

Settlement of foreign exchange transactions

1. Introduction

Foreign exchange transactions involve a wide range of risks for credit institutions that are active in the foreign exchange market. An important risk factor in foreign exchange transactions concerns their settlement. The financial system relies heavily on the secure and efficient settlement of foreign exchange transactions. There is a risk that disruptions in foreign exchange settlements would cause a chain reaction in the financial system and spread to those of other countries.

Central banks have focused closely on the safety of foreign exchange transactions as part of their function of promoting financial stability. In recent years, central banks and market participants have jointly worked on enhancing the safety of settlement operations. An important milestone in this respect was achieved with the establishment of CLS Bank.

This article deals with foreign exchange settlements, the risk that they entail, central bank cooperation in this field and ways to limit settlement risk. It discusses CLS Bank and the way it reduces settlement risk. There is also a discussion of Iceland's position in this respect, measures taken by Icelandic credit institutions to manage settlement risk and their attitudes towards participation in CLS Bank's settlements.

2. The foreign exchange transaction process

Before turning to foreign exchange settlement risk, the conventional process for handling these settlements needs to be explained. An example may be given involving two banks, A and B, which make a foreign exchange transaction. Bank A is Icelandic, and Bank B Swiss.

Under the transaction, Bank A in Iceland sells euros to Bank B in Switzerland and receives US dollars in return. The transaction and settlement are conducted through the two banks' accounts with their correspondent banks, which operate in the countries where the respective currencies are issued and are also participants in the settlement systems of those currencies. In the settlement process, Bank A's correspondent bank pays euros to Bank B's correspondent bank. At the same time, Bank B's correspondent bank pays US dollars to Bank A's correspondent bank. The euro payment is settled in the euro payment system in Europe, and the dollar settlement in the US payment system. Settlement of these two currencies is not coordinated.

This process is shown in Fig. 1.

3. Risk factors in foreign exchange transactions

Foreign exchange transactions pose various types of risk. Participants in the foreign exchange market are obliged to understand and manage these risk factors in their operations. Some of the risks are addressed in official regulations.² The risk involved in foreign

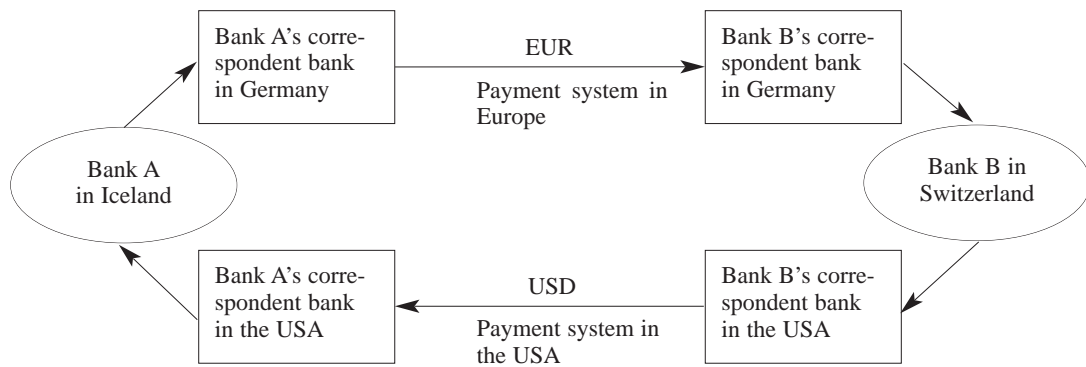
1. The author is Deputy Director of the Central Bank of Iceland's Financial Stability Department.

2. See in particular the Solvency Ratio of Credit Institutions and Undertakings Engaged in Securities Services no. 693/2001, with sub-

Fig. 1

Conventional foreign exchange transaction process

Bank A in Iceland sells euros to Bank B in Switzerland and buys US dollars
Settlement of these two currencies is not coordinated



exchange transactions may be divided into two categories according to whether or not they are connected with their settlement.

Market risk is not particularly linked to the foreign exchange settlements. It is present while a bank has unhedged foreign exchange exposures and entails a risk of financial loss due to unfavourable movements in the exchange rates of currencies. Banks can hedge their exposures with measures including derivatives trading.³

Foreign exchange settlement risk is the risk that one party to a foreign exchange transaction will pay the currency it sold but not receive the currency it bought. Settlement risk may be divided into credit risk and liquidity risk. Other risk factors connected with settlements are operational risk and replacement risk. These risks are defined in Box 1.

Settlement risk is more serious than other types of risks in foreign exchange transactions insofar as it entails a risk that all the underlying financial value of the transaction, i.e. the principal, could be lost, as well as possibly causing a financial system crisis. However, in light of experience the probability of settlement risk is low.⁴

The following is a more detailed account of foreign exchange settlement risk.

4. Settlement failure

Foreign exchange transactions involve settlements in at least two currencies. Each leg of the transaction is settled in the country where the respective currency is issued. In conventional foreign exchange transactions there is often a considerable time difference in the settlement of each leg. Different time zones mean that the operating times of payment systems differ from one country to another. The settlement process, settlement time and finality of payments is therefore not coordinated between settlement systems.

A study conducted in 1995 revealed a frequent lag of one or two days from when a party to a foreign exchange transaction sends an irrevocable payment order in connection with the sale of currency to the time that it receives a final counterpayment in the form of the purchased currency. A further one or two

sequent amendments, and Rules no. 387/2002 on Foreign Exchange Balance.

3. On management of market risk in foreign exchange transactions see, for example, Solnik, B., pp. 549-573, and Lequeux, P., pp. 55-71.

4. Compared with settlement risk, however, market risk entails a sub-

stantial probability of the loss of much smaller amounts. Actual total losses by banks on their foreign exchange transactions are greater in connection with market risk than with settlement risk. In this respect the need for market risk management is more immediate and more visible than the need for settlement risk management. On the other hand, settlement risk in conventional foreign exchange transactions may be expected to pose more of a danger to the financial system bearing in mind that market risk is easier to manage than settlement risk, and that banks in general have adopted sophisticated methods of market risk management.

Box 1 Types of foreign exchange transaction risk¹

Credit risk/exposure: the risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter.

Replacement risk/replacement cost risk: the risk that a counterparty to an outstanding transaction for completion at a future date will fail to perform on the settlement date. This failure may leave the solvent party with an unhedged or open market position or deny the solvent party unrealised gains on the position. The resulting exposure is the cost of replacing, at current market prices, the original transaction.

Systemic risk: the risk that the failure of one participant in a transfer system, or in financial markets generally, to meet its required obligations when due will cause other participants or financial institutions to be unable to meet their obligations (including settlement obligations in a transfer system) when due. Such a failure may cause significant liquidity or credit problems and, as a result, might threaten the stability of financial markets and confidence in the market.

Legal risk: the risk that a counterparty will incur damage because laws or regulations are inconsistent with the rules of the settlement system, settlement arrangements or other interests entrusted to the settlement system. Legal risk is also created by unclear or unsystematic application of laws and regulations.

Liquidity risk: the risk that a counterparty (or participant in a settlement system) will not settle an obligation for full value when due. Liquidity risk does not imply that a counterparty or participant is insolvent since it may be able to settle the required debit obligations at some time thereafter.

Market risk: the risk that an institution or other trader will experience a loss on a trade owing to an unfavourable exchange rate movement.

Foreign exchange settlement exposure: the amount at risk when a foreign exchange transaction is settled. This equals the full amount of the currency purchased and lasts from the time that a payment instruction for the currency sold can no longer be cancelled unilaterally until the time the currency purchased is received with finality.

Operational risk: the risk of incurring interest charges or other penalties for misdirecting or otherwise failing to make settlement payments on time owing to an error or technical failure.

Foreign exchange settlement risk: the risk that one party to a foreign exchange transaction will pay the currency it sold but not receive the currency it bought. This is also called *cross-currency settlement risk* or *principal risk*; it is also referred to as *Herstatt risk*.

1. See CPSS (1996), pp. 63-65.

business days may elapse until the bank in question knows with certainty that the counterpayment has actually been received. As a result, three to four business days – plus any intervening weekends and holidays – can elapse between the beginning of some banks' settlement exposures and the time at which they know with certainty that they are no longer at risk.⁵ A bank's maximum FX settlement exposure could equal, or even surpass, the amount receivable for three days' worth of trades, so that at any point in

time the amount at risk to even a single counterparty could exceed a bank's capital.⁶

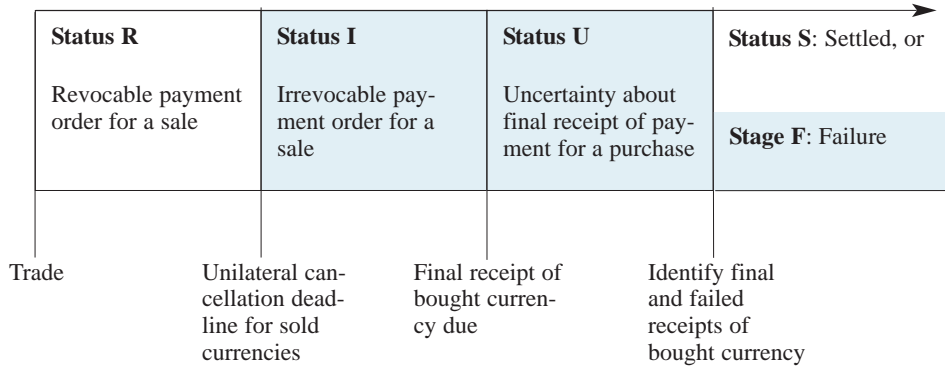
Conventional foreign exchange transactions entail the risk of incidents or events occurring that prevent their normal settlement. This is known as settlement failure. In particular, settlement failure may be caused by financial or technical factors. A settlement failure can have serious consequences for payment and settlement systems and for the financial system as a whole. Since the financial systems of

5. CPSS (1996), pp. 11-17.

6. CPSS (1996), p. 2.

Fig. 2

Changing status in the foreign exchange settlement process
(shaded when a risk is present)



Source: BIS, *Settlement Risk in Foreign Exchange Transactions*, CPSS (1996), pp. 8-9.

more than one country are involved in foreign exchange transactions, there is a risk that the failure may spill over to financial systems in other countries. Thus settlement failure also poses a systemic risk.

5. The scope of settlement risk

An understanding of the scope of foreign exchange settlement risk is a precondition for the measurement and management of it. In conventional foreign exchange transactions, a bank irrevocably delivers for sale a given amount of a specific currency without simultaneously receiving in return the currency that it buys. The bank assumes the risk that it will not receive the currency that it intends to buy. The bank's exposure in connection with a foreign exchange settlement therefore corresponds to the risk of losing the entire value of the currency that has been bought in the transaction. The exposure lasts from the time that a payment instruction for the currency sold can no longer be cancelled unilaterally until the time the currency purchased is received with finality.⁷

In order for a bank to evaluate its settlement risk, the settlement process needs to be divided into five categories of trade status, as shown in Fig. 2.

Status R lasts from the original transaction until the bank's payment order for the sale has become

irrevocable. At this stage there is no settlement risk. Status I lasts from when the payment order for the sale will not be unilaterally revoked until the right to receipt of the payment for the purchase has been established. At this stage there is a risk that the amount will be lost. Status U lasts from the time that the bank's entitlement to receipt of the payment for the purchase has been established until it knows with certainty that final payment or payment failure has taken place. Under normal circumstances the bank may expect that it has already received the currency. However, an incident leading to payment failure may have occurred. Thus the bank's risk of losing the purchased amount is still present at this stage. Status S is when the bank knows with certainty that it has received final payment of the purchased currency. By now there is no longer any risk involved. Stage F occurs if the bank knows with certainty that a payment failure has taken place. At this stage there is a clear risk that the bank will lose the purchased amount.

By determining the starting point of each stage in the foreign exchange transaction process and measuring the duration and amounts involved at each respective stage, a bank is able to measure its settlement risk. If it does not measure the risk it is likely that it will either overestimate or underestimate it. Both maximum and minimum risk can be measured. Each bank's maximum risk is the sum of the risk

7. Basel Committee on Banking Supervision, p. 14.

involved in stages I, U and F. The advantage of measuring maximum risk lies in the fact that it allows foreign exchange transactions which are still at Stage R to be ignored. Minimum risk, however, is limited to the sum of stages I and F, i.e. stage U is omitted since as a rule payment may be expected to have taken place.⁸

6. Examples of systemic failures due to disruptions in foreign exchange settlement

On 26 June 1974 the German supervisory authority withdrew the banking licence of Bankhaus Herstatt and ordered it into liquidation. This happened at 15.30 German time, during the banking day but after the close of the interbank payments system in Germany. Although this was not a large bank, it had been engaged in extensive foreign exchange market trading. Before the decision to close the bank was announced, several of its counterparties had made irrevocable payments of large amounts in Deutsche Marks to it through the German payment system. These payments were made in the faith that counterpartments in US dollars would be deposited in their accounts in New York later that day. When the decision was announced Herstatt had not honoured these counterpartments. The value of the unsettled payments was around 200 million US dollars, plus uncompleted forward transactions.

On receiving notification that Herstatt's banking licence had been withdrawn, its correspondent bank in New York suspended all payments in US dollars from Herstatt's account. The banks that had paid Herstatt Deutsche Marks earlier that day and were awaiting counterpartments in US dollars were therefore left exposed for the full value of the Deutsche Marks.

The closure of Herstatt was the first and also the most serious crisis regarding the functioning of payment and settlement systems as a result of failure to settle foreign exchange transaction obligations. Other failures occurred last decade which were not so serious. The main ones were the problems faced by Drexel Burnham Lambert Group in February 1990, the bankruptcy of BCCI in July 1991, the impact of the coup in the Soviet Union in 1991 on

foreign settlement systems, and the collapse of the Barings Brothers in February 1995.⁹

7. Central bank initiatives

Following the closure of Bankhaus Herstatt, G-10 central banks launched cooperation aimed at preventing a repeat of such systemic failures. Among other things an analysis was made of the operations of payment and settlement systems, including international multi-currency settlement systems. On the basis of this work, guidelines were drawn up for risk management and supervision with a view to reducing settlement risk.

In 1994 the G10's Committee on Payment and Settlement Systems (CPSS) began developing methods for reducing foreign exchange settlement risk.¹⁰ In 1996 CPSS published the Alsopp Report on this issue, which was approved by the G-10 banks.¹¹ The report presents the G-10 central banks' assessment that the conventional foreign exchange settlement framework could have a severely negative impact on the safety and soundness of banks, the adequacy of market liquidity, market efficiency and overall financial stability.¹² It was deemed necessary to design a strategy aimed at reducing foreign exchange settlement risk. Active involvement by market participants in working towards this goal was underlined.

The report proposed three ways to reduce foreign exchange settlement risk: firstly, that each bank should adopt suitable methods for measuring and managing settlement risk; secondly, that market participants should develop a multi-currency settlement system to reduce the banks' settlement risk; and thirdly, that the central bank in each country should encourage market participants to seek ways to reduce settlement risk.¹³

9. CPSS (1996), p. 6-8

10. It should also be mentioned that in 1994 The New York Foreign Exchange Committee issued its recommendations for market participants: *Reducing Foreign Exchange Settlement Risk*, October 1994.

11. Bank for International Settlements, *Settlement Risk in Foreign Exchange Transactions*, Report prepared by the Committee on Payment and Settlement Systems of the central banks of the Group of Ten countries, March 1996.

12. CPSS (1996), p. 2.

13. CPSS (1996), pp. 18-31.

8. See further on measurement of foreign exchange settlement risk: CPSS (1996), pp. 33-50.

Following this report, work began on implementing this strategy. One priority was to shorten the time that banks maintained foreign exchange exposures. This was done by improving measurements and management of individual banks' settlement risk, synchronising settlement times and introducing real-time gross settlement (RTGS) systems. Ways were also sought to reduce the number and amount of payments that needed to be settled, by developing bilateral and multilateral netting systems for foreign exchange transactions and by securing the legal certainty of netting arrangements.¹⁴

It was decided that the CPSS should closely monitor the outcome of this strategy over the following two years. Its report published in July 1998¹⁵ found that substantial results had been achieved since 1996. There was increased awareness and understanding of risks among many banks, more accurate risk measurements, progress had been made in risk management and the duration of settlement risk had been shortened. Market participants had sought ways to develop new settlement methodologies, including the drafting of proposals for the establishment of a continuous linked settlement (CLS) bank for foreign exchange transactions. Central banks had promoted the development of settlement systems and synchronised their settlement times. Nonetheless, the outcome was still deemed unsatisfactory. It was therefore decided to continue work aimed at reducing settlement risk on the basis of the strategy that had been formulated in 1996.

8. Supervisory Guidance for Managing Settlement Risk

In September 2000 the Basel Committee published its Supervisory Guidance for Managing Settlement Risk in Foreign Exchange Transactions.¹⁶ The purpose of the guidance was to inform supervisory authorities about the nature of foreign exchange risk

14. Galati, G., p. 59.

15. Committee on Payment and Settlement Systems, *Reducing Foreign Exchange Settlement Risk: a progress report*, Bank for International Settlements, July 1998.

16. Basel Committee on Banking Supervision, *Supervisory Guidance for Managing Settlement Risk in Foreign Exchange Transactions*, September 2000.

and the measures that could be taken towards managing it. Supervisory authorities were advised to consider these factors in their evaluations of banks' policies and procedures. Information on the substance of the guidelines is given in Box 2.

9. Evolution of PVP settlement solutions

Despite the substantial results achieved in reducing settlement risk, it could clearly not be eliminated except by developing a system that settled both currency legs of foreign exchange transactions simultaneously. Such a system would ensure that a final transfer of one currency occurs if and only if a final transfer of the other currency or currencies takes place. This is the 'payment versus payment' (PVP) principle, which was developed on the recognised principle of 'delivery versus payment' (DVP) from securities settlements.¹⁷

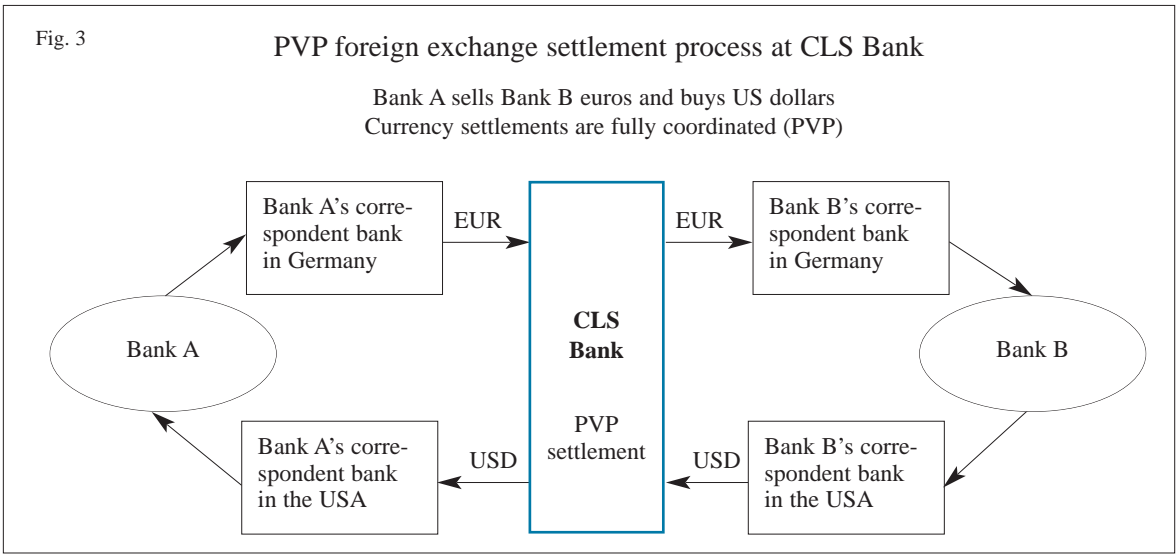
In the wake of the Alsopp Report of 1996 a task force was formed from major commercial banks from eight countries to examine ways that PVP solutions could be developed. Known as the G-20 banks, the group founded CLS Services Limited (CLSS) in July 1997 to implement its plans for the establishment of a foreign exchange bank of settlements, CLS Bank. The bank was to handle foreign exchange settlements in accordance with PVP conditions using a process named 'continuous linked settlement'.

The principle behind these plans was that CLS Bank would serve as an intermediary between both parties to foreign exchange transactions, or their correspondent banks. Participants would have a multi-currency settlement account with CLS. The bank would settle transactions by transferring currency between the buyer's and seller's accounts. Both legs of the transaction would be settled simultaneously by the bank in order to meet the PVP principle and thereby prevent foreign exposures from being formed. Settlements of accounts with CLS Bank would be on a gross basis, i.e. each transaction would be settled separately (without netting). Financing of the transactions by the commercial banks, on the other hand, would be on a net basis, i.e. each commercial bank would only need to pay (or be paid) the

17. See Ásgeirsson, H., p. 68.

Box 2 Supervisory Guidance for Managing Settlement Risk in Foreign Exchange Transactions¹

1. *The nature of settlement risk:*
 - Banks should understand the nature and effect of settlement risk.
 - Banks should treat FX exposures as being equivalent to other credit exposures.
 2. *Senior management responsibilities:*
 - Senior management should ensure that they fully understand the FX settlement risks incurred by the bank.
 - Senior management should formulate a policy on settlement risk and review it regularly.
 - Banks should have clear procedures for measuring and managing exposures.
 - Adequate training should be provided to all staff responsible for the various aspects of FX settlement risk.
 - Senior management should exercise appropriate oversight of settlement exposures.
 - Settlement risk should be integrated into other risk management.
 3. *Duration of FX settlement exposure:*
 - Banks should know and apply methods for measuring the duration of settlement exposure.
 - Banks need to be certain when the unilateral cancellation deadline is for each currency.
 4. *Measurement of FX settlement exposures:*
 - Recognised methods should be used to measure both minimum and maximum risk.
 - Measurement of settlement risk should constitute part of general risk assessment and management.
 5. *Setting and using limits:*
 - A normal limit should be set for exposures to each counterparty.
 - Methods should be devised to determine a limit for exposures to each counterparty.
 6. *Procedures for managing fails and other problems:*
 - Banks should have procedures for quickly identifying fails and taking appropriate action.
 - Banks need to strike a balanced approach in their reactions to fails.
 7. *Contingency planning:*
 - Banks should undertake contingency planning and stress testing.
 - Contingency plans should be established to include a broad spectrum of stress events.
 8. *Improving the management of FX settlement exposures:*
 - Contingency planning for FX settlement problems should be coordinated with planning for other problems.
 - Contingency plans should be tested periodically.
 - Banks should develop recognised methods for management of FX risks.
 - The duration or size of the settlement exposures relating to FX deals should be reduced.
 - Banks should negotiate better cancellation cut-off times with correspondents.
 - Methods for identifying receipts should be improved.
 - Internal processing should be improved.
 - Collateral arrangements should be managed properly.
 - Netting agreements should be legally sound.
 9. *Use of bilateral netting:*
 - The advantages of establishing bilateral netting towards counterparties should be assessed.
 - Sound methods should be developed for measuring the effect of netting on settlement risk.
 - The legal basis for payment netting arrangements should be sound.
 10. *Alternative arrangements for FX settlement risk reduction:*
 - Banks should assess the advantages of adopting new risk-reducing arrangements, in particular with direct or indirect participation in CLS Bank settlements.
 - Banks should assess the effect of participation in CLS Bank on all risk factors in their operation.
 11. *Internal audit:*
 - Banks should have in place adequate internal audit coverage of the FX settlement process.
 - A bank's board of directors should ensure that the scope and frequency of the FX settlement internal audit programme is appropriate to the risks involved.
 12. *A bank's responsibilities to its counterparties:*
 - A bank needs to be aware that its own behaviour affects the settlement risk faced by its counterparties.
 - A bank should take account of its counterparty in order to preclude settlement problems.
 13. *The role of supervisors:*
 - Supervisors should make sure that banks measure, monitor and manage FX settlement risk appropriately and use risk management methods consistent with them.
 - Supervisors should share information about FX settlement risk problems.
-
1. Based on: Basel Committee on Banking Supervision, pp. 2-13.



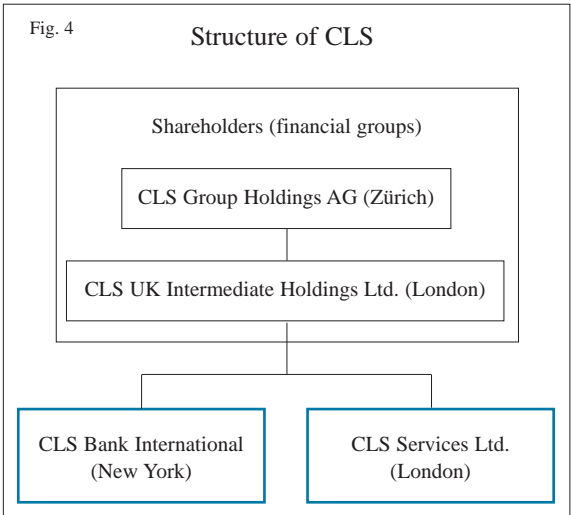
amount in a specified currency on a specified day corresponding to the total balance of all payment orders after they had been netted. Such an arrangement would virtually eliminate settlement risk and also reduce the banks' liquidity requirement. This process is shown in Fig. 3.

10. Establishment of CLS Bank

Plans for international PVP foreign exchange settlements proved both complex and time-consuming to implement. Settlements had to be arranged in such a way that the elimination of settlement risk would not

create new types of risk or increase others, e.g. liquidity risk. This led to some delays before the system entered service.

CLS Bank began operation in September 2002. It is headquartered in New York and operates under US federal law. It is regulated by the Federal Reserve Bank of New York. Shareholders in CLS are nearly 70 of the world's largest financial groups, with head offices in 17 countries. They own CLS Group Holdings AG, which is the holding company of CLS UK Intermediate Holdings Ltd, CLS Bank International (CLS Bank) and CLS Services Ltd. The principal role of the last-mentioned company is to provide operational and back-office support to CLS Bank and its affiliated companies. The structure of CLS is outlined in Fig. 4.

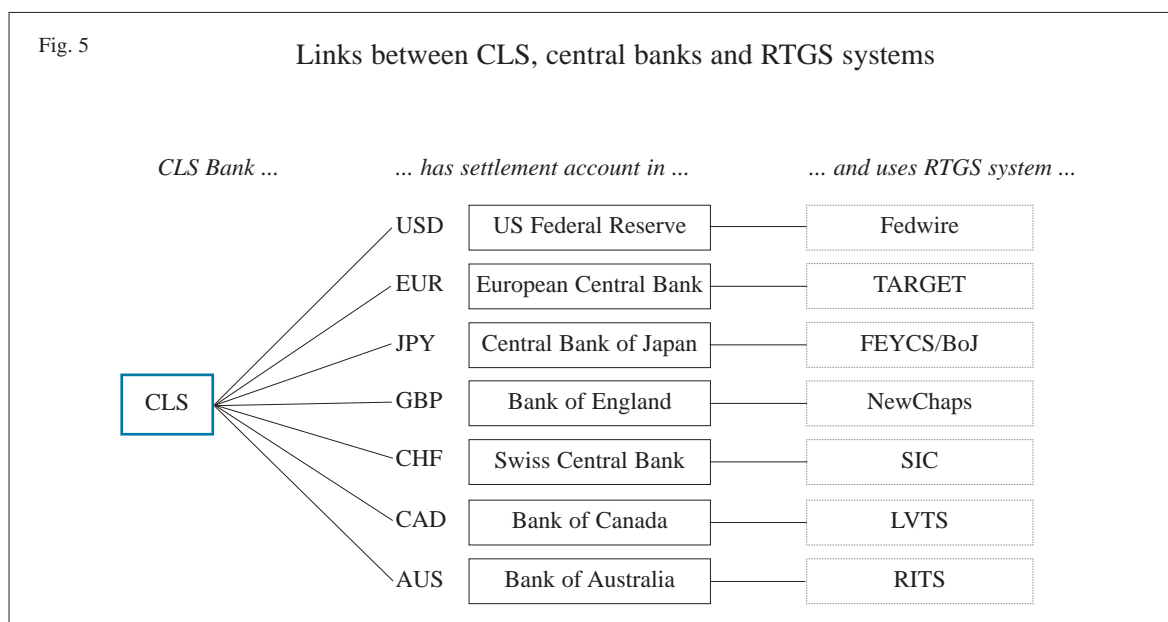


Only shareholders are entitled to become direct participants in settlements, as settlement members. They likewise need to demonstrate that they have the financial and operational capacity and adequate liquidity to be able to meet the obligations that participation entails. Each settlement member has a multi-currency account at CLS Bank with sub-accounts for each currency, to which they can send payment orders into the settlement system. They guarantee to maintain sufficient liquidity to be able to complete a settlement at all times.

User members have restricted rights in the system and do not have accounts at CLS Bank. Instead they are sponsored by a settlement member who acts on

Fig. 5

Links between CLS, central banks and RTGS systems



their behalf. Each instruction submitted by a user member must be authorised by a designated settlement member. This makes the instruction eligible for settlement through the account of the settlement member.

Settlement members and user members may invite other banks to negotiate on becoming third-party customers.¹⁸ CLS Bank does not negotiate directly with third-party customers. Failure by a third-party customer to fulfil its obligations therefore has no direct impact on CLS Bank.¹⁹

CLS Bank now makes foreign exchange settlements in seven currencies: US dollars, euros, yen, sterling, Swiss francs, Canadian dollars and Australian dollars. More currencies are expected to be included in settlements. Preparations are in progress for endorsing the Swedish krona, Norwegian krone, Danish krone, Hong Kong dollar, New Zealand dollar and Singapore dollar as settlement currencies in the system.²⁰

18. On the development and effect of third-party access to CLS settlements, see FX Week, Third Party CLS, pp. 6-8. On competition among international banks for offering third-party access to CLS settlements, see Lyon, P., pp. 2-3.

19. Definitions of and information about the parties involved in settlements are given on the CLS website: <http://www.cls-group.com/index.cfm>.

20. The Nordic central banks have discussed CLS settlements in their publications on financial stability, for instance Norges Bank, *Financial Stability* (2002/2), pp. 26-28.

The bank links the RTGS systems of the central banks of countries that issue eligible currencies. Settlements are therefore made using central bank money. This is illustrated in Fig. 5.

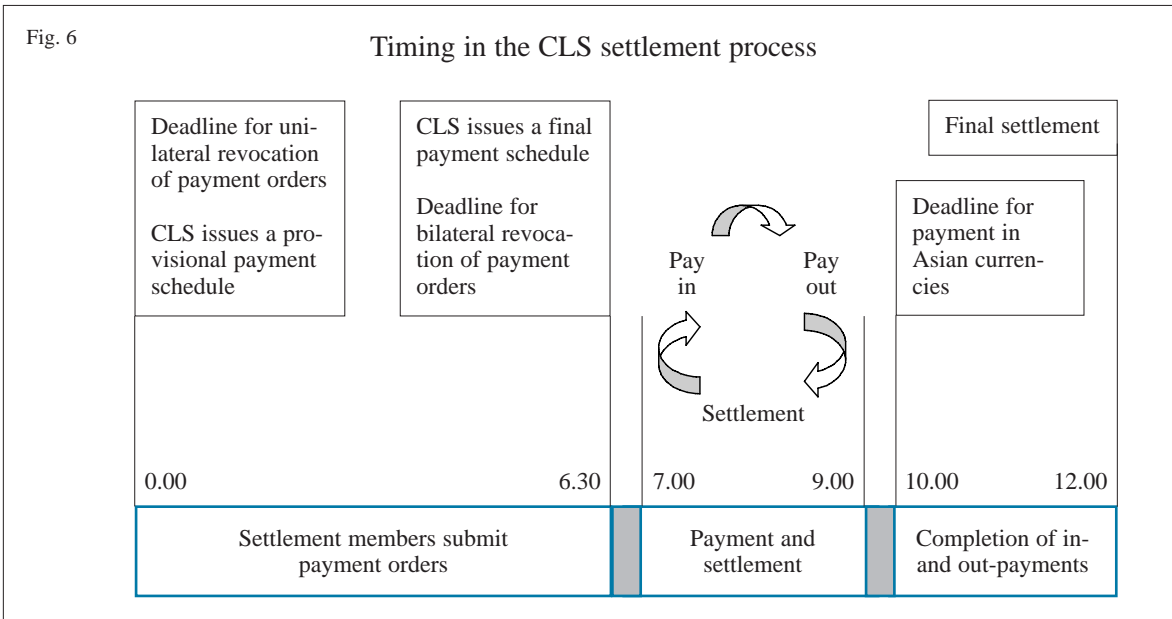
From the time that CLS Bank began operation, settlement turnover has been steadily growing. In April 2003 the bank settled an average of almost 70 thousand payment instructions per day in connection with foreign exchange transactions to the value 800 billion US dollars.²¹ This is equivalent to around one third of the estimated total volume of global foreign exchange transactions.²²

11. Settlements at CLS Bank

CLS settlements are made in stages. The start of the process is that until 6.30 a.m. CET (Central European Time) on the day of settlement, the settlement members send CLS Bank details of the payment orders that are to be settled. At 6.30 CLS Bank calculates, on the basis of this information, the total pay-in position or

21. CLS Bank press release from 7 April 2003.

22. According to a report issued by the Bank for International Settlements from 2002 the daily average turnover of global foreign exchange transactions in April 2001 was 1,200 billion US dollars (see BIS (2002), p. 5). These are net figures, i.e. based on only one of the two legs of a foreign exchange transaction. The CLS figures are gross. In order to be comparable, the former figures therefore need to be doubled.



pay-out position of each member for each currency vis-à-vis the bank. Using these calculations the bank sends each member a pay-in schedule. Although the settlement is gross (i.e. on a payment for payment basis), the total requirement to fund the settlement is calculated net. This reduces the liquidity requirement by up to 90%.

Members pay CLS Bank according to their pay-in-schedules from 7.00 a.m. to 12.00 noon. This period was selected because all seven RTGS systems linked to the bank are operative at this time. Settlement commences at 7.00 a.m. and is usually completed by 12.00. The bank accepts payments from members until 9.00 using their respective multi-currency accounts to make the foreign exchange settlements. It examines whether each member has a sufficient deposit in all currencies to complete the settlement. Transactions which for some reason cannot be completed are queued in order to attempt settlement at the first opportunity. A settlement is rejected if the transaction does not fulfil the requirements made towards it. All in-payments (pay-ins) and out-payments (pay-outs) should be concluded by 12.00 noon. Timing of the settlement process is explained in Fig. 6.²³

23. A more detailed explanation of the settlement process is given in Bronner, M., pp. 135-139.

12. The impact of CLS on risks

As pointed out above, the main objective behind the establishment of CLS Bank was to eliminate foreign exchange settlement risk. Foreign exchange settlement risk is divided into credit risk and liquidity risk. It is worth examining the impact of settlements on these two risk factors.

CLS settlements by and large eliminate credit risk. The PVP principle and the requirement for a positive balance on the settlement account preclude a situation where failure to pay would entail that CLS Bank be owed by a settlement member. In order to ensure that total deposits in settlement accounts are always positive, the bank imposes a ceiling on the negative position in each currency and includes a 'haircut' on the exchange rate when the total deposit amount is calculated. Thus as a rule members cannot lose the principal of their claim even if the counterparty defaults. This may occur in special cases, however, so credit risk is not absolutely ruled out. As a contingency, the bank insists that other members jointly guarantee to pay the settlement obligation of a defaulting party.

With regard to liquidity risk, the total deposit in a settlement account is expected to be sufficient to allow the bank to perform all out-payments even if a given participant defaults. However, a situation may

arise where the deposit in a specific currency is insufficient to allow the bank to perform specific out-payments automatically. As a contingency, the bank can procure liquid funds in the relevant currency through swaps with credit institutions. Such measures ought to suffice in most cases. However, they might not prove adequate if many participants suffer serious crises on the same day. Then the bank may need to respond by, for example, performing its out-payments in other currencies than had been negotiated.

Although CLS settlements eliminate virtually all credit risk and greatly reduce liquidity risk, some operational risk is present. The technical resources used for the settlement are complex and the system makes stringent demands towards settlement members, e.g. that they make payments according to the pay-in schedule. Disruptions in the operations of a given settlement member or in the operation of a given RTGS system could therefore have serious consequences. CLS has thus changed the nature of potential sources of operational problems and the channels for the potential impact of such problems.²⁴

13. The situation in Iceland

Foreign exchange transactions by Icelandic credit institutions have grown substantially in recent years. They have striven to adopt the latest technology, which has made their business easier and more efficient. Priority has been given to managing specific types of foreign exchange risk, especially market risk, liquidity risk and operational risk.

However, management of foreign exchange settlement risk is not as advanced in Iceland. Icelandic credit institutions seem relatively unconcerned by settlement risk. Although they certainly understand settlement risk and are aware of its nature and possible impact, they have only taken limited action to measure the risk and manage it. Icelandic credit institutions have striven to select sound counterparties in their foreign exchange transactions, limit their exposures towards each one and reassess their procedures in light of experience. However, a systematic, defined and formal process for limiting

foreign exchange settlement risk has not been incorporated into their risk management.

Iceland has not adhered particularly closely to the Basel Committee Supervisory Guidance for managing settlement risk, cf. Box 2. It appears that Icelandic credit institutions have considered themselves to enjoy a satisfactory degree of security in this respect, since no major foreign exchange settlement failures have been felt in the country.

Regarding CLS Bank, no discussion has taken place in Iceland yet on incorporating the Icelandic króna into its settlements. Knowledge of and interest in CLS settlements does not appear to be widespread within the Icelandic financial system and it is mainly confined to management and experts at banks who handle foreign exchange transactions, risk management and capital management. However, on their own initiative a number of CLS settlement members have invited Icelandic commercial banks to become third-party customers and have held presentations about their services for them. The nature of the service and settlement methodologies are apparently fairly similar among them all.

Icelandic banks can be expected to negotiate third-party access to CLS settlements this year or next year. Their main reason for wanting access appears to be a desire for greater security by limiting settlement risk. Interest also seems to be driven by a certain amount of pressure from their correspondent banks to take part in settlements. Thus Icelandic banks apparently feel that CLS settlements are establishing themselves as a principle in foreign exchange transactions and that it is natural for them to keep pace with this development.

Varying amounts of progress have been made by Icelandic banks in their negotiations for third-party access to CLS. As a rule, the negotiating process has involved each bank examining the terms for negotiation offered by a small group of foreign settlement members. Their decisions to continue talks have mainly been based on the credibility of these parties, previous business experience, assistance with establishing links and the price of the service. However, final offers for service prices have only been made in a very few cases.

In general, Icelandic banks appear to expect CLS settlements to have several positive effects on foreign exchange back-office activities. They will have

24. Galati, G., pp. 62-64.

access to real-time information about foreign exchange positions, the number of transactions will be reduced and simplified, and the risk of error will be reduced. Settlements are generally not expected to affect the banks' customers. However, some additional cost is expected to be incurred through CLS settlements, especially in connection with system installation. Settlements are not expected to have any initial direct effect on the banks' terms in foreign exchange markets or their credit ratings.

Conclusion

Foreign exchange transactions entail a risk that a bank will suffer financial loss when it delivers a currency that it sells without receiving in return the currency that it buys. Settlement risk is the most serious type of risk in foreign exchange trading, insofar as settlement failure could lead the bank to lose the entire principal of the transaction, as well as causing a crisis of the financial system which could spread to those of other countries.

Following serious crises at the end of the twentieth century caused by foreign exchange settlement failures, central banks and market participants launched cooperation aimed at preventing a repeat of such systemic crises. A strategy and plan of action were drawn up for ways to limit and manage foreign exchange settlement risk. Among other things, guidance for supervisory authorities was published. However, it was not thought that risks could be satisfactorily limited without introducing a new system

for simultaneous settlement of both currencies in transactions. After some delays in the preparation of the settlement structure, CLS Bank began operation in September 2002. The CLS settlement eliminates virtually all credit and liquidity risk during settlements and reduces the liquidity requirement for it, but does not prevent operational risk.

In Iceland, credit institutions have been considered to enjoy an acceptable degree of safety with respect to settlement risk. However, there is reason to pay closer attention to the nature of the risk and its possible impact on the Icelandic financial system. Generally speaking, no specific measures have been taken to incorporate systematic and formal settlement risk management procedures into Icelandic credit institutions' risk management strategies. There is scope for improvement both by credit institutions and the authorities. Particular attention should be paid to the Supervisory Guidance issued by the Basel Committee on Banking Supervision in 2000.

Most Icelandic commercial banks are considering indirect participation in CLS settlements as third-party customers. Thorough preparations need to be made for such participation, including a requirements analysis, an evaluation of its effect on risk management and internal work processes, and careful selection of the party to negotiate with and the service on offer. Broadly speaking, such participation must be seen as contributing to more systematic management of settlement risk by Icelandic credit institutions and conducive to financial stability in Iceland.

References

- Ásgeirsson, H., 'Efficiency and safety of securities settlement systems', *Monetary Bulletin*, 2002/4, pp. 64-76.
- Bank for International Settlements, *Triennial Central Bank Survey, Foreign exchange and derivatives market activity in 2001*, March 2002.
- Basel Committee on Banking Supervision, *Supervisory Guidance for Managing Settlement Risk in Foreign Exchange Transactions*, September 2000.
- Bronner, M., 'The CLSTM system: reducing settlement risk in foreign exchange transactions', *Financial Stability Review*, Banque de France, November 2002, pp. 131-142.
- Committee on Payment and Settlement Systems, *Reducing Foreign Exchange Settlement Risk: a progress report*, Bank for International Settlements, July 1998.
- Committee on Payment and Settlement Systems, *Settlement Risk in Foreign Exchange Transactions*, Bank for International Settlements, March 1996.
- FX Week, Special Issue, Third Party CLS, *Only time will tell*, spring 2003, pp. 6-8.
- Galati, G., 'Settlement risk in foreign exchange markets and CLS Bank' *BIS Quarterly Review*, December 2002, pp. 55-65.
- Lequeux, P., *Alternative Investments – Managed Currencies*, Euromoney Books, 2001.
- Lyon, P., 'Continuous-linked conflict', *Risk*, March 2003.
- Norges Bank, *Financial Stability*, 2002/2.
- Solnik, B., *International Investments*, Addison-Wesley Longman, 4th ed., 2000.
- The New York Foreign Exchange Committee, *Reducing Foreign Exchange Settlement Risk*, October 1994.