



C SECURITIES SETTLEMENT SYSTEMS AND FINANCIAL STABILITY

INTRODUCTION

Securities settlement systems form an essential part of the financial market infrastructure. If they are badly designed, they may contribute to severe disruption of the functioning of financial markets. Awareness of the importance of securities settlement systems is especially high in Europe, as the European securities settlement infrastructure has been changing rapidly in many ways (see Section 6.2 of this report).

This Special Feature describes the most important reasons why robust securities settlement systems are important for safeguarding financial stability, and states how they should be designed to ensure that they do not contribute to instability in financial markets. The process of securities settlement is briefly described in the next section, while subsequent sections go on to discuss in detail the relationship between securities settlement systems and financial stability.

SECURITIES SETTLEMENT AND SECURITIES SETTLEMENT SYSTEMS

The trading of securities involves the reaching of an agreement between two parties – a buyer and a seller – to exchange securities at an agreed price for other assets, typically money. Trading constitutes an obligation to deliver, but not a delivery process in itself. Securities settlement involves the actual transfer of securities from the seller to the buyer. Put more generally, *securities settlement is the transfer of legal ownership in (or other rights related to) securities from one party to another*. Securities settlement systems are entities that provide securities settlement services.

Usually, all shares in a given security are safe-kept for their entire lifetime in a single place, the primary depository for the issue. The security is described as being *immobilised*, as shares are never physically moved from one place to another. The security may still exist

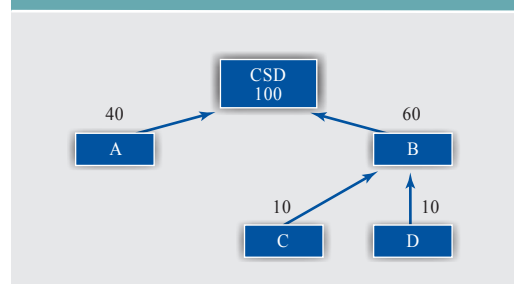
in the form of physical papers. However, most securities are *dematerialised*, i.e. they exist only electronically in the form of a computer entry. Many countries have established entities that serve as the primary depository for (almost) all securities issues or for (almost) all issues of certain types of securities (e.g. equities). Such entities are known as *central securities depositories* (CSDs).

In the case of immobilised securities, ownership is usually established in the form of securities account entries.¹ An owner of shares must have a direct or an indirect securities account relation with the CSD or primary depository. In Chart C.1 *A* and *B* have securities accounts directly with the CSD, while *C* and *D* have accounts with *B* and are thus indirectly linked to the CSD. 100 shares of an issue are safe-kept in the CSD; 40 shares are held on *A*'s account with the CSD, and so on. Account holdings oblige the use of a double-booking principle. This means that, for a given issue, the number of shares safe-kept in the CSD must equal the number of shares on accounts with the CSD. Furthermore, the number of shares any entity owns must equal the number of shares the entity holds on accounts with other institutions, minus the number of shares other institutions hold on accounts with the entity. Accordingly, *A* owns 40-0, *B* owns 60-20 and *C* and *D* own 10-0 shares.

Securities settlement now only requires account entries to be changed. If the sender and the receiver of shares both have an account with

¹ Sometimes ownership is not established by account entries, but instead by registration in a so-called registrar.

Chart C.1 Securities account relations – an example



the same entity, settlement simply requires that the shares to be transferred are debited from the account of the sender and credited to the account of the receiver. If for example the ownership in 20 shares is to be transferred from *A* to *B* (from *C* to *D*), 20 shares must be debited from *A*'s account with the CSD (*C*'s account with *B*) and credited to *B*'s account with the CSD (*D*'s account with *B*). Settlement becomes more complicated if, for example, the sender (e.g. *A*) has an account with the CSD, whereas the receiver (e.g. *C*) has an account with an intermediary (e.g. *B*) that itself has an account with the primary depository. The shares now have to be debited from the sender's account with the CSD, credited to the intermediary's account with the CSD and credited to the receiver's account with the intermediary.²

Entities which, like *B* in the above example, serve as intermediaries between banks and primary depositories such as CSDs, are referred to as custodian banks. Custodian banks and CSDs are the most important settlement service providers in securities markets. Custodian banks, unlike CSDs, usually do not act as the primary depository, but only as intermediaries in the settlement process. Furthermore, again unlike CSDs, they typically provide the full range of banking services and not only settlement services. Table C.1 shows the value of securities held on accounts with the largest custodian banks, while Table C.2 complements this with information on the value of securities held on the accounts of the largest CSDs in the EU.

All in all, securities settlement is by and large based on securities account networks. It is important to note a special characteristic of securities accounts that distinguishes them from cash accounts: securities on securities accounts with a bank (or another entity) are not a liability of the bank. As a consequence, the securities owners do not lose their securities if the bank goes bankrupt, provided that securities settlement is governed by a sound legal basis.

RISKS ORIGINATING FROM PARTICIPANTS IN SETTLEMENT SYSTEMS

Risks to financial stability can originate in the activities or financial condition of participants in settlement systems. Well-designed settlement systems can contribute to mitigating these risks.

For example, one party in a securities transaction, say the buyer, could go bankrupt before settlement so that the transfer of money from the buyer to the seller becomes impossible. If the settlement system transfers the ownership of the securities from the seller to the buyer, then the seller loses up to the full value of the securities (principal risk). If the loss is sufficiently large, the seller may go bankrupt as well, imposing risks – including the possibility of bankruptcy – for creditors of the seller, etc. To avoid contagion effects such as this, settlement systems should settle in delivery versus payment (DVP) mode. DVP means that the settlement system ensures that ownership in securities is transferred from the seller to the buyer if and only if ownership in money is transferred from the buyer to the seller.

It should be noted that the introduction of DVP simply leads to a potential reallocation of claims on a bankrupt bank. Consider the following example with three banks *A*, *B* and *C*. Assume that *B* has liabilities towards *C* of 25 and assets with a value of 10. *A* is not aware of the weak financial situation of *B* and sells securities with a value of 50 to *B*. Without DVP, the settlement system might transfer at settlement day the securities from *A* to *B*. However, since *B* has insufficient funds for the transaction, *A* receives nothing from *B*. *B* will now have assets with a value of 10+50 and liabilities towards *A* of 50 in addition to the liability towards *C* of 25. When *B* is declared bankrupt, *B*'s assets may be divided among the creditors proportionally so that *A* receives 40 and *C* 20. *A* will have lost 10 and *C* 5. However, with DVP, the transaction between *A* and *B* is cancelled, so that *A* loses

² In a handful of cases, not all shares in a security issue are safe-kept in a single entity, but are instead spread between different places. Settlement may now require the movement of shares, in the form of physical papers, from one place to another.

Table C.1 Custodian banks: assets under custody (USD billions)

Rank	Name	Worldwide Assets	Cross-Border Assets ¹	Domestic Assets ²	Reference Date
1	State Street	9100	n.a.	n.a.	30/06/2004
2	The Bank of New York	8662	2425	6237	30/06/2004
3	JPMorgan	8014	1897	6117	31/03/2004
4	Citigroup	6640	4405	2235	31/03/2004
5	Mellon Group ²	2903	763	2140	31/03/2004
6	BNP Paribas Securities Services	2790	2203	587	30/06/2004
7	UBS AG	2398	Na.	n.a.	31/03/2004
8	Northern Trust	2300	824	1476	31/03/2004
9	HSBC Global Investor Services	1572	755	817	31/03/2004
10	Société Générale	1329	784	545	31/03/2004
11	Investors Bank & Trust	1202	196	1006	30/06/2004
12	RBC Global Services	1182	671	511	30/04/2004
13	Credit Suisse Group	1119	n.a.	n.a.	31/03/2004
14	Credit Agricole Group	1010	301	709	30/06/2004
15	Brown Brothers Harriman	1000	708	292	30/06/2004
16	Wachovia	946	7	939	31/03/2004
17	CDC Ixis	623	80	543	01/01/2003
18	Banca Intesa	550	350	200	01/01/2004
19	Nordea Bank	466	79	387	30/09/2004
20	Fortis Bank	450	294	156	31/01/2003
21	UniCredito Italiano SpA	414	271	143	01/01/2004
22	PFPC	400	21	379	01/01/2004
23	Dexia Fund Services	382	382	0	31/07/2004
24	ING	375	n.a.	n.a.	30/09/2003
25	SEB Merchant Banking	340	n.a.	n.a.	30/06/2004
26	KAS BANK	292	107	185	31/03/2004
27	SIS SegalInterSettle AG	242	242	0	01/01/2004

1) Investor and issuer located in different countries.

2) Investor and issuer located in the same country.

Source: Globalcustody.net (2004).

nothing and *C* receives 10, i.e. *B*'s remaining assets. *C* has now lost 15.

Table C.2 EU CSDs: assets under custody (EUR billions)

Name	Country of location	Worldwide assets	Reference date
Euroclear Group		12700	30/06/2004
<i>Of which:</i>			
Euroclear Bank	Belgium	5700	
Euroclear France	France	3700	
CREST	UK	2600	
Euroclear Netherlands	Netherlands	700	
Clearstream International		7300	31/12/2003
<i>Of which:</i>			
Clearstream Luxembourg	Luxembourg	2900	
Clearstream Frankfurt	Germany	4400	
Monte Titoli	Italy	2043	31/12/2003

Source: CSD homepages.

As this example shows, DVP reduces the losses that trading partners (bank *A*) with a bank may incur if the bank (bank *B*) goes bankrupt. But it increases the potential losses of the bank's other creditors (bank *C*), as they will have to bear the losses the trading partners would have incurred without DVP. However, the other creditors might in general be better prepared to cope with such losses than the trading partners of the bank. Trading partners are exposed to risks only for a short period, the time between the execution and the settlement of the trade. They may therefore consider costly risk management measures unnecessary. The other creditors often give longer-term credit so that risk mitigation measures seem more appropriate. If this were not the case, DVP would not necessarily reduce contagion risk.³

3) DVP not only reduces the risk of contagion, it also increases the readiness to trade as it protects trading parties against losses. As a result, DVP markets more liquid and thus more efficient.

Today, all CSDs in the EU offer internal settlement in DVP mode. Custodian banks, however, typically do not settle in DVP mode. Instead, they guarantee successful settlement and thus bear the risks themselves, arguing that they, as banks, are able to apply appropriate risk management measures to reduce their own risk exposure.

DVP does not address all systemically relevant risks. If, for instance, the seller in a securities transaction is unable to fulfil a delivery obligation at settlement day on account of not having the securities, DVP settlement is postponed and may be cancelled entirely after a certain time. Before this happens, the buyer however may have already sold on the securities to a third party, who also may then be unable to fulfil a delivery obligation in time, etc. To help avoid this type of contagion effect, CSDs often organise securities lending programmes. If a participant in the CSD has an uncovered delivery obligation, this participant will automatically receive a securities loan from another participant against collateral.

Related problems may arise if the CSD uses so-called multilateral netting. In the most common type of multilateral netting, multilateral cash netting, transactions are not settled one after another. Instead, many transactions between various participants are collected and net cash positions are calculated for each one. Then, only the net cash positions are transferred from one participant to another. If, for example, bank *A* sells securities to bank *B* for EUR 50 and to bank *C* for EUR 20, while *C* sells securities to *B* for EUR 10, *A*'s net cash position is +70, *B*'s position is -60 and *C*'s position is -10. EUR 60 must be transferred from *B* to *A* and EUR 10 from *C* to *A*. If, for example, *C* does not have enough liquidity to settle its cash obligation of EUR 10, it is not possible to settle the calculated position. The calculations are obsolete and must be unwound. This means that new calculations must be carried out from which the transaction between *C* and *B* is excluded. This may substantially delay the settlement of all transactions and thus give

rise to contagion effects that could disrupt the financial market. CSDs can avoid or strictly minimise unwinding risks if they calculate (net and gross) positions under the constraint that they have to be covered.

Finally, disruption can occur if the settlement system transfers the ownership of securities to the wrong party because a participant has sent incorrect instructions to the system. CSDs can help to mitigate the consequences of such errors if they ask for instructions from both parties, the sender and the receiver, and only transfer assets if there is clearly no mismatch between the two sets of instructions.

RISKS ORIGINATING FROM THE SETTLEMENT SYSTEM ITSELF

Risks to financial stability can also have their origin in the activities of or the financial condition of the settlement system itself, for the simple reason that many settlement systems, especially CSDs, but also large custodian banks, are systemically important. Large parts of financial markets often rely on a single settlement system. If this system does not operate properly or breaks down completely, the disruption can be significant.

A major concern in this respect is a system's operational reliability. The probability that a system will face technical problems should, of course, be minimised. For example, the capacity of the system should be high enough to cope with peak volumes. However, as technical problems can still occur, it is especially important to limit any adverse impacts. To avoid loss of information, the system should frequently make data backups. After a technical breakdown, perhaps resulting from a disaster such as a terrorist attack, it should be possible to continue business as normal, resuming operations from a second site.

Another concern is the financial soundness of the settlement system. Most CSDs are prohibited by the authorities from granting credit. However, some do grant (secured and

unsecured) credit to their participants, especially the two international CSDs, Euroclear Bank and Clearstream Banking Luxembourg. They do this mainly to assist participants in covering otherwise uncovered settlement obligations, so that the contagion effects described in the previous section can be avoided. On the other hand, if participants default on such credits, the settlement system itself could run into difficulty. For this reason, central banks and regulators argue that CSDs should only grant unsecured credit to a very limited extent and should generally put in place rigorous risk control measures to mitigate credit risk.

Custodian banks grant credit to an even larger extent than CSDs, as the former carry out their normal banking business in addition to their settlement business. A default of a custodian bank may therefore seem to be more likely than a default of a CSD. On the other hand, the impact of a default of a custodian bank may be less severe, as one custodian bank may relatively easily take over the custody business of another. Furthermore, the settlement business of CSDs does not rely on custodian banks, whereas custodian banks rely on settlement services provided by CSDs as CSDs are essential as primary depositories (see Chart C.1).

Finally, human error in settlement systems can lead to incorrect transfers or losses of securities followed by contagion effects. Dematerialisation of securities, automation of procedures and double-checking might help to avoid such problems.

RISKS ORIGINATING FROM OTHER SOURCES

Another source of risks is the system used for communication between the settlement system and its participants or between different settlement systems. If communication is disrupted, then settlement – and with it large parts of the financial markets – can be disrupted. The communication system must therefore be reliable. Additionally, the settlement system should have alternative communication systems available in case one system cannot be used.

Finally, securities settlement must be based on a sound legal basis. Legal uncertainty, especially in times of crisis, could cause or magnify problems with a systemic impact.

CONCLUDING REMARKS

By late 2004, very few incidents with a significant systemic impact had been reported in the EU securities settlement industry. The significant systemic impact that such incidents may have strengthens the keen awareness among central banks, regulators and the market that settlement systems are crucial for the functioning of financial markets. All have constantly pressed for improvements when needed. At least in the case of CSDs in the EU, DVP settlement, securities lending programmes, arrangements to avoid unwinding in net settlement and facilities to improve operational reliability are commonly in place. Overall, the risk that financial instability could be caused by or spread through settlement systems seems to be limited.