

CLS – purpose, concept and implications

On 9 September 2002, Continuous Linked Settlement (CLS), a clearing and settlement system that settles foreign exchange (FX) transactions in seven major currencies, including the euro, the US dollar and the Japanese yen, went live. CLS is the banking industry's response to the objective of the G10 central banks to reduce FX settlement risk since, by design, it largely eliminates this risk. When settling FX trades in CLS, settlement members need to meet a strict daily timeline and thereby face some challenges for liquidity management. CLS is also expected to have an impact on market infrastructures and market conditions. The euro is the second most settled currency in CLS and it is expected that the values and volumes processed in euro large-value payment systems will, ceteris paribus, decrease. Some market participants expect CLS to trigger the development of an intraday money market and the two-tier pricing of FX trades, but views are split on these issues and it is still too early to draw any firm conclusions.

I The nature of FX settlement risk

FX settlement risk is generally defined as the risk that one party to an FX transaction will pay the currency it sold but not receive the currency it bought. FX settlement risk has both a credit risk and a liquidity risk dimension. The party that makes the first payment for one leg of the FX transaction faces the possibility that its counterparty may not deliver the currency at the time it is due (liquidity risk). It would then have to finance the shortfall until the counterparty eventually honours its obligation. The party paying first also faces a risk that the counterparty may fail altogether to complete the second leg of the transaction (credit risk). With regard to both liquidity risk and credit risk, the party paying first is exposed for the full amount of the transaction. Of course, the parties to an FX transaction are also exposed to other risks (e.g. market risk, operational risk, replacement risk), but the amounts at risk in these cases represent only a fraction of the underlying value of the transaction. The size of FX settlement risk therefore makes this type of risk the most significant one.

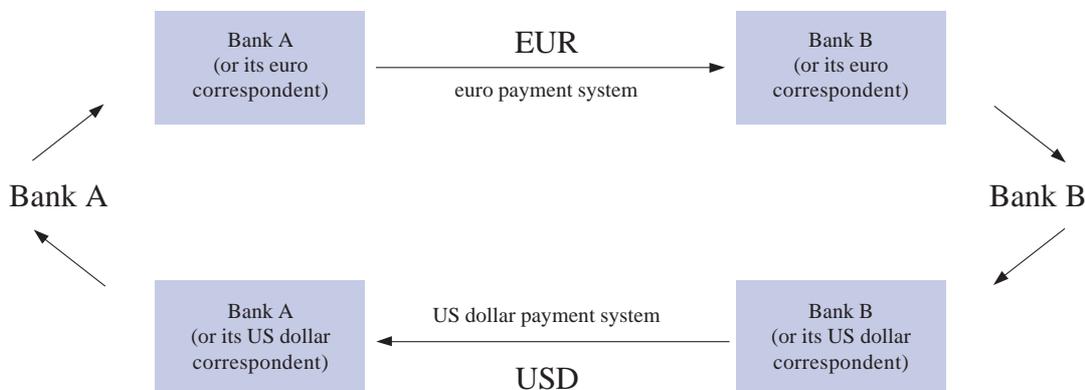
One well-known example of FX settlement risk is the case of Bankhaus Herstatt. This German bank was an active participant in the FX market. In June 1974 the German banking supervisory authority ordered the bank into liquidation after the close of the German payment system. The counterparties of Bankhaus Herstatt had irrevocably paid the Deutsche Mark leg of their USD/DEM transactions via the German payment system, but after Bankhaus Herstatt's collapse its

correspondents suspended the US dollar leg of the transactions, thus subjecting Bankhaus Herstatt's counterparties to substantial losses. In the literature, FX settlement risk is therefore often referred to as "Herstatt risk".

To illustrate the traditional settlement of FX transactions we can take the example of bank A buying US dollars from bank B against euro. Bank A (or its euro correspondent) would normally make the euro payment to bank B (or its correspondent) in the euro area using a euro payment system, such as TARGET, the real-time gross settlement (RTGS) system for the euro. Similarly, bank B (or its US dollar correspondent) would make the US dollar payment to bank A (or its correspondent) in the United States using a US dollar payment system. Although the operating hours of the euro and US dollar payment systems now overlap, the payments of the two currencies are normally not made simultaneously. Because of time zone differences and because US dollar large-value payments are often made towards the end of the business day in the United States, the counter-payment from bank B may be made 10 to 15 hours after the payment from bank A has been finally settled. The unsynchronised settlement of the two payments in our example exposes bank A to the risk that bank B will not make the US dollar payment as agreed. Depending on the currencies involved (e.g. Japanese yen and US dollars), time-zone differences may be more substantial.

Chart I

Settlement of an FX transaction via correspondent banks



2 Central banks' strategy for reducing FX settlement risk

The vast size of daily FX trading¹ combined with the global interdependence of FX markets and payment systems has raised some concerns in central banks. In the 1980s and early 1990s the G10 central banks published several studies and identified a number of issues related to cross-border payment arrangements. These studies recommended minimum standards and examined possible central bank service options that might decrease risk in the settlement of FX trades. In March 1996 the Bank for International Settlements (BIS) issued a report entitled "Settlement Risk in Foreign Exchange Transactions" (also known as the "Allsopp Report" after Peter Allsopp, the Chairman of the CPSS Steering Group which produced the report). This report analysed in particular the risks involved in FX settlement operations and outlined a strategy to reduce them. It also developed a definition of and a methodology for measuring FX settlement exposure. Empirical studies presented in the report showed that the FX settlement exposures of banks could last for up to two business days (and it may be another one or two days before banks know with certainty that they have received the currency that they bought), and that such exposures (even to a single counterparty) could in some cases exceed the bank's capital. In order to reduce these exposures and the systemic risk attached to them, the G10 central banks outlined a three-track strategy.

First, individual banks were requested to take measures to control their foreign exchange settlement exposures by improving their practices for measuring and managing exposure. In that respect, banks should take measures to improve their back-office procedures, correspondent banking arrangements and risk management controls by making greater use of netting arrangements². Second, industry groups were encouraged to develop well-constructed multi-currency services that would contribute to the risk reduction efforts of individual banks. The G10 central banks felt that such services would be best provided by the private sector rather than by the public sector, and it is in this context that banks contributed by setting up the CLS project. Third, central banks committed themselves to encouraging and fostering private sector development in this field. They also agreed to improve national payment systems and to facilitate private sector risk reduction efforts.

In July 1998 the BIS issued a progress report ("Reducing Foreign Exchange Settlement Risk: a

¹ According to the Triannual Central Bank Survey conducted by the BIS in April and June 2001, the size of daily FX trading at that time was around USD 1.2 trillion. Since every transaction has two settlement legs (one for each currency involved in the trade) the total value of the related payments is USD 2.4 trillion.

² "Netting is an agreed offsetting of positions or obligations by trading partners or participants. The netting reduces a large number of individual positions or obligations to a smaller number of obligations or positions." ECB, Blue Book, June 2001

Progress Report”) which showed that many market participants had made significant progress in dealing with FX settlement risk by raising senior management awareness and by defining responsibilities. Banks had in fact reduced their exposures and improved the methods used to measure them. Industry groups had developed multi-currency services that had the potential of reducing FX settlement risk, and central banks had been improving large-value payment systems (e.g. extending the operating hours of payment systems to create

overlaps between different time zones). In order to support the strategy of the G10 central banks, the Basel Committee on Banking Supervision was invited to develop international supervisory guidance for banks on the prudential management and control of FX settlement risk in line with the recommendations of the Allsopp Report. The Basel Committee on Banking Supervision subsequently issued its report on “Supervisory Guidance for Managing Settlement Risk in Foreign Exchange Transactions” in September 2000.

3 CLS –the market’s response to FX settlement risk

In pursuing the reduction of FX settlement risk, the banking industry developed several initiatives. Two multi-currency netting projects, ECHO and Multinet, received an unenthusiastic reception from the banking industry. When CLS was established in 1997, ECHO and Multinet were merged with CLS because banks did not wish to invest in several different initiatives to reduce FX settlement risk and preferred to concentrate their efforts on one project.

General overview of CLS

CLS became the banking industry’s contribution to the G10 strategy to reduce FX settlement risk. Central banks have supported the development of the CLS system and, by November 2002, 67 major financial institutions located in 17 countries had joined the system and had become CLS shareholders. Some 22 banks, i.e. one third of the shareholders, are located in the euro area. CLS Bank was granted a specific banking license in 1999 in New York, limiting its fields of activity. In fact, CLS Bank’s sole function is to engage in FX settlement activities. This design of CLS Bank as a single-purpose bank, was an important factor in gaining the support of central banks. It ensures that CLS Bank cannot expose itself to the risks that ordinary banks take by investing deposits in interbank or customer loans, and that such risks do not impinge on its activities as a settlement bank.

The multi-currency CLS system aims to eliminate FX settlement risk insofar as practicable. It achieves this by applying a strict risk management regime and by settling trades on a payment versus payment (PVP) basis in its own books. In a PVP system, the settlement of the two sides of an FX transaction is synchronised. The settlement of one side of the transaction occurs if – and only if – the other side of the transaction is also settled. The application of the PVP principle means that the debiting of one currency and the crediting of the other currency occurs simultaneously. CLS takes over the function of a trusted third party, making sure that the parties to the FX trade will either be paid the currency they expect to receive or be refunded in another currency. The function of CLS in the settlement process is strictly limited to that of a settlement agent. CLS does not at any point become a counterparty of the participants.

CLS started settling FX transactions on 9 September 2002. Currently seven major currencies are eligible to be settled in CLS, namely the US dollar, the euro, the Japanese yen, the pound sterling, the Swiss franc, the Australian dollar and the Canadian dollar. Participants in the CLS system make their funding payments to CLS through the RTGS systems in their respective currency areas to ensure that such funds are transferred with immediate finality. For this purpose CLS Bank

has opened accounts with the respective central banks. For the funding of euro positions, it has opened an account with the ECB to process euro payments via the ECB Payment Mechanism (EPM), the ECB component of TARGET. The asset that is transferred through the RTGS systems is central bank money, thus ensuring that CLS funding payments do not carry any credit risk or liquidity risk.

Each participant has an account in each eligible currency in the books of CLS. The FX trades of the participants are settled on a gross basis, i.e. each trade is settled individually. There is no netting in the settlement process. However, participants do benefit from a netting effect on the funding of their positions. For all the trades that participants send to CLS for settlement, CLS calculates only one net position per currency. Since participants conduct transactions in different currencies, with different maturities and with different counterparties, the net positions resulting from settlement in a single clearing and settlement system are significantly smaller than the positions resulting from settlement via several settlement arrangements. For example, if bank A sells USD 100 to bank B against euro and buys USD 100 from bank C against Japanese yen, its US dollar position is squared and it does not have to make any US dollar payments. For this reason the value of payments that banks need to make to settle their FX transactions is substantially lower in CLS than in traditional settlement mechanisms.

CLS system design

The design of the CLS system is quite complex. In order for the system to operate properly, the participants need to strictly fulfil their responsibilities as defined in the system rules. These rules also define the risk management features of the system, the operational timeline and the procedures to be followed in the event of a failure by a member to fund its short positions.

The parties involved

There are several parties involved in the CLS system, each performing different functions. *Settlement members* can submit instructions for the settlement of FX trades directly to CLS. Once these instructions are validated, they can be settled provided that they pass the required risk management tests (as described below). Settlement members fund their CLS accounts and receive amounts owed to them from CLS via RTGS accounts with the respective central banks. Settlement membership is the most common form of participation in CLS. To become a settlement member a participant must be a CLS shareholder, operate under an appropriate supervisory regime and fulfil strict financial and operational requirements.

User members also have to be CLS shareholders and can submit instructions directly to CLS. However, user members do not maintain accounts with CLS and therefore have to settle their transactions via a settlement member. User membership may be sought by banks which do not wish to manage their central bank liquidity so actively or which do not have the necessary infrastructure to do so. So far only a few shareholders have indicated an interest in becoming user members. Both settlement members and user members can provide CLS settlement services (*third-party services*) to other banks or corporate customers that are not participants in the CLS system.

For currencies in which settlement members do not have a central bank account or cannot provide sufficient liquidity, they can employ *nostro agents* to make and receive CLS payments on their behalf. For example, a Japanese bank that is an active participant in USD/JPY trading may have ample of liquidity to fund its Japanese yen payments. It may also have a strong position in the United States to cover its liquidity needs. However, its access to euro liquidity may be limited because this is not the focus of its activities. In such a case, the Japanese bank would look for a euro area bank with sufficient

access to euro liquidity to ensure that its euro payments can be made under all circumstances. Nostro agents do not have to be CLS shareholders, but in practice most of them are. Since nostro agents often provide their services to many different settlement members, they have an important role to play in the functioning of the CLS system. They may face significant liquidity demands in cases where many of the settlement members to whom they provide services are in a debit position. Sufficient access to liquidity is therefore indispensable for nostro agents. In addition, they must be operationally robust, as an operational problem on their side could affect a large number of settlement members. Although the responsibility for stable and reliable operation lies with the nostro agents, ultimate responsibility for the timely and accurate provision of funds to CLS still rests with the settlement members. Settlement members therefore need to ensure through service level agreements that nostro agents provide their services in an appropriate and reliable manner.

Liquidity providers play a crucial role in the event that a settlement member fails to honour its pay-in obligation. In such events, CLS will be short of whichever currency the failing settlement member was supposed to pay in and CLS will not be able to complete pay-outs in that currency to the other settlement members. In order to complete pay-outs, CLS will ask those liquidity providers which have made a commitment to provide liquidity up to a certain amount in the currency concerned to swap the needed currency for the currencies that the failing member has a positive balance in. Since CLS tries to obtain liquidity from the failing settlement member as long as possible to complete its normal operations, liquidity providers are only called in very late in the CLS day. Liquidity providers therefore need to respond to CLS requests very quickly. CLS normally requires at least three liquidity providers per currency. However, for smaller currencies there may be only two liquidity providers.

As outlined in the paragraphs above, nostro agents and liquidity providers play a crucial role in the operation of the CLS system. They need to ensure a specific operational capacity and sources of liquidity that can be used in the event of unexpected, increased demand. For these reasons, the ECB requires nostro agents and liquidity providers in euro to have direct access to TARGET and unrestricted access to Eurosystem intraday and overnight credit. These conditions can only be met by institutions that are located in the euro area.

Risk management features

The CLS system has been designed to eliminate FX settlement risk. In order to strike an appropriate balance between credit risk, liquidity risk and settlement efficiency,³ CLS allows participants to incur debit balances on condition that these debit balances are always “collateralised” by corresponding credit balances in other currencies. Several features have been integrated into the system design that allow for an appropriate management of risks. Every transaction is checked against three different risk management criteria and settled only if all three checks are passed.

First, there is the maximum debit balance which a settlement member is allowed to incur in any one currency. This is called the *short position limit* and varies from currency to currency. For each currency this limit is the same for all settlement members. For the euro, it is set at €1 billion. The value of the short position limit depends on the amount of liquidity that has been committed by liquidity providers in the currency concerned and is calculated in a way that ensures sufficient liquidity even if the participant with the largest debit position in that currency fails to honour its obligation. For the euro, there are four liquidity providers, each of which has committed €500 million. In

³ CLS could completely eliminate credit risk if it only allowed settlement out of positive balances in the respective currencies. However, this would significantly increase the time-criticality of liquidity demands in these currencies and considerably reduce the settlement efficiency of the system. In addition, it would increase the impact of a participant's pay-in failure.

the event that a settlement member that is also a euro liquidity provider has a €1 billion short position and fails to make its pay-ins, euro liquidity facilities would still amount to €1.5 billion, thus exceeding the shortfall by €500 million.

Second, there is the maximum total debit balance that a settlement member is allowed to incur (the total of all debit balances in all currencies). This is called the *aggregate short position limit* and is defined individually for each settlement member according to the size of its Tier I capital and its short-term credit rating. The higher the capital and the better the short-term credit rating, the higher the aggregate short position limit. The maximum aggregate short position limit allowed for any settlement member is the equivalent of USD 1.5 billion.

Third, all settlement members are required to maintain a *net positive overall account value* with CLS at all times. This is a logical consequence of the fact that CLS is not allowed to extend credit to its settlement members. In order to protect CLS against market risk (i.e. the risk that credit positions in one currency that CLS holds as collateral for a settlement member's debit position in another currency might depreciate as a result of market fluctuations), haircuts are applied to debit and credit balances in all CLS accounts.

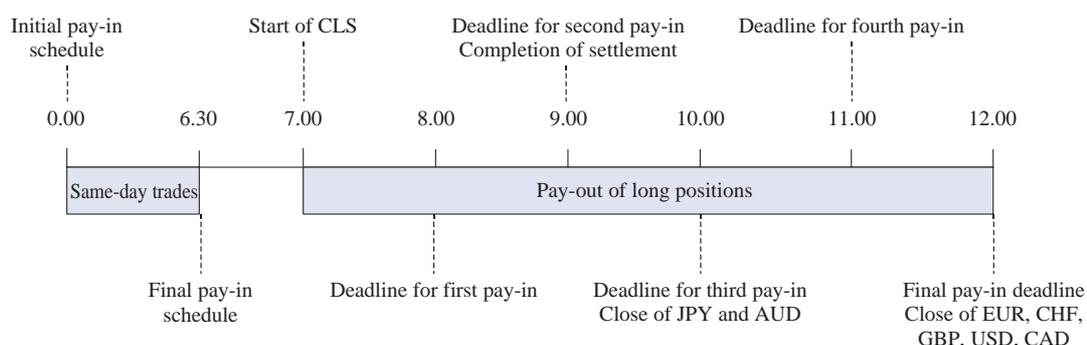
The CLS daily timetable

The CLS timeline is very strict. It requires settlement members to make their (potentially very high-value) funding payments in a very limited time frame and by predetermined deadlines. European settlement members benefit slightly from this timeline since CLS operates at a time (7 a.m. to 12 noon CET) when European financial markets are open and fully liquid. In the Asia/Pacific region CLS operates very late in the business day (when the northern hemisphere is on winter time, CLS closes at 8 p.m. local time in Australia), and in North America it operates at night (1 a.m. to 6 a.m. Eastern Standard Time).

In general, settlement members first pay funds into CLS's central bank accounts in the currencies in which they have an overall short position. Once these pay-ins have been received, CLS starts the settlement process in its own books. If the settlement process is sufficiently advanced and funds are no longer needed for settlement, CLS pays out of its central bank accounts the currencies in which the settlement member has an overall long position. On a normal day, the more detailed timeline would be as shown in Chart 2.

Settlement members submit their FX settlement instructions to CLS before the actual settlement day. CLS matches the

Chart 2
CLS daily timeline (CET)



instructions of the two parties that have agreed on an FX trade and, based on these settlement-eligible instructions, calculates the long/short positions of the settlement members in the seven eligible currencies. At 12 midnight CET, CLS establishes an initial pay-in schedule for each settlement member (see Box 1 for an example for one settlement member) listing the preliminary positions and pay-ins in each currency and sends these pay-in schedules to the settlement members.

After 12 midnight CET, settlement members can bilaterally agree on additional trades to be settled on that day or to cancel trades that had been submitted at an earlier stage. These transactions are primarily conducted in order to reduce pay-in requirements, as is illustrated by the fact that in/out swaps (see Box 2) are currently the most common type of same-day trade. At 6.30 a.m. CET, CLS

issues a final pay-in schedule that takes into account the trades agreed upon since the issuing of the initial pay-in schedule. The final pay-in schedule lists the minimum funding which settlement members have to make in each currency by a specific time.

At 7 a.m. CET, the CLS system starts its daily operations. Settlement members start making their funding payments and CLS starts the settlement process, always respecting the risk management procedures explained in the previous section. The pay-in schedule is calculated in such a way that all trades can be settled by 9 a.m. CET. The time remaining until the close of the CLS system is used to make the outstanding funding payments in the currencies in which settlement members have a short position and to make the respective pay-outs.

Box 1

Example of a settlement member's pay-in schedule

The pay-in schedule that CLS calculates for each settlement member is based on the positions that are projected to build up after all trades from this settlement member are settled. In our example, the settlement member ends up with long positions (i.e. pay-outs) in CAD, JPY, CHF and GBP and a short position (i.e. pay-ins) in AUD, EUR and USD. CLS divides the short positions into various instalments that have to be paid by the respective pay-in deadlines.

Pay-in schedule for an individual settlement member (cumulative amounts in millions of units for each currency)						
	Projected net position	By 8 a.m. CET	By 9 a.m. CET	By 10 a.m. CET	By 11 a.m. CET	By 12 noon CET
AUD	-300	-100	-250	-300	-300	-300
CAD	400	0	0	0	0	0
EUR	-500	-100	-280	-300	-400	-500
JPY	200,000	0	0	0	0	0
CHF	3,000	0	0	0	0	0
GBP	800	0	0	0	0	0
USD	-4,500	-900	-3,800	-3,800	-4,200	-4,500

The pay-ins take into account the fact that all payments in the Asia/Pacific currencies have to be made by 10 a.m. CET because the local RTGS systems close soon thereafter. Therefore, in our example, AUD pay-ins have to be completed by that time. The instalments are not divided equally as the CLS risk management procedures have to be respected. This means that pay-ins have to be calculated in such a way that all trades are settled by 9 a.m. CET. Consequently, in order to respect the short position limits for each currency, the aggregate short position limit and the net overall positive value of this settlement member at all times, the 9 a.m. CET pay-in in USD becomes quite large. Pay-ins by 10 a.m. CET have to be sufficiently large to enable CLS to complete the pay-outs of JPY.

Box 2

Rationale and drawbacks of in/out swaps

Settlement members' funding payments for the CLS system are highly time-critical and can grow quite large at times. As Box 1 illustrates, the settlement member in the example would have to pay in USD 3.8 billion by the 9 a.m. CET deadline, which is 3 a.m. Eastern Standard Time. In order to reduce this time-critical liquidity demand, banks have created an automated tool for swapping CLS positions for positions outside of CLS. Banks buy the currency in which they have a considerable short position in CLS (e.g. USD) and sell a currency in which they are long in CLS (e.g. CHF). In order to do so, they find another settlement member that has the opposite needs and agree on an FX deal to be settled the same day in CLS. Since the deal changes the FX positions of both banks, the two settlement members reverse the deal outside CLS (in this example the first settlement member would buy CHF against USD from the second settlement member in the market outside of CLS) and settle the deal on the same day. These transactions, called "in/out swaps", have the advantage of allowing settlement members to use the entire business day to raise sufficient liquidity to make this very large payment. However, they do have the drawback of re-introducing FX settlement risk for the outside leg of the swap. The ECB understands that banks find this tool useful for liquidity management in the early stages of CLS but expects in/out swaps to be phased out once banks are sufficiently acquainted with CLS and sufficient volume has been reached to reap high net funding benefits.

In/out swaps are not used by all settlement members because this is a tool that can only be used at a very late stage (between the issue of the initial pay-in schedule and the issue of the final pay-in schedule) and because of the investment and operational capabilities needed (it requires banks to operate on almost a 24-hour basis). For these reasons, some settlement members have developed an alternative tool whereby they post their CLS positions in the different currencies on a Reuters screen on the day before settlement and try to find solutions (e.g. outright trades, forward trades or swaps) to reduce their liquidity demands on the settlement day.

In contrast to the pay-ins that have to be made by predetermined deadlines, CLS does not pay out its dues according to a specific schedule. Long balances are paid out as soon as possible, but only if CLS's central bank account in the relevant currency has sufficient funds. As a general rule, Asia/Pacific currencies are paid out first, since these RTGS systems close first, and large balances are paid out before small balances. Pay-outs can only be made if settlement members maintain a net overall positive account balance after the pay-out has been made. A pay-out algorithm is used to calculate the pay-outs in a way that limits the drainage of liquidity in the relevant RTGS systems.

If all funding payments have been made according to the pay-in schedule, CLS concludes the pay-outs in JPY and AUD shortly after 10 a.m. CET, since the respective RTGS systems close soon afterwards. Short positions in European and North American currencies can be covered until 12 noon CET

and final CLS pay-outs should be completed soon thereafter.

CLS failure management

CLS has implemented several procedures to help the system to complete settlement of the trades submitted to it and to ensure that settlement members receive the currency of the transactions they have settled via the system in the event that a settlement member fails to pay in.

If a settlement member fails to make its first pay-in, CLS sends a pay-in call for account value immediately after the 8 a.m. CET deadline. At the same time it temporarily suspends pay-outs from the account of the settlement member until it has covered the shortfall. If, owing to this pay-in failure, some transactions in the settlement queue remain unsettled by the 9 a.m. CET settlement completion time, CLS issues pay-in calls for

settlement to those (non-failing) settlement members whose instructions have not yet been completely settled. Should any settlement member still be in a debit position when a currency is about to close (10 a.m. CET for Asia/Pacific currencies and 12 noon for European/North American currencies), CLS issues a pay-in call for currency close to any such settlement members asking them to make up the shortfall. If that call is not honoured, CLS resorts to the liquidity providers in the respective currency, asking them to swap this currency against any other currency on the CLS accounts. Upon receipt of this liquidity, CLS completes the pay-outs by transferring any amounts still due to the settlement members. On the next business day, CLS reverses the swap with the liquidity provider and the failing settlement member has to bear the costs of that transaction (plus penalties).

In the extreme case of a failure by more than one settlement member or liquidity provider, the committed liquidity facilities may not be sufficient to complete the pay-outs. In such cases, CLS may either resort to non-

committed credit lines that it has arranged with some institutions, pay out alternative currencies that it has in its central bank accounts, or carry these balances over to the next business day and exchange them for the correct currencies on that day.

Loss allocation

In CLS, losses can only occur if a settlement member fails and, at the same time, there is an adverse movement of exchange rates against the currencies in which the failing participant has a credit balance. As explained above, CLS uses the credit positions of a settlement member in one currency to collateralise its debit position in another. Should the currency of the credit position depreciate beyond the level of the haircuts against the currency of the debit position, the collateral currency may not be sufficient to close out the debit position. In such a case, any resulting loss would be apportioned to the settlement members that traded with the failing settlement member on the day it failed.

4 The role of central banks in CLS

Central banks have had a close relationship with CLS right from its inception in 1997. This is not surprising since CLS is the response of the banking industry to the central banks' objective of reducing FX settlement risk. CLS welcomed the comments of the G10 central banks throughout the development phase of the project and the G10 central bank governors have also voiced their support for the system. Central banks are closely involved in two areas. First, central banks oversee the CLS system and, second, they provide account and settlement services to CLS.

Central banks are now also looking into whether it would be advisable to use CLS for the settlement of their own FX operations.

The co-operative oversight framework of the G10 central banks

Oversight of the CLS system is carried out according to the framework for cross-border and multi-currency schemes as defined in the Lamfalussy Report.⁴ The Federal Reserve System provides the lead oversight since CLS Bank is located in the United States. The Federal Reserve System also co-operates with the central banks of the other eligible currencies and the central banks of other countries in which settlement members are located. The ECB is the overseer for the euro, and in this capacity it has assessed the risks that inclusion in CLS would bring to the

⁴ "Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries", BIS, Basel, November 1990

euro. In co-operation with the central banks of the other eligible currencies, the ECB has assessed the CLS system against the standards defined in the Lamfalussy Report. In addition, it has assessed the risks specific to the euro area. The ECB concluded that, in general, euro FX transactions would be settled safely and efficiently in the CLS system and that the system should not give rise to undue risks for the euro money market and payment systems. Hence it approved the inclusion of the euro in the list of eligible CLS currencies. The central banks of the other eligible currencies reached similar conclusions for their currencies and, eventually, the Federal Reserve System approved the start of live operations for CLS.

Central banks' operational involvement

Besides the oversight function, central banks also have an operational role in CLS. They provide accounts and, in most cases, settlement services for CLS. In this capacity, the ECB has opened a customer account for CLS and both

funding payments from and pay-outs to settlement members are processed via the EPM and consequently via TARGET. Given the time criticality of CLS payments, the Eurosystem has strengthened its contingency arrangements for TARGET to care for possible operational failure scenarios. Similar measures have also been taken by the central banks of other eligible currencies. In order to avoid systemic risks in the event of operational problems, in February 2001 the Eurosystem and the European banking industry reached agreement on the "Recommendations for CLS payments in euro". According to these recommendations, which are not legally binding, banks will try to make CLS-related payments sufficiently early and are prepared to reduce the number of such payments in the event of operational problems. The Eurosystem tries to assist banks in solving problems related to the submission of CLS payments. On the basis of these recommendations, the strengthened TARGET contingency arrangements have been successfully tested under live conditions in co-operation with the European banking community.

5 The expected impact on the euro market

In its regulatory approval process for CLS, the ECB placed special emphasis on assessing its impact on euro markets. It concluded that the CLS system would create new challenges for banks' liquidity management but that, overall, banks should be able to manage their positions both under normal circumstances and in case of a pay-in failure of a participant. An analysis of the liquidity impact on euro large-value payment systems showed that all systems would probably experience a reduction in values and volumes.

The following sections discuss these analyses in more detail in light of the initial experience of live CLS operations. The analysis is based on information provided by CLS and has been discussed extensively in meetings with euro area CLS shareholders.

The role of the euro in CLS

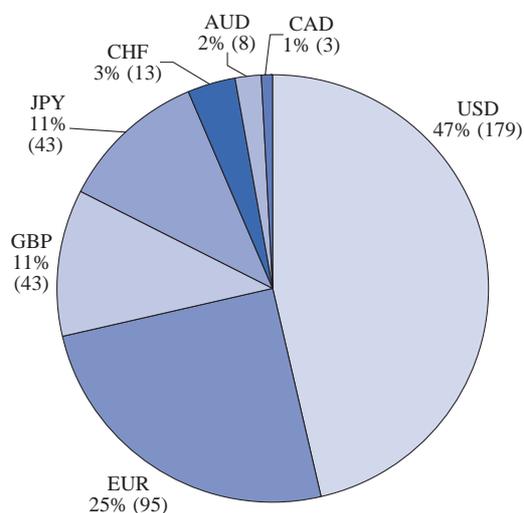
The settlement members have supported the start of CLS by quickly increasing the number and value of FX trades they conduct through the system. In November 2002, the daily value of FX trades settled in CLS was around USD 192 billion. Given the estimated total daily turnover of the whole FX market (USD 1.2 trillion in April 2001), this accounted for around 16% of all FX activities.

The euro is the second most settled currency in CLS, with a settlement value of 25% of all FX trades in November 2002. The US dollar share is 47%.

Chart 3

Settlement values within CLS by currency in November 2002¹⁾

(shares in %, average daily values in USD billion equivalent)



1) The value of settled transactions in each currency amounts to double the value of trades because every trade involves two settlement legs, one in each currency.

Impact on large-value payment systems

The ECB analysed the probable medium-term impact of CLS on the number and value of payments settled in individual large-value payment systems operating in euro. According to these analyses, the two most used systems for the settlement of FX trades in euro are TARGET and EURO I. Before the start of CLS, TARGET was estimated to

account for 62% of the total value of FX trades in euro, compared with 32% for EURO I. The remaining 6% are settled via smaller euro large-value payment systems.

The settlement members of CLS have indicated that in the medium term the value of FX trades involving euro that they intend to conduct through CLS on a daily basis would be around €271 billion. This would account for around 55% of the total value of the FX market in euro (with an estimated value of around €495 billion in 2001). If it is assumed that the settlement of FX trades would be transferred in equal measure from TARGET and EURO I to CLS, a rough estimate for the reduction of payments in these systems can be calculated. On the basis of this assumption, the value of payments settled in TARGET would shrink by a maximum of €185 billion per day in the medium term (a 12% decrease), and the value of payments settled in EURO I would fall by €77 billion (a 37% decrease). In terms of the number of payments, the reduction would be more modest, at around 13,000 (5%) in TARGET and 10,000 (9%) in EURO I.

Table I below summarises the estimated effects of CLS on the two main large-value payment systems in euro. The medium-term estimate relates to a scenario in which CLS has a 55% market share in the settlement of FX transactions while the maximum impact relates to a scenario in which all FX

Table I

The impact of CLS on daily values and volumes settled in TARGET and in EURO I

	Daily value of payments		Daily number of payments	
	TARGET	EURO I	TARGET	EURO I
	EUR billions	EUR billions	Thousands	Thousands
Turnover	1,485	208	264	114
Absolute reduction in turnover				
Medium-term estimate	185	77	13	10
Maximum impact	338	140	41	30
	%	%	%	%
Relative reduction in turnover				
Medium-term estimate	12	37	5	9
Maximum impact	23	67	15	26

transactions in euro are settled via CLS. The degree to which the reduction in values and volumes caused by CLS will be compensated by other factors still remains to be seen.

In November 2002 the value of FX transactions involving euro that were settled in CLS was €96 billion (i.e. one-third of the medium-term estimate). As a result, the impact on euro large-value payment systems has been rather modest so far. However, in the longer run, as settlement members bring more FX trades to CLS, new settlement members and third parties enter the system, and as the number of currencies eligible for settlement in CLS increases, the reduction in the number and value of payments will probably be more marked.

Impact on banks' liquidity management

The reduction in payments that banks need to make in euro large-value payment systems will free payment capacity for the banks, and also reduce their liquidity needs in general. However, although the nominal amount of payments that need to be made to settle FX trades is reduced, the payments to CLS, which can be unexpectedly high, need to be made at specific points during the morning (CET). Currently, banks are able to operate with relatively low levels of liquidity compared with the value of payments they make in a real-time gross settlement system by synchronising their outgoing payments with payments they receive from other banks. In the CLS system banks can no longer wait for incoming payments to fund their CLS pay-ins, and the introduction of these "timed payments" to CLS presents a new challenge to the liquidity management of many banks.

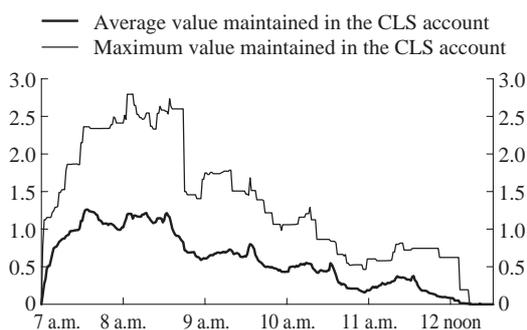
In addition, although settlement members can estimate their probable pay-in requirements to CLS in advance, they do not know the precise amounts until the start of the settlement day. As a result, while liquidity requirements in general should decrease, temporary requirements might increase from current levels. Careful management of

liquidity and monitoring of positions is therefore indispensable.

In simulations carried out by CLS prior to the introduction of the system, the daily pay-in requirements in euro amounted to an average of €15.6 billion (ranging from €10.0 billion to €22.7 billion on individual days). By making use of in/out swaps the average total pay-in requirements could be reduced to around €4.7 billion. In November 2002 pay-ins in euro amounted to €4.1 billion on average.

Another aspect that was analysed in the development phase of CLS was the amount of liquidity that CLS would maintain in its accounts during the day. Owing to the fact that the pay-ins to fund short positions are made to CLS before it pays out the long positions, some euro liquidity is blocked in the CLS account in the EPM. Simulations carried out by CLS showed that an average balance of only €500 million would be maintained in its account in the EPM between 7:30 a.m. and 10 a.m. CET. Relative to the available liquidity in TARGET, this is not very high and therefore the overall liquidity level of TARGET was not expected to be substantially affected. Chart 4 shows the average account balance of CLS in November 2002. The liquidity maintained in the CLS account has been somewhat higher than expected. On average, the CLS daily balance between 7:30 a.m. and 10 a.m. CET amounted to €919 million. The highest balance seen during November was €2.8 billion.

Chart 4
Funds maintained in the CLS account in euro in November 2002
(value, EUR billions)



Impact of pay-in failures

Before giving its approval for CLS to start operations, the ECB investigated the consequences of settlement members failing to provide CLS with the required pay-ins. Particular attention was given to compliance with Lamfalussy Standard IV, as defined in the Lamfalussy Report, which stipulates that the system should be capable of ensuring the completion of settlement in the event of an inability to settle by the participant with the largest single settlement obligation. The conclusion of the analysis was that CLS was considered to meet this standard. The systemic consequences of such an event in CLS would be mitigated to a high degree by the risk management facilities available in CLS.

It was noted, however, that the failure of a member to pay in would probably result in a substantial amount of trades that could not be settled with the failing member. In addition, to complete the settlement of all trades between non-failing members, a small number of settlement members would occasionally need to provide CLS with large amounts of additional funding.

No serious incidents affecting the smooth settlement of FX trades in CLS have been experienced since the system went live.

Possible consequences for market structure

CLS has been operational for only a few months and a full assessment of its consequences for the market structure is therefore not yet possible. However, a number of topics have been discussed in industry fora concerning the possible implications of CLS.

For FX trades settled in CLS, settlement risk is largely eliminated. If this risk were priced, settlement in CLS would be "less expensive"

than traditional FX settlement. It is conceivable that spreads between buy and sell prices could be narrower for trades settled in CLS than for trades settled through traditional channels. However, it remains to be seen whether such a two-tier pricing of FX trades will emerge.

Intraday liquidity has a value because funds that are received early in the day can be used for settling payments later on that day. However, the pricing of credit is still based on value dates, and no market for funds that are paid back on the same day exists. Currently, the major source of intraday liquidity in euro is the intraday credit granted by the Eurosystem against eligible collateral. The collateral used for acquiring credit from the central bank cannot be used elsewhere (e.g. for securities lending), and the use of collateral therefore carries an opportunity cost. Since the start of CLS the need for liquidity only at specific points in time during the day has increased. This could become a trigger for the development of an intraday money market. However, it should be noted that the need for such a market is not evident, as central banks currently provide intraday credit free of interest. Also the operational cost of organising a liquid intraday money market would probably exceed the current opportunity cost of collateral.

A further issue that has been triggered by CLS, and which is being discussed extensively within the banking community, is the possibility of raising central bank liquidity against collateral held in foreign countries. Such a facility, called a cross-border collateral pool (CCP), would increase the ability of banks to raise intraday credit in foreign currencies. The exact benefits and costs, and the need for central bank involvement in creating the necessary infrastructure, are currently being discussed. A private sector CCP Task Force has been established to study these issues, and proposals to go forward are expected in early 2003.

6 Conclusions

CLS is the market response to the G10 central banks' efforts to reduce risks in FX settlement. These central banks were closely involved throughout its long development phase. CLS commenced operations in September 2002 after having gained the approval of central banks for the inclusion of their respective currencies in CLS and after final approval by the Federal Reserve System in its capacity as the lead overseer of the system.

For trades settled in CLS, the FX settlement risk is largely eliminated. On the other hand, CLS creates new challenges for the participating banks, especially in the field of liquidity management. It also establishes closer ties between the settlement

infrastructures of the countries whose currencies are settled in it. This also means that problems experienced in one country can swiftly spill over to systems in other countries. However, the risk management features in CLS should sufficiently mitigate these effects.

Finally, CLS has only been operating for a few months. The number of settlement members is still growing and turnover is still being built up. A more detailed analysis of its effects on the parties involved, on euro payment systems and on the structure of the market in general will be carried out by the ECB when more experience has been gathered and adequate statistics on CLS operations are available.