the delaying of the settlement of uncovered payment orders by queuing mechanisms until sufficient balances are available for settlement. A combination of one of these options with the overdraft option is, of course, possible and is considered for several schemes which are presently being constructed.

QUEUING MECHANISM

In what follows, I shall assume a centralized queuing facility – the option chosen for most RTGS systems. The processing sequence, the transparency of queued (or pending) payment orders to the sending and receiving banks, and the revocability of queued payment orders are key issues for the design of a queuing mechanism. They have important implications for liquidity and risk management.

(i) Processing Sequence

The liquidity necessary to process a given payment flow crucially depends on the processing sequence.
The simplest choice is the first-in, first-out rule. This rule has the effect that payment orders are settled according to their input sequence. In this scheme, uncovered large-value payment orders may cause small-value payment orders to be queued even though sufficient balances would be available for their settlement. This rule governed the operation of SIC until 1994.

A more flexible approach is to allow a sending bank to assign a priority to a payment order and to process the payment flow according to priorities, and, for a given priority, according to the first-in, first-out rule. This approach gives the sending banks more flexibility in the management of their payment flow. It was implemented in SIC in 1994.

Both methods are static in the sense that, once the sending bank has made its choice regarding the priority and the input sequence, the settlement sequence is determined and cannot be changed. This restriction could be relaxed by a facility which enables a participant to dynamically change the sequence of its queued payment orders, for example, by enabling a participant to point to a payment order which should be given the highest priority. Such an additional option is planned, for example, by The Nederlandsche Bank for its TOP system.

All three methods mentioned so far ensure that the settlement sequence is determined by the sending bank. It is a matter of debate whether changes in this sequence by a third party, that is by manual interventions of the RTGS operator or by an optimization algorithm of the settlement facility, are a desirable further option to increase the efficiency of an RTGS system. One concern is that the central bank could be made liable, if, as a result of reordering actions, payments would fail to be made. Another concern is that intervention by the third party could destroy the scheduling chosen by the participant in order to reach certain goals, for example, in order to reduce the settlement lag in foreign exchange transactions. These concerns could be reduced by restricting interventions to day-end procedures.

(ii) Transparency of Queues

The most controversial issue in the present RTGS discussion is probably the question whether a receiving bank should have access to queued incoming payment orders. In SIC, this information is made available on request.

Giving a participant access to queued incoming payment orders may induce him to act upon that information, for example, by honouring a cash withdrawal. If so, he will be exposed to the sending bank in a similar way as in a net settlement system. This is the main argument against making incoming queues transparent to participants. The weight of this argument may depend on the technical implementation of this function. If information on queued payments and the content of the payment message is automatically released to the receiving bank, the mechanism would in fact degenerate to a T-shaped RTGS system with the corresponding exposures. If the information is only available on request, the situation is different. If the receiving bank acts upon the assumption that a queued payment will be executed, it makes a credit decision which - in a properly managed bank - will be subjected to ordinary credit risk management.
procedures. The same result would be achieved by using a different communication channel, e.g. the telephone, but in a less efficient way. Indeed, not providing information on pending incoming payment orders would be an incentive for participants to use a separate communication system for this purpose. This, again, would mean that the mechanism degenerates to a T-shaped structure with its risk implications.

A second -- in practice more important -- aspect to be considered in this context is liquidity management. In an RTGS system which does not allow more or less unlimited overdrafts, queued incoming payments are an important source of liquidity. The relevant information is particularly important towards the end of a day if not all queues are empty. The cash manager will have to make his decisions regarding any adjustments of his position by that time at the latest. If the information on the total amount and the originators of queued payment orders are not readily available, errors are likely to occur. The uncertainty would probably also make more or less frequent postponements of final cut-off times necessary in order to give participants the necessary time for collecting the required information through other communication channels (e.g. telephone calls to other participants). As an alternative, the RTGS could be operated in such a way, that, under normal circumstances, the queues would be empty well in advance of the final cut-off time. This goal could be reached by providing sufficient intraday liquidity to the participants, for example, in the form of unpriced daylight overdraft limits.

(iii) Revocability of Queued Payment Orders

The question regarding the revocability of queued payment orders has so far not received a uniform answer. In SIC, a queued payment order can be revoked anytime by the sending bank until the first cut-off without the consent of the receiving bank. Between this first cut-off and the final cut-off the consent of the receiving bank is required. In other schemes queued payment orders can only be revoked by the system operator on request by the sending bank and revocability may be limited to certain conditions, for example, to cases of erroneous payment orders. The third category comprises those schemes which do not allow the revocation of queued messages.

In an RTGS system which queues uncovered payment orders there is the risk that the queued orders will not be executed. In a scheme which restricts or does not allow revoking, receiving banks may rely on the arrival of queued incoming payment orders to a degree which may not reflect the prevailing risks. The revocability rule intends to make the participants of the payment scheme fully aware of this risk.

The revocability of queued payment orders has another important function in RTGS systems which restrict daylight overdrafts. In such systems, gridlocks may be a potential problem. This refers to a situation in which payments do not move because they are all awaiting incoming funds. Gridlocks are likely to occur if participants enter amounts which are large in relation to the reserve base available in the system. If revocation is allowed, such payment orders can be revoked and re-entered in two or more portions. This splitting of very large amounts has proved to be an efficient instrument in the hands of SIC participants to resolve "serious" gridlocks.
(iv) Optimization Procedures

Gridlocks are a major concern in RTGS systems – at least if they last until the end of the processing day. The efficiency of the settlement mechanism could be increased by implementing optimization procedures which reorder queued messages in order to increase the number or value of settled payments, and it could be increased by netting incoming and outgoing payments.

I have already mentioned several concerns regarding intervention in the processing sequence originally determined by the sending bank in the course of the processing day. The question remains whether optimization procedures could help to resolve those gridlocks which remain until or occur near the end of a processing day. The systemic risks associated with such gridlocks can be important. Because of a lack of relevant information and with the exception of very simple cases, the results of an optimization procedure cannot be predicted by a participant. Therefore, rules should be designed in such a way that the participants have incentives to avoid gridlocks. A possible solution is to abstain from optimization procedures and to give participants the option either to take action before the end of the processing day, or to bear the consequences of non-execution of all payments involved in the gridlock. This strategy has been adopted for the operation of SIC following the experience that participants started to rely on manual optimization interventions by the SNB in the initial phase of the SIC operation, thereby increasing the risk of gridlocks with important systemic consequences.

ACCOUNT STRUCTURE

With respect to the account structure, two issues have to be considered. The first issue results from the fact that commonly a central bank as well as the banks participating in the payment system have a number of branches. If so, should the branches of the bank be permitted to hold accounts with more than one office of the central bank, that is, should a bank be allowed to hold multiple accounts with the central bank for payment purposes? The management of multiple accounts poses cash management problems for the bank and risk management problems for the central bank which are difficult to solve. Therefore, as a rule, centralized accounts are preferred for large-value payment transactions. This does not exclude, of course, that supplementary accounts are maintained for special purposes, e.g. cash withdrawals by a bank branch from the local central bank office.

The second issue is the degree of integration of the accounts used for payment and settlement purposes with the accounting system of the central bank. In the Swiss case, these two functions are separated. The accounting system maintains the so-called Master accounts, the SIC system the SIC accounts. Both types of accounts are reserve accounts. At the beginning of a day, balances needed for payment purposes are transferred from the Master account to the SIC account. At the end of the SIC day, the balances of the SIC account are transferred back to the Master account. During the day, balances can be moved anytime from one account to the other. The SIC accounts are used for funds transfers between the SIC participants, the Master accounts for the
remaining operations such as cash withdrawals or money market transactions between the SNB and a SIC participant.

As a result of this separation of accounts, the accounting system and the payment mechanism are only loosely coupled. This facilitates the task of designing optimal data processing and communication facilities for the two functions with widely diverging requirements. For example, it very much facilitates the task of providing a 24-hour payment service and the high availability required for a real-time funds transfer mechanism. The disadvantages of this separation are, of course, the same as those already mentioned with respect to multiple accounts. However, their significance is limited since the payment traffic is concentrated on the SIC accounts and only a very small number of transactions are posted to the Master accounts.

CONCLUDING REMARKS

There are, of course, many other aspects which are of interest when discussing RTGS systems. Operational issues such as the throughput capacity of the settlement mechanism, the reliability of the system itself as well as the participants systems, which are linked to it and the availability of adequate back-up solutions have important implications for the overall operation of the system. Other examples are the links between the RTGS systems and net settlement systems, the supply of intraday liquidity and related issues. I have concentrated my discussion on those aspects which seem to be controversial in today's RTGS arena and on which we have been able to collect some interesting evidence with the operation of an RTGS system in Switzerland.
Thank you for that kind introduction and good afternoon. I commend the Hong Kong Monetary Authority for hosting this seminar. I submit that our Global Payment Systems are at a crossroad and that timely action is needed. While much progress has been made on improving intra-country payment systems, I believe it is now time to pick up the pace on collaborative cross-border initiatives. For, as Peter Allsopp said – no country’s payment system is an island! As I outline my viewpoint for you, I’m hopeful you will come to share my belief that it is indeed time for more concerted action on cross border settlement issues.

As the growth in world trade accelerates, we are experiencing similar growth in the financial markets. For example, there has been an explosion in the number of participants, settlement and custody agents; a tremendous growth in the number and complexity of instruments traded cross-border with a corresponding increase in settlement requirements. And, we have all witnessed the globalization of risk but, have payment system risk management and security improvements kept pace?

First Chicago’s own market research documents show how our customers are globalizing their business. As evidenced by this data, nearly half of our customers already make multicurrency payments and close to 100% make off-shore dollar payments – and this data is a couple of years old. All of the current indicators point toward even higher percentages.

### Globalization Of Payment Systems

<table>
<thead>
<tr>
<th>Percent of U.S. Multinationals Making International Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
</tr>
<tr>
<td>80%</td>
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<tr>
<td>60%</td>
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<tr>
<td>40%</td>
</tr>
<tr>
<td>20%</td>
</tr>
<tr>
<td>0%</td>
</tr>
<tr>
<td>Multicurrency</td>
</tr>
<tr>
<td>Cross Currency</td>
</tr>
<tr>
<td>U.S. Dollar</td>
</tr>
</tbody>
</table>

Source: First Chicago Marketing Survey
At the same time, the increasing richness of our technology options has led to more and more automation. This trend started in the 1960’s and banks and their customers have been leveraging automation ever since. But, as evidenced by our large clerical workforces and the paper-intensity of our processes, progress has only been moderate. I submit that we are now entering a new era which will be so different that I call it a “Discontinuity”.

As you know, discontinuities occur once in a lifetime; that is, they are cataclysmic events. With the price-performance of core technology doubling every 18 months, I believe we are, indeed, experiencing a technological discontinuity. For example, Robert Johansen - a noted futurist - has written that a new technology product is being developed every 20 seconds. It is simply not possible for us to perfect the best ways to harness and leverage the overwhelming technological power available to us before it is leap-frogged by the next generation. In fact, until recently, computer manufacturers lagged in providing the operating systems and tools needed to fully utilize this power. So today we are experiencing a true paradigm shift - from stand-alone transaction processing system to near paperless integratable sets of systems that interoperate with customer and supplier systems. In turn, this is triggering E.D.I. growth and, with it, electronic settlement via financial E.D.I.

Historically, there were three bases of competition in banking – capital, talent and geography – and all three were very important to both the growth rate and success of banks. For example, geographies’ importance is reflected in the fact that strong, growing economic regions have consistently spawned rapidly growing banks. And, indigenous banks have historically had an advantage.

With the increased use of technology to deliver banking services, time has become a fourth basis of competition. Increasingly, both consumer and commercial customers transact business electronically. For example, over 30% of First Chicago’s retail customers no longer visit our branches. And, the forecast is for electronic banking to grow rapidly. In fact, several leading U.S. consumer banks have leveraged call center technology to launch major coast to coast “direct” banking solicitations.

In the future, capital and talent will endure but due to technology, time will almost totally displace geography as a basis of customer satisfaction. This radical shift, as it evolves, is beginning to dramatically reshape how bank budgets are invested. That is, the percentage of expense and capital dollars spent on technology is increasing while the percentage spent on premises is beginning to decline. For example, in the United States, during the past eight years, annual spending on technology by banks has grown from nine-and-a-half billion dollars to nearly seventeen billion dollars and is now projected to grow by an additional 20% by 1997 – well in excess of the rate of inflation. In turn, automated settlement services are also expanding – not only for payments but also for securities transactions.

As securities settlement times shrink, the importance and value of collateral is increasing – in part because the volume and size of payments is growing so rapidly. Going forward, the need to settle more and larger payments in less time will greatly...
exceed the liquidity available within the system. Of course, there will be a premium on highly accurate information posted in real-time, cross-border, and on synchronized laws and regulations to facilitate the "re-use" of both collateral and funds on deposit. As Ernie Patrikis outlined, certain central banks and the B.I.S. have been focusing on these emerging needs but much more work is needed on standardizing the relevant high value commercial legal frameworks.

One indicator of the growth in payment systems risk is the growth in foreign exchange trading. Volume increases in the 3 year period for London, New York and Tokyo were 60%, 46% and 34% respectively and other major markets had similar increases. While netting has held settlement transactions to lower growth rates, some uncertainty remains concerning the variations in legal structures across the globe. The group of 20 is addressing this issue, but, I submit that we collectively need to pick up the pace of our collaborative, cross-border efforts in order to maximize the use of netting so that finality is achieved faster and funds on deposit can be "re-used", that is, freed up to stand behind additional transactions.

<table>
<thead>
<tr>
<th>Foreign Exchange Trading</th>
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<tbody>
<tr>
<td><strong>Average daily volume (billions of dollars)</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
</tr>
<tr>
<td>Singapore</td>
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<tr>
<td>Tokyo</td>
</tr>
<tr>
<td>New York</td>
</tr>
<tr>
<td>London</td>
</tr>
</tbody>
</table>

Source: Financial Times/Central Banks

This is essential because, as dollar volumes have grown, so has risk. For example, chips volumes have grown rapidly and are now several multiples of the United States gross domestic product (that is, 44 times GDP in 1994 versus just 4 times GDP in 1970). Clearly, bankers and regulators have strengthened risk reduction measures throughout this period and are jointly continuing to focus on risk management. But are we moving quickly enough? I think not!
Increasing Payment Systems Risk

Comparison of Annual CHIPS Volumes to Annual U.S. GDP

Source: BIS

You are all well aware of the phenomenal trade growth throughout Asia. This has clearly been a contributor to rising payments and settlement activity. And, throughout the region, there is an increase in automated monitoring and the adoption of stronger risk management practices – including the use of real-time gross settlement. But is there an equal focus on perfecting and synchronizing laws and regulations that will facilitate netting of high value commercial transactions? If not, what is being done to increase the liquidity needed to achieve timely settlement?

As yet another indicator of the rate of change, I was impressed by this projection from the "Economist". Clearly, Asia will continue rising in prominence relative to the traditional industrial countries. Obviously, Intra Asian clearing systems should be considered – within a common set of standards and policies. But which central banks will stand behind cross border settlement?

The Emerging Asian Markets

Source: IMF; EIU/Economist
The Changing Global Economy

The 10 Largest Economies in the World

<table>
<thead>
<tr>
<th>Rank</th>
<th>1992</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>United States</td>
<td>China</td>
</tr>
<tr>
<td>2</td>
<td>Japan</td>
<td>United States</td>
</tr>
<tr>
<td>3</td>
<td>China</td>
<td>Japan</td>
</tr>
<tr>
<td>4</td>
<td>Germany</td>
<td>India</td>
</tr>
<tr>
<td>5</td>
<td>France</td>
<td>Indonesia</td>
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<tr>
<td>6</td>
<td>India</td>
<td>Germany</td>
</tr>
<tr>
<td>7</td>
<td>Italy</td>
<td>South Korea</td>
</tr>
<tr>
<td>8</td>
<td>Britain</td>
<td>Thailand</td>
</tr>
<tr>
<td>9</td>
<td>Russia</td>
<td>France</td>
</tr>
<tr>
<td>10</td>
<td>Brazil</td>
<td>Taiwan</td>
</tr>
</tbody>
</table>

Source: Arcus Data Security Inc.

I submit that the current and projected growth in cross-border trade and financial transactions raises these fundamental payment systems issues for us:

How effective have we been in:

- making liquidity fungible cross borders?
- facilitating faster settlement and finality?

And in managing risk?

How secure are our payment systems?

A partial solution to the need for more liquidity and faster finality can be found in the growth of the equity and bond markets as well as the trend to securitize many types of underutilized assets. The resulting securities are becoming more broadly distributed and are of increasing interest to institutional investors seeking diversification. However, the unevenness of laws and regulations makes it very difficult and somewhat risky to use these assets to stand behind offshore settlements. How can we make these assets fungible across borders for collateral purposes?

Isn’t this precisely the kind of multilateral problem that calls for concerted standards and cross-border legal consistency? With today’s information technology, banks can fairly quickly and confidently install the reporting systems to account for these assets. But this is not enough. Individual banks lack the regulatory power to normalize underlying legal structures. In concert with the B.I.S., shouldn’t our central banks address this opportunity? I submit that doing so would contribute materially to improved risk management.
In the future, there will be many payment systems catering to local, national and regional needs. To achieve the best risk management, we must use common standards and consistent security techniques. We clearly need to focus our attention on improving security. As volumes grow, our networks are increasingly the target of fraud specialists, who operate with more and more sophistication. Yet, while basic technology is doubling in price-performance every 18 months our basic security processes are rooted in practices over 18 years old. Collectively we have been quite fortunate that our losses haven’t been higher. I’m especially concerned about the practice of faxing key payments information in unencrypted form — a popular practice in several Asian countries and one that is bound to attract fraud. And, banks and central banks have substantial “hidden” costs as a result of using traditional security tools which are not only dated but inefficient. Isn’t it time for a concerted search for a major breakthrough in this area?

Of course, cross border teamwork is not easy. All of these obstacles must be overcome.

- Jurisdictional limitations
- Monopolistic policies
- Regulatory restrictions
- Dynamically changing technologies
- Nationalistic policies
- Lack of standards
- Time zone differences
- Diverse customer needs —
-Multiplicity of languages
- Consumer versus Corporate
- Environmental instability

One fairly non-controversial factor that we could attack jointly is reliability and recoverability. As seen in this example from the U.S., environmental instability abounds at a time when our customers, as well as risk management considerations, demand more stability and faster recoverability. Are the regulations each participating bank must meet tough enough? Are regulators requiring their banks to fully leverage proven technology? Should all central banks set an example by having true three-way redundancy as is being incorporated in the newest version of Fedwire? Wouldn’t tougher standards in this area reduce risk by speeding up finality?

I submit that the B.I.S. should work with the central banks to adopt the following minimum standards: In the area of business continuity — instantaneous and seamless recovery from disasters with no service interruption and no data loss in the payment system. And, in the area of security — payment systems must incorporate the best commercial end-to-end security features and functions. There truly is no technological factor that prohibits progress in this area. Indeed, there are many examples of success at individual banks but fraud will attack the weakest link, hence, global consistency is essential. And it is not just fraud prevention that argues for more investment in this area. The recent Barings and Daiwa incidents emphasize that secure, comprehensive up-to-date cross-border information is essential to avoid market meltdown and to contain risk during a crisis.

Global Payment Systems
Risk Management Requires Continuity In Times of Environmental Instability

<table>
<thead>
<tr>
<th>Incident</th>
<th>Date</th>
<th>Data Centers Hit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Virus</td>
<td>May, 1988</td>
<td>500</td>
</tr>
<tr>
<td>Chicago Flood</td>
<td>April, 1992</td>
<td>400</td>
</tr>
<tr>
<td>NY Power Outage</td>
<td>August, 1990</td>
<td>320</td>
</tr>
<tr>
<td>Chicago/Hinsdale Fire</td>
<td>May, 1988</td>
<td>175</td>
</tr>
<tr>
<td>Hurricane Andrew</td>
<td>September, 1992</td>
<td>150</td>
</tr>
<tr>
<td>Los Angeles Earthquake</td>
<td>January, 1994</td>
<td>100</td>
</tr>
<tr>
<td>Pakistani Virus</td>
<td>May, 1988</td>
<td>90</td>
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<tr>
<td>San Francisco Earthquake</td>
<td>October, 1989</td>
<td>90</td>
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<tr>
<td>Seattle Power Outage</td>
<td>August, 1988</td>
<td>75</td>
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<tr>
<td>Midwest Flood</td>
<td>July, 1993</td>
<td>50</td>
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<tr>
<td>East Coast Blizzard</td>
<td>March, 1993</td>
<td>50</td>
</tr>
<tr>
<td>L.A. Riot</td>
<td>April, 1992</td>
<td>50</td>
</tr>
<tr>
<td>World Trade Center Bombing</td>
<td>February, 1993</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: Arcus Data Security Inc.

As essential as central banks are to such a set of initiatives, teamwork is required on a much broader scale. Clearly securities regulators must be involved and, eventually, customers. Swift could also add value. As we analyze fraud losses in the United States, in a majority of cases there has been inside collusion. Occasionally, at a bank, but most frequently by an employee of a customer or of a third party participant. In our experience, the best controls are “end to end” – that is, in partnership with our customers. For example, we at First Chicago ask wire transfer customers to validate all large dollar payments across their account same day while intervention and recovery is still likely. Unfortunately, this is not yet a common customer practice.

To motivate customer participation, we must invest in education on security and risk exposures and develop via value-added information features. But, this isn’t enough. I’m increasingly of the opinion that we must adopt explicit pricing for the value we are adding. Today, banks “give away” very valuable settlement and finality services and charge only for basic transaction processing. Yet we are incurring significant risk in providing liquidity, settlement and finality. Pricing is a very powerful motivator. Just look at what happened when the Federal Reserve began charging for daylight overdrafts. As you may recall, when intraday overdrafts on Federal Reserve accounts were not tightly regulated, member banks used them aggressively to smooth out the temporal gaps between outflows and inflows. Further, this “free” intraday liquidity was used to reduce operational contention. Because a significant percentage of outbound payments, for example, Fed Fund repays and especially payments for Asia clients were known prior to the opening of Fedwire, major payment banks released these payments at the opening of the wire – thus, going into very substantial overdraft positions – but, getting back to a positive position by Fedwire cutoff time. Prior to the imposition of
pricing, in the fourth quarter of 1993, peak daylight overdrafts averaged one-hundred-and-thirty billion dollars. With the imposition of pricing in April, 1994, peak daylight overdrafts declined to an average of seventy-two billion dollars. And, in 1995, they are averaging sixty-six billion dollars – that is a forty-nine percent reduction from the fourth quarter of 1993. Since payment volumes have been rising throughout this timeframe, the daylight overdrafts needed to support each dollar of payments actually declined even faster. An intended and welcomed consequence of pricing.

If you share my view that faster finality is a very powerful risk reduction tool for protecting the safety and soundness of banks, isn’t it time to start charging explicitly for this service – with differential pricing depending on how “buttoned up” individual banks are in using the very best payments-related security and reliability tools? Ernie Patrikis predicted this may occur at some point in the future. In turn, wouldn’t this drive banks to use pricing to change customer behavior? As a “free market bigot”, I am reluctant to propose regulation as central to solving a problem – but when safety and soundness is involved, perhaps regulation is warranted.

That is, should central banks charge explicitly for the provision of liquidity, finality and risk management in order to stimulate commercial banks charging for these services?

Technology is a wonderful enabler. Unfortunately, banks don’t have a monopoly on its use. As our transactions become more automated, more non-bank providers are going after our customers. These non-banks are finding one or more banks that will give them access to settlement for a nominal charge. Just two weeks ago, Tom Meltzer, President of the St. Louis Federal Reserve Bank said, and I quote, “market forces have already blurred the distinction between banks and non-banks” – end quote. Clearly, automation requires investment. If settlement services are not going to become outrageously costly as risk increases – banks must continue to enjoy transaction processing fees. If we collectively install truly differentiated security and the highest reliability and recovery services, we can improve risk management while retaining our customers and the resulting revenue streams.

In conclusion, we collectively must leverage the revolution in technology to re-engineer the payment systems by adding end-to-end security to reduce the risk of providing liquidity and finality. In order to fund the required investments, I suggest we stop “giving away” some of the most valuable services we provide. Doing so should result in a safe and sound set of global payment mechanisms that facilitate the continued expansion of world trade – but time is of the essence – I submit that strong leadership is needed now! We cannot tolerate endless studies and a ponderous pace of action.

In other words, to quote an aggressive U.S. business leader, it is time to “lead, follow or get out of the way!”

I have appreciated the opportunity to share my views with you and I look forward to discussing these subjects further during the remainder of the seminar. Thank you very much for your kind attention.
I am very pleased to be invited here today to give a presentation on the new China National Automated Payment System (CNAPS). This Seminar is very timely in discussing the challenges facing domestic payment systems in a global economy. These challenges are even greater and more complex for a developing country like China, which is in transition from a planned economy to a socialist market economy. I would like to introduce to you the background behind these challenges, and the objectives, issues and complexities we faced in the design, planning and organization of a modern payment system for China.

BACKGROUND TO THE DEVELOPMENT OF CNAPS

It is hard to imagine what a long way the Chinese banking system has been transformed since 1979, the year of reform and opening. In 1979, there was only one bank, the People’s Bank of China (PBC). Since then, the People’s Bank of China has become the central bank, with the financing aspects devolving into four specialized banks, the Industrial and Commercial Bank of China (ICBC), the Agricultural Bank of China (ABC), the Bank of China (BOC) and the People’s Construction Bank of China (PCBC). These specialized banks have now transformed into commercial banks and policy-based lending has been taken over by three development banks. There are now altogether 18 commercial banks, 450 finance companies and investment trust companies, 5 foreign banks, 5 joint-venture banks and 113 foreign bank branches operating in China, amidst a host of insurance companies, securities firms and other capital market institutions.

This year, the National People’s Congress enacted the Central Bank Law and the Commercial Bank Law. The former defined the principal functions of the PBC, the central bank, as the formulation and execution of monetary policy under the direction of the State Council, to supervise and regulate the financial sector, and to maintain the stability and smooth operation of the payment and clearing system. The latter law defined the commercial operations of the commercial banks, including their duties and responsibilities in providing payment services to the public.

The scale of the Chinese financial system is difficult for an outsider to imagine. The financial system in China has at the end of 1994 213,500 branches, with a total employment of 2,773,100 people. Roughly 140,000 branches are small rural branches of the state commercial banks, while the balance are mainly branches of rural and urban credit cooperatives. Together, these financial institutions mobilized broad money equivalent to 4.7 trillion RMB or US$565 billion, roughly 107% of GDP, reflecting the high level of savings in China. The whole banking system is still managed according to four levels of administrative hierarchy: headquarters, provincial and municipal level, district or city level, and county (town) levels. At each town or city level, the bank
branches open clearing and statutory reserve accounts with the 2,400 branches of the PBC throughout the country.

The transformation of a payment system designed for previously manual accounting and centralized credit planning and allocation into a socialist market oriented, modern and automated payment system with international dimensions was a huge task by any standards. It involved the complete transformation of bank procedures, accounting, the legal and regulatory framework and major structural changes in policies and objectives. From the first, the PBC faced major problems of basic telecommunications infrastructure, since 10 years ago, most payments were effected either by post or by telex. The lack of a nationwide interbank telecommunications network covering all the banks and branches resulted in a large amount of interbank float, that affected the management of bank liquidity and the effective implementation of the central bank’s monetary policy.

By the end of the first decade of reform and opening in the 1980s, it was becoming clear that China needed a new, modern payment system to pave the way for major reforms in technology, industrial and financial structure. As the market grew, the functions of the Chinese payment system, its coverage and transaction volumes will change dramatically. There will be high demand on timeliness, liquidity, safety and reliability, while consumer transactions and the types of services offered, such as ATM, EFTPOS, telebanking and corporate banking will increase. It has been estimated that by the year 2000, the annual transaction volume would increase between 5 to 10 times to 7 billion items.

In 1990, the PBC began the planning for the design of a new modern payment system for China with the following policy objectives:—

- strengthen central bank macro-economic management;
- reduce float, speed up circulation of funds and increase efficiency of funds transmission;
- improve convenience and service to users;
- achieve a reliable, secure and integral payment, clearing and settlement system to meet the needs of a growing economy;
- expand flexibly and modularly to suit Chinese conditions.

We started also with the following guiding principles of compliance where possible with international standards, minimization of payment system risks, high integrity and reliability, cost efficiency and usage of modern technology.

**CNAPS OVERALL FRAMEWORK**

As I mentioned earlier, undertaking a project of this size and complexity required considerable expertise from all levels. To achieve this, we sought the help of the World
Bank and organized a top level Steering Group, chaired by myself. The Group was advised by two Advisory Groups, a domestic group comprising banking, accounting and technical experts from within China, and an International Advisory Panel of experts from around the world, who brought their international experience and expertise to assist us in this project. They came from the Bundesbank, the Bank of England, the New York Fed, the Bank of Japan and the Swiss National Bank. I am delighted that all the members of the IAP are here at this Seminar. Their help and advice have been generously given and are very much appreciated. A project office was established within the PBC to undertake the implementation work and they were assisted by an international firm of consultants.

After 4 years of hard work, the design concept and vision of the new payment system took shape, adapting the best international experience and ideas while meeting the Chinese realities of existing conditions. The whole framework comprises two major components – the payment processing system, called China National Automated Payment Systems (CNAPS) and the underlying nationwide computer telecommunications network called the China National Financial Network (CNFN), which supports the payments processing. The CNFN will connect the branches of the PBC with the commercial banks and other financial institutions all over the country and provide convenient, rapid, safe and efficient message transfer services, while reinforcing central bank monetary policy.

CNAPS integrates two levels of financial payment services. At the first level, CNAPS functions as the High Value Interbank Payment System, whereby the banks settle all their interbank payment across the books of the central bank on a real time gross settlement basis (RTGS). At the second level, the banks and finance companies will provide flexible and multiple financial services for their clients. The central bank is connected to the commercial bank branches through the CNFN, which provides an efficient, homogenous and robust network for the banks to build their financial services and for final clearing and settlement across the books of the PBC using CNAPS.

CNAPS ARCHITECTURE

The key architecture of CNAPS is a star-mesh mixed network topology, with payment messages being transmitted from the County/level branches up to Provincial/Municipal level and then to the National Processing Center, where the accounts would be cleared and settled across the books of the central bank, and thereafter down again to the payee level. The CNAPS supports the following applications, which would all operate on CNFN:–

- High Value Payment System (on RTGS)
- Bulk Electronic Payment System (BEPS) on net end of day settlement
- Government securities Book-Entry System
- Bank Card Authorization System
In the first stage of implementation, the CNAPS will concentrate on the HVPS on a RTGS basis and BEPS on a NET basis, although the other functions will also be supported. With the RTGS and star architecture, there is a natural consolidation and centralized management of the clearing accounts of the commercial banks under CNAPS. For example, there will be no need for each commercial bank branch to operate clearing accounts with each of the 2400 branches of the PBC. The consolidation will occur since the main branch at the country or city level of a commercial bank will operate only a single clearing account with the same level PBC branch and will clear and settle on behalf of other branches of the same bank. Such a consolidation of clearing balances would reduce the size of the net clearing balances with the central bank, and enable the central bank to conduct open market operations by affecting the size of the net clearing balance. Speeding up the clearing and settlement process would automatically reduce the size of the float.

To enable the RTGS High Value Payment System to function smoothly, collaterized daylight overdraft would be allowed within certain limits, but overnight overdraft would be prohibited.

The CNFN is being developed with full support from all the commercial banks and the Ministry of Post and Telecommunications. Because of the different stages of implementation of reliable terrestrial/ground lines, the CNFN utilizes the current PBC satellite telecommunication network system, as well as the dedicated and leased line data communication networks operated by the commercial banks. CNAPS is being developed and operated in co-existence with the existing satellite based Electronic Interbank System (EIS) and the mainly manual Local Clearing Houses. A detailed migration plan from the existing systems to the fully electronic CNAPS has been designed.

The design and bidding process of CNAPS has been completed, and contract negotiations are in place. We expect to begin construction this year after the contract has been awarded. Implementation will begin with simulation tests to start in 1996 and a test bed linking 20 cities and more than 80 counties would be completed with the next two years. To prepare for this massive project, we have created a high level Project Steering Committee with a PBC Deputy Governor as chairman, and presidents from the commercial banks and key directors from the PBC as members. A Payment System Executive Center has also been established, with a chief executive, responsible for the engineering implementation. A project co-ordinating group, led by a director of the PBC Payment and Science and Technology Department, has been set up to co-ordinate the project.

CONCLUDING THOUGHTS

In the past 4 years of designing and bidding, we have acquired a lot of valuable experience which will be of benefit to the design and implementation of payment systems.
systems in other countries. As far as I am aware, no other developing country has ever embarked on a project of this size and complexity. The learning process has been very arduous, and while it takes time, it has been important not only for the engineers, but also for the accountants, regulators, lawyers, economists and monetary policy makers and consumers/users of the payment systems to be intimately involved in the design process.

Two activities have to move in parallel in designing and implementing CNAPS. One is to formulate the business flow of payments and to harmonize standards, and thereafter to find out the appropriate technical or engineering solution. The other is to improve the management of the process itself. The technical and the management activities complement and reinforce each other. Failure in one delays the other – success in one helps the other. Strong project management at all levels is vital in a project of this complexity. We will be pleased to share our experience with the developing countries.

It cannot be refuted that an efficient and robust payment system, together with a CNFN that runs on homogenous and international standards, is vital to the reform and opening of China’s financial system and economy. The commercial banks are upgrading their payment services and also their internal procedures and controls in line with the changes envisaged under CNAPS. With improved financial management information for supervisory and monetary management purposes, as well as reduced payment system risks, the PBC will be able to improve its macro-economic policy management significantly.

I fully agree with my colleagues from the International Advisory Panel and experts at this Seminar that efficient and robust domestic payment systems are the foundations of the global payment system. This is why China as a developing economy that is opening more and more to world trade and investments must have a robust payment system to facilitate transactions in its own currency – the RMB. At the same time, I believe that the linkages with other payment systems are also vital to improve payment flows across borders, so as to reduce settlement and payment risks internationally. With CNAPS designed to international standards, we stand prepared to discuss linkages with payment systems of other currencies. These bi-lateral links are vital to the world of open trade and investments.

This is why the PBC has agreed to establish the payment link between CNAPS in RMB and the Hong Kong RTGS systems in HK dollars when both begin to function in 1997. With the volume of trade, investment and other transactions between the mainland and Hong Kong growing rapidly, this linkage must receive priority. We hope it will form the first of many links with other payment systems in the Region and internationally. The People’s Bank of China has worked closely with the Hong Kong Monetary Authority in this and all other respects. In case there is any doubt, I would remind everybody that the Basic Law guarantees that the Hong Kong dollar will exist for at least another 50 years. In other words, after 1997, there will be one country, two currencies, two monetary systems, two monetary authorities and therefore two independent payment systems. These two payment systems will be linked to each other, and hopefully with payment systems of major currencies as well.

Thank you.
Thank you. I am here to speak from the U.S. perspective this afternoon about risk reduction and enhanced efficiency in large value payment systems using CHIPS, the Clearing House Interbank Payments System, as a model.

But first a little background, the New York Clearing House, a private association, was formed in 1853 for the efficient exchange and settlement of checks and drafts and to ensure the maintenance of conservative banking practices.

In those 142 years we have grown so that now our daily check exchange averages $18 billion. The New York ACH, our small value payments system, consists of over 800 participants. The daily transaction volume is 1.3 million with a daily dollar value of $10.4 trillion. CHIPS, our electronic LVPS, with which many of you are familiar, has 113 participants with a daily transaction volume averaging 202,000 and a daily dollar volume of greater than $1.2 trillion.

The Clearing House has a long history in the electronic payments process. As a matter of fact, CHIPS, which celebrated its 25th anniversary in April, was the first electronic payments system in the world and since inception has cleared over $2.6 quadrillion.

Last year the Chairman of the Clearing House member banks designated a Global Payments Committee whose charter was to perform a strategic review and analyze the forces at work in the wholesale payments system environment. Their charge was to evaluate central bank policy trends and to assess the business implication of market developments as they affected large value payment systems. Then to explore private sector initiatives that address the emerging payment systems needs and that satisfy both current and future risk control requirements.

In the marketplace, we saw rapid growth of cross border capital flows and the need to provide efficient, low risk means to settle these flows. Netting systems such as FX Net, ECCHO and Multinet were being formed by the private sector.

In the policy arenas the G-10 central banks had many efforts underway to influence and improve payment system services. In Europe there is a trend towards

- Implementing real time gross settlement systems in countries that do not have them
- Minimum standards for private large value payment netting systems (the Lamfalussy standards) were established
- Both Fedwire and BOJ Net had announced expanded operating hours
- There was a trend of use of more collateral to secure intraday credit extended by central banks to secure RTGS
- The Fedwire began pricing daylight overdrafts

In its analysis of risk control issues and related efficiency trade-offs, the New York Clearing House focused on elements of settlement risk and not forward replacement risk (important in context of multilateral FX Clearing House initiatives). We found it useful to distinguish among three elements of settlement risk.

One element of settlement risk is **intraday risk on central bank operated real time gross settlement systems**.

This risk is measured by the level of intraday overdrafts that are incurred by participants on central bank operated clearing systems. To the extent that the central banks require collateral to cover these risks, the underlying credit risk is shifted back to the institution incurring the overdraft and is borne by the shareholders and the creditors. (The central bank bears the liquidity risk that the overdraft will not be covered.)

The second element of risk is **Finality of Settlement**. This risk is incurred by participants in net settlement systems such as CHIPS who could incur losses if another participant is unwilling or unable to meet its settlement obligation and an unrecoverable overdraft results from loss sharing arrangements or an unwind of payments. [The central bank's primary concern here is that the lack of assured finality and the possibility of subsequent unwind of net settlement systems could undermine the stability of the payment systems and increase the likelihood of systemic failure.] I will be discussing steps we at CHIPS have been taking to minimize this risk by strengthening finality of settlement.

The last risk is **Herstatt risk** and this is the risk of potential loss that could be incurred if a foreign exchange trade counterparty fails to deliver payment in one currency after having received payment in the countervalued currency. This situation is due to the time zone as well as payment system finality differences between traded currencies.

Conceptually, finality of settlement risk and Herstatt risk overlap but are not identical. Thus strategies that attack only finality of settlement will not eliminate Herstatt risk and vice versa.

The size and cost of risks associated with finality of settlement and Herstatt risk are topics of open debate among the bankers and regulators and as of yet, no agreed upon methodology for calculating the cost of settlement risk has been found. However, it was determined that we at the Clearing House would look at efforts to address both Herstatt risk and finality of settlement.

Three private sector initiatives were identified by the Clearing House that I will present today.
The first initiative is to enhance private sector large value payment systems through further risk minimization. In particular, the focus is on the enhancement of CHIPS with emphasis on improving the assurance of finality.

The second initiative is to encourage the development of private sector large value payment systems for other currencies, thereby extending the value added benefits of net settlement systems.

The third initiative is the development of multicurrency payment vs. payment net settlement systems to address Herstatt risk in the foreign exchange market.

These three initiatives are not exclusive of one another.

Initiative One -- The Enhancement of CHIPS -- CHIPS is by a wide margin the world’s largest private sector large value payment system. Most CHIPS members are participants in other large value payment systems around the world. CHIPS facilitates the movement of $1.2 trillion daily which is an amount slightly greater than that of Fedwire and equal to approximately 20% of the value moved over the G-10 funds transfer system and accounts for 95% of U.S. dollar FX settlement. CHIPS currently has 113 banks participating, representing 29 countries with over 70% of them non-U.S. banks. Capital is used extremely effectively based on the principle of multilateral netting strongly supported by U.S. and New York law. On an average day, our daily volume of $1.2 trillion is netted to around $6-7 billion. CHIPS has created significant economic value, not only for its members and participants, but also for financial and commercial organizations worldwide.

It has provided a safe and efficient system for funds transfer. Its players have benefited substantially from CHIPS ability to develop a system that is both low risk and efficient. CHIPS has a very strong record of risk minimization and in its 25 years of operations CHIPS has never failed to settle.

This record is largely a function of a series of initiatives designed by CHIPS have achieve risk minimization. The development and implementation of these initiatives has been an evolutionary process starting with bilateral credit limits and resulting debit caps, explicit loss sharing arrangements, meeting the Lamfalussy standards, and a survivor based collateral arrangement with an opportunity cost of $8 million annually among all participants which supports $3 plus billion in collateral.

A similar self collateralizing system where each participant would collateralize 100% of its debit cap would raise the opportunity cost of required collateral to $180 million (compare to $8MM) annually to support $72 billion (compare to $3+billion) in collateral if activity levels were to remain the same. In addition, the “survivor pays” approach allows for enhanced mutual scrutiny, market discipline and explicit credit limits that our current loss-sharing rules impose. (Eliminates moral hazard).

The existing survivor based collateral arrangements can cover a range of failures. In keeping with the Lamfalussy standards, CHIPS covers the failure of a bank with largest net debit position, a substantial number of smaller counterparties and many country
failures. There is also what I call the doomsday scenario – if more than one of the largest counterparties in their largest net debit position were to fail simultaneously on a given day, the unwind scenario could be invoked but this is under the most dramatic of circumstances – after the collateral pool that covers all of the above circumstances is insufficient to complete settlement and the CEOs of the 11 New York Clearing House member banks have not been able to find another solution.

We believe that it is possible for a private sector net settlement system to come very close to the level of risk reduction that can be achieved through real time continuous settlement while at the same time maintaining much of the efficiency inherent in net settlement. To support this we are constantly looking at enhancements of the system.

Our Number One Priority is Risk Management.

Electronic payments are now the lifeblood of banking, intensifying dependence on computers and telecommunications. The risk of system failure or disruption has been classified into three areas: credit risk, operational risk, and fraud risk.

OPERATIONAL RISK

There has never been a settlement failure in the history of CHIPS operations. However, the sheer volume of money moving through the payment system has raised the concern of the Clearing House and the banking community about underlying risks.

To assure continuous operation, CHIPS has dual computers at its primary site and an identical system at a separate site. High speed lines link the two sites. There are diversely routed fiber optic communications lines going directly to each site. Uninterrupted electric power is assured by a battery-based reserve and a dual diesel generator supply system.

Contingency plans are tested against a variety of simulated events in mandatory exercises involving all participants. The contingency plans worked flawlessly during the few occasions when relocation was required. (All connections to CHIPS must be made from New York City or authorized backup locations to assure availability of senior management.) Operational uptime is consistently in the 99.9% to 100% range. (23 months of 100% uptime; 11 minutes down in the past three years).

FRAUD RISK

To protect against fraud risk, the Clearing House implemented full payment message authentication on the CHIPS network eleven years ago. Authentication is the process of identifying the message originator and verifying that the information received has not been altered intentionally or accidentally. [CHIPS is the only funds transfer system that is completely secured by the use of the ANSI standard for authentication.] To administer security key changes and to administer all aspects of internal security and staff awareness, the Clearing House has a staff dedicated to EDP security. We maintain audit trails, internal and external auditing, rigorous separation of duties including development, testing and operation of the system and strictly limit physical access.
CREDIT AND SYSTEMIC RISKS

The third area of concern, credit risk, has commanded priority attention of bankers, business community and regulators. CHIPS is a private funds transfer network with no central bank support and as a result all risk is borne by the participants. Several safeguards have been implemented to protect both individual participants and the system. Although no payments system is risk-free, CHIPS is one of the safest funds transfer systems in the world today. Management continues to study new ways to ensure the soundness of the system while maintaining the operational and cost efficiency necessary for a high volume payment system.

The first safeguard was Same-Day Settlement, put into effect in 1981. It eliminated overnight exposure to failures; it reduced float in the banking system; and it accelerated the availability of funds to customers. Until then, CHIPS transactions took up to two days to complete, except in the case of a weekend or holiday, when it could take up to four days to settle.

Three years later, Bilateral Credit Limits were established to protect receiving participants. Each CHIPS participant now establishes and is able to modify dynamically the next amount of funds it is willing to accept from every other participant. These bilateral limits are enforced in real time by CHIPS. The system opens each day for 20 minutes before payment-message processing begins to allow participants to change bilateral limits.

A third credit control in effect is Sender Net Debit Limits. This restriction sets a maximum debit limit or “cap” on the $ amount of payments any participant may make, at any given time, to all other participants. This is a real time control which restricts the aggregate amount a participant owes the system. In response to an emergency the President of the Clearing House may lower or raise the caps of any or all participants. [We may also establish a threshold to alert Clearing House management that a participant’s debit cap may substantially change on the next business day.] Should the sum of the bilateral limits during the business day increase or decrease by a certain set percent when compared to the start of day sum of the bilateral limits, Clearing House management is immediately alerted by CHIPS.

Another control, called Settlement Finality, assures that the system will settle each day if one or more participants fail to settle. Each participant agrees to assume a pro rata share of a failed participant’s net debit position. The share required of each remaining participant is based on bilateral credit limits granted to the failed participant.

To insure liquidity to cover an additional settlement obligation, each participant pledges U.S. Government Treasury bills, bonds or notes to the Clearing House as Collateral. In 1991, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) provided the Legal Certainty which provided special protections for the multilateral netting arrangements and increases protection for each CHIPS participant. An example of benefits under this provision: if a CHIPS participant becomes insolvent, the trustee of this failed bank can no longer collect the individual payments made to it throughout the CHIPS day and then claim that the payments it made that day are null and void. Instead, the obligation is the net amount.
You will forgive me for going through these risk controls so rapidly. I have been at meetings such as this where literally hours are spent on each control. We at CHIPS have some of these in place for close to 15 years and just consider them to be first principles of a netting system – but I will be pleased to review, discuss or debate any or all of these with any of you.

As I stated earlier, we are constantly seeking to increase our risk management. In January 1996, CHIPS Rules will be modified to implement improvements to Settlement Finality. The Sender Net Debit Cap equals a percentage of the sum of the bilateral limits set on a participant by all other participants. The percentage used will be 4% of the sum of the bilateral limits. This represents a 20% reduction of the current 5% net debit cap. We will have a phased in implementation over a year with evaluations performed during each phase. If all goes well we may accelerate implementation. Each CHIPS participant must maintain collateral in its CHIPS Collateral Account with a value equal to $10 million or five percent of the highest bilateral credit limit granted by the participant to any other participant during the day, whichever is greater.

In January 1996 CHIPS will have debit cap reduction and collateral enhancement – but what are their benefits? The enhanced settlement finality arrangement will substantially increase the ability of CHIPS to settle in the face of a multiple participant failure. The new arrangement would assure settlement if all participants from any of 20 individual given countries were to fail at the same time (as opposed to 17 countries with the current arrangement). It would permit CHIPS to settle even if as many as 15 smaller participants (failing simultaneously at its highest possible debit position) were unable to settle (as opposed to 10 smaller participants currently). And cover the failure of the two banks with the highest debit caps from five additional countries.

Only four countries remain uncovered. In using real data for one year (rather than theoretical) we were able to cover the simultaneous failure of the two largest banks in two additional countries due to the unlikelihood that both would be at their maximum debit position simultaneously. (The two remaining countries we will continue to review).

For the future, we will be looking at extended operating hours as this could create opportunities to reduce Herstatt risk by reducing time differences in settlements in major currencies by extending operating hours and also could facilitate adoption of reduced net debit caps by providing more time to move payments through the system. We are also considering the introduction of multiple batch settlements to permit finality to be achieved earlier in the day for many payments, another means of reducing Herstatt risk.

Other items we are also investigating are rigorous rules for sending and receiving funds flows to ensure the orderly flow of funds and reduce the likelihood of gridlock.

Currently by noon New York time 80% of the volume and 66% of value is the standard. By 2 p.m., 88% of volume and 84% of dollars prior to our 4:30 cut off. Another is enhanced requirements for participants membership. One way to reduce risk further is to upgrade the admissions criteria and monitoring processes – as long as they are done on an objective basis consistent with the Lamfalussy standards calling for fair and open access.
Just let me conclude Initiative One by emphasizing that our ongoing intent is to come as close to zero risk as possible by attacking the recognized risk in the system in a context that enables the system to continue to provide the very tangible efficiency and cost benefits our participants require to meet their customer costs and efficiency expectations while enhancing coverage across more participants and country failures.

Our first initiative in the green book was to enhance CHIPS. We believe that a private sector net settlement system such as CHIPS model has much to offer - low risk and increased efficiency. Therefore, the second initiative that was evaluated was the creation of private sector net settlement systems for other currencies and the linking of these systems to each other.

CHIPS is a fully developed, technically advanced system with a user base that already includes most of the world's major banks. The CHIPS model is therefore familiar not only to the central banks and regulators, but also to the major banks in most financial centers. Insofar as this model proves attractive, it would be well worth the attention of those planning the upgrade or creation of other private-sector netting systems to examine CHIPS, not only for design elements and risk management, but also in order to build systems that can facilitate further convergence and interaction in the future. Obviously, the implementation of this initiative would require significant cooperation by the central bank and the major banks in each financial center. We recognize that this initiative represents a much longer term approach to risk reduction and that a significant amount of discussion and exchange of ideas would have to go into developing any serious proposal, particularly in Europe where the momentum towards individual RTGS appears to be strongest.

The third initiative considered “Multilateral Multicurrency PVP” aims to address Herstatt risk directly by focusing on processing and operational improvements to effect payment vs. payment currency settlement.

In payment vs. payment a final transfer in one currency occurs if and only if a final transfer of the other currency or currencies also takes place.

Reducing Herstatt risk for FX and similar cross border interbank payments involving linked currency movements has become a regulatory and market priority. The increase in the use of netting between counterparties has already reduced exposure levels. However, the inefficiency and risk in the settlement of FX transactions is an obvious and recognized failing of the current process. Because of time zone and payment system operations and finality differences, one leg of a foreign exchange transaction may settle as much as 18 hours prior to the other, leaving open the possibility of counterparty default.

A recent study by the New York Foreign Exchange Committee as well as a recent study by the New York Foreign Exchange Committee as well as a recent publication from the BIS on FX settlement risk noted risk could be as great as 36 hours until Nostro reconciliation is complete and identified opportunities to strengthen international correspondent banking practices.
We see a PVP system that presents a global solution to completely eliminate Herstatt risk through the synchronized processing of both legs of a foreign exchange transaction. Either both FX legs move or neither does. If you pay, you will get paid. In addition, the concept is based on and seeks to exploit the self-collateralizing nature of foreign exchange transactions. Thus significant collateral cost savings are possible by linking the currency legs of the transactions rather than treating the individual legs as independent transactions that require collateralization to reduce or eliminate the settlement risk. The goal was for these payment systems to be operated and controlled by the private sector, the world’s major foreign exchange institutions.

We looked at three different models - actually, we looked at many - but these three form a continuum. We have the Clearing Center model, the payment system model, and the Clearing House bank model.

First, a PVP system based on a clearing center model. A Clearing Center PVP system would act as netting agent and a central counterparty assuming the liability for eligible foreign exchange transactions in order to provide multilateral transaction netting. This would be accomplished in the transaction processing stage and therefore, only foreign exchange transactions would be accepted. Cash settlements would be via accounts in the Clearing Center’s own name with central banks or by way of correspondents using home country settlement systems. Due to the concept of the clearing center substituting as the central counterparty – this model was not strongly supported.

In the payment system model, the payment system would play a central coordinating role and act as a netting agent but not as the central counterparty. It would take multicurrency instructions directly from the participant or from bilateral netting systems. Multilateral netting and PVP would be accomplished in the payment phase and liquidity would be secured by self-collateralization and pledged collateral. The interface would be directly with central banks for settlement.

Another model we looked at was a Clearing House bank model. This model would be a bank rather than a payment system and serve as a multicurrency bank for all participants. PVP would be achieved through simultaneous debits and credits to participants accounts on the Clearing House bank’s own books. Liquidity would be secured by prefunded accounts in the Clearing House bank. Access to payment systems is for participants to move money into and out of the Clearing House bank not for PVP.

All three of these PVP models represent radical thinking to attack the problem and require reengineering the foreign exchange settlement payments process.

Success of any PVP system requires a single coordinated approach.

- Acceptance of a business case for moving forward (there is still a way to go as to what the costs of FX settlement risk are and the determination that the cost of proposed solutions are lower than the cost estimates.

- A critical mass to avoid regional fragmentation – (we are seeing some of the fragmentation occur with the ECCHO and the Multinet which are regional rather

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than global solutions). A concern since many of the cost/benefit analyses have much to do with individual banks’ philosophy of risk, cost of capital, cost of collateral and availability of liquidity.

- And the necessity to exploit both the core competency of the public and private sector and ensure active involvement of central banks and FX business managers, operations managers and risk managers.

After looking into the past – the history of CHIPS – its risk management and successful processing of $2 quadrillion over the past 25 years, addressing present – strengthening settlement by going beyond the Lamfalussy standards – to cover not only the failure of the counterparty with the largest net debit cap to aiming for coverage of the simultaneous failure of the two participants with the largest net debit caps and looking into the future of eliminating Herstatt risk through payment vs. payment, what are our overall conclusions?

1) Programs to reduce settlement risk should consider the cost of reducing risks as well as the benefits. Balance issue of risk and efficiency.

2) Central banks and the private sector share a desire to promote low risk and efficient large value payment systems. [We believe they do though we may differ in priority.]

3) Central banks should offer real time gross settlement payment systems but private sector alternatives should be considered and included.

4) A strong market case is developing for efficient low risk cross border system linkages to satisfy the service needs of large value payment systems participants.

Currently, a group called the P-20 (G-20), an international group of banks, all of which are CHIPS participants, from a number of countries are pursuing these issues and hopefully will publish a follow up paper in January 1996.

5) To meet these needs the preferred solution well may be a global private sector multilateral netting payment vs. payment service that is established in close cooperation with the central banks. In the absence of an acceptable private sector solution – it is assumed the central banks will develop a solution based on linkages.

6) We need to exploit the core competencies of both sectors for natural cooperation and optimal results. The central bank which provides oversight to ensure stable national payment systems, to strengthen finality for future overlapping and synchronization of payments system hours and in giving help in achieving legal clarity in certain key areas and, of course, to provide liquidity as the lender of last resort.

In the private sector, design a cost effective solution and manage an efficient operation. The provision and allocation of credit resources and lastly but not least, is risk management through ongoing risk analysis.
In summary, the New York Clearing House banks support practical alternatives that reduce risk and increase efficiency in large value payment systems in order to achieve these ends. We need the continued cooperation between the private sector and the central banks as a key factor critical to success.

Thank you for the opportunity to share some of our thoughts about the past, present and future with you today and salute you for providing the forum in which these discussions may continue and grow.
I am glad to have the opportunity today of talking to you about “Netting in the Global Payment Systems”, a subject which, in view of the continuing discussions on the pros and cons of gross and net settlement systems, is very topical and of great importance for the international banking community.

TRENDS IN INTERNATIONAL FINANCIAL MARKETS

It is a well-known fact that, in the wake of the growth in economic links at an international level in the past few decades, international money and capital flows, too, have expanded considerably. The dismantling of restrictions has opened up a worldwide field for banks operating internationally. This has given rise to sharp competition between the banks, and this competition in the past few years has reduced margins and interest rate differentials more and more. The banks have tried to compensate for this by raising turnover, for example, in foreign exchange dealings. The greater use of so-called financial innovations, such as futures, options and interest rate and currency swaps, has again increased the volume of transactions. Today we are faced with a situation in which, in the wake of this development, payment messages involving the equivalent of more than US$1.230 billion (April 1995) race around the globe each day. They entail high turnover, particularly in the clearing centres of the important world trade currencies. Unfortunately, there are no comprehensive statistics on the volume and, above all, on the underlying transactions or participants in international payments. In Frankfurt we settle more than DM 600 billion under the netting procedure EAF alone every working day, and on peak days even perceptibly more than DM1 trillion. The bulk of these transactions concerns the DM side of international foreign exchange and securities transactions, whereas the national money market tends to use our gross system EIL-ZV for settlements.

KEY FEATURES OF NETTING PROCEDURES

I should like first of all to deal with the conception of the netting procedures, and then highlight the reasons for their international attractiveness.

(f) Advantages of Netting Systems

Under netting procedures, financial obligations are met not by paying money for each individual debt, but, instead, by offsetting these against counter-obligation and paying only the balance. Thus netting procedures can, in principle, establish the same financial position between two or more business partners as gross procedures would have done only after a long series of transactions in which payment orders were executed and transfer receipts credited. Only the final balance, for example, in interbank clearing, affects the liquidity of the netting participants, since only this amount has to be settled.
Settlement can be defined as the discharging of obligations between two or more parties through the irrevocable transfer of credit balances to their accounts at a specified settlement agent. For the most important systems, this is the central bank, as a rule. Only when all debit balances have been covered and all credit balances have been executed through irrevocable crediting to the central bank accounts, do the banks consider settlement as “final”. By postponing settlement to the end of the day, the netting procedure, in terms of liquidity, achieves a comprehensive synchronisation of payment inputs and outputs, which could not be achieved under a gross procedure in the course of the day and therefore requires the use of liquidity.

In this context, the calculation of netting positions therefore refers only to the function of reducing obligations to a single amount, whereas settlement represents the discharge of this obligation. Most of the existing national clearing houses offer only the netting side. Since the Bundesbank also operates the EAF system, it executes both netting and settlement.

However, the advantages of the various netting procedures are not restricted to lowering the need for liquidity. They also concern the operational area – which, in my opinion, also applies to gross systems. I should like to cite the following examples for this:

- In view of the closed circle of participants it seems advisable to use standardised procedures for “matching”, that is, for the agreement between the contracting partners on whether the contract has been concluded, and to what it refers, for example, currencies and amounts. This is by no means self-evident these days. Since misunderstandings occur relatively frequently in international transactions, the need to protect oneself against these risks has contributed considerably to the development of netting procedures.

- Owing to the concentration of the exchange of messages and settlement, banks and non-banks need fewer correspondent banking connections or house banks, and thus fewer working balances. This advantage is always associated with centralised clearing houses. However, it also applies to gross procedures if the clearing house or the central bank, as the central agency, settles on a gross basis.

- Advantages in terms of rationalisation arise from the reduction in the number of payment messages, where the obligations resulting from contracts between the partners are netted even before the interbank netting systems are involved. This applies both to contracts between bank customers and to the banks' own transactions, for example, from foreign exchange dealings. Liquidity and credit risks can be reduced perceptibly by procedures which result in legally enforceable netting and definitively cancel the original claims and liabilities. The risk then extends only to the net amount. However, in my opinion, this can also be achieved in the run-up to gross procedures.
(ii) Types of Netting Procedures

These considerations afford an opportunity to underline once again the multitude of business relations which may profit from netting.

In terms of the underlying transactions, netting ultimately always involves payment obligations, which may arise in the banking area, for example, from foreign exchange contracts, SWAP contracts or payment orders, and in the non-banking sector from every type of business operation.

In terms of the number of contracting partners, the procedures may be subdivided into bilateral netting systems or multilateral netting systems, the advantage of the former being strict reciprocity and that of the latter higher effectiveness.

In legal terms, a distinction may be made between the following procedures.

Under the position netting procedure, the simplest procedure, the obligation for the original gross amounts is maintained in full until settlement of the net amount; this means that up to that time the individual contracts are maintained as well.

By contrast, agreements on "netting by novation" provide for the expiry of individual contractual forward obligations (foreign exchange contracts, as a rule) at the time of their confirmation and their transformation into a single new obligation. The amounts due from an expired contract are added to the current balance between two partners in each currency for each future maturity date.

In the case of netting by novation and substitution, new obligations arise, which at the same time devolve upon a central contracting partner, such as a clearing house.

All of these types of netting are to be found in practice; however, the situation differs from one country to another according to the legal system concerned. In the case of the netting of payment orders by the big clearing houses in the international financial centres, multilateral netting by novation is applied in most cases.

In terms of the number of currencies, we distinguish between netting for one currency only, which, as a rule, is the domestic currency, and in exceptional cases (for example, Chase Tokyo dollar clearing) a third currency, and netting for several currencies (for example, ECHO procedures used by European banks).

GLOBAL PAYMENT SYSTEMS

In the case of global payment systems, we distinguish between national and cross-border payment systems.

(i) National Systems

A large number of national net large-value payment systems include global elements, in that international interbank payments are executed through them; among such
payments, the execution of foreign exchange transactions in the home currency prevails. Thus, as mentioned above, the EAF in Frankfurt, the Bundesbank’s electronic netting procedure, effects mainly the clearing of domestic SWIFT follow-up payments. Foreign banks can participate in the EAF either directly through their own local branches or indirectly through their correspondent banks domiciled in Frankfurt. At present EAF has just under 70 participants, most of which are foreign banks; all of them participate direct. The fact that on working days after US public holidays the settlement volume in Frankfurt increases sharply, to more than DM 1 trillion, confirms that most of these apparently domestic payments are really based on cross-border transactions. The same applies, for example, to CHIPS in New York. CHIPS is a private sector payment system with 115 bank participants representing 29 countries and with an average daily turnover of nearly US$1.2 trillion. Like the EAF, CHIPS nets payment transactions multilaterally and settles the net obligations at the end of the day. The payments transferred over CHIPS are also primarily related to interbank transactions of an international nature, including the dollar-payments resulting from foreign currency transactions and Eurodollar placements and returns.

(ii) ECHO and MULTINET as Cross-Border Systems

At present, it is mainly ECHO and MULTINET which are under discussion as cross-border multi-currency systems. Since the ECHO clearing house started operations as recently as August 18, 1995, I would like to deal with the conception of this system in more detail.

ECHO (Exchange Clearing House Ltd), which is domiciled in London, is responsible for a global multi-currency settlement agency whose task is the multilateral netting of spot and forward foreign exchange transactions. The target is to minimise the foreign exchange settlement risk in international foreign exchange dealings.

Preconditions for participating in ECHO netting are, inter alia, membership of a banking group domiciled in an OECD country, tier 1 capital amounting to at least US$900 million as well as a rating of at least BBB +.

Netting is executed by ECHO in accordance with the open offer procedure under English law. The clearing house offers all members, with legally binding effect, the facility of booking payments arising from concluded foreign exchange transactions. Simply the bilateral conclusion of a transaction between the participants constitutes, through implied intent, the acceptance of this offer by ECHO. The clearing house thus becomes a contracting partner of the other two dealing parties. In contrast to the principle of netting by novation, under the open offer procedure the obligations already contractually agreed are not replaced by new obligations at the time of their confirmation. The clearing house will become liable under the contracts.

For each value date, a single positive or negative balance is calculated on each banking business day for the individual users for each currency. For offsetting these net positions, ECHO maintains so-called nostro banks (ECHO nostro agents) in the countries where the currencies involved are issued. The balances resulting from the offsetting of all foreign exchange contracts concluded are passed on for each currency through these nostro banks and settled in the national payment systems (for example, in the case of the Deutsche Mark, through the EAF).
MEASURES FOR RISK REDUCTION

(i) Special Risks Associated With Net Systems

The members of netting systems are exposed to different types of financial risks, which were analysed some years ago by the G 10 central banks and which have led to the recommendation to protect netting systems against legal and credit-worthiness-related risks by complying with the so-called Lamfalussy criteria. I think that for this group of participants it is not necessary to list these Lamfalussy criteria again. But nevertheless I should like to underline once more the risks involved.

Under netting procedures, the payment instructions exchanged in the course of the day do not become final at the time they are processed, as is the case under a gross procedure, but instead at the end of the procedure, when the resultant debit balances have been covered. Thus, a recipient credit institution runs a credit risk in the event of prematurely crediting the accounts of the beneficiaries. In practice, owing to the cover network with gross large-value payment systems, the payments are sometimes irrevocably available even later. If the recipient bank has simply taken mere payment messages into account in its liquidity management and if these payment messages do not become final within the agreed period, the recipient bank runs a liquidity risk, since it has to provide the missing liquidity by borrowing or selling assets.

If as a result of the above-mentioned risks a participant cannot cover its debit balance at the time of settlement, it will be excluded from the netting procedure. When it makes a new attempt at settlement later, other participants will possibly incur new uncovered debit balances (domino effect), since the receipts of credit transfers from the excluded participant will be lacking. A complete unwinding of the settlement would pose the problem that other credit institutions would be affected by the liquidity difficulties of one bank, which might spread, as a systemic risk, to the entire banking system not only nationally but also internationally.

If foreign exchange transactions are settled through netting systems involving different closing times owing to different time zones, one party will pay in advance, as a rule; that is, its payments will become final before it receives the counter-payment of the counterparty. The risk arising from the time gap between the final execution of each part of a foreign exchange contract is referred to as the time zone risk.

In the following, I should like to show by means of various examples the different approaches adopted in order to reduce the risks involved in net procedures to a degree which ensures that the Lamfalussy standards are met.

(ii) Risk Reduction in the Case of CHIPS

One way to minimise risks has been realised by CHIPS. CHIPS participants have adopted a system of bilateral credit limits and sender net debit caps that limit both individual participant exposure and the entire system's vulnerability to credit risk.

Global Payment Systems
Under CHIPS bilateral credit limits, each participant establishes the maximum net amount it is willing to receive from another participant, and this limit is enforced automatically, in real time, by the CHIPS computer system. Further, there is a sender net debit cap in place that limits the amount that any one participant can owe to the entire CHIPS system. Each participant's sender net debit cap is equal to 5% of the sum of the bilateral credit limits established by each of its counterparties in CHIPS.

All CHIPS participants agree to participate in a scheme for guaranteeing daily settlement if a participant with a large settlement obligation ever fails to meet that obligation. The settlement guarantee is combined with a loss-sharing arrangement to govern the distribution of the burden of funding a failure to settle among the members of CHIPS. CHIPS maintains significant liquidity to permit the mobilisation of cash on very short notice to allow the system to settle in a timely fashion if a participant unexpectedly fails to meet its net debit obligation. The liquidity arrangements include a pool of US Government securities collateral held in escrow at the Federal Reserve Bank of New York.

(iii) Further Development of the EAF to Become EAF 2

After in-depth discussions on possibilities for avoiding the above-mentioned systemic and credit risks, the Bundesbank and the banking industry agreed to build so many gross elements into the EAF that it offered more, from the point of view of risk, than mere compliance with the Lamfalussy standards, but, at the same time, largely maintained the liquidity advantages associated with the former net procedure.

A conversion of the EAF, conceived along the lines of CHIPS in New York, was vigorously rejected by the German banking industry. The credit institutions argued that in Germany, contrary to the situation prevailing in New York, smaller and foreign-based banks are direct participants, as a rule. Thus – in order to keep the payment system functional – the credit institutions would be forced to grant bilateral limits in the form of recipient ceilings even to banks which normally would not be eligible for loans. They were not willing to be forced to carry out a loss sharing in accordance with these limits, contrary to ASO under the CHIPS system. Instead, the Bundesbank and the banking industry finally agreed to build so many gross elements into the EAF that it even exceeds the Lamfalussy standards. This new system – EAF 2 – is to be introduced as early as in spring 1996.

EAF 2 is characterised by a two-phase procedure. In phase 1, between 8 a.m. and 12:45 p.m., payment orders will be submitted and netted bilaterally. The key difference compared with the existing procedure will be that as early as phase 1 payments will become available finally to the recipient credit institutions at intervals of about 20 minutes and can thus be passed on without any credit risk. Contrary to a gross procedure, cover in this case will be provided through counter-payments which are offset against each other in order to lower the need for liquidity in the individual bilateral operations. Later, in phase 2 (1 p.m. to 2.15 p.m.), the residual payments which have not been offset bilaterally will be offset multilaterally in two stages. The key difference between this and the existing multilateral settlement will be the avoidance of systemic risk. In the event of uncovered debit balances, no unwinding,
involving the exclusion of participants, has been provided for; instead, only individual payments will be returned, and these will be treated as uncovered, just as in a gross system. These payments will be established according to a predefined objective algorithm, and at the same time there will be a guarantee that a maximum volume of residual payments can be settled. The finality of the payments already offset bilaterally in phase 1 and settled multilaterally in phase 2 will not be affected by the exclusion of individual payments.

(iv) ECHO

For risk limitation purposes, various limits have been laid down for ECHO. The direct exposure limit is used to determine the maximum overall exposure of a participant vis-a-vis the clearing house and is established on the basis of the capital and credit rating of the participant. In addition, there is an indirect exposure limit which is meant to limit the contract volume vis-a-vis the individual business partner. Its establishment is also geared towards the capital and the creditworthiness of the participant concerned. The currency liquidity limit is the maximum daily amount that can be settled in one currency by each individual user and corresponds to the total volume of the swap facilities granted to each country. If the limit is exceeded, cash or securities have to be deposited as collateral.

In the context of liquidity risk management, ECHO requires the depositing of government paper or cash in an asset pool. Conversely, the nostro banks also have to grant the clearing house fixed credit lines, whose aim is to safeguard liquidity. These credit line commitments are uncollateralised. If the overdraft facility is not used or if it is insufficient, ECHO has the possibility to ensure account settlement by using the swap lines existing at the nostro bank.

If a participant has liquidity problems, ECHO can thus resort to binding currency overdraft lines, credit lines, commitments by the nostro banks, swap facilities of the participants or the security pool. If a participant defaults permanently, the other participants are liable in accordance with their bilateral relations.

(v) Risk Limitation in the Global Netting Systems

These examples make it clear that the Lamfalussy criteria can be complied with in different ways and that it is thus possible to minimise the risks involved in global netting systems. EAF 2 will be introduced in any case, and an unwinding, which would be associated with a systemic risk, can be ruled out. By contrast, CHIPS, at least theoretically, will always be exposed to the danger that settlement will fail. The ECHO concept in so far is similar to that of CHIPS.

The treatment of the subject would be incomplete if I did not briefly address the models dealt with by the Group of Twenty for a global clearing of foreign exchange transactions, which is meant to ensure the reciprocity of payments in spite of time-zone differences.

The models I refer to are: the “gross matching with earmarking”, the “matching with netting” and the “clearing house bank” concept.
In the “gross matching with earmarking” model, foreign exchange transactions are to be booked, in a transaction-related manner, on a gross basis in national RTGS systems which are linked with each other. An intermediate central computer (so-called matching machine) would assume the matching of foreign exchange transactions and ensure that payment orders were placed only if the corresponding cover had previously been blocked in both RTGS systems involved for both sides of the foreign exchange transaction (so-called earmarking). In this way, the model would ensure payment-versus-payment settlement.

The second model, “matching with netting”, provides for the establishment of a central system (so-called PVP system) which executes multilateral multi-currency netting for all participants. Payments from the individual participants to meet the net balances due to the PVP system and, conversely, payments from the PVP system to the participants would be effected through the national RTGS systems of the corresponding currencies in which the PVP system would have to maintain accounts. The PVP system coordinates the payments in such a way that payments to participants with credit balances are initiated only when the payments from the participants with debit balances have been received.

Finally, there is the so-called “clearing house bank (CHB)” concept. This model is based on the idea that a central clearing house bank maintains for each participant currency accounts in all currencies involved in the system. Both sides of a foreign exchange transaction are booked simultaneously in the account system of the CHB, and the payments become final when they are booked at the CHB. Participants could increase their working balances on the currency accounts or withdraw excess funds through the national RTGS systems, in which the CHB would maintain accounts.

A comprehensive evaluation of the models described above cannot be given at present, since the discussions in the G 20 have not yet been concluded.

(vi) Recommendation for Establishing RTGS Systems at the European Level

Whereas payments exchanged in netting systems become final only when all debit balances have been covered by the participants at the end of the procedure, payments in gross systems are already executed and become final when the originator has the corresponding cover for each incoming payment in the form of account balances or unused overdraft lines. In this context, the term “finality” implies the irrevocable and unconditional transfer of the credit balances and the discharge of the obligations.

Owing to this residual risk involved in netting systems and the lack of experience with regard to mixed systems, such as EAF 2, the European central banks have agreed to establish for large-value payments RTGS systems operated by themselves in all countries and to interlink them, for the implementation of a single European monetary policy in stage three of EMU, to form a single system called TARGET. The inclusion of existing netting systems was ruled out, owing to the danger of a transfer of risks between the countries. Nevertheless, it remains allowed to operate, in addition, nationally protected net systems, and to effect settlement through the accounts at the central bank. In this way, there is a guarantee that the advantages of net procedures associated with the lowering of the need for liquidity can be used by the banks.
THE FUTURE OF NETTING PROCEDURES

Gross systems will continue to exist alongside netting systems. The various systems will not oust but supplement each other to ensure that the participants can use the advantages of each system and avoid the disadvantages. The two trends I have described here will ultimately only be a transition towards a uniform large-value payment system, which combines efficiency with the minimising of risks and the lowering of liquidity needs. In this way, undesirable distortions of payment flows between different systems will be avoided. In my opinion, such a uniform procedure will also have to be linked closely to the unrestricted liquidity volume, similar to what has been achieved in our EIL-ZV which combines payment transactions with account keeping. Future developments will show which option will prove to be the most attractive one, from the various points of view, and thus shape the uniform system. EAF 2 is just an initial step in this direction. I am firmly convinced that in the coming ten years the EIL-ZV RTGS system and the EAF 2 net system will become a single large-value payment system in Germany.
INTRODUCTION

You no doubt are familiar with the customary distinction between a specialist and a generalist: the former is someone who knows everything about nothing, the latter is someone who knows nothing about everything. As my remarks will be rather general and much less technical than those you have heard in other presentations, they will fall in the category of generalism.

The key word in the theme of this conference is “global”, referring to payment systems. The key word in my presentation is “European”. I will start by setting my theme, which is narrower than that of “global” payment systems, against the twofold background of i) the evolution of international monetary and financial relationships, and ii) European developments. I will then briefly review the work central banks have done in the last five years to develop cooperation with regard to European payment system problems. Finally, I will briefly relate this work to the movement towards Monetary Union and the single currency.

CENTRAL BANKING BECOMES INTERNATIONAL

The first element of the background is the shape that the international monetary and financial system has taken on a global scale. I think the central fact is that the system has been completely transformed from what it was in the aftermath of the Second World War and from what it was designed to be at the Bretton Woods Conference fifty years ago. What we have now is not a system based on official arrangements and institutions, but one based on private and market arrangements. The Bretton Woods system was underpinned by the idea that trade flows should be as free as possible but that capital flows should be closely tied to an official system, with very little room left for market forces. As a result of trade integration this system has gradually evolved to allow convertibility and freedom of cross-border capital flows. Twenty years ago the Bretton Woods system collapsed, essentially because of the enormous strength that the private financial and money markets had attained compared with official forces and arrangements, as a result of the emergence of international banking.

If an international system is virtually to replicate the features we find in a domestic monetary and financial system, it must embrace monetary arrangements, payment arrangements and banking activities. These are the three areas to which Ernie Patrikis and other speakers referred this morning. In setting out the features of central banking in a fully-fledged economic and monetary system and explaining the process whereby international relationships that had left little room for market developments were supplanted by a system in which private markets took the lead, we describe the context in which international central bank cooperation developed in the field of payment.
systems. Indeed, with this transformation the need for the policy functions that central banks provide in a domestic system became greater and greater on the global scale as well.

The same evolution observed at the global level is also to be seen at the European level, where its progress has been more intense simply because the process of economic, monetary and financial integration has been deeper and faster. This is one reason why European developments may deserve specific treatment in a conference devoted to global issues.

THE EUROPEAN CONTEXT

The second element of the background is the EU context. There the aim, which has been largely achieved, has essentially been to reproduce within the European Community - originally composed of six countries, now fifteen and in the foreseeable future involving many more - the level of economic, financial and monetary integration that is typical of one of our countries. Typical today, I should stress, because in many of our countries - including my own - four or five generations ago there were restrictions on domestic transactions, movements of goods and the provision of services; custom duties were paid to ship goods from one city to another. Even in the most advanced countries, the concern that domestic capital flows should not be too large gave rise to some of the institutional arrangements that still exist today. In the United States, for instance, I think that some of the restrictions on interstate branching and even the organization of the Federal Reserve into different districts were inspired by the concern that capital would move too easily from regions that may have been poor but had a high saving rate to wealthier ones. This just gives an idea of how far-reaching the project of creating a fully integrated economic area in Europe was when it was launched about forty years ago.

The essence of the EU background in economic terms is the well-known principle of the complete freedom of movement of goods, services, capital and persons inside the area. It does not spell out the idea that a single currency or a single monetary system should exist for such an area. This is because at the time the Community project was designed a monetary union already existed as a result of the Bretton Woods system, and it was assumed that fixed parities would remain the rule inside the area. In fact, an area wider than Europe was unified from a monetary point of view, and Europe was just a region of that wider area.

The project of fully implementing freedom of economic movement was stalled for about fifteen years until the mid-eighties, when it took on new momentum with the objective of starting the single market by 1993. The sudden acceleration of integration largely involved the financial and monetary component of the process, which had previously been little developed. Capital mobility became complete at the end of the eighties and an EU banking law, called the Second Banking Coordination Directive, was implemented, envisaging complete freedom to branch and to provide services in the EU area. This is the kind of legislation that was already established within EU countries and that is now being implemented in the United States with the liberalization of interstate branching.
No special arrangement had yet been planned for monetary institutions. However, more or less in the same years, in the late eighties, payment system cooperation was taking shape at the G-10 level through successive steps that carry the names of the people who chaired the relevant committees: the Angell Report on netting schemes and the Lamfalussy Report on standards for netting systems.

Parallel to the development of EU integration was the acceleration of technological change, which to some extent created the need for increased cooperation. The strong push for enhanced cooperation among central banks at the EU level that began in the early nineties therefore sprang from these different forces: the emergence of an integrated financial and monetary system, even more advanced at the European than at the global level; the experience of cooperation among the G-10 central banks in the field of payment systems; and the need to cope with new problems posed by technological change.

FIVE YEARS OF EU CENTRAL BANK COOPERATION

Against this background, let me briefly review the record of EU cooperation in payment systems. It is a rather short record, spanning less than five years. Cooperation in the payment system field was essentially triggered by the movement towards a single market, which I have described, and also by the beginning of initiatives taken in the same field by the European Commission, which were, however, dictated more by consumer protection considerations than by concerns typically related to central banking.

The sequence of steps of cooperation among central banks in the field of payment systems can be summarized as follows.

In January 1991 the Committee of EU Central Bank Governors very cautiously created a Working Group on Payment Systems, with the idea that the group should be temporary – to last one year – and have a limited range of action, confining itself to exploring the central banks’ main concerns in the field. A year later, in May 1992, a report issued by this group offered an analysis of the “problems of common concern” to EU central banks and identified four areas in which joint work by central banks was recommended. I will review these four areas in a moment.

A year and a half later, at the end of 1993, a new document was presented, describing the desirable main features that European domestic payment systems should share; it became the basis for central banks’ endeavours in the development of their domestic payment systems. Around the same time steps were taken to bring the Ecu Clearing System into line with the Lamfalussy standards.

A third report established some rules for cooperation among central banks in the oversight of cross-border participation in domestic payment systems. Finally, in May 1995 a report was published on the project for a single EU-wide payment system, called the TARGET system.

The work conducted in these four areas was in fact addressing the following needs: i) to exercise oversight on the Ecu Clearing System and bring it into conformity with the Lamfalussy standards; ii) to organize cooperation among central banks in order to deal
with cross-border participation in domestic payment systems; iii) to bring about a minimum degree of harmonization among domestic payment systems; iv) to start designing a single or common integrated system for the final stage of Monetary Union.

THE ECU CLEARING

The Ecu Clearing System had been created several years before this work among central banks began. It was the result of initiatives taken by commercial banks inside the EU and featured a link to the Bank for International Settlements, which held the accounts for the clearing. The key points are: that it was the first system to have been created as a cross-border netting system, well in advance of the growing concern of central banks in this field; and, perhaps more importantly, that it was a clearing system denominated in a unit - the Ecu - for which there was no central bank. It thus presented some special and very interesting features for the world of international payment arrangements, for which there is indeed no central bank and there is great reluctance to play the central bank role that is so crucial to every netting system at the domestic level.

The Lamfalussy standards had been drawn up after the Ecu Clearing was created. In a sense the central banks had limited leverage on the system, because there was no central bank providing central bank money and finality. The effort needed to bring the system into line with the Lamfalussy standards was particularly complex. It was largely based on moral suasion, on the kind of pressure that any central bank would bring to bear on the commercial banks of its own country participating in the system. Very significant progress has been made so far in the "Lamfalussyzation" of the Ecu Clearing System, although the process is not yet complete.

OVERSEEING CROSS-BORDER PARTICIPATION

The problem of overseeing cross-border participation in domestic systems is created by the rather peculiar situation in which the EU finds itself since the start-up of the single market for banking services, again in a world in which no integrated central banking functions as yet exist.

The Second Banking Coordination Directive allows every bank licenced in an EU country to engage in banking business and to branch in other countries. The host country simply receives notification of the fact that the foreign bank intends to set up in that country, to open branches and offer banking services. The home country authority remains in charge of banking supervision for the complete network of activity of that bank. Thus, for the home supervisor the London or Paris branch of Deutsche Bank is just another branch of Deutsche Bank, like the Hamburg branch, and is not directly subject to the host authority’s supervision; just as in my own country, for instance, the branches of a bank are not supervised by the local branch of the Bank of Italy.

Meanwhile, however, the host country authority remains fully in charge of monetary policy, liquidity supply and the local payment system in which the foreign bank’s branch can participate. So we have a sort of split situation, in which three functions - monetary policy, payment system and bank supervision - that are usually performed by
a single institution and are always performed by institutions belonging to the same country, same currency area, same legal system, etc., are divided between the host and home country authorities.

The need for EU central banks to cooperate in the oversight of cross-border participation in domestic payment systems arises from this split situation and is essentially due to the fact that between a payment system and its participants there are transfers of risks in two directions: from the system to the bank and from the bank to the system. The need to ensure that there is no undue or uncontrolled transfer of risk in either direction involves very close cooperation between the central banks of the home and host countries. The basic rules for this cooperation were set in the report on the oversight of cross-border participation in domestic payment systems.

HARMONIZING DOMESTIC SYSTEMS

The third line of action traced out by the Working Group on Payment Systems concerns the development of domestic payment systems. Cooperation among central banks in the field of payment systems in the first half of the nineties was taking place at a time when every central bank in Europe was in the process of reviewing and to some extent restructuring its own domestic payment system. Cooperation was thus facilitated by the fact that systems were changing anyway. And since payment systems, like most technology-intensive systems, are very flexible when you design them and very rigid once they have been designed, every central bank felt the need to plan its work in a careful and open-minded way. In addition, cooperation was made imperative by the development of the single market.

Let me take a limiting case. A bank that has a network of branches and activities in several EU countries and can operate as a fully integrated bank has the possibility to choose the payment system it considers best suited to its own operations. If for a moment we disregard the fact that every bank is based primarily on one currency and if we consider that currencies can be largely interchangeable, then it is conceivable for a large EU bank to be a participant in a variety of domestic payment systems. If such a bank runs its treasury department in a fully integrated fashion, it is in a position to choose the payment system or netting system that is most favourable in terms of strictness of rules, ease of access to liquidity provisions, and so on.

This limiting case illustrates that the increasing integration of the banking system into a single system called for a minimum degree of harmonization among domestic payment systems, in order to make sure that a standard of soundness would be observed by every system and by each participating bank regardless of its choice of location.

The document that set minimum common features for domestic payment systems in the EU countries identified six areas where a degree of harmonization was desirable. I shall simply list them: i) conditions of access to the system, ii) risk management policies, iii) legal issues, iv) standards and infrastructure of system, v) pricing policies, and vi) operating hours. There were two key elements in the recommendations and the lines of action adopted by the EU central banks. The first was the decision to develop a real time gross settlement system in every country. That now sounds almost obvious, but at
the time only one country – Denmark – had a fully operating RTGS system, while only a few were planning to develop one; for several countries the very idea of RTGS became relevant as a result of the work carried out in common with other EU central banks.

The second key element was the decision to check each domestic netting system carefully and bring it into line with the Lamfalussy standards. These standards had originally been designed for international netting systems. Only in a second stage was it recognized that charity begins at home, that it was necessary to verify and ensure full compliance in domestic systems first.

Let me add two remarks to the description of these lines of action. First, it was discussed at length among the EU central banks whether RTGS should replace or complement netting systems. It was recognized – not without some initial hesitation, but ultimately with full conviction on the part of all – that the two systems could and should coexist, that there was room, or an optimality, for each of the two systems for certain classes of payments. To my mind the key dividing line is between classes of payments for which the time value of money is relevant for intra-day intervals and payments for which there is no difference in value between money at 10 a.m. and money at 12 noon. The value may be seen from a purely private point of view – the usual type of consideration that attaches value to time for money – but it may also be a public policy consideration, related to the risk involved in very large amounts going through the netting system.

The second remark is that the work done in this field, as in the other areas I have mentioned, benefited greatly from a very close dialogue between the group of central banks involved and the banking community in Europe. A tradition of regular meetings between the Working Group and representatives of the banking community was established and proved very helpful in designing these lines.

TARGETING MONETARY UNION

So far I have not mentioned Monetary Union because in the three areas I have described the key is the single market, not the prospect of Monetary Union. Yet, although in the period 1988-1992 the idea and then the project and finally the designing of Monetary Union were not the reason for cooperation in the field of payment systems, I believe that Monetary Union, if and when it is implemented, will be a facilitator of many of the problems the central banks in Europe are facing today in this field. It will be a facilitator because it will eliminate the multiplicity of currencies and exchange rate risk and correct the absence of a system-wide policy maker in the integrated monetary and financial system which is being brought into being as a result of a single market but which still lacks the complement of a single currency and single central bank.

TARGET is the name of the future integrated payment system that will operate in the final stage of Monetary Union. The features of this system are described in a report that was approved by the EMI Council and subsequently published last May. I will not describe the system in detail but will just say that TARGET takes a sort of middle
course between the two extreme solutions that could have been imagined. One was to do nothing, letting the market do whatever it felt to be necessary in a monetary union; the other was to start to build an entirely new system, possibly an EU-wide netting system similar to the netting systems that had been historically developed inside our countries.

The middle course was to design a system that would connect domestic RTGSs through an infrastructure, called “Interlinking”, which would permit a payment from agent A in one country to agent B in another country to be processed in exactly the same way in which it would be processed in a domestic RTGS system if A and B were nationals of the same country. The Interlinking infrastructure will provide the passage from the one country’s system to another’s in a way that will be virtually imperceptible to the banks and economic agent involved in the payment. For this result to be achieved, it is necessary not only to develop Interlinking but also to make sure that national RTGSs reach a higher degree of harmonization than that which may be sufficient for the needs of a single market, which I have described.

Further harmonization of RTGS is planned in three fields: operating hours, pricing policies and, most importantly, the provision of intra-day liquidity. National RTGSs are now being developed in ways that are not identical. They differ, in particular, in the provision of intra-day liquidity, partly because monetary policy instruments differ from one country to another: where there are large reserve requirements, the reserve account provides a source of intra-day liquidity; where there are no such requirements, other instruments for supplying liquidity are necessary and even in this case a variety of possibilities exist.

TARGET was designed for a situation in which Monetary Union will be perfect, namely a single central bank, a single currency, a complete replacement of national currency denominations by a common currency. While this work was being accomplished by payment systems experts, the progress of the debate on what in esoteric language came to be called the “changeover” process made it clear that this perfect stage of Monetary Union may not be in place from “day one” of Monetary Union.

The changeover will start when the single European central bank replaces national central banks in the design and implementation of monetary policy, and end when national banknotes, currencies and currency denominations are completely replaced by the common denomination.

These two moments do not coincide for a number of largely technical reasons. It is impossible to implement Monetary Union and the single currency “overnight”. The process will take months, perhaps even two or three years. It is now clear that during this period, the period of the changeover, currency denominations will coexist with fixed exchange rates; it will no longer be possible to develop a market for exchanging currencies, but it will still be possible to price and pay in a variety of currencies. What is now being done in the field of payment systems is to see how the TARGET system can handle this transitional period and how it could be integrated with easy procedures for conversion from one denomination to another.
CONCLUSION

Let me conclude by underscoring the relevance of this experience for the global payment system. I think it is relevant because it involves a very advanced state of integration, although limited in geographic scale, and the design and - to a large extent - actual implementation of very advanced solutions. These developments go back to the essence of the role that money and central banking play in an economy, highlighting two basic points. First, there tends to be a one-to-one correspondence between an economy and a currency or at least a set of monetary arrangements. If economies serve the market, if the market is single and fully integrated, the multiplicity of currencies and possibly of central banks may be a source of problems. Second, the three functions of central banking are so closely integrated that having a split situation for very long may create great problems. When, referring to the adoption of a single currency in Europe, a speaker this morning said “not in my lifetime”, he probably did not have in mind the theoretical desirability of restoring full consistency between monetary institutions and arrangements and the degree to which the system has become global but, rather, the enormous technical, legal and, above all, political and cultural obstacles that have to be overcome in order to implement something that seems conceptually very simple and straightforward.

I would say in conclusion that the EU solution is: “one system, many countries”.

Global Payment Systems
INTRODUCTION

Good afternoon. It is a pleasure to address this Hong Kong Monetary Authority seminar and the many participants who are charged with helping to manage global securities clearance and custodianship.

The Hong Kong Monetary Authority has taken a leadership role in helping to fundamentally change the payments infrastructure of the Hong Kong market. By commissioning the Hong Kong Association of Banks to study Hong Kong’s settlement problems, Hong Kong may be able to incorporate real-time, gross settlement by 1997.

I want to focus today on the trends we are seeing in the global financial markets and their implications for global securities clearance and custodianship.

While I’m sure most of you are familiar with State Street, I thought I would review briefly who we are so you can understand our perspective on the financial markets.

State Street is not an ordinary bank. Our primary focus is servicing and managing financial assets on a global scale. Our customers are institutional investors – pension funds, mutual funds, retirement plans and others with responsibility for large pools of assets.

We provide them with a broad and growing array of services, including custody, portfolio administration and accounting, treasury services, cash management, global securities lending, and performance measurement and analysis.

Our resources are dedicated to helping these customers carry out and monitor their increasingly complex, increasingly global investment strategies.

During the 1970s and 1980s, this focus led to our leadership in the U.S. markets we serve.

In the 1980s, we made a strategic decision to expand internationally so that we could support our U.S. customers as they went global with their investment strategies and, at the same time, penetrate non-U.S. markets.

We now have offices in 16 countries around the world and a global network that spans 70 markets. We enable our customers to invest in virtually every market in the world.
MARKET SIZE

How large are some of these markets? By any standard, the pools of assets in the
world's financial markets are extremely large. Globally, there are a total of about $25
trillion in securities — about $9 1/2 trillion in equities and $15 trillion in bonds. These
pools have become a major factor in today's world economy.

Who owns these securities? Worldwide, the insurance industry has almost $7 1/2
trillion of assets. Pension funds have $6.7 trillion, with U.S. funds accounting for more
than half of that total. Japan, the next largest pension fund market, has about $1 trillion
in assets, followed by the UK and Ireland, continental Europe and Canada. Around the
world, the mutual fund industry has assets of $4.1 trillion, with just over $2 trillion in
the U.S.

Now, let me share with you some of the trends we’re seeing in these vast global
markets.

TRENDS IN THE GLOBAL FINANCIAL MARKET PLACE

(i) Aging of the Population

The first trend I would like to mention is the aging of the population in developed
countries.

By early next century, Japan will have the world’s oldest population. Across Asia, other
populations are aging rapidly too.

The World Bank estimates that by 2030, 22% of China’s population will be over 60 — a
higher percentage than any country in the world other than Sweden at the start of this
decade.

In fact, by 2030, Hong Kong, Singapore, South Korea, Taiwan, Sri Lanka and Thailand
will all have a greater percentage of people over 60 than the United States had at the
time of its last census in 1990.

In 1949 in China, life expectancy was only 35 years. Today, there is a life expectancy
of 73 years. With an average retirement age of 58 in China, many people can expect to
spend up to a quarter of a century in retirement.

Put simply, people are living longer and they are spending more time in retirement.
Longer — and for that matter, healthier — retirements obviously require more retirement
assets — a lot more.

(ii) Shift from Government to Private Pension Plans

The second trend we are seeing is the increasing shift from public, pay-as-you-go
pension systems to private-sector, prefunded pension systems.
The aging of the population is severely straining pay-as-you-go pension arrangements such as the U.S. Social Security System.

In industrialized countries, the ratio of active workers to retirees is declining. In the U.S., for example, there were 16 workers for every retiree in 1950. Today, there are 3.2 workers per retiree. In 2010, the ratio is projected to fall to just 2 to 1. By that point, Social Security taxes on workers will contribute little to meeting retirees' needs.

For OECD countries as a group, the ratio of people between the ages of 20 and 59 to those over 60 was just 3 to 1 in 1990, ranging from a low of about 2.7 in Australia to a high of 4 in Norway.

In France, the state pension system incurred a $7.6 billion deficit last year. While the French continue to debate just what a capitalized, private pension system should look like, reform legislation has already been passed. A recent law gives tax incentives to artisans and independent workers who invest in private pension funds.

Likewise, in Hong Kong, the government has proposed a private pension system, called Mandatory Provident Funds System, which would pay benefits in a lump sum to those who reach 65 years of age. While the plan has been criticized for various reasons, there is a greater fear among some that if the plan is not adopted, a less lucrative, government-run plan will be introduced when the territory reverts to Chinese sovereignty in 1997.

In many other countries, as well, prefunded private-sector pension plans will play an increasingly important role in future years. Because of this shift to private pension plans and because an aging population requires greater retirement monies, overall pension assets are growing rapidly.

In Japan, pension assets are expected to nearly double by the end of the century. In Australia, they are projected to double during the 1990s. Canadian pension funds are growing at about 10% a year. And in Singapore, pension assets are expected to increase almost 40% in the next five years.

(iii) Growth in Cross-Border Investment

The third trend we're seeing is a growth in cross-border investment. This growth is being driven by investors' desire for higher returns and the benefits of diversification. The UK, Germany, Canada, Japan and the U.S. are the most aggressive intentional investors.

Hong Kong has also developed a unique role, serving as a bridge to gain access to the rapidly growing market of mainland China.

While pension funds are leading the cross-border charge, their levels of international investment vary widely. UK pension funds are the most aggressive in terms of their international allocation. U.S. pension funds invest a relatively small percentage of their assets overseas while the Netherlands, Canada and Japan fall in between.
Of course, we must ask, is cross-border investing a sound investment strategy? The answer, according to several economists with the International Monetary Fund, appears to be yes. They point to recent studies that show that home-country bias (that is, a preference for investing in one's domestic securities market) caused U.S. institutional investors to earn 2% less in annual returns during the 1980s than global investment would have produced.

(iv) Increased Complexity of Investment Strategies

The fourth trend I want to mention is strongly related to the higher level of cross-border investment occurring around the world. Today, we operate in a business environment that is increasingly global and competitive – for services and for our customers.

Our customers are demanding a higher level of service from us because their customers – whether they are mutual fund shareholders, retirement plan participants or other financial services providers – are demanding more from them.

Seeking enhanced returns and broader diversification, institutional investors are adopting increasingly global investment strategies that take advantage of innovative and complex derivatives-based instruments.

This new level of complexity is re-defining what our customers expect from their services. Not only must we provide a broad and ever-growing array of products and services – including portfolio accounting and administration, asset management, foreign exchange, global securities lending and performance measurement – we must deliver them in a completely integrated way.

And investors' hunger for information means we must supply them with the status reports they need on their global investment portfolios fast and accurately – a capacity that we at State Street have developed to a world-class level.

(v) Empowerment of the Individual Investor

The fifth and final trend I’d like to mention is the empowerment of the individual investor through greater investment choice. This trend is behind the growth in the defined contribution plan and collective investment fund markets that is occurring in countries around the world.

There are a number of realities driving this trend: more and more of our society’s wealth is being transferred into the hands of people under 50 years old. In the U.S., it is projected that during the next 50 years, these people will inherit more than $12 trillion from their parents in what has been called the greatest transfer of wealth in history.

This group of people is accustomed to making their own decisions about investments. The rise of the discount brokerage firm and no-load mutual funds purchased directly from the fund sponsor, without the advice of a broker, are testaments to this desire for self-direction. This trend is resulting in the growth of pooled funds that enable
individuals around the world to benefit from the professional management of their assets.

IMPLICATIONS FOR GLOBAL SECURITIES CLEARANCE AND CUSTODIANSHIP

Now, let me turn to what this complex, globalized business environment means for global securities clearance and custodianship.

To begin, let me say that times have changed dramatically for our industry. Ten years ago, the financial asset services business didn't really exist. Instead, we performed basic transaction processing services, and the focus was just making sure we processed the trade correctly.

We were processing increasingly higher volumes of trades without having the sturdy infrastructure necessary to support the volumes – as a result, we operated extremely inefficiently.

The market crash in 1987 forced the securities and custody industries to change the way we operated. We focused on getting the trade processed right the first time.

In effect, the “back office” was finally recognized by the “front office.” We met customers' and investment managers' demands for electronic trade settlement. We made substantial investments in technology to build the infrastructure to support increased volumes and increased complexity.

As an example – while we have no claim to be the largest processor in the world – in August alone we successfully completed 60,000 trades worldwide. They were valued at $32 billion.

In Hong Kong, we completed 3,000 trades that month at a value of $525 million.

We have also addressed the problem of standardization – or lack thereof. SWIFT led this charge as one of the original proponents of standardization. Now others are trying to get the global players in the financial markets to adopt SWIFT’s message formats.

It is critical to State Street that our subcustodians have the technology to support SWIFT communication between themselves and State Street and that they have automated linkages to their local depositories and cash clearing systems.

State Street employs local banks to perform subcustody services in 70 markets.

Some of the key components we look for in the institutions we employ are: commitment to technology, presence in the local securities market and the ability to support value-added services, such as proxy voting and cash management.

In the 1980s, the chief aspect of subcustodian service was the ability to settle security transactions and safekeep assets. Today, as volumes have exploded, the goal is to
automate the process by providing real-time reporting and market information to the global custodian, thereby minimizing manual intervention and risk.

State Street is also involved in industry efforts to reduce operational risk. I am co-chairman of the U.S. Working Group of Thirty, which develops recommendations for revamping world securities clearance and settlement processes.

In 1989, the Group of Thirty proposed nine standards for improving the world securities industry's efficiency and reducing settlement risks. The recommendations included changing the settlement system for all markets from T+5 to T+3 and eliminating regulatory and taxation barriers that inhibit the practice of lending securities.

As of June, a number of European countries, Canada, the U.S., Hong Kong and many others have implemented changes in their settlement systems.

Likewise, numerous countries are now encouraging securities lending, including Australia, Canada, Germany and Japan.

In Hong Kong, securities lending is occurring on a limited bilateral basis between members of the Central Clearing and Settlement System, but not in a centralized system.

A rarity 10 years ago; securities lending is now one of the well recognized and widely used ways to maximize returns.

Today, State Street offers an integrated array of services that enable our customers to do their jobs more efficiently and at the same time achieve higher investment returns.

Investors' eagerness for information, while not new, is steadily escalating. Events like the implementation of daylight overdraft pricing by the U.S. Federal Reserve are magnifying investors' demand for accurate, almost instantaneous information.

Our pension plan sponsor customers, for example, are saying to us, "Don't just process my transactions for me. Become my business partner and help me achieve my business objectives. Give me instantaneous access to your data at the same time that you have it."

Customers want to share the information so they can download it to perform analyses in their own software applications -- and we are providing it to them. In fact, the future of our business is tied up in this demand for better and ever more timely information.

FUTURE CHALLENGES FOR THE INDUSTRY

I would like to share with you now how the evolution of the securities industry has led to an increase in the number and type of risks taken by providers involved in international settlement.
As I mentioned earlier, cross-border investments are flourishing. But the lack of standardization across markets means high risks are present in cross-border trading.

As we have seen through the trials of others such as Barings and Daiwa, risk management is an absolutely critical part of doing business. For those of us who play a fiduciary role, risk management is even more important.

The key to success is to fully integrate risk management into business practices so that it is not an after-the-fact exercise. Companies must develop a culture that fosters and rewards the management of risk.

There must be a high level of accountability and attention from top management and directors. And there must be a continuous reevaluation of the effectiveness of risk management policies to ensure that they reflect changing industry dynamics.

Today, custodians, clearing agents and international depositories are taking large risks, without being adequately compensated, as they help to maintain liquidity in cross-border trading.

Credit and liquidity risks tend to be more complex and longer lasting in a cross-border environment. The number and size of time gaps are greater between the processing cycles of various central depositories, and also between those of central depositories and national payment systems.

These gaps happen because of multiple currencies, the localization of national payment systems and central depositories, and time-zone differences.

If the risk is not absorbed by someone, it results in additional costs for traders or investors.

I am a member of the board of directors of Euroclear, which has conducted a study addressing these challenges. While we believe that a number of industry initiatives need to be undertaken to begin moving toward the best long-term solution, Euroclear has developed nine specific recommendations.

These recommendations include improving the infrastructure of both central depositories and national payment systems. Euroclear believes that each central depository and payment system should move toward real-time settlement. This single improvement would reduce the duration of pipeline liquidity risk because processing cycles of central depositories and national payment systems could be better synchronized and payment finality achieved earlier.

Euroclear also recommends that central depositories eliminate or refrain from adopting forced settlement rules. Forced settlement rules deter matching until the last possible moment before settlement, especially by intermediaries who need to be sure they have control of client assets before committing to settle.
CONCLUSION

As we move into the future, the challenge for those of us in the financial services business will be to successfully navigate through an increasingly complex business arena.

We must figure out how to integrate the flexibility, creativity and total focus on customer service that are the hallmarks of successful technology development companies, while still listening to what our customers' objectives are.

Fiduciary risk management will also play an important role in the process. Risk management is an evolving concept that is increasingly important at State Street. We must serve rapidly growing, rapidly changing markets without taking inappropriate risks.

And we need to educate our customers about the value of the risks we take – on their behalf – so that they accept the fact that we deserve to be paid for them.

Thanks to technology, the world is becoming smaller. Economies around the world are privatizing and creating millions of potential customers. By establishing alliances with institutions in these markets, financial asset services in particular and banks in general can take advantage of the tremendous opportunities that these new markets offer.

Thank you very much.
HONG KONG IN THE GLOBAL PAYMENT SYSTEM

Joseph Yam
Chief Executive
Hong Kong Monetary Authority

INTRODUCTION

I am pleased to have this opportunity to present our views on Hong Kong’s payment system within the global payments network. Given the time constraint, I do not propose to go into the technical details of our existing payment system in Hong Kong and the proposed Real Time Gross Settlement (RTGS) project. These have been adequately covered in an article recently published in the Hong Kong Monetary Authority’s Quarterly Bulletin which has also been reproduced as an annex to the printed version of this speech. I would like to take the opportunity instead to share with you our views on a number of issues which have been important in shaping the RTGS system that we are trying to build. I would also like to share with you our views on how our system could feature in the global payments network.

THE HONG KONG RTGS SYSTEM

Hong Kong was a late starter in the reform of the interbank payment system. We currently still clear and settle our cheques and inter-bank payments on a net basis the next day. The US Fedwire system has been processing payments on RTGS basis since 1968. The Swiss payment system, SIC, went on RTGS in 1987. We did not begin looking at our interbank payment system until 1993. With rapid changes in both regional and national payment systems worldwide, following the important studies made by the G-10 Committee on Payment Systems and by the European Union central banks on payment system standards, it was abundantly clear that we in Hong Kong must try and upgrade our system to meet these international standards and do it quickly.

Being a late starter does carry one advantage: we are able to learn from other people’s experience, good or bad. In this connection, I would like to express our sincere gratitude to fellow central bankers who have been most helpful to us by giving us invaluable advice and sharing with us their experience. In particular, I would like to thank Peter Allsopp from the Bank of England, Israel Sendrovic of the New York Fed and Christian Vital of the Swiss National Bank for all their help and assistance.

In the design and implementation of our new RTGS system – by no means a simple project – we have set for ourselves a few key guiding principles, which can be summed up as confidence, credibility and consensus.

(i) Confidence – full compliance with international standards

First of all, confidence. Not many serious and prudent players want to carry out financial transactions in a financial system that does not command their full confidence, in particular, confidence in the efficiency, integrity and robustness of the payment system. Confidence on an international level – for after all we are keen to
maintain Hong Kong's status as an international financial centre - requires full compliance with international standards. This view immediately settled two fundamental questions for us: the adoption of RTGS as the basis of our new system, and the settlement across the books of the Hong Kong Monetary Authority (HKMA) to enable settlements to be unconditional, final and irrevocable. The adoption of RTGS will immediately eliminate most of the legal risks associated with bilateral or multilateral netting. Settlement across the books of the HKMA will eliminate any doubt over credit risks associated with commercial banks acting as settlement institutions, however prudently these commercial banks are run. Once this was decided, a single tier architecture, instead of the present three tier one, with every bank settling directly across the books of the HKMA, made the design both simple and efficient.

An associated issue of importance if the payment system is to command the full confidence of market participants concerns the management of credit risks arising from daylight overdrafts. Our plan is to tackle that issue by integrating our book-entry securities system - what we call the Central Moneymarkets Unit (CMU) service - directly with the RTGS payments flow mechanism. Any daylight overdraft incurred by banks at its clearing account with the HKMA will be fully collateralized with Exchange Fund paper on a repo (sell and buy-back) basis. As far as I know, our RTGS system is one of the first to be engineered with a seamless integration between the settlement function and the government securities book entry function. We will be happy to share our technical specifications on this and other features with other central banks.

(ii) Credibility - evolution, not revolution

The second guiding principle, as I mentioned earlier, is system credibility. In implementing any technical reform which had system wide implications, such as the interbank payment system, technology itself cannot be taken for granted. Although we could have bought new and advanced technology from the international market, lock, stock and barrel, we decided to adopt an evolutionary approach by prudently building on the existing large value fund transfer system called CHATS, which has many years of proven record. A brand new system would cost probably twice as much and it would also require at least 18 months longer to implement. The banks in Hong Kong are familiar with CHATS procedures and the settling in period would be considerably shorter than putting into a new system with technology untried in the Hong Kong environment and brand new procedures. The larger banks can interface their own complex systems with RTGS through the tested IBM AS400 machine, while the smaller banks can access RTGS through PC terminals. In other words, our new system will have the credibility of the existing CHATS behind it and will be quite user friendly.

Further to ensuring system credibility, we have the most challenging task to try and ensure that the new system will not fail. We have thus planned a very thorough testing process, before going live on RTGS, with the assistance of an international firm of consultants with strong international and domestic experience. Such testing is both labour intensive and expensive, but there is, I am afraid, no short cut if we are to build an absolutely robust payment system for Hong Kong.
(iii) Consensus – full cooperation between the public-private sectors

The third guiding principle is consensus. A project as complex as this one could not be designed and so far implemented smoothly without the full co-operation of the banking industry, which after all is the main user of the payment system. We have in Hong Kong a large and rather heterogeneous population of over 180 licenced banks, operating within a rather complex three-tier clearing structure comprising the Management Bank of the Clearing House, a number of Settlement Banks and an equal number of catchments of Sub-settlement Banks of varying size. But their interests are well represented by the Committee of the Hong Kong Association of Banks (HKAB).

Through HKAB, we consulted the banking industry at each and every critical stage of our study and decision making process. I personally also chair a Committee on Payment System involving many top bankers to give a policy steer to the RTGS project. It is a reflection of the co-operative spirit in this consensus approach that the RTGS project is now being implemented by a joint venture company, called Hong Kong Inter-bank Clearing Limited (HKIC), with 50:50 ownership by the HKMA and HKAB.

Let me place on record our appreciation of the valuable contribution of the project team, including the Management Bank of the Clearing House, the Hongkong Bank, as the owner of CHATS and all other members of the Hong Kong banking community, for making this important project proceed thus far so smoothly and on schedule. We aim to have full implementation of the project by the end of 1996, which will be less than 24 months after the endorsement of the feasibility study. This is an ambitious target by any standards, but we have little alternative. We cannot afford to lag behind others in this important area of market infrastructure if Hong Kong is to maintain its competitiveness as an international financial centre.

BEYOND RTGS – Cross border linkages

I am confident that these guiding principles will ensure smooth completion of this important project on schedule. But this is not the end of the matter. We need to look beyond RTGS as we look beyond 1997.

Don’t take me wrong. The targeted completion of the project before 1997 has nothing to do with the transfer of sovereignty. The year 1997 features prominently in this context because two important events that have great relevance to Hong Kong in the payment system area will occur. The Federal Reserve Board has already announced that in 1997, the operating hours of Fedwire will be extended to 18 hours. This is the first event. Conceptually and technically a bilateral link between the RTGS payment systems of two currencies should not be too difficult to design and achieve. This will enable cross currency transactions to be settled via a payment versus payment (PvP) basis and will help eliminate Herstatt risk, which is biggest for the East Asian time zone in view of the longer time gap with New York. It will also strengthen trade and capital flows between the two economies, particularly when one currency is linked to the other as a monetary policy objective. We certainly hope that a direct linkage can be achieved between our RTGS system for the HK dollar and Fedwire for the US dollar. We will continue to pursue the idea with our colleagues from the New York Fed.
The second event is the targeted completion in 1997 of the China National Automated Payment Systems (CNAPS) for the RMB, which is also designed on an RTGS basis. I have little doubt that the RMB will in time, along with the US dollar, become one of the two most important foreign currencies for Hong Kong, particularly after it attains freely convertible status. The mainland and the US are, afterall, our largest trading partners. We have, therefore, in consultation with the People’s Bank of China, taken the strategic decision to work towards linking our RTGS with the CNAPS system.

We have looked beyond RTGS and have initiated discussions leading to linkages of RTGS systems on a bilateral basis for a number of reasons. First, a robust network of global cross-border payments can only be built on robust domestic payment systems. Robust RTGS systems form the basic building blocks of the global network.

Secondly, once the foundations have been laid, the inter-connection between payment systems should be built bi-laterally instead of multi-laterally. We fully understand and appreciate that the European Union, with their intention to build a single currency, would be keen to link the European payment systems together first on a multilaterally basis. Similarly, other G-10 payment systems have internal interests to cater for, thus restraining the capacity to “internationalize or harmonize” the global payment network. There are many legal and structural constraints to multilateral system linkages. It may take a long time for these to be resolved to the satisfaction of all. On the other hand, it is in two economies’ own direct interests to build a bilateral linkage with each other, and this could be achieved with much greater ease.

Thirdly, PvP linkages can be achieved either indirectly via private sector banks, or directly with linkages of two RTGS systems together. Mr Bruce Summers, Senior Vice President of the Richmond Fed, has recently proposed what we think is a most practical and feasible way of linkage through a payment – matching mechanism at the “good offices” of central banks. He said that “In essence, each central bank involved would escrow payments originated by users of the service and release the payments only when a well-defined condition is met for each.” This mechanism would eliminate Herstatt risk without exposing central banks to new credit risks and the global payment system to commercial bank risks.

Fourthly, in a world of cross-border payments, domestic payments are only one leg of an international transaction. In Hong Kong, daily inter-bank HK dollar transactions are already in the order of US$15 bn, but foreign exchange transactions are in order of US$91 bn daily. This goes to show that payment systems must be robust and efficient both domestically and internationally.

Fifthly, the bulk of the cross-border flows through Hong Kong so far is between Hong Kong, Europe and America, reflecting the traditional pattern of trade, and the dominance of the US dollar in international transactions. However, there has been greater and greater intra-Asian trade and investment flows, such that efficient and robust Asian payment systems must exist to facilitate this growth. Between 1990 and 1994, the number of SWIFT messages recording financial flows around the world increased by 9.1%, but total messages for the Asia-Pacific Region has been growing nearly 50% faster at an average annual rate of 14.6%. As the value and volume grow, there is no alternative to the reduction of payment system risks except through direct linkages between RTGS payment systems of different currencies.

Thus, we consider the building of direct linkages between RTGS based payment systems in this region and internationally as essential, in order to support the rapid growth of trade and capital flows around the world. The HKMA would be pleased to discuss with other central banks should they be interested in establishing bilateral PvP links with Hong Kong.

ENHANCEMENTS TO CMU SERVICE

Before closing, I would like to take this opportunity to announce two enhancement measures to our CMU Service which will be implemented very shortly. The first enhancement is that as from December 1995, the CMU Service will be able to offer end-of-day delivery versus payment (DvP) facility for private sector debt securities lodged and cleared with the CMU. This should help reduce settlement risk in the trading of these securities. Of course, the DvP function, both real time and end-of-day, will be available to all CMU instruments, including the Exchange Fund Bills and Notes and private sector debt securities, when our system goes live on RTGS by the end of next year.

The second enhancement is that, as from January 1996, the CMU will accept non-Hong Kong dollar denominated debt securities. So far the CMU only accepts Hong Kong dollar debt securities because the CMU Service is designed and set up to promote the Hong Kong dollar debt market. However, there is no reason why the CMU, which is already linked up with EuroClear and Cedel, cannot widen its coverage to debt securities denominated in foreign currency. Following consultations with market participants, we have decided that the CMU Service should widen its coverage to cater for market demand for the clearing of foreign currency debt securities.

These two enhancements to the CMU, together with the launching of the 7-year Exchange Fund Notes later this month as announced by the Financial Secretary yesterday, are part and parcel of the HKMA’s on-going efforts to upgrade the market infrastructure. I am acutely conscious of the fact that the financial markets are becoming increasingly globalised and fiercely competitive. There is no scope for complacency. Financial business and transactions will flow to and gravitate in those centres which offer the best service and the least risk.

CLOSING REMARKS

Finally, as host of this seminar, I would like to thank all of you for attending. Your presentations and discussions will, I am sure, be most helpful towards the building of robust domestic payment systems and the cross border linkages of such systems to form a global payment system that is equally robust. I wish all of you a pleasant and enjoyable stay in Hong Kong. Thank you.
ANNEX

Hong Kong’s Payment system

To meet international standards and minimise settlement risks, Hong Kong is moving towards a Real Time Gross Settlement (RTGS) system from the existing next day net settlement system. A new clearing company, Hong Kong Interbank Clearing Limited, has been set up to implement and run the new system. When RTGS is fully implemented by the end of 1996, it will be among the most advanced and robust payment systems in the world with real time PvP and DvP functions.

Background

In order for Hong Kong to maintain its status as an international financial centre, the HKMA has been working closely with the banking community to ensure that Hong Kong has an efficient and robust payment system, which is an essential market infrastructure. Much work has been done in the past two years. In January 1994, the HKMA’s Working Party on Payment and Settlement System recommended that Hong Kong should move to RTGS as soon as possible. Since the issue was of strategic importance and involved the whole banking community, a Committee on Payment System (CPS), chaired by the Chief Executive of HKMA with representatives from leading banks in Hong Kong, was set up on 31 May to provide policy input on the implementation of RTGS in Hong Kong. At the same time, the Hong Kong Association of Banks (HKAB) commissioned in June a Project Co-ordinator to undertake RTGS Feasibility Study based on the recommendations of the Working Party. The CPS met four times and guided the Project Co-ordinator on important features of the RTGS design. The final conceptual design of the RTGS system incorporated the following core features:

a) compliance with international standards;

b) final settlement across the books of the HKMA;

c) a single tier system in which all licensed banks would open clearing accounts with the HKMA;

d) banks would be able to obtain intra-day liquidity through repurchase agreement (repo) with the HKMA, using Exchange Fund Bills and Notes; and

e) allowance for domestic and international linkages to facilitate real time delivery versus payment (DvP) and real time payment versus payment (PvP).

Conceptual design of the new RTGS system

With the view that the new RTGS system should be simple, robust, evolutionary and in full compliance with international standards, the CPS decided that the RTGS system would adopt a Y-shaped topology (Chart 1) with all licensed banks having direct access to the system. The Y-shaped topology of information and payment flow meant that the system would be kept simple and direct, without unnecessarily routing information or

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1. payment vs. payment – settlement of two currencies at the same time for foreign exchange transactions.
2. delivery vs. payment – settlement of cash and securities at the same time for sale or purchase of securities.
value through other intermediaries. While a bank would send in the full details of its payment instruction, including customer information, to a central Transaction Processor, the instruction would be ‘stripped’ such that only the settlement instruction, i.e. information on the amount, the paying bank and the receiving bank, would be passed onto the Settlement Account Processor and known by the HKMA. No daylight overdraft is allowed for the clearing accounts. Hence, banks without sufficient clearing balance or securities for repo to effect payment instructions would have their instructions queued in the system. Such a queuing mechanism would mean that a payment instruction cleared across the books of the HKMA would be final and irrevocable. The queuing mechanism allows the banks to manage their own queues of payment instructions through cancellation and resequencing.

Under any RTGS system, it is important to address the issue about how intraday liquidity can be provided to the banks in order to reduce the chance of gridlock being developed since every payment has to be settled on an individual and gross basis. A related issue is whether the overdraft should be clean or collateralised, since the provider of funds may be subject to credit risk. The Hong Kong RTGS design solves these two problems by having a seamless interface with the CMU book-entry securities clearing and settlement service operated by the HKMA so that banks can obtain intraday liquidity through same day repo to fund their payments. It is one of the few RTGS system in the world to wholly integrate the payment settlement function with the book-entry securities settlement function.

The main findings and recommendations of the Feasibility Study, which took full account of the advice and views of the CPS, were approved by the Exchange Fund Advisory Committee and the HKAB Committee in December 1994.
To ensure the smooth implementation of the RTGS project, the CPS also accepted the Project Co-ordinator’s recommendation that the system be built on the existing CHATS inter-bank fund transfer system, so that the design and implementation work can proceed on an evolutionary path.

In view of the co-operative nature of the RTGS project, the CPS recommended the establishment of a new clearing company to be jointly owned by HKMA and HKAB to replace the existing Clearing House managed by the Hongkong Bank (HSBC) or the Management Bank to provide interbank clearing functions. A new company, Hong Kong Interbank Clearing Limited (HKIC) was established in May and is actively involved in the implementation of the RTGS project.

Roles and responsibilities of the HKMA, the HKAB and other parties under RTGS

The RTGS project involves a number of key parties:

(a) the HKMA, the settlement institution, the provider of intra-day liquidity, the current operator of the CMU, the regulator of the payment system and the lender of last resort;

(b) the HKAB, the institution responsible for interbank payment and clearing;

(c) the HKIC, the operator of the clearing house, which is jointly owned by HKMA and HKAB, each with equal shares which is responsible for implementing the RTGS project to its completion and operation;

(d) commercial banks, the users of the interbank payment system; and

(e) users of the CMU system (mainly Recognised Dealers of Exchange Fund Bills/Notes and Members of the CMU Service for private sector debt securities).

Under RTGS, HKMA will take over the Management Bank’s role as the settlement institution. Instead of having the present two-tier structure which has ten Settlement Banks, one of which is HSBC, and over 160 Sub-settlement Banks settling across the books of their respective Settlement Banks, all licensed banks will have clearing accounts directly with the HKMA. Settlement will be across the books of the HKMA. This eliminates the risk of the settlement institution(s). Payment instructions, once settled, will be final and irrevocable.

HKMA is the regulator of the payment system and the lender of last resort. Besides overnight liquidity, HKMA will also provide intraday liquidity to banks through intraday repos to allow smooth payment flows and reduce the chance of gridlock developing. A seamless interface is being built between the CMU system and the RTGS system to allow real time delivery versus payment and intraday repo (a special form of real time DvP) to take place. All the overnight and intraday repo facilities are provided by a collateral management system to be operated by the CMU.
The operator of the new payment system will be HKIC. Its Management Board comprises eight Directors: two from the HKMA, one each from the three Continuing Members of the HKAB, i.e. the note-issuing banks, and three elected among the other member banks of the HKAB. The HKIC is currently recruiting its General Manager and searching for suitable premises.

The HKAB is co-ordinating banks in all activities relating to RTGS. It has been keeping banks informed of the project’s progress and preparing them to get on or switch to the new RTGS system. The HKAB, with the help of the HKMA, the existing Clearing House and the Project Co-ordinator, arranged four seminars in May and June to brief the banks further on the design of the new payment systems. The transaction processor, a key component of the RTGS system which takes care of the clearing functions in being developed under the guidance of HKAB. The Electronic Clearing (ECG) mainly for bulk volume low value payments in the second quarter and paper cheques in the third quarter.

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<td><strong>Provision of Intraday Liquidity for RTGS</strong></td>
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- No intraday overdraft
- Intraday funding available through same day repo
- Seamless interface between the three components of the new RTGS system:
  - Transaction Processor
  - Settlement Account Processor
  - Central Moneymarkets Unit Processor

| Exchange Fund General Ledger |
| Settlement Account Processor |
| Central Moneymarkets Unit Processor |
| Transaction Processor |

**RTGS Phase I Implementation** *(March/April - 4th quarter 1996)*

*Processing interbank fund transfer messages by RTGS software* Through using the RTGS software as early as March/April 1996, the member banks will have about nine months to familiarise themselves with the RTGS functionalities before moving to genuine real time settlement. All banks will have an account in the Settlement Account Processor (SAP). Payment messages will be processed as if in real time but settlement will only take place on a net basis at day end observing the existing two tier structure, i.e. first across the books of the Settlement Banks (for the Sub-settlement Banks), and then across the books of the Management Bank (for the Settlement Bank). The notional (not actual because the final settlement has to wait until day end on a net basis) balances of the banks’ accounts with the SAP will change in real time as a result of these payment messages. These notional balances will serve only an advisory function, i.e. the banks will be alerted if their notional balances fall below zero but they can still input new payment instructions into the system.
End of day settlement A second objective of the Phase I implementation in March 1996 is to have same day settlement (at day end) instead of, as under the existing system, at 10:15 a.m. on the next day. The intention is to have CHATS, cheques and ECG all settled at day end at, say, 5:00 p.m. However the cheques settled today are those presented to the Clearing House (or the new Clearing Company) yesterday. All cheques presented to the Clearing House (or the new Clearing Company) on Day D will only be given value to the banks’ clearing account balances on Day D + 1 with final settlement at the end of Day D + 1. This will eliminate the systemic risk associated with returned items which should have all been counted and adjusted for by the early afternoon of Day D + 1.

RTGS Phase II Implementation (4th quarter 1996)

RTGS across the books of HKMA Since the HKMA will replace the HSBC as the settlement institution in the new payment system, all banks’ clearing accounts will be moved across to the HKMA in the fourth quarter of 1996. By that time the interface between the RTGS system and the CMU, which will be upgraded to include a collateral management system, should have been developed to provide intraday liquidity to the banks through intraday repo of Exchange Fund paper and other qualified securities. It will then be a single tier structure with all banks settling across the books of the HKMA. At this point of transition, the settlement mode will change from day end net settlement to RTGS.

Project time-table

RTGS implementation is planned to commence in the first quarter of 1996 and for full operation before end 1996. During the course of 1996, the new clearing company will step by step take up the functions of the existing Clearing House. It is in Hong Kong’s interest to implement RTGS in the shortest possible time frame, having regard to the need to establish real time payment versus payment (PvP) link in 1997 with the US Fedwire when the latter lengthens its operating hours from 12 to 18 hours. The HKMA has also reached agreement with the People’s Bank of China to establish PvP link between the HK dollar payment system and China’s new payment system (CNAPS), which is scheduled to implement RTGS in 1996. Hong Kong needs to catch up with other East Asian countries in the reform of its payment system. For example, South Korea and Thailand have implemented RTGS in 1994 and June 1995 respectively and Malaysia is also in the process of implementing RTGS. Hong Kong must therefore seek to achieve RTGS as soon as possible in order to remain competitive as an international financial centre.

Domestic and International Linkages

The RTGS system will be the first payment system in the world which operates integrally with a book-entry debt securities clearing system. This integral system not only allows DvP for securities settlement, but also provides a source of intraday liquidity for banks through the form of intraday repo of Exchange Fund Bills and Notes and other eligible securities. It will be the Foundation for the key integration of payment and clearing systems software for the new RTGS system is being developed.
by HSBC and BCSIS Singapore Ltd., based significantly on the existing proven CHATS software.

Impact on banks

Under RTGS, all licensed banks will have direct access to the payment system. Banks that are not members of the existing Clearing House Automated Transfer System (CHATS) will have to become members of CHATS which will start to run on RTGS principles starting from March/April 1996, before full implementation by the end of that year. To prepare banks for the RTGS environment, all banks will have to become CHATS members by the end of 1995.

Under the RTGS system, banks are not allowed to incur an overdraft at any time of the day. Banks will therefore have to manage their payment flows. However, they may obtain intraday liquidity from the HKMA through repos of Exchange Fund paper and other eligible securities. Taking advantage of the seamless interface between the CMU and the RTGS systems, intraday repos can be highly automatic.

Project Progress

The following milestones were achieved in accordance with the agreed schedule:

(a) completion of the User Requirements for the new RTGS system in January 1995;
(b) establishment of the interim clearing company and the arrangement of a bridging loan to fund its start-up costs in February 1995;
(c) completion of the Functional Specifications for the new RTGS system in April 1995;
(d) interim clearing company was named Hong Kong Interbank Clearing Limited ("HKIC") in May 1995;
(e) agreement by the Committee on Payment System in May 1995 on the phasing strategy for RTGS implementation;
(f) consultations with banks on the phased implementation strategy in May/June 1995;
(g) software programming by the HSBC and the Banking Computer Services Information Systems Private Limited from Singapore in progress; and
(h) recruitment of the General Manager of HKIC in progress.

Phasing Strategy of Implementation

There are a number of important issues involved when phasing in the new system.
**Preparatory stage** (Now to March 1996)

**Moving all banks onto CHATS** Only about 70 banks out of a total of 170 are now on CHATS. It is necessary for HKAB to alert those banks (about 100) which are not currently CHATS members to the preparatory work involved. Banks will be given a choice between using AS400 or PC as their front end equipment. This process of moving onto CHATS should start as soon as possible and all banks will probably be on CHATS by end 1995.

**Introducing limits to CHATS** The HKMA is now conducting a study on the existing payment flows based on data provided by the present Clearing House. In order to familiarise the banks with the RTGS environment, net sender's limits will be introduced into the existing CHATS well before adopting the RTGS software. The banks will be alerted if during the day, the value of their total net outgoing CHATS payment messages (after deducting the value of the incoming ones) at a certain point in time exceeds a pre-determined limit. This will also help the banks to manage their intraday payment flows and HKMA to make an assessment on the amount of intraday liquidity required.

**Installation of mainframe equipment in HKIC** This task will be undertaken in the fourth quarter of 1995. to enable the HKIC to have the necessary equipment to take up the clearing functions of the existing Clearing House step by step during 1996: CHATS in the first quarter, with other securities systems within Hong Kong and internationally.

The RTGS system also allows for PvP functionality for foreign exchange transactions. PvP helps to remove Herstatt\(^3\) risk in cross border multi-currency transactions. The HKMA has already initiated preliminary discussions with other central banks about PvP linkages. The extension of the operating hours of the US Fedwire from 12 hours currently to 18 hours in early 1997 means that PvP between HK dollar and US dollar will be possible, thus eliminating the major Herstatt risk in such payments.

**Concluding remarks**

The development and implementation of the RTGS System is crucial to maintain Hong Kong's status as an international financial centre. As such, it requires the participation of the entire banking community. The whole-hearted support and the contribution of the HKAB and the HSBC, the Management Bank of the existing Clearing House, to this important project are particularly significant.

Hong Kong is a late starter in the reform of its payment system. But we have moved forward very rapidly in the past two years. Hong Kong's payment system is now undergoing rapid evolutionary changes. By end 1996, Hong Kong will have a world class payment system which is simple, robust and efficient, that will be integrated to the world network of payment systems to deliver future real time DvP and PvP capability.

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\(^3\) Herstatt risk arises in foreign exchange transactions when one counterparty delivers currency in one time zone and receives value in the other currency in another time zone. The risk is the possibility of failure of the counterparty who is to deliver later.
BECOMING “BEST IN CLASS” AT PAYMENTS

I.R. Wilson
Chairman
Hong Kong Association of Banks

Good morning, ladies and gentlemen. I am gratified to have been invited to speak at this seminar as the subject matter is very much a live issue. It is also one where there is a clear convergence of the interests of commercial and central banks. I will endeavour to talk from the perspective of commercial banks but if I stray into central banking territory I hope you will see that as a confirmation of that convergence of interests I have just mentioned.

I should also mention that I drafted this address prior to knowing the contents of Joseph Yam’s speech but I was assuming he would talk to you about developments in Hong Kong’s payments system. The Hong Kong Association of Banks is as much involved in this as the HKMA but I will try to give you a flavour of the considerations that led to banks’ enthusiastic implementation of the programme we jointly devised.

An overhaul of payment systems has been taking place on an international level for some time now and we are beginning to see the emergence of a dramatically different picture. What is difficult to understand is why it has taken so long. Banking is, after all, as much about the storage and transmission of value as the provision of credit and, given the technology available, it is amazing that the transmission side of it is still so ponderous. A recent article in the new Chartered Banker – what an excellent name for an authoritative banking magazine! – talks about the efforts of the European Commission to impose a 6-day ceiling on international payments and what an uphill battle it is having. There is still far too much emphasis on what is convenient for banks and not enough focus on what the customer needs and how to deliver it efficiently.

So let us look at the developing environment and the needs it gives rise to. Needs not just of customers but of banks themselves, by the way.

Banks compete internationally as well as domestically. An important segment of customers, the multinationals, is not confined to just using local banks. And there are some services which have to be delivered across borders. Hong Kong is a node in the global net. We need a level playing field between us and other leading financial centres, otherwise the business will not come to us.

Even at the time of the Herstatt incident the huge volumes involved in international forex trading were worrying; now they are even greater. The risks are no longer tolerable. Netting is not always the solution as the criteria for acceptability for risk-weighting purposes are stringent. There is pressure for payment against payment, with the two legs of forex transactions being settled simultaneously. Clearing and settlement systems therefore have to link up internationally.
The retail banking environment has also changed. Services are consumer-driven and high-street banks cannot afford to be complacent. At the premium level banking is moving from transaction banking to relationship banking. Customers have a reduced degree of trust in banks and are looking more closely at how they perform services. In the search to contain costs banks are moving away from bricks and mortar to remote distribution via telephone banking. The automated, paper-less, staff-less branch is appearing. There is also a greater consciousness of the risks inherent in the payment infrastructure. The studies carried out internationally in the late eighties pinpointed these for us.

Banks cannot reform, whether at the retail or the wholesale level, till the infrastructure is in place. Here in Hong Kong, by and large, manual processes are efficient, so if we want to make a quantum leap it is down to technology. Hence the programme that I mentioned earlier, the programme to overhaul the way we clear and settle inter-bank payments in Hong Kong.

Once that programme was agreed, we moved fast. The implementation of Real-Time Gross Settlement and the other changes to the clearing arrangements bring about clear benefits to banks and their customers. The timetable is aggressive but we have accepted minor imperfections in order not to fall behind other financial centres. We have also accepted that all banks must join the system directly if we are to benefit from the reduction of risk. Once we have the new structure in place, we shall be able to build on it to devise the services needed to satisfy the requirements I was talking about earlier. It will be up to banks how quickly they can turn around payments that have come through the new system, but I rather fancy that, for incoming cross-border payments, even those that have to be transferred to another bank, Hong Kong banks will be able to turn them round and have them in the beneficiary’s account in one working day. That compares most favourably with the 6 days that European banks are finding so challenging.

The strategy adopted is one of deliberately weaning customers off cheques. They will still be useable – cheques, that is, not the customers – but they will be settled and credited with value the working day after the day of deposit. Availability to the customer – D plus 2 – will still be the same. The clearing tariff and value-dating will predispose customers wanting urgent need settlement to have their banks pay via RTGS.

We also looked at Giro, which has the advantage of avoiding settlement risk by having the debit effected before the credit and having a much more streamlined transaction flow. Giro was developed some years ago before the emergence of services such as telephone banking and payroll credits and the gap to be filled is therefore not so great here in the continuum of payment services. We are continuing to look at it but in a fairly low-key fashion, given the competing priorities of RTGS.

Banks are not just competing with each other. The competition from non-banks in the payment area is especially noticeable in the U.S. Being able to transmit funds means that you have to hold the funds in the first place, which brings you dangerously close
to offering deposit services. In Hong Kong you need a banking licence to do that. But as my fellow panel member Joseph Yam has frequently said in the past, if you do not move the market has a way of flowing around you. What we therefore have to do to maintain our position is to look for the best in class in payments, in as well as outside the banking sector, outside as well as in Hong Kong, and try and be better. I believe that what we are developing in Hong Kong will put us up with the leaders, if not ahead of them, given the real-time settlement link with the collateral management system, and this will give banks in Hong Kong a head start to providing best-in-class payment systems.
INTRODUCTION

Since 1987, Thailand has experienced an economic boom, unparalleled in its postwar history. Real GDP had risen by an average of 11.5 percent a year between 1987-1990 before levelling off to the rate of 8.5 percent in following years. The rapid economic expansion was accompanied by a shift in the economic structure with the industrial and service sectors becoming the main engines of growth. Demand for wide-ranging, more sophisticated, speedy, and reliable financial services became apparent. The Thai financial system is now changing towards a full-fledged financial center in the future. Since 1989, the Bank of Thailand has formulated medium and long term plans to prepare the groundwork for the development of the country's financial structure in response to internal needs and external competition. Toward this end, payment system development has become one of the most important issues of the financial sector reform.

PAYMENT INSTRUMENTS

At present, Thailand is still a cash-oriented society. Public cash holding amounts to 60-70 percent of total money supply – a considerable high ratio compared to developed countries. As the economy grows, the demand for new banknotes has pressed for an expansion of the note printing works and the burden in dealing with banknotes has increasingly raised the cost of payments.

![Cash Component in M-1 (%)
As of 1992](chart.png)
As for non-cash payment, cheque, the main instrument, accounts for almost 90 percent of non-cash payment and is commonly used in business circles. A bank cashier’s cheque and a Bank of Thailand cheque are usually entrusted and used for large-valued payments. Cheque-clearing process requires physical exchange of cheques at the clearing house. Thus, in the metropolitan area and its vicinity, if cheques are deposited before 10.00 a.m. (within the first 1-2 hours of the banking hours), customers will receive funds in the afternoon of the next day. As for interregional interbank cheques, clearing requires the physical transfer of cheques between regions which can take up to 1-2 weeks before finality takes place.

Payments by credit cards, debit cards, direct debit and credit transfers account for about 10 percent of non-cash payment. Retail funds transfer transaction can be made through a commercial bank’s electronic in-house network, provided that both the originator and the beneficiary maintain their accounts at the same bank.
MODERNIZATION OF THE PAYMENT SYSTEMS

To improve the payment systems, the Bank of Thailand is implementing several significant initiatives to reduce paper-based payments by introducing electronic payments. These initiatives started over three years ago with an aim to increase the efficiency and integrity of the payment system and, at the same time, reduce payment system risks. The development also provides more choices for consumers to choose the most appropriate means of payment.

The first phase of the modernization, timing of which is shown in the following table, consists of three major initiatives. These initiatives are: BAHTNET – a large-valued interbank electronic funds transfer system, Electronic Cheque Clearing System (ECS) – a system for electronic presentment and clearing of cheques and Media Clearing – an electronic interbank clearing system of retail payments for bills, direct deposit of payroll, dividend, interest, and other similar types of consumer payment transactions.

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<td>Project</td>
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<td>BAHTNET</td>
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<td>Electronic Cheque Clearing System (ECS)</td>
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(i) BAHTNET which stands for Bank of Thailand Automated High-Valued Transfer Network, is an electronic network linking BAHTNET users and the Bank of Thailand’s current account system. BAHTNET allows users to effect funds transfer from their own book at the Bank of Thailand to another on a real time gross settlement (RTGS) basis by using terminals at their own premises. At present, BAHTNET users are limited to commercial banks, but starting next year membership will be extended to non-bank financial institutions and a few government offices.

BAHTNET started its operation in late-May 1995 and is now performing satisfactorily. At this initial stage, BAHTNET services are limited to 1) Interbank Funds Transfer 2) Current Account Inquiry 3) Bilateral Communication between users and 4) General Broadcast. The interbank funds transfer amounts to Baht 4-10 billion a day (US$ 160-400 million), a 10-15 percent share of the total value of transactions in the local money market. The third party funds transfer has just been in service since late-October 1995.
(ii) **Electronic Cheque Clearing system (ECS)**

In Thailand, the use of cheque has been growing rapidly both in volume and value. The volume grows 10 percent a year bringing the average volume to 300,000 cheques a day, the number is double on a peak day, making it increasingly costly to handle the clearing process manually. The ECS is therefore offered as a solution.

Under the ECS, the collecting bank will transmit electronically the information on cheques about the paying bank, branch, account number and the amount of payment to the clearing house during the banking hours. The clearing house will process the data throughout the day and calculate the clearing balances for each bank after the banking hours. Settlement will then be effected based on the electronic information. Physical cheques will be delivered to the clearing house later in the evening for sorting, matching against electronic data, and sending to the paying bank. After the verification of cheques by the paying bank in the next morning, the data on unpaid cheques will be transmitted to the clearing house for clearing and settlement of returned items. Later in the afternoon, funds become available in the depositor's accounts.
Under ECS, customers may deposit their cheques anytime during banking hours, have them cleared at the end of the same day and withdraw the fund next day afternoon.

As a migration step towards ECS, starting from February 1995, the clearing house has begun sorting cheques with MICR encoded characters using reader-sorser machines, a step which has become known as Automatic Clearing System (ACS). Once ACS functions smoothly, ECS will be adopted. We expect ECS to be operational in mid-1996.

(iii) Media Clearing

Media Clearing is an off-line retail funds transfer system for transactions which occur on a recurring basis. The system will provide an interbank clearing arrangement for less time-critical large volume of small-valued transfers, both on credit side such as payroll and dividend, and on debit side such as payments of utilities. The system is expected to help reduce the usage of cash and cheques.

At present, retail funds transfer exists only for payments which the payer and the payee have accounts at the same bank. In most cases, payers and/or payees maintain their accounts at a number of banks to facilitate the transfer. This is a costly practice both in terms of fund management and data handling since data must be sorted into n sets and sent to n banks.

Under the Media Clearing system payers and payees will no longer need to have accounts at the same bank. The sending bank can send all payment data to the clearing house in advance of the settlement date. The clearing house will then sort the payment data by bank and send the information to the relevant bank. The credit or debit balance for each bank can be settled at the clearing house through BAHTNET on the settlement date.

(iv) Other on-going project

Apart from the major initiatives discussed above, the Bank of Thailand has encouraged the Thai Bankers Association to develop an On-line Retail Funds Transfer (ORFT) system. The ORFT will allow bank's customer to make interbank retail funds transfer on an on-line basis through an interbank network, using either the ATM platform or a separate one. At present, although ATM is used nationwide, a bank's customer can only make intra-bank on-line funds transfer. ORFT is expected to be operational in the second half of 1996.
PHASE I

ELECTRONIC PAYMENT SYSTEM

LVFT
ECS
OFFT
ORFT

DEVELOPED BY COMMERCIAL BANKS

CUTOVER SCHEDULES

<table>
<thead>
<tr>
<th>Service</th>
<th>Date</th>
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<tbody>
<tr>
<td>BAHTNET</td>
<td>MAY 1995</td>
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<tr>
<td>CHEQUE CLEARING</td>
<td>Mid-1996</td>
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<tr>
<td>MEDIA CLEARING</td>
<td>JULY 1996</td>
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<tr>
<td>ORFT (by Bankers’ Assc.)</td>
<td>2nd half of 1996</td>
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FUTURE DEVELOPMENT

The second phase of modernization to be implemented during 1996-1998 has been planned. The plan includes projects to enhance the operation of the foregoing initiatives to the full potential, and to undertake a few new initiatives. Major planned initiatives are:

1. To improve the efficiency of cheque collection in the regional areas. This project aims to design and install an efficient clearing network both for intra and interregional cheques nationwide.

2. To develop a DVP system for the clearing and settlement of government securities and BOT bonds.

3. To take the initiative in laying the legal groundwork for electronic fund transfers, specifically to make electronic evidences admissible in court.
4. To promote the use of retail electronic means of payment, particularly EFT/POS, to reduce the usage of cash. The Bank of Thailand will coordinate with commercial banks in setting necessary arrangements, standards and rules and regulation for the set-up of an EFT/POS pool.

**BOT PAYMENT SYSTEM**

- BAHTNET
- THAICLEAR

- CHEQUE CLEARING
- MEDIA CLEARING

**PHASE 2**

1. DVP system for government securities' clearing and settlement
2. More efficient regional cheque collection
3. Legal framework for EFT
4. EFT/POS pool

**POINT OF CONCERN**

One important concern of a monetary authority is the systemic risk of the country's payment system. This has led many countries, including Thailand, to adopt RTGS as the real-time settlement rule for their large-valued funds transfer systems. However, gains in terms of risk management by moving to RTGS come at the cost of higher liquidity needs of the system. Therefore, the success of a real time gross settlement system such as BAHTNET, will largely depend on the mechanism to deal with the tighter liquidity constraint compared to a netting system. A number of central banks have decided to provide intraday credit or overdraft facilities to members of a RTGS system to alleviate the problem of gridlock. The fundamental issue underlying this liquidity supply is that it would not be prudent for a central bank to provide unlimited, uncollateralized intraday credit for free or at a nominal charge.

The Bank of Thailand plans to render an Intraday Liquidity Facility (ILF), a daylight overdraft, to BAHTNET users early next year. However, the intraday credit will be limited by ceilings and eligible collateral. The per-minute charge of this credit, when annualized, will be close to the market's overnight interest rate. These rather stringent
conditions are set for fear that we may lose the ability to control central bank money if participants fail to repay and the intraday credit has to be rolled over. We are aware that without adequate liquidity support from the central bank or an emergence of an active interbank intraday money market, the real time gross settlement system, albeit it has many virtues, is at risk of gridlock and funds transfer will be channelled instead through the net settlement system. Since more countries are migrating to the real time gross settlement system, the liquidity issue is worth getting attention of payment experts and consultation on the design of liquidity arrangements should be most welcome.
INTRODUCTION

As in many other countries, the Korean payment system consists of several retail payment systems and the central bank large-value wholesale payment system. Until the early 1980s, it remained largely cash and paper-based. But a decisive shift began from the mid-1980s as electronic banking became widespread. Last December's launch of the central bank financial wire network transformed the structure of the Korean payment system.

DEVELOPMENTS IN RETAIL PAYMENT SYSTEM

Cash and paper-based instruments such as checks and commercial bills are still in general use among Korean people reflecting the traditional strong preference for cash and quasi-cash. One notable feature is that cashier's checks are commonly used like cash by both individuals and firms, whereas current account checks are mainly used by firms for high-value transactions along with commercial bills. As a result, the share of all the checks and bills used during 1994 made up 56% of the volume and 96% of the value of all retail payments. The use of bank giro took the second largest share in terms of both value and volume, followed by interbank fund transfers and, then, credit cards.

The Korean retail payment systems comprise a check clearing system, a bank giro system, and several interbank electronic banking networks. All of these payment and settlement systems are run by KFTC (Korea Financial Telecommunications & Clearings Institute), a non-profit clearings and financial data relay center established and jointly owned by member banks. All payments through the systems are settled on net basis. In the last few years, the volume of payments conducted through the electronic networks has been rising sharply.

- The Check Clearing System was first introduced in 1910 by a private check clearing house in Seoul. Currently 50 local clearing houses, located in most of cities and large towns, carry out the exchange of checks, bills, and other documents and settle balances among banks in their regions. In addition to these intra-region clearings, seven mutual clearing arrangements among neighboring clearing houses facilitate the rapid settlement of checks and bills among nearby regions. A proposal for electronic check truncation is currently under study by the Bank of Korea in order to reduce the burden of physical delivery of checks and bills.

- The Bank Giro System, which was initiated in 1977, is now available for various payment purposes throughout the country. There are three giro service systems: paper-based inpayments, direct deposits, and direct debits. Both the direct debit system and the direct deposit system are operated in a similar way to the Automated Clearing House (ACH) system in the United States.
Inpayments and direct debits are used mainly for making consumer payments to large organizations, such as public utilities and installment sales companies. Direct deposits are used for the disbursement of bulk payments such as salaries and wages.

As for the electronic payment networks, there are currently three nation-wide network systems in full operation; namely, the Interbank CD/ATM Network, the Interbank Funds Transfer System and the Automatic Response Service (ARS) System.

- The Interbank CD/ATM Network is operated to allow customers' withdrawals from their accounts and fund transfers at any bank's machines. Since it started up in 1988, the number of CDs and ATMs has taken off dramatically to stand at about 20 thousand as of the end of March 1995.

- The Interbank Funds Transfer System was introduced in 1989. Using the system, a bank can remit funds immediately for its customers to an account held at any other bank.

- The Automatic Response Service (ARS) System was set up by Korean banks in March 1989 for use in home banking and firm banking services. Customers can not only get certain financial details they need from their banks by telephone but also make fund transfers within the bank.

In addition, the Prepaid Card Network which was provided in September 1994 by banks and several credit card companies and used at various retail merchandisers, is currently in its early stage.

Furthermore, the EFT/POS System, whose nationwide network will be completed during this year, is expected to become widely used in the near future.

**EMERGENCE OF THE CENTRAL BANK FINANCIAL WIRE NETWORK**

The Bank of Korea, like other central banks, had come to recognize the imperative for a real-time gross settlement system which could reduce settlement risk by providing "finality".

In March 1987, the Bank of Korea resolved to set up an RTGS system in order to accommodate the rapidly increasing volume of the nation's payments, stimulated by financial deregulation and internationalization.

In 1990, the Bank of Korea started the program's development and, after four years of concerted efforts, the network was put into operation in December last year.
BOK-Wire is designed to perform a variety of functions through its six subsystems. Unlike most other central bank systems, whose functions are limited to fund transfer and securities settlement, BOK-Wire carries out additional automatic file transfer processing outside of banking hours.

(1) The Domestic Currency Funds Transfers System, which plays a key role in BOK-Wire, executes fund transfers between participants and between their head offices and branches for various purposes using their current accounts with the Bank of Korea. It also carries out the settlement of call transactions, the multilateral net settlement of retail payment transactions and large-value third-party fund transfers at the request of participants' customers. For the sake of convenience, the system provides a queuing mechanism which allows a funds transfer message with an insufficient balance to wait in the queue file until the balance is filled.

(2) The Foreign Currency Funds Transfer System carries out foreign currency fund transfers between participants and between their head offices and branches using their US dollar accounts with the Bank of Korea. To facilitate the settlement in Korean won of foreign exchange trades in the interbank market, which is currently executed using gross settlement, a new function providing net settlement of multilateral positions in Korean won will be added to the system by the end of this year.

(3) The Government and Public Bond System handles issuance, registration, redemption, and so on of government bonds and the Bank of Korea's Monetary Stabilization Bonds. The book-entry transfers of bonds and the associated settlements are made on a delivery-versus-payment (DVP) basis to eliminate settlement risks.

(4) The Bank of Korea Loan and Discount System executes file transfers and settlements related to the central bank's loans and discounts to the banning system. In addition to the on-line fund transfer function for loans and their repayments, the system can automatically screen the loan application documents for eligibility.

(5) The Treasury Funds Transfer System carries out file transfers and settlements related to the Bank of Korea's disbursement and receipt of Treasury funds via the Treasury agencies, which are banks.

(6) The Monetary and Financial Information System gathers information from participating banks about money supply, bank deposits, foreign exchange positions, required reserves, and so on.

Several measures have been built into the system to reduce risk. Firstly, a half-day call system, which can be used during either the morning or the afternoon, has been introduced as a means for participants to cope with intra-day fund shortages especially in connection with net settlements.
Secondly, a designated time system is adopted for net settlement transactions such as
interbank settlements, and for transfers of Treasury funds. Under this system, fund
transactions are executed at the designated time automatically. This effectively
smoothens participants' fund management.

Thirdly, the Bank of Korea monitors the fund management and financial status of
participants. The fund managers of each participating institution can also monitor its
financial status as a whole and centrally control its funds on a real-time basis. This
encourages sound and efficient fund management practices on the part of banks.

Any financial institution that has a current account with the Bank of Korea is eligible
as a participant with the central bank's consent. Currently 142 institutions are
connected to the network; of these 85 are banks, including 52 foreign bank branches,
and 57 are non-bank financial institutions, such as investment and finance companies
and securities firms.

BOK-Wire operates around the clock on bank business days. It deals with on-line
business such as fund transfers and government bond-related fund settlements during
banking hours and handles file transfer business outside of banking hours.

BOK-Wire is now handling around four thousand fund transfers a day with a total
value of around 17 trillion Korean won, about 22 billion US dollars. As BOK-Wire
executed about 45% of the nation's entire payments in terms of value during the first
half of this year, the share of payments handled by all electronic payment systems
increased sharply.

BOK-Wire now plays a pivotal role in the payment systems of the nation. It is
considered to have greatly augmented the efficiency and the security of the overall
payment system and enabled various economic units to operate their funds more
efficiently. By doing so, it is expected to accelerate the development of financial
markets and improve the effectiveness of monetary and credit policy.

IMPLICATIONS FROM PAST EXPERIENCE AND FUTURE TASKS

Some features have been found particularly important in the development of the
payment system in Korea.

First, the central bank played a key role in promoting the setting-up by the financial
institutions of major electronic banking networks. It is generally accepted that without
its leadership the Korean payment system could not have taken such a huge leap into an
electronic banking environment. For the promotion of electronic banking, a committee
was organized in June 1987 at the request of the Bank of Korea. It is chaired by the
Governor of the Bank of Korea and composed of twenty-four heads of financial
institutions including banks, supervisory bodies for nonbank financial institutions and
KFTC. The Committee makes decisions on matters concerning the selection of common
electronic banking business and the progress of the national payment systems.
Furthermore, the Bank of Korea itself built the on-line, real-time gross settlement
system as the backbone of the nation's financial infrastructure.
Second, Korean banks were able to benefit from setting up nation-wide common networks for most of their electronic payment systems right from the beginning. They avoided a lot of the expenses they would have had to lay out if they had first set up their individual networks and only integrated them later. Here, the role of KFTC, the clearings and financial data relay center established jointly by member banks, was crucial in the efficient coordination of the development and maintenance of the common financial networks.

Third, the issue of credit cards by most of the banks has led to a dramatic change in the way Koreans make payments over the past few years. The share of total retail payments paid by bank credit cards has risen from 5% to 9.4% by volume over the last five years, thereby, reducing people’s need for cash. On top of this, BOK-Wire has substantially contributed to a reduction in the use of paper-based payment instruments by firms and banks.

Despite all the progress made in improving the payment system, there are still a number of tasks that confront us in encouraging paperless payment and settlement and developing electronic payment systems.

First, we are proceeding with the standardization of the electronic payment business, including preparation of common basic specifications for IC cards issued by domestic financial institutions and development of standard file formats for firm banking business.

Second, we plan to construct a shared network for the Cash Management Service System, allowing firms to manage their cash balances with many different banks through a single access to the system by their PCs or telephones. This new system will result in massive improvement in customers’ convenience and efficiency in managing their available funds.

Third, Korean banks have to rationalize the pricing of their payment services in order to encourage the use of electronic payments. Currently the fee for paper-based payments is maintained relatively lower than that for electronic payment services. This results in some distortion of the fee structure and discourages the wider use of electronic banking.

Lastly, in order to reduce the risks associated with net settlement systems, which maintain open positions until final settlement, the introduction of further risk reduction measures are currently under consideration including debit caps, loss-sharing and collateral agreements. Moreover, we are trying to do our utmost to improve the whole payment system by engaging in a continuous dialogue with other central banks.
TOWARDS RTGS IN AUSTRALIA

Neil C. Mackrell
Head
Financial System Department
Reserve Bank of Australia

I would first like to express my gratitude to the Hong Kong Monetary Authority for this opportunity to outline to you progress being made in Australia to reform our payments system. In keeping with the global theme of this seminar, I will focus on the high-value end of our reform efforts.

I think Australia has an interesting story to tell.

From the Reserve Bank's point of view the important point in the story is that the banks in Australia are now fully committed to introducing Real Time Gross Settlement (RTGS) for high-value payments in 1997. I believe this is now widely shared as an important national goal, and one that we can build on as national payment systems become increasingly inter-connected. But that's for the future.

For the present, as the title of this presentation suggests, our story is one of work-in-progress, which I'll turn to in a moment. Before doing so, I should explain, especially to those of you who have not followed the reform process in Australia over recent years, some of the background behind the emergence of a consensus in favour of real time gross settlement arrangements.

As many of you would know, until late last year, efforts to reform high-value payments arrangements in Australia remained focussed primarily on a system of Deferred Net Settlement. The system we were developing was referred to as PRESS, the Payment Registration and Electronic Settlement System. It aimed to very substantially strengthen our existing deferred net settlement arrangements by introducing irrevocable payments through a legally secure multi-lateral netting mechanism, a system of net debit caps and loss-sharing arrangements based on pre-agreed underwriting commitments. PRESS was to be capable of being collapsed into an RTGS system at some time in the future, which at the time was thought to be at least five years away. This system had broad similarities to the CHIPS system in the US that Jill Considine outlined so well yesterday.

In the event, the PRESS project was suspended shortly after tenders had been evaluated and has since been abandoned. The banks saw the costs as excessive. But perhaps of greater significance was recognition that, internationally, the move towards RTGS systems was progressing more quickly than we had previously thought likely. Within the RBA we were detecting a groundswell of opinion from our commercial banks in favour of moving directly to RTGS, rather than indirectly through a reformed Deferred Net Settlement system. This was something they had been reluctant to do previously. The international move towards RTGS systems seems to be particularly evident in this region; a point that comes through in the program for this seminar.

More broadly, it seemed to us in the Reserve Bank that in the second half of the 1990's, to do anything other than move directly to RTGS would have been difficult to justify. In short, RTGS was a good idea whose time had come.
In July of this year, the RBA confirmed its intention to implement RTGS arrangements. This followed extensive discussion with the banks. The main points of that announcement were to:

- Settle high-value interbank payments across Exchange Settlement Accounts with the RBA on an RTGS basis;
- Do so by building on the existing infrastructure of the Reserve Bank Information and Transfer System (RITS), which is Australia's system for the transfer and settlement of Commonwealth Government Securities;
- Upgrade the RITS settlement network to provide an option of direct access for payments; and
- High-value inter-bank payments to be settled through RTGS by end-1997.

At the end of August of this year we followed up with the release of detailed business specifications, and held further discussions with the industry. Those discussions are continuing and we are now seeing broad-based agreement on most of the key issues.

The point we have reached is one of broad agreement on the business issues. We are seeing broad agreement on the notion of a single, streamlined platform for the system. Discussions are continuing between the RBA and the banks on aspects of eventual ownership and control of various parts of the system, and details of how banks will connect to it. These have been contentious issues for some time but I believe that we are close to a co-operative understanding that will give all the parties a role in the new system that matches their key areas of interest.

The change in mind-set that put us on the RTGS path has led to a broader package of reforms than had been contemplated up to that point. Our approach to implementing RTGS has, I believe, some particularly interesting features. In the time remaining to me today I would like to touch on two inter-related aspects:

- security settlements; and
- liquidity management

SECURITY SETTLEMENTS

One feature of our approach to implementing RTGS is the high degree of integration that we are seeking between high-value payments and the systems for settling security transactions. We have seen the introduction of RTGS as offering the opportunity for complementary reforms to streamline and simplify aspects of interbank settlement arrangements across the high-value payment systems.

We are developing RTGS functionality by building on the existing infrastructure of RITS. It is owned by the Reserve Bank. At the present time, about one quarter of the value of all high-value payments in Australia originate from these settlements. All Australian banks are members of RITS and so are many non-banks who are active in the Commonwealth Government Securities (CGS) market.
The Exchange Settlement Accounts at the Reserve Bank are accessed through RITS, and it already has limited RTGS capability built into it. The RITS system allows banks to make cash transfers independent of the need for a security settlement. It is not hard to see why the Reserve Bank should have turned towards RITS when thinking of a platform on which to base its RTGS system.

An interesting adjunct is that we have been pursuing with the owners of the system that handles settlements for non-Commonwealth Government fixed interest securities, the possibility of merging their system, referred to as FINTRACS (from which about another quarter of the total value of high-value payments originate) with RITS. The merged system would result in a single platform for all fixed interest securities settlements, both government and non-government, and the high-value payment system, including the Exchange Settlement Accounts of the Reserve Bank.

The potential for rationalising existing infrastructure for high-value payments and settlements and gaining the benefit of economies of scale are clear. Technically, the task is not great. The two systems are very similar. They were both developed by Austraclear, the company that owns FINTRACS, they use the same kind of computers, share the same network and terminals and currently provide mutual back-up.

Integration would offer scope for both initial and on-going cost savings to the industry and greater simplicity in the debt security markets. But perhaps of greater significance is the scope it offers for banks to access the securities markets to generate liquidity for high-value payments.

By building our RTGS system on the existing infrastructure of RITS and FINTRACS, Australia will gain the twin benefits of being able to implement robust DVP arrangements for securities settlements, as well as maximising the liquidity benefits to banks through close co-ordination of their payments and securities activities. It is interesting to note that the design of Hong Kong’s proposed RTGS system seems to be proceeding along similar lines.

LIQUIDITY

Let me now elaborate a little on how we propose handling the all important issue of liquidity in an RTGS environment. As you would expect, the answer involves several layers of access to different forms of liquidity and some safety valves. One layer, of course, involves access to the liquidity locked up in the security markets.

The core layer of liquidity is, naturally enough, the surplus liquidity that banks hold in the normal course of events to run their business. This is over and above their core holdings of prime assets that the RBA requires banks to hold for prudential purposes, currently 6 per cent of their deposit base.

At present, the Australian banking system holds liquidity substantially in excess of their prime asset holdings, of which about AUD4 billion is placed by banks with the Authorised Dealers in the short term money market; the cash market. They provide a bridge between same day and next day funds, remembering that inter bank obligations are currently settled on a deferred net basis.
In an RTGS environment it is proposed that these buffer balances be held in Exchange Settlement Accounts with the Reserve Bank. To make that an attractive option, the Reserve Bank has told the banks that, from the middle of next year, it will pay interest on Exchange Settlement Account balances at the cash rate, effectively the interest rate they would have received from the dealers. The dealers, in turn, have been notified of the RBA's intention to withdraw their authorised status from that time, since they will no longer have a unique role to play in an RTGS world.

Individual banks will have the usual range of avenues open to them to build up (or reduce) their holdings of buffer balances; borrowing funds (including surplus liquidity, from other banks), selling securities in the market or to the RBA (if we are buying) or re-discounting treasury notes.

For monetary policy purposes, the RBA will be able to maintain the overall level of ES balances available to the banks, much as it does now. The main difference will be that with the authorised dealers no longer having a special status, we will open up the range of eligible dealing counterparties to include any member of RITS, effectively all banks and many non-banks.

The RBA is committed to ensuring that sufficient intra-day liquidity will be available to banks to enable payments flows to settle smoothly. Nevertheless, the rules of the game will be designed to maintain a very sharp distinction between the intra-day and overnight markets to ensure that we can implement monetary policy effectively.

Intra-day liquidity will be provided through bank's holdings of CGS. The RBA will stand ready to buy CGS from banks under intra-day repurchase agreements. These could be initiated manually by banks at any time, if they wish to do so. But an important feature of our system will be an automatic repurchase facility. The system will manage automatically a repurchase of sufficient CGS to the RBA to generate an amount of liquidity sufficient to enable payments to flow. The operation of the RTGS system and the CGS transfer and settlement system on the same platform will make this far more straightforward than would otherwise be the case.

Charges for accessing intra-day repo facilities are not expected to contain any penalty element, but it will be important that all repo's are unwound by end of day in order to maintain the distinction between intra-day and overnight liquidity I emphasised a moment ago.

A further layer of potential intra-day liquidity that all banks have targeted in discussion with us is their core holdings of PAR, or prime assets. At this stage, the RBA has said that we will consider this issue only when the actual operational needs for intra-day liquidity are clearer.

There is a further potentially rich layer of "carrots and sticks" that can have an important bearing on the intra-day liquidity needs of the system. These are embodied in the facilities and control functions of queue management, including the warehousing of future dated payments, and the automatic off-setting of matching payments between the same counterparties. Pricing structures and rules of market practice may also be useful in influencing individual banks to better manage liquidity and payment flows.
Over the next two years or so, the high-value end of the Australian payments system will undergo unprecedented change. The challenge will be in managing that change. It will test the RBA and the banks, but it is a test that we know we must meet. That will only happen through co-operative effort. I believe we are all now focusing on achieving that co-operation.

Again, thank you for this opportunity to outline progress towards RTGS in Australia. We have charted an ambitious but achievable agenda of reforms. We believe that they will put the Australian financial system into a much stronger and more flexible position, making it much easier to join with other countries in the region that are developing RTGS system, to forge links in the future.
OVERVIEW ON
CURRENT PAYMENT SYSTEM IN VIETNAM

Nguyen Toan Thang
Deputy Director
Economics Research Department
State Bank of Vietnam

It is my honor to take part in this seminar and to present to you some general points about the current payment system in Vietnam.

As you may know, since 1990 the Vietnamese Banking System has been reorganized as a two-tier banking system based on the two Banking Degree Laws.

Consequently, the payment system has been reorganized and developed in compliance with the new structure of the banking system considering the international trends of development in this field. It is just in its initial stage of development and many efforts in various aspects should be made, so that the payment system can be completed to meet the requirements of the new tasks of the economy and to integrate into the international community.

In this presentation I would like to address the following issues:

1. The current legal framework for the payment system in Vietnam.
2. The present situation of the Vietnamese payment system.
4. Orientations for the development of the payment system in the coming years.

THE CURRENT LEGAL FRAMEWORK FOR THE PAYMENT SYSTEM IN VIETNAM

The Degree Law on the State Bank of Vietnam, promulgated in May 1990, has assigned the State Bank of Vietnam the responsibility to create the legal environment for the payment system and to organize clearing system between the credit institutions (a credit institution is referred to as a commercial bank, a credit cooperative or a financial company).

To do that, the State Bank of Vietnam had submitted to the Government for promulgating the Degree No. 91/CP dated 25th November, 1993 on common principles of making non-cash payment in the economy.

According to the Degree, all commercial banks operating in Vietnam including foreign bank branches are organizations providing payment services to the economy, the State Treasury is responsible for making payments related to the State Budget. There is a special feature of Vietnam that the State Treasury has a wide network of branches throughout the country and it has its own payment system.
The fundamental for making payment through the banking system is the settlement account. So the Degree regulates that organizations and individuals are entitled to choose the most convenient bank to open account with and they can open accounts with different banks.

The bank is to carry out the payment instructions of account's owner, including cheque issuing and cash withdrawing within the amount of the disposable deposit with the bank.

According to the Degree, the bank is endowed with the right and the responsibility to keep secret the data on customer's account.

Finally, the Degree authorizes the Governor of the State Bank of Vietnam to promulgate regulation on non-cash payment system in Vietnam.

On 21st February, 1994 the Governor of the State Bank issued The Regulation on non-cash payment applied uniformly to credit institutions and to the State Treasury as well.

According to the regulation, the payment instruments applied in Vietnam are as follows:

1. **Cheque:** The regulation distinguishes two kinds of cheques: corporate cheque and individual cheque. In the past, cheques were only used for making payment among organisations; now it is also introduced for individual use. That encourages non-cash payment in the population and reduce the proportion of cash payment in the total payment volume.

2. **Payment order:** This is a form of credit transfer which gives the payer the active role.

3. **Authorized collection:** is a form of debit transfer whereby the payee has the initiative. This instrument is applied mainly in case of making payment for electricity, water, telephone, insurance, etc.

4. **Letter of credit:** is applied in case the beneficiary requires the guarantee of payment through opening a special account which makes readiness of payment.

5. **Bill of payment:** is a special payment instrument which has higher face value than the banknote and its validity is limited in order to prevent counterfeit; otherwise it functions like cash.

6. **Electronic payment card:** the regulation provides the use of debit cards and credit cards for payment or withdrawing cash by the automated teller machines (ATMs).
The non-cash payment regulation also formulates the payment sub-systems consisting of:

- Intra-bank payment networks of the commercial banks.
- Payment network of the State Bank of Vietnam.
- Clearing centres of the State Bank branches in the cities and provinces.

**THE PRESENT SITUATION OF THE VIETNAMESE PAYMENT SYSTEM**

Over the last three years the Vietnamese banking system has made significant progress in the development of the payment system. Based on the legal framework established by the State Bank of Vietnam the payment sub-systems of the commercial banks have been set up and modernized rapidly. The State Bank has organized the inter-bank payment system comprised of 53 clearing centres in 53 cities and provinces for intra-provincial netting and the payment network of the Central Bank including the electronic fund transfer.

In conformity with the new regulations, the payment instruments have been improved and used widely to keep pace with the increasing payment volume. Noteworthy is the use of bills of payment. While the amount of cash payment is high, the face value of the banknotes is relatively low (the highest face value amounts to VND50,000 equivalent to USD4.5), since the end of 1992 the State Bank of Vietnam has issued this special payment instrument. The bills of payment have face value up to VND5,000,000 equivalent to USD450. So they can be used for payments with big amount and are more convenient to carry than banknotes.

The payment volume through the banking system increased rapidly, annually 50% in average. The total volume of payment made through the banking system in the 1st quarter 1995 amounted to 2,171,382 transactions with the value of VND328,733 billion or about six times of the nominal GDP in the same period.

**DOMESTIC PAYMENT VOLUME THROUGH THE BANKING SYSTEM I QUARTER 1995**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Inter-bank payment</th>
<th>Intra-bank payment</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-Cash payment</td>
<td>16,144</td>
<td>35,892</td>
<td>52,036</td>
</tr>
<tr>
<td>II-Non-cash payment</td>
<td>127,775</td>
<td>148,922</td>
<td>276,697</td>
</tr>
<tr>
<td>1. Payment order</td>
<td>87,734</td>
<td>103,588</td>
<td>191,322</td>
</tr>
<tr>
<td>2. Cheque</td>
<td>10,552</td>
<td>14,675</td>
<td>25,227</td>
</tr>
<tr>
<td>3. Authorized collection</td>
<td>645</td>
<td>326</td>
<td>971</td>
</tr>
<tr>
<td>4. Bill of payment</td>
<td>28,844</td>
<td>30,333</td>
<td>59,177</td>
</tr>
<tr>
<td>All INSTRUMENTS</td>
<td>143,919</td>
<td>184,814</td>
<td>328,733</td>
</tr>
</tbody>
</table>
If we look at the structure of the non-cash payment instruments we can have the following picture:

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Transactions</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Payment order</td>
<td>62%</td>
<td>69.1%</td>
</tr>
<tr>
<td>2. Cheque</td>
<td>14%</td>
<td>9.1%</td>
</tr>
<tr>
<td>3. Authorized collection</td>
<td>8%</td>
<td>0.4%</td>
</tr>
<tr>
<td>4. Bill of payment</td>
<td>16%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The figures show that the payment order is the mostly used payment instrument both in the number of transactions and in value. The advantage of payment order is that it is favourable to automate. Through the newly established computer networks, the State Bank and some big commercial banks have introduced the electronic fund transfer to the customers. So the use of payment order increased significantly.

Bills of payment are used more and more widely because the people have become accustomed to this instrument.

The application of payment cards is on pilot stage in the Bank for Foreign Trade (Vietcombank). At first, only debit cards are used, credit cards are not introduced yet. The payment volume by using cards is not worth mentioning. Besides that the commercial banks also receive cards from foreigners as agencies for foreign card issuing organisations (VISA, MASTER-CARD, AMERICAN EXPRESS ....).

Letter of credit is mostly used for making payment with foreign partners, it is almost not applied to domestic transactions.

The improvement of the payment system has accelerated the payment procedure. Transactions within and between the major cities are now accomplished normally in one or two business days. This is an important achievement of the banking system in terms of time of payment procedures in comparison with that of the past. It is frankly admitted that not long time ago it took weeks or even months to complete a payment transaction.

Since March 1995 fourteen Vietnamese banks including the State Bank have been joining SWIFT. Thus the international payment has been improved and accelerated.

The first ATMs have been installed in Hanoi and Ho Chi Minh City to broaden the use of payment cards.
SHORTAGES AND PROBLEMS OF THE PRESENT PAYMENT SYSTEM IN VIETNAM

Although the legal framework for the payment system has been improved, there is no Law on Cheques as the legal base to promote the use of cheques. So cheques are only the common payment instrument among the enterprises, but not among the individuals. Because of the risk of fraud, cheques are now only used for making payment within a province or a bank with its branch network. That means the issuing of cheque in case of making payment between different banks which are located in different provinces is impossible. Some regulations on cheque do not correspond with the international practice, so the Vietnamese cheque seems to be strange to the foreigners.

The application of electronic payment requires the existence of a number of legal regulations and standards uniformly applied to all banks, the preparation for which is now in process.

In general the technical infrastructure of the payment system in Vietnam is in poor conditions. The application of informatics technology is just on initial stage. The banks are short of means like hardware, software and good telecommunication network. The measures for protecting security of the data and operations are not sufficient.

There are some technical difficulties related to the inter-bank transactions among different provinces (transport and communication problems).

In addition, the income of the people is still low and their preference of using cash still remains, so the cash payment volume outside the banking system is relatively high (estimated about 35% of the total payment volume of the economy).

ORIENTATIONS FOR THE DEVELOPMENT OF THE PAYMENT SYSTEM IN THE COMING YEARS

In order to complete the legal framework for the payment system, we are now formulating the Degree Law on Cheque, which should be appropriate to the Geneva Convention on Cheque Law. After promulgating the Banking Laws, we will upgrade the Degree Law on Cheque to the Cheque Law. It is necessary to improve the use of cheque and to make the Vietnamese cheque correspond with the foreign cheque.

For the application of electronic payment methods the State Bank of Vietnam will issue the following regulations and standards:

- Regulation on electronic fund transfer
- Regulation on electronic clearing
- Standards on electronic payment
The payment system will be modernized when we carry out the project financed by the World Bank. Now we are in the process of preparation for the international bidding procedures of the project. The project has to build the informatics infrastructure for the Vietnamese banking system with modern technology, on which two electronic inter-bank payment systems (one is the high value payment system and the other is the low value payment system) are to be set up in the State Bank of Vietnam and the intra-bank payment networks of six most important commercial banks are to be upgraded. We hope that with the project the problems of inter-provincial payment will be solved and the modernized payment system will be able to meet the demand for payment services of the economy including payment and settlement for securities and foreign exchange trading, which will be developed in the near future.

Another task of the Vietnamese banking system is to develop the non-cash payment in the individual sector. We have to improve the quality of the payment services provided by the banks.

We will also provide new and modern instruments such as smart card. According to the approved plan, we are installing 40 ATMs in the 5-6 major cities and provinces.

Ladies and Gentlemen, this is a brief summary of the payment system in Vietnam. I hope it has been of some interest to you and I would be happy to answer any questions you may have. Thank you very much for your kind attention.
Global Payments: Key Issues

Takashi Ansai
Executive Director
Bank of Japan

Technological innovation is making the world increasingly small. As a result, the world economy as a whole has changed so drastically that now it is just like a nation's market economy observed in the past. The world's industrial capital and financial capital now move across borders in pursuit of maximum returns, accompanied by the rapid increases in the volume of trade and the increasingly active movement of people.

One may call this trend "globalization". However, compared with this globalized economy as a whole, a nation's statesman or a nation's central bank which seeks to ensure the stability of the domestic currency value and maintain a safe and sound credit system in the nation might look as if they were locals of narrow vision.

However, we central banks are never locals. For example, while a central bank devotes its efforts to achieving sustainable economic growth of the nation by minimizing domestic price fluctuations, it has a strong belief that, in the long run, such efforts will surely contribute to growth of the world economy.

With respect to the maintenance of the stability of the financial system, another task imposed on central banks, the world's central banks have recently been changing the way of banking supervision as the financial systems become globalized. They used to impose regulation from the outside of the market; now they seek to conduct banking supervision by making the best use of disciplines which exist within the market. In other words, the purpose of banking supervision has been shifting from prevention of individual bank's failures to containment of systemic instability of the financial system as a whole. This is, among others, why we need to address payment systems issues.

Now that different markets all over the world are closely linked together as a result of globalization, it is necessary for central banks and other interested parties in the markets to have a common understanding and to make maximum efforts to ensure the smooth functioning of their domestic markets and reduce settlement risks that exist in these markets.

While technological innovation has promoted financial liberalization and globalization and therefore increased settlement risks, it is now possible that such innovation will also contribute greatly to the reduction of these risks.
In this regard, we should continue to make efforts to establish a safe and efficient payment and settlement systems, making the best use of the benefits derived from technological innovation. This will, I believe, vitalize various markets and contribute to the most appropriate distribution of resources on a global scale.

REDUCTION OF HERSTATT RISK

With the expansion of foreign exchange and cross-border transactions, Herstatt risk has been increasing in recent years. Against this background, interested parties have come to recognize the need to control the risk adequately. To this end, both central banks and the private sector have been working on the reduction of the risk, as Mr. Patrikis and Ms. Considine have already mentioned in the previous sessions.

It should be noted that specific risk reduction measures have been taken by some countries. In the U.S., for example, the FRB has decided to extend Fedwire operating hours from 10 to 18 hours a day in 1997 to contribute to reduction of Herstatt risk. In Hong Kong, the existing interbank funds transfer system, CHATS, will be developed into RTGS system. I understand one of the reasons for this is that Hong Kong aims to reduce Herstatt risk by linking CHATS with other countries’ settlement systems on RTGS system basis.

In Japan, interested parties have been paying particular attention to Herstatt risk. One of the reasons is that, in almost all foreign exchange transactions where Japanese yen is sold, the seller bears the risk of paying Japanese yen before receipt of the countervalue, because Japanese yen is settled earliest on the value date due to the fact that Japan is located just on the west of the dateline. Another reason is that Japanese yen/U.S. dollar transactions, which are most actively traded in the Tokyo foreign exchange market, involve largest Herstatt risk, among other currency combinations, because Japanese yen/U.S. dollar transactions involve not only the largest trading volume but also the longest delivery lag, due to the fact that the U.S. is located just on the east of the date line, meaning the U.S. dollar is settled latest on the value date. In light of the situation, I keenly feel the need for the Bank of Japan and private banks in Japan to make coordinated efforts to reduce Herstatt risk.

MOVE TO ROLLING SETTLEMENT AND PROMOTION OF DELIVERY VERSUS PAYMENT (DVP) IN SECURITIES MARKETS

In 1989, the G-30 promulgated nine recommendations for risk reduction in securities settlement, including introduction of Delivery Versus Payment “DVP” and T+3 rolling settlement. Those recommendations, widely supported by the securities industry, have increasingly been introduced in major financial centers. Rolling settlement and DVP have greatly contributed to the development of the securities markets, by not only reducing the settlement risk but also standardizing settlement practices internationally.

Talking about Japan, DVP was introduced in April 1994 for Japanese government securities (JGS) settlement, by linking the JGS transfer system and the funds transfer system over Bank of Japan Financial Network System (BOJ-NET).
With regard to rolling settlement, in the United Kingdom, T+10 rolling settlement was introduced for equities in July 1994, to replace the traditional “designated-day settlement” (where the transaction backlog was settled on a specified day), and, the settlement period was further shortened to T+5 in June 1995; Euro-bond settlement practices shifted from T+7 rolling settlement to T+3 in June 1995. JGS are now the only example where securities are settled on designated days in major countries. Under the Japanese practices, JGS are settled on the 5th, 10th, 15th, 20th, 25th, and the end of each month, that is, nine business days on average after the trade. However, there is growing recognition among market participants in Japan that a move to rolling settlement should be achieved very soon. This September, the government decided to abolish the regulation which limits the level of interest rate to be accrued to cash collateral for securities lending far below market rates (that is, maximum rate should be collateralized overnight call money offer rate minus one percent, which would be negative under current market conditions), and practically has prohibited development of cash collateralized securities lending markets in Japan. The reason why this regulation has been imposed on market participants is as follows. In Japan, Gensaki, similar to a repo market, emerged and has existed to facilitate fund-raising by securities firms. However, because Gensaki transactions are sale and repurchase transactions, the securities transaction tax is imposed on sellers of securities. As securities lending transactions have a similar financial feature to Gensaki transactions, the limits on cash collateral was introduced to shut a tax loophole when the securities lending market was created. Thus, the deregulation, once implemented by the end of this year, is very likely to stimulate the securities lending market. It has been argued for years that JGS market lacks repo markets which would have facilitated the exchanges of cash and securities among market participants. While the current settlement practice allows position netting of receipts and deliveries transacted within each trading period, thereby enabling market participants to save securities necessary for settlement, rolling settlement would require them to obtain all the securities necessary to support settlement of short-sale transactions. With this deregulation of securities lending, it is expected that a deep and liquid securities lending market would emerge and develop into Japan’s repo market, which would supply both securities and funds necessary to support rolling settlement.

SAME-DAY INTERBANK SETTLEMENT IN THE ZENGIN SYSTEM

The introduction of same-day funds transfer is consistent with the move to rolling settlement in that it contributes to the reduction of settlement risks by shortening the settlement lag.

The Zengin System, a nationwide on-line system in Japan for domestic third-party funds transfers, introduced same-day interbank settlement in 1993, to replace the former next-day settlement arrangement. Under the former arrangement, a beneficiary’s bank credited its beneficiary’s account on the business day the payment instruction was received, and extended credit to the originator’s bank. The inter-bank settlement between beneficiary’s and originator’s banks took place at 1 p.m. on the following business day. Under the new arrangement, the inter-bank settlement is finalized at 5 p.m. on the same day that a beneficiary’s bank makes payment to its beneficiary, thereby reducing inter-bank overnight credit risk.
Accordingly, the Bank of Japan extended BOJ-NET operating hours by two hours to facilitate same-day settlement. Shift to same-day interbank settlement in the Zengin System, which handled a daily average of over three million payments in number and about JPY seven trillion in value in August 1995, significantly reduced unsettled balances and thereby settlement risks in the Japanese payments system.

EMERGENCE OF ELECTRONIC MONEY

With the recent technological innovation, IC chips and computer networks are now available at a much lower cost than in the past. The encryption technology has also been developing rapidly. Against this background, various types of electronic money, which can be exchanged without physical delivery on computer networks or IC chips, are in experimental stages in many countries. Though no one knows how widely electronic money will be used in coming years, we could not rule out a possibility that physical currency might be replaced with electronic money to a considerable degree some time in future.

From users’ point of view, introduction of such electronic money is considered beneficial and promising, as it greatly enhances convenience to users and can be widely used for payments among individuals, and we firmly believe that this kind of innovation in retail payment systems should be encouraged. It is also true, however, that electronic money should meet certain requirements or minimum standards to secure the stability of payment systems: For example, technological security, such as preventive measures against counterfeiting, legal and contractual infrastructure, are among many issues to be addressed in this regard.

From the central bankers’ viewpoint, we are concerned about the implications of electronic money for the conduct of monetary policy and for other central bank activities. Central banks and private banks should cooperate in this area to enhance the usability and safety of this new payment instrument.

INTRODUCTION OF REAL-TIME GROSS SETTLEMENT (RTGS)

There is a pronounced tendency toward the introduction of Real-Time Gross Settlement (RTGS) as a settlement method in various payment systems in the world. Not only EU countries but also countries in Asia and Oceania have increasingly been introducing RTGS for funds transfer systems, in most cases, managed by central banks. To my knowledge, countries in this region that have already introduced or is planning to introduce RTGS include Japan, Korea (BOK-wire), Thailand, Australia, China and Saudi-Arabia. Of course, Hong Kong is an example not to be forgotten, for its unique presence and importance as an international financial center. I have heard that the banking community here in Hong Kong is, in the cooperation with the Monetary Authority, in the process of developing Clearing House Automated Transfer System (CHATS) into a new RTGS system for large-value interbank funds transfers.
Needless to say, this trend reflects the growing awareness in the markets of the need to minimize systemic risk behind the recent expansion in financial transactions and the subsequent increase in the settlement volume. For example, the ratio of interbank funds transfers to GNP in Japan marked a rapid increase from around 20 times in 1980 to 120 times in 1990, though somewhat decreasing recently.

BOJ-NET offers participants a choice of either RTGS or the designated-time net settlement services, although the use of the latter is dominant as it is still more efficient in terms of liquidity management. Private banks in Japan prefer the designated-time net settlement mode to the RTGS mode to save the liquidity necessary for settlement. The Bank of Japan of course takes a great interest in any possible effects that this dominance of designated-time net settlement in Japan would have on the stability and also on the international competitiveness of Japan's payment systems. We are willing to have discussions with the parties concerned on various related issues.
GLOBAL PAYMENTS SYSTEMS:
KEY ISSUES FOR A GLOBAL COMMERCIAL BANK

Stuart Gulliver
Head of Treasury and Capital Markets
HSBC Markets
The Hongkong and Shanghai Banking Corporation Limited

Perhaps I should start by explaining the context of my interest in this issue. I am speaking to you today not as a specialist in the subject of payments systems, but as an interested user. As Head Of Treasury and Capital Markets for HSBC Markets in Hong Kong, I control a business that receives over 3,000 payments per day, representing over USD14 billion in cash movements. Obviously, this makes the mechanisms by which those funds move, the risk they represent and the income and costs the Bank derives from this process, key issues in the operation of my business. In common with other market participants, I have experienced Herstatt Risk first-hand when the settlement of our transactions with Kuwaiti banks was disrupted by Iraq’s invasion of Kuwait between Yen and USD settlement.

What I wish to share with you today are some thoughts regarding the impact that current developments in Global Payments Systems are likely to have on the operations of commercial banks, and their implications both for market strategy generally and for opportunities for HongkongBank in particular.

The proliferation of Netting, DVP & PVP settlement systems, and the introduction of Real Time Gross Settlement, will create a challenging environment for the technological infrastructure and operating procedures of the world’s financial institutions. They will also result in significant reductions to the levels of risk in the system and the amount of capital required to support it. The world’s large financial institutions will, thus, face both threats to their established businesses and new business opportunities.

Currently, banks earn income from providing credit intermediation in the world’s payments system. Banks with large remittance, correspondent banking, custody and depositary operations obtain free use of funds on balances placed in order to facilitate delivery. As the system picks up greater efficiency, idle balances will fall, the gross value of remittances in the financial system will decline, and reduced delays in the timing of settlements will reduce the need for credit intermediation in facilitating payments. All these developments will eliminate risks on which banks currently obtain income. The net result will be less systemic risk in the payments system and the elimination of substantial costs to customers associated with the need to compensate banks for mitigating these risks. Therefore, traditional sources of bank income will be eroded, but so will the risks.

On the other hand, the introduction of Real Time Gross Settlement will provide opportunities for banks to benefit from the efficient deployment and sourcing of liquidity. Those banks that are provide net liquidity and credit resource to the system will be afforded the opportunity to benefit from it; those that represent a drain on the liquidity and credit risk resources of the payments system will be penalized for doing
so. Developments such as intra-day interest rate markets (which already exist in the USA and will soon exist in Hong Kong) will benefit banks that manage their liquidity in such a way as to be contributors of liquidity, either in the form of currency or collateral, and penalize those that fail.

Real Time Gross Settlement requires the existence of collateral to prevent the simple transference of risk to the central bank or other clearing house operator. Collateral acts as a lubricant to the timely execution of transactions and a buffer to timing mismatches that remain. One issue for many Asian markets is the lack of an adequate pool of suitable collateral, due to the relatively small scale and lack of secondary market liquidity of the region's government bond and bill markets. This will leave a role for commercial banks as the providers of credit intermediation and collateral. Those institutions that can successfully provide the collateral function by the use of their own capital and creditworthiness will stand to benefit greatly from their key role in facilitating the smooth operation of the payments system. This will develop demand for their paper and services in intermediating credit risk. As an entity with a comparatively strong credit rating, Hongkong Bank believes it has a great role to play in encouraging and participating in this process.

Another key concern for any global commercial bank, and a factor determining the speed of the development of regional markets, will be the ability of both global and local market participants to effectively assess the exposure to settlement risks they face when dealing with counterparties. This is essentially a credit issue, and one that has not always been easy to address, given the youth of the region's markets and the differing settlement procedures, disclosure and supervision standards that exist.

Banks that have developed an extensive regional presence, such as Hongkong Bank, have enjoyed an obvious competitive advantage in assessing regional counterparty risk. The advantage inherent in the ability to assess risk accurately will to some extent be eroded by the fact that counterparty risk will be reduced with the development of more sophisticated payments systems. However, this will be more than compensated for by the growth in regional markets resulting from the reduction of risk. It is also worth remembering that although large regional players have undoubtedly benefitted from the "float" effect of carrying other banks' funds, at the same time a considerable amount of settlement risk created by intra-day exposures within national clearing systems has often needed to be absorbed on an unrecompensed basis. The development of Real Time Gross Settlement systems, in particular, will be a major factor in developing markets with greater depth of liquidity and breadth of product range.

Looking forward, the adoption of common standards across global payments and custody systems, and the widespread adoption of multilateral netting in FX markets, hold forth the distinct possibility of a world in which settlement is almost simultaneous to trading across a wide range of currency and asset markets. We may be several years away from such a vision, but a world in which there are markets that accurately price settlement risk and intraday credit is the first step in this direction. The US's introduction of an intra-day Fed Funds market should be watched with interest, for now there is a market which will incentivise the efficient operation of payments on a real-time basis, rather than the end of day batch processes that financial markets have
traditionally relied on. A new science of intra-day treasury management will develop, with operations becoming regarded as a profit centre rather than a cost centre and banks trading intra-day funds among themselves to optimise their funding cost. The time-value of money will become measured in minutes rather than days. This will free up capital in the world’s financial system and allow that capital to be more productively employed in fostering economic growth.

The sophistication of banks’ systems will largely be a function of the extent of their focus on the issue. Smaller banks may find it is cheaper to sub-contract these functions to bigger banks with greater technological capabilities or balance-sheet structures which give them advantage in managing intra-day liquidity. This phenomenon has already been observed in the global custody market, with ever-increasing gaps between the sophistication of the services offered by the market leaders and the rest of the banking universe. This represents an opportunity for the world’s largest banking institutions to earn an economic rate of return from the vital function of helping to eliminate systemic risk from the global financial system.

This may result in the eventual development of “super-correspondents” whose operating procedures are sufficiently ahead of market practice for them to offer payment services to other banks, which are of lower cost than those banks can achieve by managing their own payments. Technology will be the key. Those banks whose market share in FX, custody and remittances is very large will have greater incentive to develop systems to exploit the cost savings and risk reduction benefits obtainable from state-of-the-art payments systems. The cost of intra-day money and the reduction of settlement risk is most relevant to those who generate the largest flows through the financial system.

Whilst some of the worlds’ markets are moving rapidly towards standards that make this vision a reality, many markets are a long way from it. The Asian economies are generally in a relatively early stage of development in this regard, with the notable exception of Hong Kong, which is one of the world’s more progressive. Hong Kong is introducing a Real Time Gross Settlement system in 1996 and rates highly in terms of its equity and debt settlement processes.

Hong Kong and Taiwan lead the region in equity settlement processes, complying with six of the nine key G30 recommendations. This puts them among the world’s most developed centres in terms of the sophistication of their settlement mechanisms, a status befitting the relative size of their equity markets. Hong Kong also leads the region in terms of its debt settlement mechanisms, but it is encouraging to see the rapid progress being made in most jurisdictions.

Whilst Asia’s developing markets encounter smaller flows than the G7 economies and the region’s major centres, their settlement mechanisms are generally less developed and the credit strength of major counterparties is perhaps more of a concern. Therefore, settlement risk remains an extremely important issue. Most of the region’s central banks are very forward thinking and the pace of development of settlement infrastructure is extremely rapid, evidencing a widespread appreciation of its importance. Asia’s developing economies have a unique opportunity to adopt best practice from the outset, and facilitate the development of their banking industries such...
that settlement and payments issues do not impede overall economic development. The private sector will play a key role in this process, both in terms of providing feedback and contributing liquidity, technological skill and treasury management expertise.

At the same time, this process provides further stimulus to the development of the region's Government debt markets, as the demand for collateral grows. We at HongkongBank are committed to participating as fully as possible in the development of the region's government bond markets, as an underwriter, as a distributor, as a market maker and as an investor. Indeed, we see this as a key competence in expanding our role in the region's financial system. As such, we actively support the development and deregulation of the region's domestic capital markets, the gradual removal of obstacles to the free movement of capital and the participation of foreign firms in domestic markets. The role of banks in the region's financial infrastructure is changing, and HongkongBank intends to ensure that it remains a constructive instrument of that change rather than it's victim.

We believe the HSBC Group has a unique combination of global financial strength, local knowledge and commitment to Asian markets, and look forward to continuing to play a leading role in the region's economic development. This represents both a unique commercial opportunity and a pressing social obligation. We are committed to fulfilling our full potential in both respects.
One of the key issues for participants in global payment systems is the resilience of the underlying technology supporting those systems. We have been meeting at this seminar for two days and, indeed, there are payment systems conferences from time to time all over the world. As many of the conferences, discussions center around the business of moving large-value payments and associated credit, liquidity, and settlement risks. Very few of the discussions center around technology and operational risks. There are, probably, a number of reasons for this.

One is that discussions on technology are not very appealing for many participants in the payment system because while they know that they are totally dependent on technology they do not have a very good understanding of it and are rather uncomfortable with it.

Second, there are so many other issues on the table, that issues relating to technology simply get crowded out in these forums. I am sure there are other reasons but the most important reason, I think, is that technology is taken for granted. It works, it worked yesterday, and it worked the day before and the day before that too. In fact, many of the most important payment systems in the world have had 100 percent availability over the past few years and those that did not, show numbers like 99.94 percent uptime.

So why do I choose to talk about technology?

One reason it's relevant here is that both Hong Kong and China are building new payment systems and many other countries either are developing new systems or implementing major enhancements to existing ones.

Second, is that in the last few years these systems have grown increasingly more complex. Continued globalization has resulted in vastly expanding volumes and value of payments. Prospectively, efforts toward risk reduction, particularly Herstatt risk in the foreign exchange market, addressed either by the private sector, the central banks, or some combination of the two, will certainly result in even greater complexity and interdependence of the world's major payment systems.

Third is because there are huge changes taking place in the operating environment for payments, even as the financial markets are evolving rapidly. These changes are a threat to the maintenance of a 100 percent reliable payment system. I will mention just some of the changes that Fedwire will undergo in the next few years as examples of what we all are facing. Technology systems that were separate in each of the twelve Reserve Banks are being centralized into only one location. Message formats are being
significantly expanded to support end-to-end automation of payment transactions. This will reduce manual intervention and allow for the complete transfer of originator and beneficiary information to comply with recent Treasury regulations.

In late 1997, operating hours will be expanded from ten hours to eighteen hours a day, so we can get greater overlap with international markets. A new book-entry securities system is being developed. And, we are seeing increased consolidation and a continued move to greater interstate banking in the United States. These changes will affect not only the Federal Reserve System but virtually the entire banking community in the United States.

Lastly, there is constant change in the technology itself. It is becoming increasingly difficult to know in which technology to invest and when to invest in it. Whether we are talking about proprietary systems or open systems, mainframes or client servers, SNA or X.25, fast Ethernet, FDDI or ATM. You don’t know what they mean. I am not sure I remember either; but I know I must worry about them.

While keeping up with change, we cannot lose sight of the issue of security. With the increased power and the decreased cost of microprocessors, and the advent of the Internet and other electronic communications, it is becoming increasingly challenging to stay a step, preferably two, ahead of the bad guys.

Thus, in the face of all the changes to the payment system, to the banking system, and to technology, we need to make sure our systems are resilient and can withstand any and all problems. Our systems have zero tolerance for intrusion or fraud; confidence that may take years to build can be lost in moments. Thus, great vigilance on our part is always required. We must always remember that we deal not only with technology, but also with people – users, operators, and supervisors – within and outside our organizations and we cannot take the reliability of the underlying technology of the payment system for granted.

At the Federal Reserve Bank of New York, ensuring the continued integrity of Fedwire operations is a primary responsibility. We process over a trillion dollars a day in funds and securities transfers and perform the settlement services for another trillion dollars in funds transfers. Our operating environment is characterized by redundancy not only in our computer hardware components but also in our electrical power supply, water and air conditioning systems. Our communications network provides for alternate routings around outages. We have stringent physical security controls, encrypted communications lines and application level security controls. We have a high degree of automation in the operation itself for repetitive and routine procedures so that manual intervention is kept at an absolute minimum. We also have a backup site that is ready to take over processing within a half hour in the event of loss of our primary site. As transactions are processed at our primary site, copies are sent in real-time to our backup site so that contingency readiness is always maintained.

Where we don’t have redundancy is in the application software. Here, the key is to prevent problems as much as possible and to be in a position to fix problems should they occur. We accomplish this through rigorous testing and a disciplined change

Global Payment Systems
control policy. We have multiple levels of testing that begins with the developers, a separate quality assurance staff, and extends to the user community inside the bank and finally to the banks that are connected to Fedwire. Notwithstanding the burden this places on our human resources, no change is too small to test and the rule we follow is that we test until we are all comfortable, and that includes the operators of the payment system, the participants, users, supervisors, and the auditors.

If after all the testing and transition to a new system an application software problem does arise in the operation, it has to be fixed in place. This calls for having technical people ready to respond quickly in the event of an emergency, and we have such a staff. We are very aware that the payment systems' dependence on people is great.

Perhaps our greatest dependence is on the software developers and as I have said many times, these people are extremely difficult to manage. Sometimes they are scientists, sometimes they are artists, sometimes they are entrepreneurs, sometimes they are merely temperamental and sometimes you don't know what they are. But you have to coddle them and to recognize that you really depend on them much more than you would like. And, as much as possible, you should have backup for these people as well.

Even though we all do our best to continue to have flawless operations, payment systems and their underlying technology are developed by humans and humans are not perfect.

We all have our horror stories. At the Federal Reserve Bank of New York, at the end of September 1987, three weeks before the market crashed, we had what we fondly refer to as Hell Week. The funds transfer system was down on September 29 for six hours and we close at 11:45 p.m.; down another six hours for both funds and securities transfer on September 30 when we finally closed at 3:45 a.m. the next morning; and down another few hours on October 1. This was all due to bugs in a data management system used by thousands of companies all over the world. We happened to have a confluence of events that triggered bugs three days in a row. Fortunately for the financial system, and for me, everything worked out at the end.

In the past few years payment systems have been the object of a lot of attention, some of it unexpected and unwelcomed. In January 1994, we had the bombing of the World Trade Center in New York City, where a number of financial institutions had to evacuate and to relocate to their operations contingency centers. We had a major power outage in New York City in 1990 and after three days on diesel generators, the generators failed and we had to relocate operations. There was an earthquake in San Francisco and a flood in the Minneapolis Fed computer room. One can never take continuity of operations for granted.

In other words, you can never do too much contingency planning or have too much back-up! Central banks and major market participants cannot be stingy in this area. The potential negative consequences of a major payment system disruption far outweigh the up-front money that must be spent to have adequate contingency capabilities.
I am sure many of you have seen the movie about the flight to the moon of Apollo 13. The action takes place at a command center on the ground and on the Apollo spacecraft. If one were to focus only on the command center and forget about what it was controlling, one would quickly realize that the command centers for our payment systems and for space missions are pretty similar, and the activities, especially in times of crises, are similar. The Apollo 13 crisis dealt with people’s lives and we deal with money. Both are designed to be flawless. Apollo 13 had a happy ending, but not all of the payment system high-tech crises and even crises in critical low-tech systems have happy endings.

It is our job to make sure that regardless of what happens systems continue to work. The stakes are too high for them to fail. A payment system needs to be designed to work in relatively normal times but also to work when almost everything breaks down.

This calls for levels of redundancy in our computers, networks, and locations. It calls for trying to anticipate and prevent problems as much as possible and to develop a methodology and a discipline for implementing changes. Above all, it means managing not only the process, but the people who form the team that keeps everything running. And one of the crucial management tasks is sustaining the awareness and the spirit that it is very much a team effort.

I don’t mean to be Jeremiad, but given the rapidity of change and all the things we need to worry about, I thought it appropriate to raise a little consciousness and, hopefully stimulate a bit of thought about these management issues, too. So, as you implement your new payment systems or modify existing ones here in Hong Kong, or in China, and certainly in the United States, you can remind yourselves that payment systems are complex, they require discipline for development, implementation and operation, they have no margin for error, and in spite of, or because of technology, they are dependent on people.
Programme
Thursday, 2 November 1995

8:45 - 9:45 a.m.  Registration

9:45 - 10:00 a.m.  WELCOMING ADDRESS
DONALD TSANG
Financial Secretary

10:00 - 10:45 a.m.  KEYNOTE ADDRESS
"GLOBAL PAYMENT SYSTEMS - THE CHALLENGES FOR CENTRAL BANKS"
ERNEST T. PATRIKIS
First Vice President
Federal Reserve Bank of New York

10:45 - 11:15 a.m.  Break

11:15 - 11:45 a.m.  INTERBANK EXPOSURES IN THE INTERNATIONAL PAYMENT SYSTEMS
PETER ALLSOPP
Head, Payment, Settlement and Clearing Systems Division
Bank of England

11:45 - 12:15 p.m.  THE ARCHITECTURE OF REAL TIME GROSS SETTLEMENT SYSTEMS
CHRISTIAN VITAL
Director, Deputy Head of Department III
Swiss National Bank

12:30 - 2:20 p.m.  Lunch
(at Concord Room 8/F of New World Harbour View Hotel)
THE EVOLVING GLOBAL PAYMENT SYSTEMS
DONALD R. HOLLIS
Executive Vice President
The First Chicago Corporation

2:30 - 3:15 p.m.  CHINA NATIONAL AUTOMATED PAYMENT SYSTEM (CNAPS) PLAN AND PRACTICE
CHEN YUAN
Deputy Governor
People's Bank of China

3:15 - 3:45 p.m.  RISK REDUCTION AND ENHANCED EFFICIENCY IN LARGE-VALUE PAYMENT SYSTEMS: A PRIVATE SECTOR RESPONSE
JILL M. CONSIDINE
President
New York Clearing House

Global Payment Systems
3:45 - 4:15 p.m. Break

4:15 - 4:45 p.m. NETTING IN THE GLOBAL PAYMENT SYSTEMS
HERMANN-JOSEF PERSE
Bundesbankdirektor
Deutsche Bundesbank

4:45 - 5:15 p.m. PAYMENT SYSTEMS DEVELOPMENT
TOMMASO PADOA-SCHIOPPA
Deputy Director General,
Bank of Italy
Chairman
Basle Committee on Banking Supervision

5:15 - 5:45 p.m. GLOBAL SECURITIES CLEARANCE AND
CUSTODIANSHIP
MARSHALL N. CARTER
Chairman and Chief Executive Officer
State Street Bank and Trust Company (Boston)

5:45 - 7:00 p.m. Cocktail Reception
Convention Hall III of
Hong Kong Convention and Exhibition Centre

Friday, 3 November 1995

8:30 - 9:45 a.m. PRESENTATION I
Moderator: PETER ALLSOPP
Head, Payment, Settlement and
Clearing Systems
Division
Bank of England

Panel Members: JOSEPH YAM
Chief Executive
Hong Kong Monetary Authority

l.R. WILSON
Chairman
Hong Kong Association of Banks

TARISA WATANAGASE
Director
Payment System Development Office
Bank of Thailand

9:45 - 10:15 a.m. Break

10:15 - 11:30 a.m. PRESENTATION II
Moderator: CHRISTIAN VITAL
Director, Deputy Head of Department III
Swiss National Bank

Panel Members: HOON SHIM
Assistant Governor
Bank of Korea

NEIL C. MACKRELL
Head, Financial System Department
Reserve Bank of Australia

NGUYEN TOAN THANG
Deputy Director, Economics
Research Department
State Bank of Vietnam
11:30 - 12:45 p.m.  PANEL DISCUSSION:
GLOBAL PAYMENTS: KEY ISSUES

Moderator:  ANDREW SHENG
Deputy Chief Executive (Monetary)
Hong Kong Monetary Authority

Panel Members:  TAKASHI ANZAI
Executive Director
Bank of Japan

STUART GULLIVER
Head of Treasury and Capital Markets
HSBC Markets
The Hongkong and Shanghai Banking
Corporation Limited

ISRAEL SENDROVIC
Executive Vice President
Automation and Systems Services Group
Federal Reserve Bank of New York

12:45 p.m.  Close
This book is due for return or renewal on the date shown unless previously recalled. Fines may be incurred for late return.
Global payment systems:
[seminar proceedings]
Hong Kong: Hong Kong Monetary Authority, 1996.