

**EXECUTIVES' MEETING OF EAST ASIA-PACIFIC CENTRAL BANKS AND
MONETARY AUTHORITIES (EMEAP)**

**FOREIGN EXCHANGE SETTLEMENT RISK IN THE EAST
ASIA-PACIFIC REGION**

**Report prepared by the EMEAP Working Group on
Payment and Settlement Systems**

December 2001

FOREWORD

The Executives' Meeting of East Asia-Pacific Central Banks and Monetary Authorities (EMEAP) was established in 1991 as a cooperative organisation for central banks and monetary authorities from eleven economies. In July 1998, the EMEAP Working Group on Payment and Settlement Systems was initiated by the EMEAP Governors as a forum to discuss and share information on topics of common interest to members relating to payment and settlement systems. It has met twice a year since its first meeting in March 1999 and six meetings have been held so far.

Since its inception, the Working Group has actively discussed options for reducing foreign exchange settlement risk in the EMEAP region. Foreign exchange settlement risk is the risk where one delivers the currency being sold but does not receive the currency being bought, which, given the huge size of foreign exchange turnover and the resulting potential for systemic risk, has been a concern to central banks and monetary authorities in every region. This risk is a particular concern for EMEAP members. Time zone differences between the two payment legs of a foreign exchange transaction is one of the major factors affecting foreign exchange settlement exposure, and EMEAP economies are geographically located where there is the greatest time zone difference with the United States whose currency is on one side of most foreign exchange transactions in the region.

Against this background, the Working Group surveyed banks operating in EMEAP economies to determine the scale of foreign exchange settlement risk in the region and assess banks' current settlement practices. This report has been compiled based on the results of these surveys and makes some practical recommendations regarding how foreign exchange settlement risk can be reduced. We hope it will help banks in the EMEAP region to fully recognise the very significant scale of foreign exchange settlement risk and further increase awareness of the importance of introducing risk reduction measures.

The production of this report was possible because of the valuable contributions of Working Group members and their staff who so willingly devoted much time and energy to this project. Special thanks go to Greg Johnston of the Reserve Bank of Australia, who did much of the drafting and provided technical assistance to member economies on the conduct of a foreign exchange settlement risk survey and the compilation of survey results. Other members of the drafting committee, comprising the Reserve Bank of Australia, the Bank of Korea, the Bank of Japan, and the Hong Kong Monetary Authority, also provided useful comments on the report.

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EXECUTIVE SUMMARY

Central banks around the world have been concerned about foreign exchange settlement risk for some time. These concerns have arisen because of the magnitude of institutions' foreign exchange settlement exposures and the potential for systemic problems to occur as a result of the failure of a single trading counterparty. As a result, a good deal of work has been undertaken to develop a framework to correctly measure, manage and, where possible, reduce this risk.

In order to address these concerns in the Asia-Pacific region, members of the EMEAP¹ Working Group on Payment and Settlement Systems agreed to undertake a study of possible foreign exchange settlement risk reduction measures. As part of this study, members surveyed the foreign exchange settlement practices of commercial banks in their jurisdiction.

The objectives of the EMEAP survey were to:

- raise commercial banks' understanding of concepts relating to foreign exchange settlement risk, both at executive and operational levels;
- promote the implementation of current best practice in the region, with respect to both the management of foreign exchange settlement risk and the back office practices which influence the size and duration of this risk; and
- identify other potential options for reducing foreign exchange settlement risk which may be implemented by individual banks and central banks and monetary authorities.

Foreign exchange settlement risk defined

Foreign exchange settlement risk is the risk that a counterparty to a foreign exchange deal delivers the currency it sold, but does not receive the currency it bought. This risk arises because the delivery of the two currencies involved in a trade usually occurs in two different countries which, in many cases, are located in different time zones. The result is that one party to a trade is usually required to pay away funds in the currency which it sold before receiving the currency that it purchased. This creates a credit risk which can last for several days - from the time the instructions for delivery of the currency sold can no longer be unilaterally cancelled until the time that the currency purchased has been received with finality.

Survey findings

The EMEAP survey found that the average duration of foreign exchange settlement risk in the EMEAP region was more than two operating days (ie not including weekends and public holidays). This is consistent with earlier surveys conducted by the Group of Ten central banks. Because of the duration of risk, a bank's full foreign exchange settlement risk exposure at a particular point in time is a multiple of one day's trades and often exceeds the value of its capital.

¹ Executives' Meeting of East Asia-Pacific Central Banks and Monetary Authorities.

The survey process identified some sound risk management and back office practices amongst banks in the region. For example, many banks identified the final receipt of foreign exchange settlements in their domestic currencies on the date they were due. Others formally managed foreign exchange settlement risk as a form of credit risk.

Nevertheless, it is apparent that there is scope for improvement in banks' risk management and back office practices. Many banks have not formally agreed with their correspondent banks a deadline for cancelling instructions to pay away a sold currency. Some banks also unnecessarily delay the time they identify the final receipt of some or all of their settlements. Of particular concern is the relatively low use of bilateral obligation netting in many of the economies whose legal systems recognise this process.

This report recognises the potential for well designed payment-versus-payment (PVP) systems to eliminate foreign exchange settlement risk, and encourages banks to be alert to opportunities to reduce their foreign exchange settlement risk even if their domestic currency is not eligible for settlement by a PVP system. In considering whether the use of PVP systems is appropriate, commercial banks should carefully consider the operations, and risk control mechanisms, of such systems in terms of the *Core Principles for Systemically Important Payments Systems*, which were developed by the Committee on Payment and Settlement Systems. They should also keep in mind that they retain a credit risk against their correspondent banks even if foreign exchange settlement risk is removed for trades settled on a PVP basis.

Recommendations

This report recommends that commercial banks should be looking to improve their settlement and risk management practices in order to reduce their exposures to foreign exchange settlement risk. In particular, commercial banks should take steps to:

- ensure that senior management are aware of, and are formally involved in, the day-to-day management of foreign exchange settlement risk;
- measure exposures properly so that they do not underestimate the level of their exposure, including by taking into account the inter-day nature of foreign exchange settlement risk;
- apply appropriate credit-based controls to exposures;
- improve back office procedures and enter into well-documented correspondent banking arrangements in order to minimise the duration of exposures;
- enter into bilateral obligation netting arrangements with counterparties to reduce the magnitude of their foreign exchange settlement risk, where this is legally enforceable; and
- where available and appropriate, use PVP systems.

The report also recommends that EMEAP central banks and monetary authorities:

- take all necessary steps to ensure that senior management within commercial banks have a formal role in managing their institution's exposure to foreign exchange settlement risk;
- actively encourage banks to use bilateral obligation netting where it is legally certain in relevant jurisdictions;

- provide guidelines for measuring and managing foreign exchange settlement risk;
- consider whether additional steps may be needed to ensure that commercial banks' increased awareness and understanding of foreign exchange settlement risk is maintained. This may be done by publishing survey results, conducting follow-up surveys, and discussing banks' survey results with their senior management, particularly where they have fallen short of industry best practice;
- consider involving prudential supervisors to help them achieve the above objectives; and
- continue to improve national payment systems in each economy, including by adding enhancements to RTGS systems that may assist reduction of foreign exchange settlement risk.

1. INTRODUCTION

Foreign exchange settlement risk, or Herstatt risk, is the risk of principal losses on foreign exchange transactions. This typically occurs in circumstances where a bank has irrevocably paid away the currency sold but, due to the failure of its counterparty, does not receive the currency purchased. Foreign exchange settlement risk is of particular concern to central banks given the large values involved in settling foreign exchange transactions, and the resulting potential for systemic risk.²

In order to address these concerns in the Asia-Pacific region, members of the EMEAP Working Group on Payment and Settlement Systems agreed to undertake a study of possible foreign exchange settlement risk reduction measures. As part of this study, members surveyed the foreign exchange settlement practices of commercial banks in their jurisdiction.³

This report sets out the Working Group's findings, and includes a summary of survey data and associated analysis, as well as a discussion of the various foreign exchange settlement risk reduction measures applicable to the region. The report also complements earlier studies undertaken by the Committee on Payment and Settlement Systems (CPSS) of the Group of Ten central banks, which assessed foreign exchange settlement risk in G10 commercial banks and put forward various options for reducing or eliminating foreign exchange settlement risk.

Chapter 1 provides some background to the origins of this report and describes the role of the EMEAP Working Group on Payment and Settlement Systems. It also sets out the particular reasons why EMEAP regards reduction of foreign exchange settlement risk as essential, and summarises the work of other bodies that have pioneered analysis of these issues and promoted a greater understanding of foreign exchange settlement risk as a distinct form of financial risk. Chapter 2 provides an explanation of how foreign exchange settlement risk arises, the basis of central bank concerns, and the accepted international methodology for measuring foreign exchange settlement risk. Chapter 3 provides a description of foreign exchange settlement practices in the EMEAP region, including information on key settlement times in regional and major currencies. From this information a picture of foreign exchange settlement risk in the region is developed. Chapter 4 sets out institutions' current risk management practices and some options for improved management of foreign exchange settlement risk. Finally, Chapter 5 draws conclusions and sets out recommendations for further action. Copies of the survey form, additional survey data and background material, and a list of key reference documents are reproduced in separate annexes.

1.1 Background

Central banks have become increasingly aware of the scale of foreign exchange settlement risk and the importance of risk reduction measures. Behind this growing awareness are several events in the past in which foreign exchange settlement risk might have caused

² April 2001 data published by the Bank for International Settlements indicate that the size of global daily foreign exchange market turnover is around US\$ 1.2 trillion.

³ All EMEAP member economies, except China, participated in the EMEAP survey. Among them, Australia and Japan have already conducted surveys as part of the Group of Ten or other relevant studies. The results of these earlier surveys are incorporated in this report.

systemic risk in global financial markets, including the failure of Bankhaus Herstatt in 1974, the closure of BCCI SA in 1991 and the Barings crisis in 1995.

Some factors particular to the EMEAP region have aggravated concerns shared by regional central banks and monetary authorities. One factor is the geographic location of EMEAP member economies, which leads to an increase in foreign exchange settlement exposures in the region. As EMEAP economies are located in the Asia-Pacific area, they have the largest time zone differences with the United States whose currency is dominant in foreign exchange trades in the region. One of the major factors affecting the duration of foreign exchange settlement exposures is the time zone difference between the regions where each leg of a currency pair is settled, as detailed in Chapter 3.3. In this sense, EMEAP economies have a “handicap” in the settlement of foreign exchange trades against the US dollar.

Another factor is that the inclusion of EMEAP currencies in the Continuous Linked Settlement (CLS) initiative will be very limited, at least in its early stage. CLS is a global private-sector initiative for the reduction of foreign exchange settlement risk (see Annex 5). Currently, the Australian dollar and the Japanese yen are scheduled to be included in its first wave of seven major currencies, with the Singapore dollar to be included in the second wave. When CLS launches its services, most EMEAP currencies will be excluded from CLS settlement and will therefore lag behind the major currencies included in CLS in terms of reduction of foreign exchange settlement risk.

Reduction of foreign exchange settlement risk is particularly important for EMEAP economies, not only for reducing systemic risk but also for enhancing the international competitiveness of their payments and financial market infrastructure. EMEAP central banks and monetary authorities have been concerned that delayed improvement in foreign exchange settlement risk reduction might affect the credibility of their local currencies and markets. The currency crises experienced in some EMEAP economies from 1997 through 1998 amplify these concerns.

Executives’ Meeting of East Asia-Pacific Central Banks and Monetary Authorities

The Executives’ Meeting of East Asia-Pacific Central Banks and Monetary Authorities (EMEAP) is a cooperative organisation of central banks and monetary authorities in the East Asia and Pacific region. Its broad objectives are to strengthen the cooperative relationship among its members, and undertake studies in areas of mutual interest for members in achieving their policy objectives. It comprises the central banks and monetary authorities of eleven economies:

- Reserve Bank of Australia
- People’s Bank of China
- Hong Kong Monetary Authority
- Bank Indonesia
- Bank of Japan
- The Bank of Korea
- Bank Negara Malaysia
- Reserve Bank of New Zealand
- Bangko Sentral ng Pilipinas

Monetary Authority of Singapore

Bank of Thailand

As well as meetings at the Governor and Deputy Governor level, EMEAP members also participate in three separate working groups on payment and settlement systems, financial markets and banking supervision.

Working Group on Payment and Settlement Systems

The EMEAP Working Group on Payment and Settlement Systems was convened by the EMEAP Governors in July 1998 with the following Terms of Reference:

- to exchange information, share experience and undertake analysis on developments in domestic and cross-border payment and settlement systems;
- to communicate with multilateral institutions and international forums on matters related to payment and settlement systems; and
- to organise seminars and workshops on payment and settlement issues of common interest among members.

Consistent with these objectives, the Working Group proposed a work plan consisting of a number of key themes, one of which was a study of measures to reduce foreign exchange settlement risk in EMEAP member economies. A formal survey of foreign exchange settlement risk, and analysis and assessment of results, was envisaged as a key step in undertaking this theme of study.

Prior to undertaking the EMEAP survey, the Reserve Bank of Australia and the Bank of Japan, who had each conducted prior surveys, organised roadshow presentations at the request of some EMEAP member economies. The roadshow presentations were designed to provide Working Group members with the necessary technical and analytical skills to undertake a survey and raise local banks' awareness of foreign exchange settlement risk issues. In part, these presentations drew upon material included in the CPSS's *Tackling Foreign Exchange Settlement Risk: A Toolkit*.⁴

Existing studies

Central banks' approach to foreign exchange settlement risk has been developed in a number of reports issued by the CPSS. Earlier reports discussed foreign exchange settlement risk in the context of cross-border and multi-currency netting schemes (the Angell and Lamfalussy reports⁵), and resulted in the widely accepted Lamfalussy Standards. A later report extended the analysis to central banks' role in providing such services (the Noël report⁶).

⁴ The CPSS was established in 1990. It serves as a permanent forum for G10 and other central banks to monitor and analyse developments in domestic payment, settlement and clearing systems as well as in cross-border and multi-currency settlement schemes. The "toolkit" is a collection of resource materials and analytical tools to assist central banks and monetary authorities in tackling foreign exchange settlement risk.

⁵ Bank for International Settlements, *Report on netting schemes*, Basel, February 1989. Bank for International Settlements, *Report of the Committee on Interbank Netting Schemes of the central banks of the Group of Ten countries*, Basel, November 1990.

⁶ Bank for International Settlements, *Central bank payment and settlement services with respect to cross-border and multi-currency transactions*, Basel, September 1993.

More recently, a formal methodology for measuring the size and duration of foreign exchange settlement risk was developed in the Allsopp Report,⁷ which was released in 1996. This report also set out the results of a survey conducted by the G10 central banks, including the Bank of Japan, of foreign exchange settlement risk in the major institutions active in the foreign exchange market. The findings of the report were that foreign exchange settlement risk was not only very substantial, but that there was also limited awareness or understanding of the risk, resulting in inadequate risk management. A follow-up report was released in 1998.⁸ This report set out the results of a second survey and found that while some progress had been made on minimising foreign exchange settlement risk within G10 economies, there remained considerable scope for improvement among reporting banks.

The Reserve Bank of Australia also issued separate studies in 1997 and 1999,⁹ which reported the results of two surveys of Australian banks active in the foreign exchange market. The results of these studies were consistent with the CPSS findings.

In preparing this report, the Working Group benefited greatly from the existing work undertaken by the CPSS in this area. The analytical approach to foreign exchange settlement risk presented in this report follows that set out in the Allsopp and Progress Reports. The Working Group also drew upon materials provided in the CPSS Toolkit on foreign exchange settlement risk.

1.2 Objectives of the EMEAP survey and report

International experience has shown that conducting a survey of banks' foreign exchange settlement practices is a valuable way of ensuring that senior management and operational staff develop a better understanding of foreign exchange settlement risk and the options for reducing and better managing this risk. The key objectives of the survey are thus to:

- *raise awareness and understanding of foreign exchange settlement risk*, both at the senior executive level and at an operational level;
- *promote implementation of current best practice* in both the management of foreign exchange settlement risk and the back office procedures which influence the magnitude and duration of the risk, with the aim of reducing institutions' overall exposure; and
- *identify other potential options for reducing foreign exchange settlement risk* which may be implemented by individual banks and central banks/monetary authorities.

⁷ Bank for International Settlements, *Settlement Risk in Foreign Exchange Transactions*, Basel, March 1996.

⁸ Bank for International Settlements, *Reducing Foreign Exchange Settlement Risk: A Progress Report*, Basel, July 1998.

⁹ Reserve Bank of Australia, *Foreign Exchange Settlement Practices in Australia*, December 1997. Reserve Bank of Australia, *Reducing Foreign Exchange Settlement Risk in Australia: A Progress Report*, September 1999.

2. FOREIGN EXCHANGE SETTLEMENT RISK¹⁰

2.1 Settlement risk in foreign exchange transactions

Settlement risk is the risk that settlement does not occur as scheduled, or as expected. In the context of settling foreign exchange transactions, this means that the bought currency was not received by the purchaser according to the terms of the trade. Foreign exchange settlement risk is thus the risk that you deliver the currency being sold, but you do not receive the currency being bought. This is a form of credit risk and involves the full principal amount of the sold currency.

How settlement risk arises

Foreign exchange transactions involve the payment of the sold currency to a counterparty in return for receipt of the bought currency from that counterparty. For example, when buying USD against JPY, the trade is settled with a payment of JPY against receipt of USD. Correspondent banks are often used to transfer or receive value where a counterparty to the trade does not participate directly in the payments system of the country of origin of one or both currencies.

Settlement risk arises because there is no coordination between the two payments which make up the settlement of the transaction. That is, the payment of one currency is not conditional on the payment of the other currency. This creates a risk that one leg of the settlement process may be completed, but the other leg may fail due to operational, insolvency or other reasons. The lack of coordination between each payment arises for a number of reasons. First, the payments are made through different payment systems, making it operationally difficult to link the two payment legs. Second, the two payment legs may occur in different time zones, which in some cases means that one leg of the settlement must be finalised a number of hours before the other leg, increasing the duration for which the outstanding leg is at risk. Finally, a number of different correspondent banks may be involved in the payments, introducing the possibility of delays and communication issues into the process.

Foreign exchange settlement risk may also have a liquidity risk dimension where the failure to deliver a currency puts a counterparty's ability to meet its obligations to third parties at risk.

Other risks in foreign exchange transactions

Although a range of other risks are present in foreign exchange transactions, these should be distinguished from foreign exchange settlement risk on the grounds that they do not place the principal at risk, and are thus less likely to have systemic implications.

These risks include market risk, replacement cost risk and operational risk. Market risk is the risk of making losses on an unhedged position due to unfavourable exchange rate movements, and may occur before or after settlement of a particular trade. Replacement cost risk occurs where a counterparty fails to deliver the bought currency on the agreed settlement date, but this is known before the sold currency is irrevocably paid away. This means that the original

¹⁰ This section is adapted from parts of the Allsopp and Progress Reports, and materials provided in the CPSS Toolkit on foreign exchange settlement risk.

trade can be cancelled and replaced with another, similar trade, but possibly at a less favourable rate.

Operational risk is a key cause of some other risks being realised and arises when a problem occurs in technical systems or operational procedures, or in the event of human error. In all but exceptional circumstances, operational risk is not likely to cause foreign exchange settlement risk to crystallise.

2.2 Central bank concerns

Magnitude and Duration of exposures

The size and duration of foreign exchange settlement exposures are a major source of concern for central banks. The total size of global foreign exchange turnover is in excess of US\$ 1,200bn each day, of which the EMEAP region is estimated to account for 24 per cent.¹¹ In addition, the duration of foreign exchange settlement risk can last for a number of days; this results in total foreign exchange settlement exposures exceeding the levels of daily exposures, with the result that exposures are often a multiple of banks' capital.

Potential for systemic risk

The size and duration of foreign exchange settlement risk gives rise to the potential for systemic disturbances to payments systems and financial systems more generally. Even relatively minor disruptions to the settlement of foreign exchange trades may be sufficient to substantially undermine the smooth operation of payments systems and the solvency of participating financial institutions. In addition, because banks participate in a range of different payment systems, either directly or through correspondent banking arrangements, there is substantial scope for disruptions in one payment system to have a flow-on effect in another payment system.

Steps taken to reduce foreign exchange settlement risk

The range of options available to reduce foreign exchange settlement risk is explored in detail in Chapter 4. However, some of the recent initiatives of central banks and monetary authorities in the EMEAP region, described below, have contributed directly to reductions in foreign exchange settlement risk.

In recent years, almost all Working Group members have implemented or further developed domestic RTGS systems for the settlement of high-value, time critical payments, such as those initiated to settle the domestic leg of foreign exchange transactions. As well as the broader risk reduction benefits of RTGS, these initiatives enable participants to actively manage the times at which they irrevocably pay away when selling the domestic currency, and reconcile final receipt when purchasing the domestic currency. Participants are thus able to reduce the duration of their foreign exchange settlement risk should they choose to do so.

¹¹ Bank for International Settlements, *Central bank survey of foreign exchange and derivatives market activity in April 2001: preliminary global data*, October 2001.

One member of the Working Group, the Hong Kong Monetary Authority, has also put in place a US dollar clearing system, enabling participants to settle HKD/USD foreign exchange transactions on a payment-versus-payment (PVP) basis.¹²

2.3 Defining and measuring foreign exchange settlement risk

Foreign exchange settlement risk can be defined as the risk that a counterparty to a deal delivers the currency it sold, but does not receive the currency it bought. This risk arises because the delivery of the two currencies involved in a foreign exchange trade usually occurs in two different countries which, in many cases, are located in different time zones. The result is that one party to a trade is usually required to pay away funds in the currency which it sold before receiving the currency that it purchased. This creates a credit risk which can last for several days – from the time the instructions for delivery of the currency sold can no longer be cancelled until the time that the currency purchased has been received with finality.

Foreign exchange settlement risk defined

A formal definition of foreign exchange settlement risk, set out below, was adopted by the CPSS in the Allsopp Report:

A bank's actual exposure - the amount at risk - when settling a foreign exchange trade equals the full amount of the currency purchased and lasts from the time a payment instruction for the currency sold can no longer be cancelled unilaterally until the time the currency purchased is received with finality.

This definition draws attention to two aspects of foreign exchange settlement risk – its size and duration. Of these, the concept that the full amount of currency purchased is at risk until settlement¹³ is more intuitively obvious than the duration over which the risk exists.

The duration of a bank's foreign exchange settlement exposure commonly commences before funds are actually paid to a counterparty, or its correspondent bank. This is because the correspondent bank paying away the sold currency will specify a deadline after which a payment instruction cannot be withdrawn unilaterally even though the actual payment may not be scheduled to occur until much later. Similarly, settlement risk may continue until well after the time the bought currency was scheduled to be received (for example the currency may not be received due to an operational or solvency problem at the paying bank or the counterparty to the trade). There may also be delays in completion of a bank's internal reconciliation process to identify settled and failed trades.

This is not to imply that risks are borne solely by the party to pay away first. A counterparty which is due to receive the currency which is to be settled first may also be exposed to foreign exchange settlement risk if the cut-off time for unilateral cancellation of a payment instruction for its sold currency occurs before it knows that it has received the purchased currency.

¹² The US dollar side of the transaction is settled across the books of a private sector bank that has been appointed as the settlement institution. Details of the system are described in Annex 5.

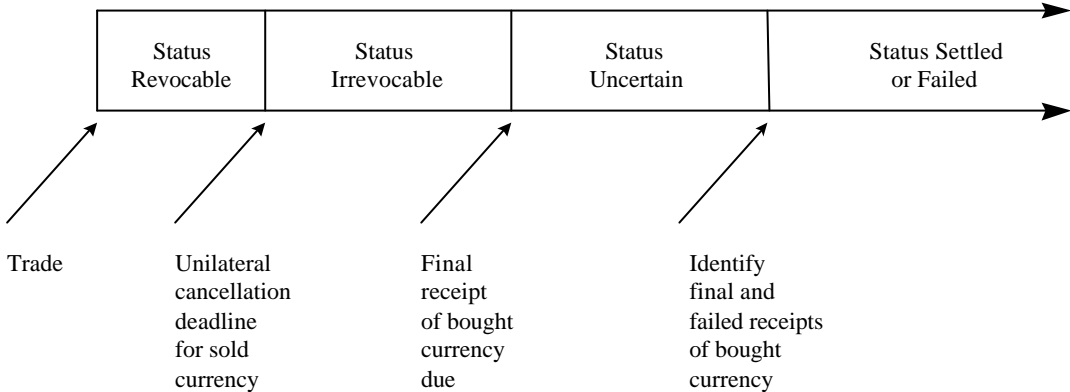
¹³ Counterparties to a foreign exchange trade may enter into bilateral netting arrangements which reduce the size of their settlement risk to a value less than the full amount of the currency purchased. However, this practice is not sufficiently widespread in the EMEAP region at present to assume that the size of settlement risk is usually less than the full value of the trade.

Surveys of banks conducted by the Group of Ten central banks and Australia between 1994 and late 1998 have shown that the duration of foreign exchange settlement risk can be as long as three operating days (ie not including weekends and public holidays). As a result, a bank's full foreign exchange settlement risk exposure is a multiple of one day's trades and at any particular point in time often exceeds the value of its capital.

The changing status of a trade

The Allsopp Report recognises that before inroads can be made into foreign exchange settlement risk a necessary first step is to correctly measure exposure. A diagram similar to Figure 1 was used in the Allsopp Report to draw out the potential duration of foreign exchange settlement risk and highlight the importance of timely and accurate reconciliation procedures.

Figure 1: Foreign exchange settlement process – changing status of a trade



Within this framework foreign exchange settlement risk does not commence until such time as a payment instruction becomes irrevocable. Further, risk does not expire until such time as receipt of the due currency is known with certainty. Thus the duration of foreign exchange settlement risk is the sum of trades with status irrevocable and status uncertain.

Minimum and maximum exposures

This framework encompasses both the period when in an *ex post*, accounting sense, value is at risk (the minimum exposure) and the true economic, or live management, risk (maximum exposure). Both are defined formally below.

Minimum exposure: This is the value of the trades for which a bank can no longer unilaterally stop payment of the sold currency but has not received the bought currency (either because it is not yet due, or because payment has been delayed because of operational or other difficulties). Using the above diagram, this equates to the sum of status irrevocable and status failed trades.

Maximum exposure: This equals the minimum exposure plus the value of bought currencies that should, but may not, have been received (ie trades with an uncertain status).

3. SETTLEMENT PRACTICES AND RISK IN THE EMEAP REGION

The surveys undertaken by Working Group members yielded a wide range of information on foreign exchange settlement practices in their respective economies. This section sets out the methodology used to gather this information, and an analysis of settlement practices and the associated foreign exchange settlement risk in the EMEAP region. This report does not reproduce specific data on the size and duration of foreign exchange settlement risk for EMEAP economies or individual banks.

3.1 Survey methodology

Participating member economies, with the exception of Australia and Japan, each conducted a survey of their respective foreign exchange markets between June 2000 and June 2001. The data reported for Australia and Japan were obtained from earlier surveys undertaken in 1998 and 1997 respectively.

A standardised survey form, consistent with that used by the CPSS in earlier surveys, was used to gather data from respondents. The survey form is reproduced in Annex 2.

Table 1: Survey period, timeframe and coverage

	Period	Timeframe	No. of participants	Coverage (% of turnover)
Australia	1 month	October 1998 ¹	21	90
Hong Kong	2 weeks	January 2001	23	85
Indonesia	2 weeks	May-June 2001	18	90
Japan	2 weeks	October-November 1997 ²	7	60
Korea	1 month	July-October 2000	36	95
Malaysia	2 weeks	June 2000	25	75
New Zealand	2 weeks	September 2000	6	90
Philippines	4 weeks	July 2000	22	85
Singapore	2 weeks	September 2000	39	90
Thailand	2 weeks	November 2000	18	91

¹ Survey results also published in *Reducing Foreign Exchange Settlement Risk in Australia: A Progress Report* (Reserve Bank of Australia, September 1999).—² Survey results also published in *Reducing Foreign Exchange Settlement Risk: A Progress Report* (Bank for International Settlements, July 1998).

Table 1 lists the EMEAP members participating in the survey, and provides a summary of when the survey was conducted in each economy, as well as the period of the survey, the number of participants involved, and the estimated coverage of the local foreign exchange market.

The period of the survey was determined by the need to obtain a representative estimate of the size of foreign exchange settlements in each market. The Working Group judged a survey period of at least two weeks to be adequate for this purpose, taking into account the considerable reporting burden on survey respondents. Survey times were decided so as to be representative of normal market activity, and to avoid abnormally quiet or busy periods in local financial markets.

The extent of survey coverage, that is the share of total foreign exchange transactions captured by the survey, was also determined by the need to obtain results representative of the overall market. In this respect, the Working Group considered 50 per cent or greater coverage to be sufficient. The variation in the number of institutions surveyed to obtain the desired coverage can be explained by differing degrees of market concentration; in some economies, the majority of foreign exchange transactions were undertaken by only a small number of banks.

The currencies covered by each member's survey were, in principle, those with over US\$ 1 million in settlements during the survey period. Because of this, there were some differences in the currencies covered by the survey in each economy as some currencies are more important in some jurisdictions than others.

Survey data from respondents were collected by the central bank or monetary authority and standardised to allow analysis and comparison across currencies. These data were then used to determine the settlement practices prevailing in the local market, and the resulting foreign exchange settlement risk.

Survey limitations

In conducting the survey, Working Group members endeavoured to obtain accurate and consistent data from survey participants. However, given the range and complexity of the data requested, it is not certain that in all cases the survey results accurately reflect settlement practices in each institution. It is possible that reporting institutions in different EMEAP economies may have had slightly different interpretations of some survey questions. The same might also apply to institutions operating in the same economy.

For these reasons the results presented in this report should be viewed as indicative measures only. This is consistent with the findings of similar surveys.

3.2 Settlement practices

Most members found that the majority of their domestically operating banks directly use the domestic wholesale payments system for the settlement of their own or customer transactions in their local currency. However, there were instances of very small banks in some member economies using larger banks to settle their local currency obligations.

Foreign currency payments and receipts are principally made through accounts that are held with overseas correspondent banks (nostro accounts). It is also apparent that the choice of overseas correspondent bank in some economies is often related to ownership; in such cases a parent or subsidiary is used to settle foreign currency transactions.

The surveys showed that banks in the EMEAP region are often more dependent on correspondent banking arrangements to settle foreign currency trades than those of North American and European banks. This adds to the complexity of reducing the duration of foreign exchange settlement risk as the timing of settlement payments, and the compilation of reports on received payments, are often not directly within the control of banks in the EMEAP region.

Key times in the settlement process

Figure 2 summarises the opening times for wholesale payments systems for the various EMEAP member economies that participated in this regional survey process, as well as some

important payment systems in other regions. The times have been adjusted to GMT+9 (Tokyo time) in order to accurately portray the overlap in times between the various payment systems. Annex 3 sets out the time differences between economies in the EMEAP region and between the EMEAP region and some other significant economies.

The introduction of CLS will mean that some economies will extend the opening hours of their respective payment systems. This must be done so that a sufficient overlap with CLS opening hours can be achieved.

Figure 2: Payments system operating hours

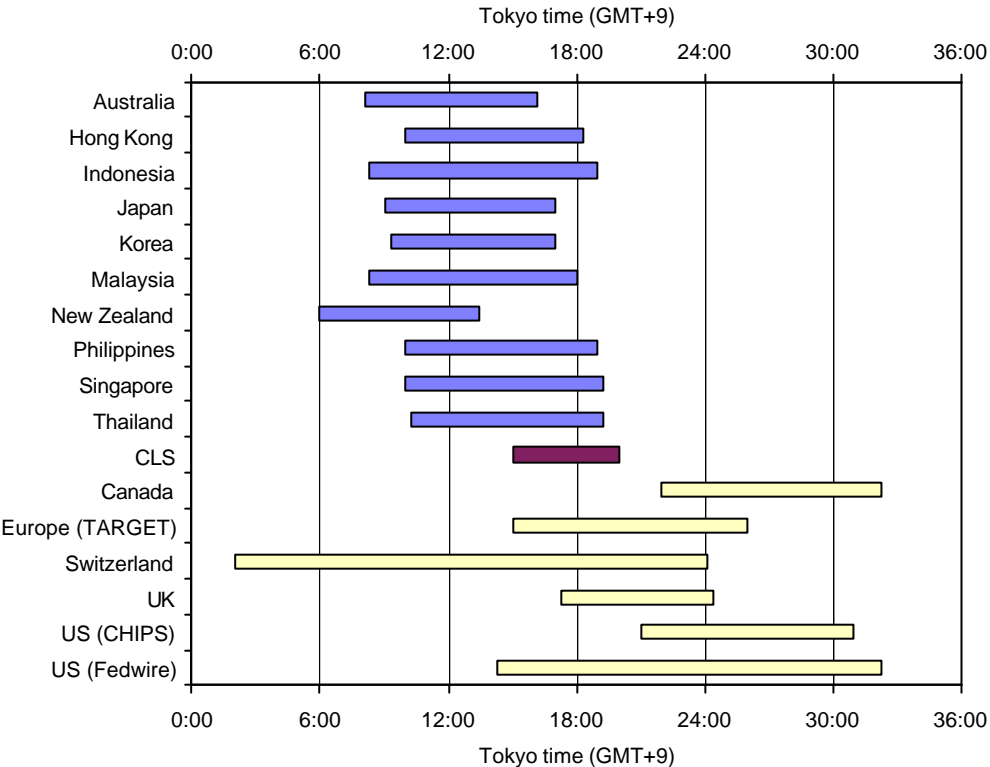


Table 2 provides a summary of weighted average cancellation deadlines within the EMEAP region for a range of currencies. This deadline is the last point in time that a paying bank can cancel the payment of the sold currency with certainty. Foreign exchange settlement risk commences from this point and the paying bank’s exposure is the full value of the bought currency.

The cancellation times shown in Table 2 are for EMEAP economies, rather than individual banks. For example, the earliest cancellation time for AUD is that of the EMEAP economy whose banks reported, on a weighted average basis, the earliest cancellation time. Where a currency is only actively traded in one country, the earliest, median, latest and average times are identical. Notwithstanding that these data are for economies, they can be used by individual banks as a reference point for comparing their practices with those of other banks in the region.

“V” in the following tables represents the settlement date agreed by the trade counterparties (the “value date”). Because of time zone differences the European and United States currencies tend to have later cancellation deadlines.

Table 2: Weighted average cancellation times*Tokyo time (GMT + 9)*

	Currency	Cancel times				Wtd avg ¹
		Earliest	Median	Latest	Average	
EMEAP currencies	AUD	0:32 V	6:40 V	12:06 V	6:43 V	10:38 V
	HKD	20:43 V-1	8:43 V	12:52 V	7:15 V	9:10 V
	IDR	10:04 V-1	21:17 V-1	8:30 V	21:17 V-1	4:31 V
	JPY	19:00 V-1	5:32 V	9:36 V	5:05 V	8:48 V
	KRW	13:51 V	13:51 V	13:51 V	13:51 V	13:51 V
	MYR	2:18 V	2:18 V	2:18 V	2:18 V	2:18 V
	NZD	7:08 V	8:06 V	9:29 V	8:14 V	9:01 V
	PHP	10:00 V	10:00 V	10:00 V	10:00 V	10:00 V
	SGD	2:45 V	8:24 V	14:42 V	8:07 V	13:39 V
	THB	13:09 V	13:09 V	13:09 V	13:09 V	13:09 V
Other currencies	CAD	21:08 V-1	15:45 V	20:06 V	12:11 V	3:31 V
	CHF	15:34 V-1	12:19 V	15:36 V	9:35 V	13:11 V
	EUR	19:49 V-1	11:44 V	15:25 V	10:11 V	12:43 V
	GBP	1:50 V	10:35 V	16:18 V	10:59 V	14:25 V
	USD	8:42 V	14:04 V	19:19 V	14:47 V	16:42 V

1. The weighted average of all EMEAP economies for the currency in column 1.

Several members indicated that some surveyed banks do have well documented cancellation times (only one economy reported a figure in excess of 30 percent for surveyed banks having documented cancellation deadlines with their most important nostro agents). However, in some cases, the benefits of this practice were reduced by bank staff being unfamiliar with these contractually agreed times. In other cases, operational or system constraints meant that payment instructions were sent much earlier than contractually agreed cancellation deadlines.

The more common practice across EMEAP banks is to rely on less formal arrangements. This results in increased risk as banks without documented cancellation deadlines can only cancel payment instructions on a “best endeavours” basis. Without legally enforceable arrangements in place, the paying bank’s exposure commences when the payment instruction is sent.

Table 3 has been produced on the same basis as Table 2. It provides a summary of weighted average reconciliation times for the EMEAP region for a range of currencies. The reconciliation time is the time at which the exposure to foreign exchange settlement risk ceases. The bought currency is confirmed as being received with finality and so is no longer at risk. However, if a bank reconciles its receipts and finds that it did not receive the bought currency then this amount is overdue and so remains at risk.

Members’ surveys identified examples of sound reconciliation practices. For example, many banks reconciled the final receipt of settlements in their domestic currencies on the day they were due, taking advantage of the real-time settlement finality provided by their domestic RTGS systems. Some banks also took advantage of the relatively short time differences in the EMEAP region and reconciled receipt of some other EMEAP currencies on the value date. However, there were also examples of inappropriate practices. In some cases banks began

identifying receipt of all bought currencies at the same time, usually on the day after the value date, even though each currency has a different receipt time. In a few cases, reconciliation of bought currencies was not completed for some days after the value date.

Table 3: Weighted average reconciliation times
Tokyo time (GMT + 9)

Currency	Identify times				
	Earliest	Median	Latest	Average	Wtd avg ¹
AUD	1:42 V+1	12:03 V+1	13:46 V+1	9:50 V+1	4:12 V+1
HKD	22:45 V	11:57 V+1	13:33 V+1	9:58 V+1	22:53 V
IDR	10:30 V+1	18:36 V+1	2:42 V+2	18:36 V+1	13:22 V+1
JPY	14:54 V	12:01 V+1	15:28 V+1	10:02 V+1	22:55 V
KRW	23:10 V	23:10 V	23:10 V	23:10 V	23:10 V
MYR	10:19 V+1	10:19 V+1	10:19 V+1	10:19 V+1	10:19 V+1
NZD	7:13 V+1	11:36 V+1	12:52 V+1	10:33 V+1	8:37 V+1
PHP	10:00 V+1	10:00 V+1	10:00 V+1	10:00 V+1	10:00 V+1
SGD	23:46 V	12:38 V+1	16:03 V+1	11:40 V+1	1:14 V+1
THB	21:29 V	21:29 V	21:29 V	21:29 V	21:29 V
CAD	11:30 V+1	16:55 V+1	19:41 V+1	16:15 V+1	16:01 V+1
CHF	10:26 V+1	13:54 V+1	3:32 V+2	17:11 V+1	20:08 V+1
EUR	9:36 V+1	12:56 V+1	17:11 V+1	13:30 V+1	14:55 V+1
GBP	10:22 V+1	14:34 V+1	3:54 V+2	16:24 V+1	18:47 V+1
USD	12:47 V+1	14:23 V+1	17:12 V+1	14:30 V+1	15:00 V+1

1. The weighted average of all EMEAP economies for the currency in column 1.

Value of foreign exchange settlements

Figure 3: Daily average foreign exchange settlements in the EMEAP region by currency

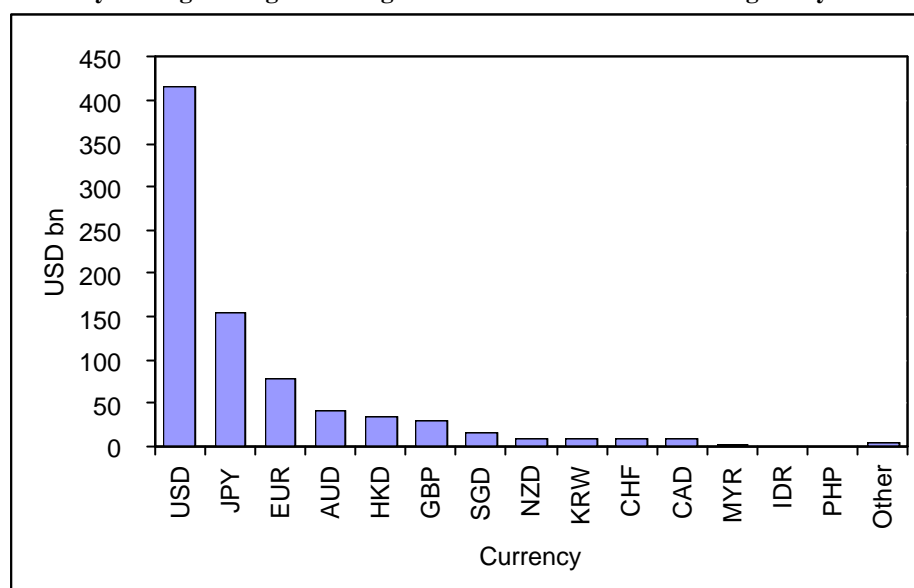


Figure 3 provides a breakdown, on a daily average basis, of currencies and settlement values within the EMEAP region.¹⁴ The survey revealed that the US dollar was on one side of almost all foreign currency trades settled in each EMEAP economy. With one exception, the domestic currency was the second most important currency traded in each member economy. The Japanese yen was also traded to a significant extent in most member economies, though the values were usually substantially smaller than the domestic currency. There was only limited non-domestic trading of other EMEAP currencies in the region.

3.3 Settlement risk

This section considers some important aspects relating to the duration and the size of foreign exchange settlement risk. It highlights the fact that foreign exchange settlement risk is an interday phenomenon with exposures lasting for considerably longer than 24 hours, and also that the size of the risk can be extremely large.

Duration of exposures

An institution's foreign exchange settlement risk lasts from the time at which a payment instruction for the sold currency can no longer be cancelled unilaterally until the currency being purchased is known to be received with finality.

¹⁴ Note that the data illustrated in Figure 3 are not directly comparable with April 2001 data, published by the Bank for International Settlements (BIS), on foreign exchange and derivatives market activity. The EMEAP data represent surveyed banks' aggregate payments and receipts, after netting, for currencies traded. The BIS data represents aggregate foreign exchange market turnover, adjusted for double counting, and not aggregate settlements relating to this turnover.

EMEAP region weighted average durations for a range of currencies are set out in Table 4. The durations shown are representative of the durations of foreign exchange settlement risk in each currency pair for member economies and participating banks.

Table 4: Duration of foreign exchange settlement risk for selected currency pairs
(hours)

Buy	Sell										
	USD	AUD	HKD	IDR	JPY	KRW	MYR	NZD	PHP	SGD	THB
USD		28	29	34	30	25	36	29	29	25	25
AUD	11		19	23	19	14	25	19	18	14	15
HKD	6	12		18	14	9	20	13	12	9	9
IDR	20	26	28		28	23	35	28	27	23	24
JPY	6	12	13	18		9	20	13	12	9	9
KRW	6	12	13	18	14		20	14	13	9	10
MYR	17	23	25	29	25	20		25	24	20	21
NZD	15	21	23	28	23	18	30		22	18	19
PHP	17	23	24	29	25	20	31	24		20	20
SGD	8	14	16	20	16	11	22	16	15		12
THB	4	10	12	16	12	7	19	12	11	7	

Note: Reported durations are a weighted average for the EMEAP region as a whole.

The duration of foreign exchange settlement exposures varies between the intra-regional currency trades and those against the US dollar. Given the relatively small time difference in the EMEAP region, the exposure duration is shorter for settlements between regional currencies. In contrast, the exposure duration is extremely long for settlements where the US dollar is the bought currency due to the large time zone difference between the EMEAP region and the United States. This tendency also applies to currencies in the Euro zone, which has a large time zone difference with the EMEAP region.

It is important to note that for many currency pairs the duration of foreign exchange settlement risk is an interday phenomenon. The survey results have shown that this settlement exposure can, on average, last for as long as 36 hours for an individual currency pair. When all currency pairs are taken into account, the average duration of the exposure in the EMEAP region, for a single day's settlements, can last for more than two days (see Figure 4). Institutions should be aware of the interday nature of the risk and reflect this in their risk management procedures.

Magnitude of exposures

The size of an institution's foreign exchange settlement risk is equal to the full amount of the currency that is being purchased. A daily profile of this risk for the EMEAP region is provided in Figure 4. This shows the build-up of foreign exchange settlement risk for all economies that participated in the survey. Individual economy times have been "aligned" to a common (Tokyo) time zone to calculate the profile.

Figure 4: Foreign exchange settlement risk in the EMEAP region
(single day and interday profile)

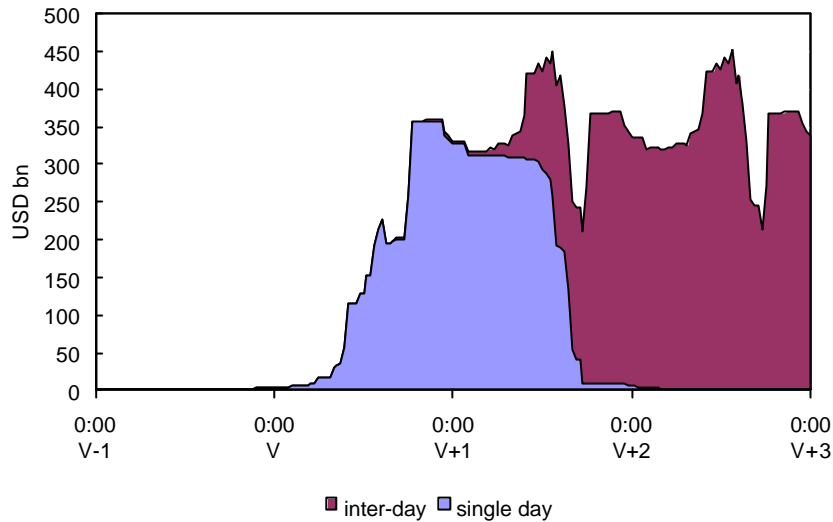


Figure 4 also provides an interday profile for foreign exchange settlement risk in the region. Because the duration of exposure for many currency pairs lasts longer than 24 hours, the cumulative interday peak of foreign exchange settlement risk is much larger than the single-day peak. It is apparent that the size of foreign exchange settlement exposure within the EMEAP region is very large. Single day exposure peaks at around US\$ 350 billion, while interday exposure peaks at around US\$ 450 billion. Exposures are generally within a range between US\$ 300 billion and US\$ 350 billion.¹⁵ In many cases, the size of banks' exposures exceeded their capital.

¹⁵ Exposure to foreign exchange settlement risk differs from the aggregate values settled because of the rolling nature of settlement. Foreign exchange settlement risk rises as cancellation deadlines pass, and falls as reconciliation occurs.

4. RISK MANAGEMENT

4.1 Institutions' current practice

The EMEAP survey form includes a number of qualitative questions relating to reporting banks' current risk management practices and any plans they may have for improvements. The following sections summarise banks' responses.

Senior management responsibility

The involvement of senior management in matters relating to foreign exchange settlement risk is critical for ensuring that institutions devote a sufficient amount of attention and resources to controlling this important risk. Their involvement should encompass the development of policies for measuring and reducing their foreign exchange settlement risk, implementation of individual counterparty and global limits on the size of this risk and day-to-day monitoring to ensure that limits are not breached.

In the EMEAP region, senior management were usually formally involved in managing foreign exchange settlement risk, though the degree of this involvement did vary. However, even in economies where banks reported a relatively high level of senior management involvement, there were often worrying examples of a minority of banks where this was not the case. In a few economies, a significant number of reporting banks' senior management had no involvement in foreign exchange settlement risk matters. Banks that had no, or limited, senior management involvement usually had a poorer understanding of key concepts relating to foreign exchange settlement risk and the ways in which their back office and other practices contributed to their exposure.

Measurement of exposures

There are several methods that banks use to measure their foreign exchange exposures. Most of these methods will underestimate or overestimate the actual exposures that they face. The Allsopp Report outlined a method that includes both irrevocable and uncertain payments and provides an accurate measure of an institution's foreign exchange settlement exposure.

The majority of reporting banks do use some form of methodology for measuring foreign exchange settlement exposure. Many of these use the single day method, whereby exposure is measured as being equal to all foreign exchange receipts that are due on the day. Because of the interday nature of foreign exchange settlement risk this methodology will tend to underestimate the actual exposures that are faced by institutions. A handful of institutions use a multiple day approach when measuring the risk. This method may have a tendency to overestimate the actual risk that is faced if intraday changes in the level of risk (ie as a result of confirmed receipt of various currencies) cannot be measured.

Most reporting banks agreed that the methodology presented in the Allsopp Report was a valid and accurate way of measuring foreign exchange settlement risk. However, very few banks expressed an intention to adopt the recommended methodology in their day-to-day risk management operations.

Control of exposures

Most members noted that the majority of their respondents used some form of individual counterparty limit to manage their exposures. Several members noted that these limits are applied to the global operations of the institution. A couple of members also noted that these limits are monitored by reporting banks on a regular basis. One member noted that some respondents have separate limits for foreign exchange settlement exposures, while others have limits for aggregate settlement exposures that are created through a range of instruments. Another member indicated that the majority of its respondents apply controls to foreign exchange settlement exposure that are similar to credit controls used for short-term credit extensions. One member noted that many banks in its jurisdiction do not include foreign exchange settlement risk in their credit risk limits.

Bilateral netting

Bilateral obligation netting, in jurisdictions where it is legally certain, is an important way for trade counterparties to reduce the size, but not the duration, of their foreign exchange settlement risk. This process allows trade counterparties to offset their gross settlement obligations to each other in the currencies they have traded and settle these obligations with the payment of a single *net* amount in each currency. In the event of a counterparty default it is the net, rather than the underlying gross, settlement obligation that may be at risk. This offers substantial risk management benefits to financial market participants.

Netting can also provide significant liquidity savings for financial market participants in that it reduces the total value of settlement payments needed for a given level of trading. However, where obligation netting is not legally certain, this process only results in a reduction in transaction values.¹⁶ The underlying *gross* settlement obligations are likely to represent an institution's true exposure in the event of one of its counterparties defaulting.

The results of members' surveys indicated that there is considerable scope for increased use of obligation netting in the EMEAP region. Most of the six economies in which this type of netting is legally certain (see Table 9 in Annex 4) noted that at least some of their reporting banks had netting agreements in place with their major counterparties. However, in some instances, this was a clear minority of reporting banks and, in one instance, no reporting banks made use of netting. As a result, the reduction in the value of foreign exchange obligations subject to netting was often significantly below that reported by the G10 countries in 1998.¹⁷

The EMEAP survey results also showed that netting of foreign exchange settlement transactions is not commonly used in economies where the legal validity of obligation netting is uncertain. Any increased use of netting in these jurisdictions would need to be treated with some caution as the size of institutions' foreign exchange settlement risk may not be reduced by this process.

Cancellation and reconciliation times

Most Working Group members found that their economy's weighted average cancellation deadlines for foreign currency payments were sometime on the day that payments were due.

¹⁶ As a result, this process is called "transaction netting" in some economies.

¹⁷ See section 2.3 of *Reducing Foreign Exchange Settlement Risk: A Progress Report* (Bank for International Settlements, July 1998).

However, many banks reported cancellation deadlines sometime on the day before payment was due, particularly for other EMEAP and foreign currencies. A few banks reported that their cancellation deadlines were the same for all the currencies, resulting in unduly long exposures for some currencies. The relatively small differences in the time zones of the various EMEAP member economies, and the need to give correspondent banks sufficient notice may, in part, account for this practice.

Many members reported that the majority of their banks reconciled most foreign currency receipts on the day after the payment was due. It was also common practice in many economies for reporting banks to reconcile receipt of their domestic currency payments sometime on the value date. In a limited number of instances, reporting banks took advantage of the relatively small time differences between EMEAP economies, and the intraday finality offered by wholesale payments systems, to reconcile receipt of other EMEAP currencies on the value date.

However, there was considerable variation between best and worst practice in each economy, indicating that there is room for improvement in the back office practices of some reporting banks. Most members also noted that the majority of their reporting banks did not have documented and legally enforceable cancellation deadlines with their correspondent banks. Instead, cancellation requests were treated on a “best endeavours” basis by correspondent banks.

In a limited number of cases, there was also evidence that reporting banks were unaware of the significance of cancellation deadlines and reconciliation of receipts for the duration of their exposure.

Payment-versus-payment

Payment-versus-payment (PVP) settlement of trade obligations eliminates foreign exchange settlement risk by ensuring that final transfer of one currency occurs if, and only if, a final transfer in the other currency takes place. The introduction of this type of system requires wholesale payments systems in relevant jurisdictions to have overlapping operating hours and the establishment of technical and legal infrastructure to ensure the coordinated final settlement of both currencies involved in a trade.

The US dollar is on one side of most foreign exchange trades in the EMEAP region. It is therefore important to recognise the key role of the US dollar in any PVP solution for the EMEAP region if significant and immediate reductions in foreign exchange settlement risk are to be achieved. Hong Kong’s US dollar clearing system allows its participants to conduct PVP settlement of HKD/USD trades and also send and receive stand-alone US dollar payments (see Annex 5). Usage of this system has been growing and currently about 14 per cent, by value, of HKD/USD trades between local counterparties in Hong Kong are settled in this manner.

Continuous Linked Settlement (CLS) is a major international initiative that aims to provide a private sector solution to foreign exchange settlement risk. Members of this arrangement will be able to settle their foreign exchange payments on a PVP basis across the books of a special purpose bank, the CLS Bank, which will be regulated by the Federal Reserve Bank of New York. The introduction of CLS Bank’s PVP services is currently planned for 2002.

In the first phase, CLS Bank will provide simultaneous settlement capabilities for seven major currencies, including the Japanese yen and the Australian dollar. Additional currencies,

including the Singapore dollar, will be included by CLS Bank at a later stage. A number of banks in both Japan and Australia intend to use CLS Bank's services when they are available. It is also possible that other PVP systems may be developed in the future.

Contracts for difference

Contracts for difference (CFD) are based on the notion that many foreign exchange transactions are entered into for the purposes of hedging and speculation, and as such do not require delivery of the underlying currencies. Only the mark-to-market profit or loss on the underlying trades would need to be settled.

The use of a CFD has the potential to provide significant reductions in the size of foreign exchange settlement risk. However, like all contracts between trade counterparties, it is important that the jurisdictions of both counterparties recognise such arrangements in the event of one of the parties to the contract defaulting. The survey results indicated that CFDs are not widely used in the EMEAP region.

Plans for change

As a result of the survey process, some participating banks in a number of economies indicated that they intend to make various changes which would reduce their exposure to foreign exchange settlement risk. These included reconciling incoming foreign exchange payments earlier, negotiating more favourable cancellation times with their correspondent banks and, in a few cases, formally documenting these arrangements. Banks in some economies also indicated that they intend to make greater use of netting and, in a limited number of cases, change their technical and back office systems to ensure that they can track their risk in real time. However, this willingness on the part of participating banks to look at ways of reducing foreign exchange settlement risk was not evenly spread within member economies or between them.

Several members noted that a number of their banks had expressed an interest in using CLS Bank's services if their domestic currency were included in the CLS initiative at some point in the future.

4.2 Options for improved risk management

Individual institutions

Individual banks can significantly improve the way they measure and limit the size of their foreign exchange settlement risk in a number of ways. These include:

- Ensuring that senior management are fully briefed on the foreign exchange settlement process, and the associated risks, and that a senior executive is responsible for managing the bank's day-to-day foreign exchange settlement risk.
- Negotiating later unilateral cancellation deadlines with correspondent banks, and identifying final receipts earlier. For example, given relatively short time zone differences in the region, banks could further shorten the duration of their exposures by reconciling final or failed receipts in many EMEAP currencies on the value date.

- Controlling foreign exchange settlement risk in a manner that is consistent with the way they control their other credit exposures, such as the extension of a loan or letter of credit.
- Using bilateral obligation netting to reduce the size of settlement obligations arising from foreign exchange trading.

Well designed PVP systems also provide commercial banks with an opportunity to eliminate foreign exchange settlement risk arising from their foreign currency trades. In considering whether the use of PVP systems is appropriate, commercial banks should carefully consider the operations, and risk control mechanisms, of such systems in terms of the *Core Principles for Systemically Important Payments Systems*.¹⁸ Commercial banks which access PVP services indirectly, through correspondent banks, should note that they retain a credit risk against their correspondent bank even though foreign exchange settlement risk is removed for those trades settled on a PVP basis. Taking these considerations into account, banks should be alert to opportunities to reduce their foreign exchange settlement risk even if their domestic currency is not eligible for settlement by a PVP system (ie because they may trade currency pairs which are eligible for PVP settlement).

Central banks

International thinking on the role of central banks in addressing foreign exchange settlement risk has evolved over a number of years. A report issued by the CPSS in 1993, *Central bank payment and settlement services with respect to cross-border and multi-currency transactions* (the Noël Report), identified four key ways in which central banks may reduce foreign exchange settlement risk and improve the efficiency of cross-border and multi-currency settlements. These were:

- (1) Improve home currency payment and settlement services so that they more fully supported international settlements, such as by providing settlement accounts and intra-day final transfer capabilities to settle home currency obligations relating to foreign exchange trades.
- (2) Extend operating hours of home currency payments services so that a greater overlap, or a reduced gap, between the operating hours of the payments systems in various countries can be achieved.
- (3) Develop multilateral or bilateral links between domestic systems so that central banks can monitor, control and execute simultaneously payments relating to the same foreign exchange deal or net obligation over their respective home-currency payments system.
- (4) Provide a multi-currency payment and settlement service. The service being introduced by CLS Services Limited is an example of such an arrangement.

However, in 1996 the Allsopp committee, after weighing up the options and recognising the costs and benefits of each option, recommended that:

- Central banks should do (1) and (2).

¹⁸ These principles were developed by the CPSS and published by Bank for International Settlements in January 2001.

- The private sector, rather than central banks, be encouraged to undertake (4).
- (3) be recognised as a decision for individual countries to consider.

Central banks in the EMEAP region have been very active in taking steps to ensure that their wholesale payments systems meet international best practice. This has been done by introducing real-time gross settlement (RTGS) for high-value payments systems (see Table 9 in Annex 4) and ensuring that payments in these systems are irrevocable at the time they are made. A number of EMEAP central banks have also actively supported the introduction of legislation to underpin the legal validity of bilateral and multilateral netting in their jurisdictions. Extensions in the operating hours of the Japanese and Australian wholesale payments and securities settlement systems are being planned to cater for the introduction of CLS Bank's settlement services in JPY and AUD.

Hong Kong has introduced a domestic US dollar settlement system based on the services of a commercial bank. The link between this system and the Clearing House Automated Transfer System (CHATS), Hong Kong's wholesale payments system, facilitates PVP settlement of HKD/USD trades in Hong Kong.¹⁹

Not all banks in each economy have plans to implement measures to reduce foreign exchange settlement risk. A challenge therefore exists for domestic authorities to take steps to ensure that best practice is implemented by their domestic banks. To this end, a number of members are considering steps such as follow-up discussions with reporting banks which fell short of best practice, discussions with prudential regulators and, in one case, a further survey to track improvements in banks' management of foreign exchange settlement risk.

However, there is also scope for improvement on the part of central banks and monetary authorities in the EMEAP region. They could encourage the use of bilateral obligation netting and provide settlement infrastructure that would facilitate the reduction of foreign exchange settlement risk, including by improving payment system infrastructure and extending wholesale payment system operating hours. Such actions would support commercial banks' efforts to reduce foreign exchange settlement risk.

Cross-currency trades

As noted earlier, the US dollar is on one side of most foreign exchange transactions in the EMEAP region. This fact is equally true in all jurisdictions.²⁰ However, this may be considered to be counterintuitive given that significant trading of goods and services, as well as direct investment, occurs between EMEAP economies.

The dominance of the US dollar may in large part be attributed to the deep liquidity in US markets. Deep liquidity provides easier price discovery, narrower spreads and the capacity to absorb greater transaction values without disrupting market prices. These advantages can tend to outweigh other considerations such as regional trade and investment flows. A further

¹⁹ Wide usage of PVP systems in the EMEAP region, or in a member economy, would make such arrangements systemically important. These arrangements would need to be consistent with the *Core Principles for Systemically Important Payment Systems* (see Annex 6). Core principle VI would be a particular consideration given the size of foreign exchange trades.

²⁰ Only 10 per cent of global foreign exchange turnover does not involve the USD. Source: *Central bank survey of foreign exchange and derivatives market activity in April 2001: preliminary global data* (Bank for International Settlements, October 2001).

factor explaining the dominance of the US dollar is that a significant share of foreign exchange turnover represents market making and speculative position taking.

However, because of their geographical location, EMEAP economies are exposed to significantly greater duration of foreign exchange settlement risk than are the economies of Europe and the Americas. One means of addressing this is to promote, where possible, cross-currency trades in EMEAP currencies. Presently, there is little such activity as counterparties tend to enter into two trades against the US dollar (eg one selling an EMEAP currency and buying US dollars, and a second transaction selling US dollars and buying a second EMEAP currency).²¹

While it is not clear what might be done to promote greater use of cross-currency trades beyond promoting the growth of regional markets to achieve critical mass, it might be worthwhile for central banks and monetary authorities in the EMEAP region to examine this issue.²²

²¹ Because of the relative illiquidity in EMEAP cross-currency markets, the transaction costs of the two trades may be lower than a single cross-currency trade.

²² If cross-currency trades between EMEAP currencies should develop significantly in future, then PVP systems in the form of bilateral linkages between national RTGS systems in the EMEAP region might help reduce foreign exchange settlement risk. With this in mind, payment experts from some EMEAP economies joined the “EMEAP Experts Program”, hosted by the Bank of Japan, and conducted basic and theoretical research on the feasibility of this kind of PVP system.

5. CONCLUSIONS

5.1 Summary of findings

At the outset of this process, the Working Group agreed that the objectives of the foreign exchange settlement surveys were to:

- raise commercial banks' understanding of concepts relating to foreign exchange settlement risk, both at executive and operational levels;
- promote the implementation of current best practice in the region; and
- identify other potential options for reducing foreign exchange settlement risk which may be implemented by individual banks and central banks/monetary authorities.

It is the Working Group's view that the economy surveys have been very beneficial in highlighting the risks posed by foreign exchange settlement risk and increasing commercial banks' awareness of key concepts relating to this risk. It is interesting to note that, despite the publication of various international and individual country reports on foreign exchange settlement risk over a number of years, all members participating in this survey process found that there is still room for improvement in the way their commercial banks deal with this risk. This emphasises the value of this survey process and the need for central banks and monetary authorities to actively promote best practice in their jurisdictions.

The surveys have highlighted that the size of foreign exchange settlement risk in the EMEAP region tends to be very large and can last well beyond a single day. In addition, many reporting banks are not taking full advantage of options that are currently available for reducing this risk. In many cases there is little doubt that cancellation and reconciliation deadlines can be improved. Cancellation deadlines are also generally not well documented. Of particular concern is the fact that bilateral obligation netting is not used as extensively as it could be within economies whose legal systems recognise this process.

Institutions also tend to underestimate their individual exposures to foreign exchange settlement risk. It is very important that institutions' senior management are aware of foreign exchange settlement risk and are involved in oversight of this risk.

5.2 Recommendations

Commercial banks should be looking to improve their settlement practices in order to reduce their exposures to foreign exchange settlement risk. In particular, commercial banks should take steps to:

- ensure that senior management are aware of, and are formally involved in, the day-to-day management of foreign exchange settlement risk;
- measure exposures properly so that they do not underestimate the level of their exposure, including by taking into account the inter-day nature of foreign exchange settlement risk;
- apply appropriate credit-based controls to exposures;

- improve back office procedures and enter into well-documented correspondent banking arrangements in order to minimise the duration of exposures;
- enter into bilateral obligation netting arrangements with counterparties to reduce the magnitude of their foreign exchange settlement risk, where this is legally enforceable; and
- where available and appropriate, use PVP systems.

It is also recommended that EMEAP central banks and monetary authorities:

- take all necessary steps to ensure that senior management within commercial banks have a formal role in managing their institution's exposure to foreign exchange settlement risk;
- actively encourage banks to use bilateral obligation netting where it is legally certain in relevant jurisdictions;
- provide guidelines for measuring and managing foreign exchange settlement risk;
- consider whether additional steps may be needed to ensure that commercial banks' increased awareness and understanding of foreign exchange settlement risk is maintained. This may be done by publishing survey results, conducting follow-up surveys, and discussing banks' survey results with their senior management, particularly where they have fallen short of industry best practice;
- consider involving prudential supervisors to help them achieve the above objectives; and
- continue to improve national payment systems in each economy, including by adding enhancements to RTGS systems that may assist reduction of foreign exchange settlement risk.

ANNEX 1

ALLSOPP REPORT RECOMMENDATIONS ON MANAGING FOREIGN EXCHANGE SETTLEMENT RISK²³

Individual banks should take immediate steps to apply an appropriate credit control process to their foreign exchange settlement exposures. This recognises the considerable scope for individual banks to address the problem by improving their current practices for measuring and managing their foreign exchange settlement exposures. In particular, banks could improve their back office payments processing, correspondent banking arrangements, obligation netting capabilities and risk management controls sufficiently to permit them to:

- measure foreign exchange settlement exposures properly;
- apply an appropriate credit control process to foreign exchange settlement exposures; and
- reduce excessive foreign exchange settlement exposures for a given level of trading.

Measure exposures

First, banks could adopt internal procedures that would permit them to measure their foreign exchange settlement exposures properly. For instance, a bank could develop a system that frequently updates its current and future global exposures as it executes new trades and as unsettled trades move through the settlement process. This would give it much more accurate and timely information regarding its foreign exchange settlement exposure. This capability, however, might not be immediately feasible, particularly for an international bank actively trading a wide range of currencies with a substantial number of counterparties out of many locations without the benefit of a consolidated risk management system.

Nevertheless, such a bank (or, at least, each of its trading centres) could adopt procedures to update its exposure calculations periodically (eg once or twice a day) and to measure its minimum and maximum exposure at any moment on the basis of all available information. In either case, Appendix 1²⁴ of the Allsopp Report provides guidelines that a bank (or each of its trading centres) could use to measure its current and future exposures.

Manage exposures

Second, a bank could adopt internal procedures for explicitly assessing the risks and rewards of its foreign exchange settlement activities, thereby permitting it to manage its properly measured exposures on the basis of fully informed business judgements. As part of an effective management approach, a bank could choose to control its properly measured foreign exchange settlement exposures in a manner consistent with the way in which it controls its

²³ Reproduced from Annex 1 of the *Progress Report*.

²⁴ Not reproduced in this report.

other credit exposures. For instance, many banks currently set a limit on their total credit exposure with a single counterparty based on an internal credit analysis. Such a limit would generally apply to all operations that generate credit exposure, whether a loan, a deposit, a letter of credit or any other formal extension of credit. Some banks also set separate sub-limits on different possible durations of credit exposure (eg remaining exposures of up to seven days, up to thirty days, up to ninety days, etc.). Furthermore, some banks that have many offices around the world but do not have a global real-time limit monitoring system, divide each limit or sub-limit among the various entities and monitor them on a decentralised basis. This control process enables a bank (or a particular office) to undertake any combination of credit-generating activities with a single counterparty and still assure senior management that the bank's overall credit exposure will remain within the level it considers appropriate.

This assurance, or any similar assurance that could be provided by other effective credit control processes, could be extended to credit exposures that arise in settling foreign exchange trades simply by including properly measured foreign exchange settlement exposures under the same set of controls. For this to work effectively, however, a bank would need to accept the proposition that when dealing with a particular counterparty foreign exchange settlement exposure represents the same credit risk, and the same probability of loss, for the bank as, for example, a loan of identical size and duration. Once a bank applies its standard credit controls to foreign exchange settlements, it could assure itself that these exposures would not exceed a level the bank considers appropriate.

Reduce excessive exposures

Third, even without lowering the scale of its foreign exchange trading, a bank could reduce any foreign exchange settlement exposure it deems excessive and decrease the uncertainty surrounding the size of its exposures by improving its settlement practices. For instance, by eliminating overly restrictive payment cancellation deadlines and shortening the time it takes to identify the final and failed receipt of bought currencies, a bank could lower its actual and potential foreign exchange settlement exposure for the same level of foreign exchange trading. Depending on a bank's trading pattern, the use of available bilateral or multilateral obligation netting arrangements could reduce exposures even further. If necessary, in certain cases a bank may further protect itself against excessive foreign exchange settlement exposures by, for instance, requiring collateral from its counterparties.

ANNEX 2

SURVEY DOCUMENTS

EMEAP Working Group on Payment and Settlement Systems

Survey of Foreign Exchange Settlement Practices

Survey Period: [date]

REPORTING ENTITY

Bank name

City/country of trading centre

CONTACT

Name

Title

Telephone

E-mail

ALTERNATIVE CONTACT

Name

Title

Telephone

E-mail

Please complete the following questions and return to [Central Bank] by [date].

For questions 1-3, please provide information for the various currencies in which your institution, on its domestic books, settled foreign exchange transactions during the period [survey period]. Please affix additional sheets where there is insufficient space.

Question 1 – DURATION OF FX-RELATED SETTLEMENT EXPOSURES

Please provide answers in the local time of the indicated reporting entity (not the local time of the currency concerned), and use the format specified in footnote 5 eg 20:30 V+1.

	<i>Column 1: send payment instructions¹</i>	<i>Column 2: unilateral payment cancellation deadline²</i>		<i>Column 3: final receipts due³</i>		<i>Column 4: identify final and failed receipts⁴</i>
Currency	Time / day ⁵	Time / day ⁵	Docu-ment-ed? ⁶	Time / day ⁵	Docu-ment-ed? ⁶	Time / day ⁵
USD						
JPY						
AUD						
...						
...						

REPORTING ENTITY

Bank name

City/country of trading centre

- ¹ At what time do you routinely issue your payment instructions for value on day V?
- ² In routine cases (ie ignoring best effort arrangements or any other possible form of special handling), what is your routine deadline for *unilaterally* cancelling (or delaying or amending) *with certainty* your payment instructions for value on day V (ie what is the earliest time after which such cancellation could depend on the consent or "best efforts" of your correspondent bank, the beneficiary, the beneficiary's correspondent bank, or some other intermediary)? If your back office or correspondent has more than one way to execute your payment instructions in a particular currency (eg via a large-value transfer system or via book-entry transfer) and the cancellation deadlines differ according to the method used, please list the *earliest* time.
- ³ Assuming your counterparty (via its correspondent bank etc) has successfully made the payment "on time" given the terms of the trade, by what time will the funds be credited to your account - ie what is the latest time your correspondent in the currency concerned will credit your account *with finality*? (Note that where a payment could be received by your correspondent at any time during the payment system day, this time would normally be later than the close of the payment system.) If funds can be paid to you in more than one way (eg via a large-value funds transfer system or via book-entry transfer), please list the latest time a final payment can reach you via any of the relevant options and still be considered "on time".
- ⁴ At what time do you usually *identify* final and failed payments to you for value on day "V"? For example, this may be the time when you *routinely* complete the reconciliation of an electronically transmitted nostro statement.
- ⁵ For each time, please indicate the hour and minute **using the 24-hour clock**. (Please use 00:00 for midnight and 12:00 for midday.) For each day, please use V to indicate value day, V-1 (or V-2 etc) to indicate one (or two etc) business day(s) before value day, and V+1 (or V+2 etc) to indicate one (or two etc) business day(s) after value day. *Example: 8.30 pm on the day after settlement day should be shown as "20:30 V+1"*. Note that midnight in the evening of any given value day should be recorded as 00:00 on the following day.
- ⁶ Please reply "yes" if the indicated time and day is based on a legally enforceable agreement or arrangement. Otherwise reply "no".

Question 1 (continued)– DURATION OF FX-RELATED SETTLEMENT EXPOSURES

Please provide answers in the local time of the indicated reporting entity (not the local time of the currency concerned), and use the format specified in footnote 5 eg 20:30 V+1.

	<i>Column 1: send payment instructions¹</i>	<i>Column 2: unilateral payment cancellation deadline²</i>		<i>Column 3: final receipts due³</i>		<i>Column 4: identify final and failed receipts⁴</i>
Currency	Time / day ⁵	Time / day ⁵	Docu-ment- ed? ⁶	Time / day ⁵	Docu-ment- ed? ⁶	Time / day ⁵

REPORTING ENTITY

Bank name

City/country of trading centre

¹ At what time do you routinely issue your payment instructions for value on day V?

² In routine cases (ie ignoring best effort arrangements or any other possible form of special handling), what is your routine deadline for *unilaterally* cancelling (or delaying or amending) *with certainty* your payment instructions for value on day V (ie what is the earliest time after which such cancellation could depend on the consent or "best efforts" of your correspondent bank, the beneficiary, the beneficiary's correspondent bank, or some other intermediary)? If your back office or correspondent has more than one way to execute your payment instructions in a particular currency (eg via a large-value transfer system or via book-entry transfer) and the cancellation deadlines differ according to the method used, please list the *earliest* time.

³ Assuming your counterparty (via its correspondent bank etc) has successfully made the payment "on time" given the terms of the trade, by what time will the funds be credited to your account - ie what is the latest time your correspondent in the currency concerned will credit your account *with finality*? (Note that where a payment could be received by your correspondent at any time during the payment system day, this time would normally be later than the close of the payment system.) If funds can be paid to you in more than one way (eg via a large-value funds transfer system or via book-entry transfer), please list *fv* a final payment can reach you via any of the relevant options and still be considered "on time".

⁴ At what time do you usually *identify* final and failed payments to you for value on day "V"? For example, this may be the time when you *routinely* complete the reconciliation of an electronically transmitted nostro statement.

⁵ For each time, please indicate the hour and minute **using the 24-hour clock**. (Please use 00:00 for midnight and 12:00 for midday.) For each day, please use V to indicate value day, V-1 (or V-2 etc) to indicate one (or two etc) business day(s) before value day, and V+1 (or V+2 etc) to indicate one (or two etc) business day(s) after value day. *Example: 8.30 pm on the day after settlement day should be shown as "20:30 V+1"*. Note that midnight in the evening of any given value day should be recorded as 00:00 on the following day.

⁶ Please reply "yes" if the indicated time and day is based on a legally enforceable agreement or arrangement. Otherwise reply "no".

Question 2 - NOTIONAL VALUE, BEFORE NETTING, OF FX-RELATED SETTLEMENT OBLIGATIONS

NOTIONAL VALUE, BEFORE NETTING, OF DAILY FX-RELATED OBLIGATIONS (SPOT, FORWARD, AND SWAP) SETTLED DURING THE SURVEY PERIOD Please provide amounts in millions of the relevant currency for all FX-related obligations payable or receivable by your bank on its [Country] books. Omit any currencies for which total obligations are less than one million USD equivalent. If needed, use "NA" for "not available". (If possible, data should exclude inter-branch activity.)						
	<i>Total</i>		<i>of which, notional value settled under bilateral netting agreements</i>		<i>of which, gross value settled on a trade-by-trade basis</i>	
<i>Currency</i>	<i>Payable</i> [Sum of columns (3) and (5)] <i>(1)</i>	<i>Receivable</i> [Sum of columns (4) and (6)] <i>(2)</i>	<i>Payable</i> <i>(3)</i>	<i>Receivable</i> <i>(4)</i>	<i>Payable</i> [Should equal Question 3, col. (5) amount] <i>(5)</i>	<i>Receivable</i> [Should equal Question 3, col. (6) amount] <i>(6)</i>
USD						
JPY						
AUD						
...						
...						

REPORTING ENTITY

_____ Bank name

_____ City/country of trading centre

Question 2 (continued) - NOTIONAL VALUE, BEFORE NETTING, OF FX-RELATED SETTLEMENT OBLIGATIONS

	<p align="center">NOTIONAL VALUE, BEFORE NETTING, OF DAILY FX-RELATED OBLIGATIONS (SPOT, FORWARD, AND SWAP) SETTLED DURING THE SURVEY PERIOD</p> <p align="center">Please provide amounts in millions of the relevant currency for all FX-related <u>obligations</u> payable or receivable by your bank on its [Country] books. Omit any currencies for which total obligations are less than one million USD equivalent. If needed, use "NA" for "not available". (If possible, data should exclude inter-branch activity.)</p>					
	Total		of which, notional value settled under bilateral netting agreements		of which, gross value settled on a trade-by-trade basis	
Currency	Payable [Sum of columns (3) and (5)] (1)	Receivable [Sum of columns (4) and (6)] (2)	Payable (3)	Receivable (4)	Payable [Should equal Question 3, col. (5) amount] (5)	Receivable [Should equal Question 3, col. (6) amount] (6)

REPORTING ENTITY

Bank name _____

City/country of trading centre _____

Question 3 - ACTUAL VALUE, AFTER ANY NETTING, OF FX-RELATED SETTLEMENT FLOWS

<p align="center">ACTUAL VALUE, AFTER ANY NETTING, OF DAILY FX-RELATED (SPOT, FORWARD, AND SWAP) PAYMENTS AND RECEIPTS DURING THE SURVEY PERIOD</p> <p align="center">Please provide amounts in millions of the relevant currency for all FX-related <u>payments</u> and <u>receipts</u> made by your bank on its [Country] books. Omit any currencies for which total obligations are less than one million USD equivalent. If needed, use "NA" for "not available". (If possible, data should exclude inter-branch activity.)</p>						
	<i>Total</i>		<i>Of which, actual flows to settle bilaterally netted trades</i>		<i>of which, actual flows to settle individual, non-netted trades</i>	
<i>Currency</i>	<i>Payments</i> <i>[Sum of columns (3) and (5)]</i> <i>(1)</i>	<i>Receipts</i> <i>[Sum of columns (4) and (6)]</i> <i>(2)</i>	<i>Payments</i> <i>(3)</i>	<i>Receipts</i> <i>(4)</i>	<i>Payments</i> <i>[Should equal Question 2, col. (5) amount]</i> <i>(5)</i>	<i>Receipts</i> <i>[Should equal Question 2, col. (6) amount]</i> <i>(6)</i>
USD						
JPY						
AUD						
...						
...						

REPORTING ENTITY

Bank name _____

City/country of trading centre _____

Question 3 (continued) - ACTUAL VALUE, AFTER ANY NETTING, OF FX-RELATED SETTLEMENT FLOWS

<p align="center">ACTUAL VALUE, AFTER ANY NETTING, OF DAILY FX-RELATED (SPOT, FORWARD, AND SWAP) PAYMENTS AND RECEIPTS DURING THE SURVEY PERIOD</p> <p align="center">Please provide amounts in millions of the relevant currency for all FX-related <u>payments</u> and <u>receipts</u> made by your bank on its [Country] books. Omit any currencies for which total obligations are less than one million USD equivalent. If needed, use "NA" for "not available". (If possible, data should exclude inter-branch activity.)</p>						
	<i>Total</i>		<i>Of which, actual flows to settle bilaterally netted trades</i>		<i>of which, actual flows to settle individual, non-netted trades</i>	
<i>Currency</i>	<i>Payments [Sum of columns (3) and (5)] (1)</i>	<i>Receipts [Sum of columns (4) and (6)] (2)</i>	<i>Payments (3)</i>	<i>Receipts (4)</i>	<i>Payments [Should equal Question 2, col. (5) amount] (5)</i>	<i>Receipts [Should equal Question 2, col. (6) amount] (6)</i>

REPORTING ENTITY

Bank name _____

City/country of trading centre _____

Question 4 - NUMBER OF FX TRADING COUNTERPARTIES

For the purpose of this form, "counterparty" is defined on a "settling entity" rather than "institutional" basis

A counterparty may include any bank, non-bank financial or corporate entity

References to "top 10, top 25, top 50 counterparties" refer to counterparty rankings by *value* of trades

REPORTING ENTITY:	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border-bottom: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 45%; border-bottom: 1px solid black; margin-bottom: 5px;"></div> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> Bank name City/country of trading centre </div>	Number of counter- parties
How many FX trading counterparties does this reporting entity <i>currently</i> have in total?	
<i>Bilateral netting</i>	
With how many of its <i>total</i> FX counterparties does this reporting entity have arrangements to settle trades on a bilaterally netted basis?	
With how many of its <i>top 10</i> FX counterparties does this reporting entity have arrangements to settle trades on a bilaterally netted basis?	
With how many of its <i>top 25</i> FX counterparties does this reporting entity have arrangements to settle trades on a bilaterally netted basis?	
With how many of its <i>top 50</i> FX counterparties does this reporting entity have arrangements to settle trades on a bilaterally netted basis?	

Question 5 – FX SETTLEMENT PRACTICES

Please provide written responses to the following questions

- i) Please describe the current duties, responsibilities and reporting structure of the person(s) charged with managing on a day-to-day basis the bank's foreign exchange settlement exposures with individual counterparties. Please discuss any significant changes that have taken place over the past 12 months.
- ii) Please describe your bank's (or, where relevant, your individual trading centre's) current methodology for measuring and projecting its bilateral FX settlement exposures for credit risk management purposes. Please discuss any significant changes that have taken place over the past 12 months. Please focus on the extent to which the methodology now takes into account (i) the period of "irrevocability" when settling a trade (ie, the time between your bank's unilateral cancellation deadline of the sold currency and the time by which the final receipt of the bought currency is due); and (ii) the period of "uncertainty" when settling a trade (ie, the time it takes your bank to identify the final or failed receipt of the bought currency after it is due).
- iii) Please discuss any plans your bank (or, where relevant, your individual trading centre) may have to revise its exposure measurement methodology to take into account the periods of "irrevocability" and "uncertainty" when settling a trade. Please provide likely dates for implementing any such revisions.
- iv) Please describe any plans your bank may have to shorten the periods of "irrevocability" and "uncertainty" it currently faces during the routine settlement of FX trades. Please include specific targets and likely dates for meeting these targets. In particular, please indicate the extent to which the bank plans over the next year to implement improvements to the times listed in Question 1 regarding unilateral cancellation deadlines and the identification of final and failed receipts. Please provide separate answers corresponding to each of the reporting entities (ie, bank-wide or individual trading centres) being covered.
- v) Please describe your bank's current process for controlling counterparty credit exposures associated with FX settlements. Please discuss any significant changes that have taken place over the past 12 months. Please indicate the extent to which your bank now includes bilateral FX settlement exposures under the same set of counterparty credit controls it applies to deposits, placements and other formal short-term credit extensions. For instance, if your bank employs limits to these formal short-term credit extensions, describe the extent to which limits apply to FX settlement exposures. (For example, in measuring its counterparty credit exposures, does the bank aggregate bilateral FX settlement exposures with other credit extensions? Are bilateral FX settlement exposures subject to the same or different limits than those applied to other credit extensions? Are limits applied globally or on a decentralised basis among the bank's trading centres? Are limits mandatory or indicative? How are exposures in excess of the limits handled?)
- vi) With respect to your bank's current procedures, how are you notified by each of your correspondents that your account has been credited? What follow-up action do you take upon identifying a failed receipt? (For example, inform credit area immediately, or after a predetermined escalation process? Include the failed amount in the measure of your bank's exposure to the counterparty?)
- vii) Please describe any plans your bank may have to include FX settlement exposures under the same set of counterparty credit controls it applies to deposits, placements, and other formal short-term credit extensions. If applicable, please provide specific targets and likely dates for meeting these targets.

ANNEX 3

TIME ZONES

Table 5: Time zones for EMEAP economies

Economy	Relative to Tokyo	Relative to GMT
Australia	+1	+10
Hong Kong	-1	+8
Indonesia	-2	+7
Japan	0	+9
Korea	0	+9
Malaysia	-1	+8
New Zealand	+3	+12
Philippines	-1	+8
Singapore	-1	+8
Thailand	-2	+7

Note: The times shown are based on the relevant economy's standard local time.

Table 6: Time zones for other economies

Economy	Relative to Tokyo	Relative to GMT
Canada	-14	-5
Germany (TARGET)	-8	+1
Switzerland	-8	+1
UK	-9	0
USA (EST)	-14	-5

Note: The times shown are based on the relevant economy's standard local time.

ANNEX 4

ADDITIONAL SURVEY DATA

Table 7: Maximum duration of foreign exchange settlement risk
(selected currency pairs, hours)

Buy	Sell										
	USD	AUD	HKD	IDR	JPY	KRW	MYR	NZD	PHP	SGD	THB
USD		40	44	55	46	27	38	34	31	38	28
AUD	29		41	51	42	23	35	30	27	35	24
HKD	28	37		51	42	23	35	30	27	34	24
IDR	42	50	53		55	36	48	43	40	47	37
JPY	30	38	42	53		25	37	32	29	36	26
KRW	14	22	26	37	28		20	16	13	20	10
MYR	25	33	37	48	39	20		27	24	31	21
NZD	28	36	40	50	41	23	34		26	34	23
PHP	25	33	37	47	39	20	31	26		31	20
SGD	31	39	43	53	45	26	37	32	30		26
THB	12	20	24	35	26	7	19	14	11	18	

Table 8: Minimum duration of foreign exchange settlement risk
(selected currency pairs, hours)

Buy	Sell										
	USD	AUD	HKD	IDR	JPY	KRW	MYR	NZD	PHP	SGD	THB
USD		24	23	28	27	22	34	27	26	22	23
AUD	6		12	17	16	11	23	16	15	11	12
HKD	3	10		14	13	8	20	13	12	8	9
IDR	15	22	21		24	20	32	25	24	19	21
JPY	0	2	2	6		1	12	5	4	0	1
KRW	3	11	10	14	13		20	13	13	8	10
MYR	15	22	21	25	24	20		24	24	19	21
NZD	11	19	18	22	21	17	28		21	16	18
PHP	14	21	21	25	24	20	31	24		19	20
SGD	4	11	10	15	14	9	21	14	13		10
THB	2	9	8	12	11	7	19	12	11	6	

Table 9: Key payments infrastructure in EMEAP economies

	Australia	Hong Kong	Indonesia	Japan	Korea	Malaysia	New Zealand	Philippines	Singapore	Thailand
Legally enforceable netting	Y	Y	N ¹	Y	Y	N	Y	N ¹	Y	N
Real-time gross settlement	Y	Y	Y	Y ²	Y	Y	Y	Y	Y	Y
Payment-versus-payment facility	N	Y ³	N	N	N	N	N	N	N	N
CLS-eligible currency	Y	N ⁴	N	Y	N	N	N ⁴	N	Y ⁵	N

¹ Bilateral netting in these economies is not prohibited but its validity has not been tested in the courts.

² FEYCS, the clearing system used to settle foreign exchange transactions, operates mainly on a deferred net basis.

³ Settlement is across the books of HSBC, a private sector bank.

⁴ Likely second-wave currency.

⁵ CLS has given in-principle approval for the Singapore dollar to be a CLS eligible currency.

ANNEX 5

PAYMENT-VERSUS-PAYMENT FACILITIES

HONG KONG

The Hong Kong Monetary Authority (HKMA) has developed a system to allow settlement of HKD/USD transactions on a payment-versus-payment (PVP) basis. This eliminates the principal risk associated with settling foreign exchange transactions. The project was jointly developed by the HKMA, HSBC²⁵ and HKICL²⁶ following consultation with the financial community.

The project was implemented in stages. In March 2000, the HKMA appointed HSBC to be the settlement institution for USD clearing in Hong Kong. This appointment is for a term of five years, and commenced on 1 August 2000.

The first phase involved the implementation of a proprietary RTGS system to settle USD.²⁷ It allows local financial institutions to settle USD transactions in real time during Hong Kong business hours (0900 to 1730), instead of more than 12 hours later in New York. This RTGS system includes an interface with the Central Moneymarkets Unit (CMU) and the Central Clearing and Settlement System (CCASS) to enable delivery-versus-payment settlement of USD denominated debt securities and equities traded in Hong Kong.

The second phase provided for settlement of HKD/USD foreign exchange transactions on a PVP basis. The first-ever foreign exchange PVP transaction took place on 25 September 2000. The PVP device involves a seamless interface between the HKD RTGS system and the USD RTGS system, and ensures that the two legs of a foreign exchange transaction are settled simultaneously, thus eliminating foreign exchange settlement risk.

Figure 5 depicts the HKD/USD PVP mechanism. In this example Bank X is selling HKD to Bank Y in exchange for USD. On settlement day, Bank X sends a PVP payment transaction to Bank Y (i). Bank Y also initiates a mirror PVP payment transaction (ii). The Cross Currency Payment Matching Processor (CCPMP) for HKD and the CCPMP for USD will then communicate with each other and attempt to match the transaction (iii). After successful matching, the HKD RTGS system and USD RTGS system will respectively hold the HKD funding of Bank X and the USD funding of Bank Y (iv). If both Bank X and Bank Y have sufficient funds, the two RTGS systems will transfer the funds to their respective counterparty simultaneously (v).

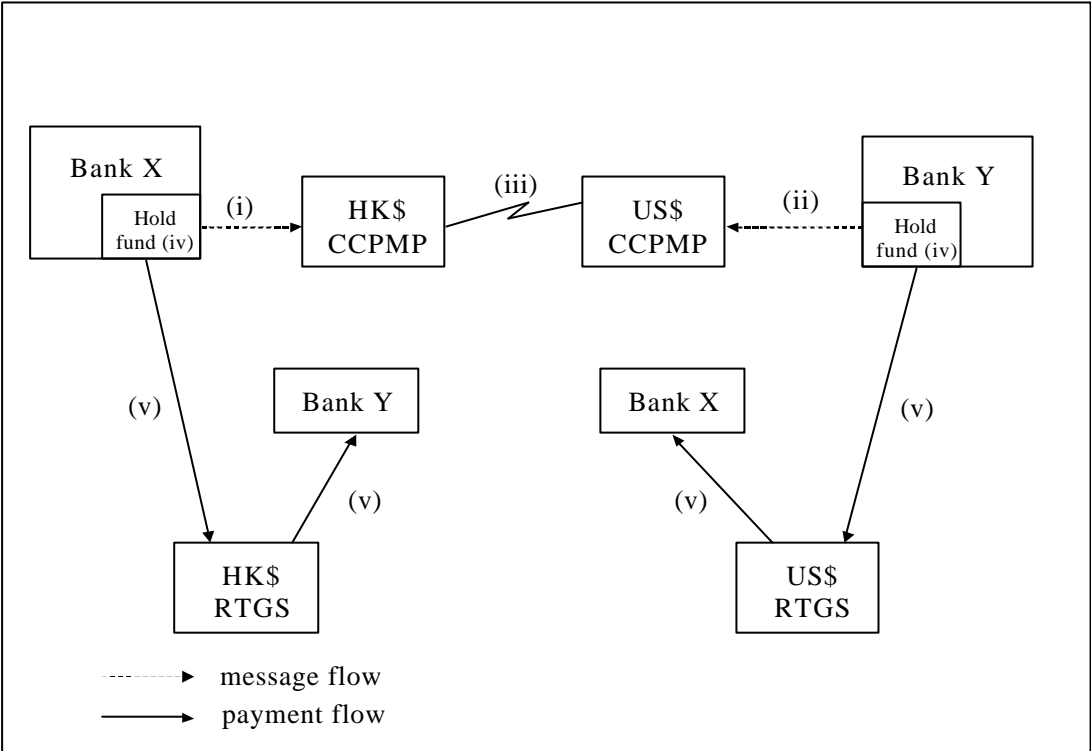
²⁵ The Hongkong and Shanghai Banking Corporation Limited (HSBC).

²⁶ Hong Kong Interbank Clearing Limited (HKICL) is the clearing operator for the US dollar clearing system. This is in addition to its responsibility for running the Hong Kong dollar interbank payment system.

²⁷ USD transactions are settled across the books of HSBC, rather than Fedwire. As a result, USD transactions can still be settled even when Fedwire is not operating.

Banks can participate directly or indirectly. Direct participants maintain USD settlement accounts with HSBC, while banks that wish to operate as indirect participants can do so by opening sub-accounts with direct participants. Banks outside Hong Kong can still participate as either direct or indirect participants of the USD clearing system. At the end of September 2001 there were 66 direct participants and 116 indirect participants.

Figure 5: PVP settlement of HKD/USD trades in Hong Kong



In the first month of implementation (September 2000), daily settlements averaged over 1,800 USD RTGS transactions involving a total value of US\$ 1.8 billion. One year later, daily settlements averaged 3,000, with a total value of approximately US\$ 3.3 billion. Typically, around 30 of these transactions were the USD leg of PVP transactions with a total value of around US\$ 1 billion.

CLS BANK LIMITED

Continuous Linked Settlement (CLS) is being developed by a group of the world's major banks. It is designed to eliminate the principal risk associated with the settlement of foreign exchange trades. This will be achieved by settling both legs of a foreign exchange transaction on PVP basis.

CLS Bank will be a limited purpose bank whose sole function will be the settlement of foreign exchange transactions. It will be regulated by the US Federal Reserve and will operate on Central European Time (CET). The introduction of CLS is expected around mid 2002.

Initially, CLS Bank will provide settlement for seven currencies. Of these eligible currencies only two, JPY and AUD, are EMEAP currencies. The other five currencies are USD, EUR, GBP, CAD, and CHF. Economies that wish their currencies to participate in CLS Bank must meet a number of requirements, including being able to provide real-time settlement and legal certainty with regards to the finality of payments.

Each bank that is a settlement member will have its own account with CLS Bank. This account will be split into sub-accounts, with one sub-account for each of the eligible CLS currencies. CLS Bank will maintain an account at the "home" central bank or monetary authority of each of the participating currencies, and will have access to the respective RTGS systems.

CLS Bank will conduct settlements during a five hour period between 0700 and 1200 CET. Economies who wish their currencies to participate will need to ensure that their RTGS systems can operate during these hours.

Figure 6 depicts the process for settling a foreign exchange trade through CLS Bank. For simplicity only two currencies and two counterparties have been included. In this example Bank X had sold USD to Bank Y in exchange for JPY. Bank X and Bank Y both submit details of the trade to CLS Bank (i). CLS Bank matches the trade and retains this information until settlement date. At the start of the settlement day CLS Bank will calculate the net long and short (ie buy and sell) positions for each bank in each currency and will provide a pay-in schedule to each bank (ii). Banks make payments to CLS Bank according to their pay-in schedules. Funds are transferred from the banks to CLS Bank across central banks' accounts via the local RTGS system (iii). CLS Bank completes the settlement by adjusting the respective positions of banks across its books. CLS Bank makes payments to banks in order to return their positions at CLS Bank to zero (iv).

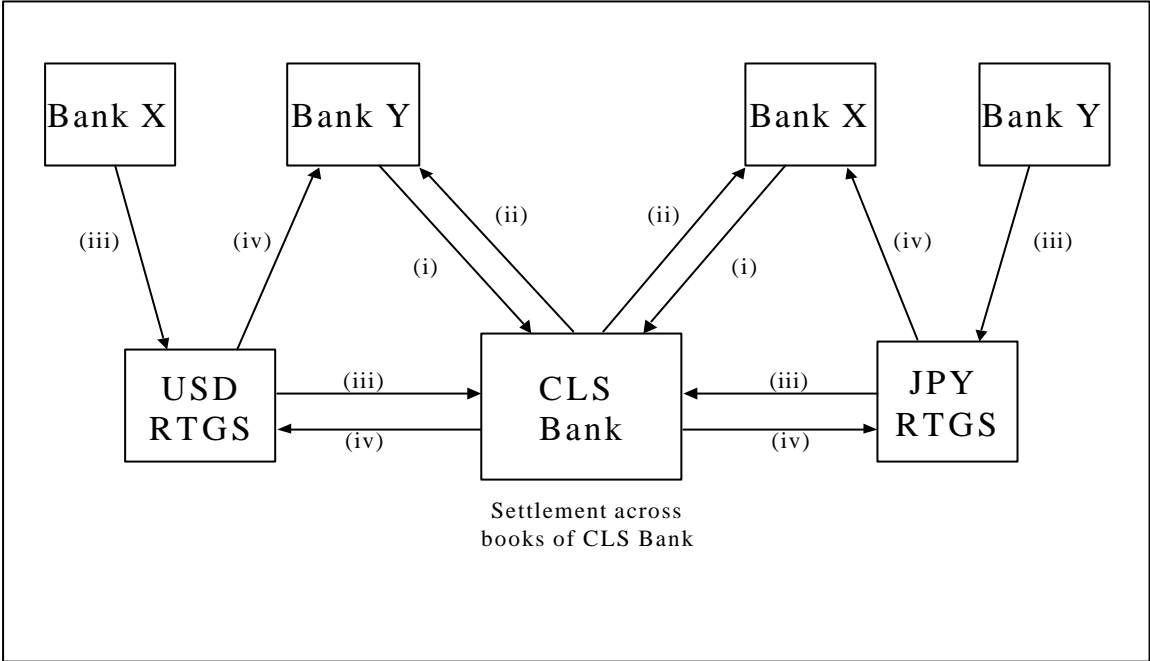
Each transaction entered into CLS Bank must pass several risk management tests before it can be settled. The overall position of a member (expressed in USD) must remain positive at all times. In addition, members cannot have short positions in a particular currency in excess of a predetermined limit. A haircut is applied to currency balances to guard against exchange rate movements.

Within the limits set by the various risk management tests, the amounts in banks' sub-accounts will change as settlement of individual transactions are posted. As settlement proceeds each sub-account may fluctuate between a long or short position. However, at the end of the settlement process the balances in each sub-account will return to zero.

It is anticipated that CLS Bank will be able to commence paying out members' long positions before those members have finished paying in their short positions. The extent to which CLS

Bank will do this will be determined by risk management tests it applies against member banks.

Figure 6: CLS Bank settlement of foreign exchange trades



ANNEX 6

SELECTED REFERENCES

- Bank for International Settlements, *A glossary of terms used in payments and settlement systems*, Committee on Payment and Settlement Systems, January 2001.
- Bank for International Settlements, *Central bank survey of foreign exchange and derivatives market activity in April 2001: preliminary global data*, October 2001.
- Bank for International Settlements, *Core Principles for Systemically Important Payment Systems*, Committee on Payment and Settlement Systems, January 2001.
- Bank for International Settlements, *Reducing Foreign Exchange Settlement Risk: A Progress Report*, Committee on Payment and Settlement Systems, July 1998 (the 'Progress Report').
- Bank for International Settlements, *Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries*, Committee on Payment and Settlement Systems, November 1990 (the 'Lamfalussy Report').
- Bank for International Settlements, *Settlement Risk in Foreign Exchange Transactions*, Committee on Payment and Settlement Systems, March 1996 (the 'Allsopp Report'),
- Bank for International Settlements, *Supervisory Guidance for Managing Settlement Risk in Foreign Exchange Transactions*, July 1999.
- Reserve Bank of Australia, *Foreign Exchange Settlement Practices in Australia*, December 1997.
- Reserve Bank of Australia, *Reducing Foreign Exchange Settlement Risk in Australia: A Progress Report*, September 1999.
- The New York Foreign Exchange Committee, *Guidelines for Foreign Exchange Settlement Netting*, January 1997.
- The New York Foreign Exchange Committee, *The 1997 International Foreign Exchange Master Agreement (IFEMA)*, 1997.