

# RISK MANAGEMENT IN NETTING SCHEMES FOR SETTLEMENT OF SECURITIES TRANSACTIONS

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## 1 Introduction

Settlement of securities transactions executed at a stock exchange or on an OTC market can be organized in several different ways. Most often the settlement of Stock Exchange transaction is done on a net basis, however, also gross settlement of stock exchange transactions exists, as for instance in the case in Switzerland. For the settlement of OTC transaction more often Real Time Gross Settlement Systems (RTGS) are used for instance in France and in the Netherlands. However, also in the OTC markets there is a tendency to net, especially for transaction in the International CSD (Euroclear and Clearstream).

## 2 Netting

### *2.1 general aspects*

Netting is an agreed offsetting of positions or obligations by trading partners or participants. Netting reduces a large number of individual positions or obligations to a smaller number and therefore reduces liquidity needs. Net positions can be calculated for both the securities side and the cash side. At the cash side multilateral netting reduce all obligations to a single debit or credit position of each participant. The net credit or debit position is calculated as the sum of all obligations to pay to all other participants less the sum of all amounts to be received. In case of net schemes at the securities side positions vis-à-vis all other participants are netted per issue or individual fund. However, some systems net only at the cash side, while the settlement of securities takes place on a gross basis (model 2 DvP systems). For instance, this may be the case if an individual securities transfer has to be listed in a separate registry before the transfer of ownership becomes finale. Also in Scandinavia model 2 systems exist due to the special design of the CSD (limited tiered structure).

### *2.2 The legal framework for netting*

Netting arrangements need a sound legal basis and should be enforceable in the event of a bankruptcy of one or more participants. To avoid any legal uncertainty an explicit recognition by law of bilateral and multilateral netting schemes, either in the bankruptcy law or in a specific law concerning payments or securities settlement, is therefore important. Even when netting is explicitly regulated, problems may arise when remote participants are given access to the system. In that case there should be a legal opinion whether the netting and the risk management policy will hold also in the jurisdiction of the remote member. Problems with remote members could be circumvented if there is an explicit regulation which law is applicable on the settlements done in a designated system (see for instance the European finality directive).

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<sup>1</sup> This paper was written in the framework of a FSAP-mission end 2001. It is based on experiences of the author in the oversight of securities settlement systems in different countries and internal work on this issue for the European Central Bank. This paper is a revision of an earlier paper on this subject written in the framework of a WHI-mission of the world Bank.

### ***2.3 Multilateral schemes and contractual netting via a central counterparty***

In order to net transactions two options are available: (I) multilateral settlement netting and (II) contractual netting via a central counterparty. In case of multilateral netting the relationships between counterparties that have conducted the trade are still legal binding and the obligations stemming from all the individual contracts are fulfilled if and only if the netting procedure is finalized in total (i.e. all participant have fulfilled their obligations). In contractual netting, however, all underlying contracts are novated to a single replacement contractual obligation vis-à-vis a clearinghouse that acts as the central counterparty. After novation participants have only a principal-to-principal relation with the clearinghouse and no longer with their original trading partners. By substituting the original counterparties, a clearinghouse allows for more certainty in trading while counterparty risk for market participants is eliminated<sup>2</sup>. In case of contractual netting, participants are no longer obliged to manage their counterparty risk in stock exchange or OTC transactions themselves. Normally, clearing and settlement via novation takes place in the derivative market for standardized contracts traded on an exchange. But also in some spot markets stock exchanges or subsidiaries novate individual trades, especially when the trade execution process itself is anonymous, as it is typically the case in order driven trading systems. In that case management of counterparty risk by each participant individually is not possible. For instance, for that reason transactions on Euronext (the merger of the stock exchanges in Belgium, France and the Netherlands) are novated via Clearnet, a subsidiary of Euronext. In Europe also repos are cleared and settled via a central counterparty in order to delegate risk management and reduce the amount of margin calls to be asked or to be paid while a central counterparty normally nets the margin calls on all underlying contracts.

In case of contractual netting the clearinghouse is exposed to pre-settlement risk (replacement or market risk) and settlement risk (principal risk and liquidity risk) and needs to implement an appropriate risk management in order to reduce these risks or eliminate them. An alternative for novation is risk management on a collective basis by the stock exchange or its clearing subsidiary by protecting the multilateral netting scheme and ensuring that timely settlement takes place even if the participant with the largest payment obligation is unable to settle. For netting schemes outside the stock exchange this kind of protection measures are normally organized by the Central Securities Depository.

From an economic point of view, the risk management by a central counterparty in case of spot market transactions might be similar to the risk management needed to protect a multilateral netting scheme in order to prevent an unwinding. However, the incentive for a central counterparty to implement robust risk management measures is far more stronger. Without these measures the continuity of the Central Counterparty is on stake and a failure of one its clients could easily lead to its own bankruptcy. Not only is there a stronger incentive to implement robust risk management, a central counterparty often is not willing to accept every participant in the market and use access rules as a risk management measure. Often only well capitalized participants are allowed to act as clearing member; see for instance the London Clearing House (LCH). Institutions that are allowed to trade on the stock exchange or in the OTC market but do not fulfill the capital requirements have to clear and settle their trades via

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<sup>2</sup> As long as the Clearinghouse/Central Counterparty forms not a risk itself and has a robust risk management implemented. Otherwise there is still counterparty risk for market participants and the risk might be even higher than in the situation without a central counterparty.

a clearing member. This clearing member is responsible for the fulfillment of the obligations of its clients vis-à-vis the central counterparty and has to manage the risk on their clients. Clearing members often act as custodians and bankers of their clients and offer them securities lending and credit facilities. In this situation the central counterparty shifts a part of the risk in the market to its clearing members who are willing to take this risk in order to be able to act as custodian or banker for indirect participants. To reduce the risk in the financial system, it is important that the clearing members have a sound and save risk management in place. Sometimes the Center Counter Party controls this. The relevant Supervisor Authority (Banking Supervisor and/or Securities Supervisory Authority) should also supervise it.

From a legal point of view, the two options differ more widely. Strictly speaking in case of a central counterparty there is no multilateral netting but bilateral netting of positions or obligations, which is far more often regulated by law than multilateral netting. Another difference is that the relationship between the clearinghouse and a participant is of another nature. The Central Counter Party is responsible for a timely settlement, and has to manage the risk in order to protect itself from bankruptcy. The relations between a system provider of a netting scheme and its participants and the responsibilities of the different parties involved in the clearing and settlement are, however, not always clear and it is not always stated that the system provider is responsible for the security of the system by ensuring timely settlement and to prevent the system for an unwinding in case of failures of one or more participants. Due to legal restrictions and/or governance structure the system provider is sometimes not being able to implement the necessary risk management measures, even it is willing to do so. If measures are implemented in a multilateral netting scheme the legal position of a system provider is that of a third party acting on behalf of the community of participants. This might influence the enforceability of the risk management measures.

However, in both options an appropriate risk management is crucial for the financial stability in a country while a failure of a participant in a multilateral netting scheme or the failure of a Central Counter Party due to a failure of one of its clearing members could lead to disruption of the market and to systemic risk; the risk that the inability of one participant in a market to meet its obligations will cause other institutions to fail to meet their obligations.

### **3 RISK MANAGEMENT MEASURES TO ADDRESS A PARTICIPANTS DEFAULT IN A MULTILATERAL NETTING SCHEME**

#### ***3.1 The risks to be addressed***

The risks that have to be addressed when a participant fails to meet its obligations are (I) *principal risk*, (II) *liquidity risk* and (III) *replacement cost risk or market risk*. There are different risk management solutions possible especially to deal with market risks. The choice of the risk management measures might be reduced by the legislative infrastructure since not all measures might be enforceable under the law of a country. However, whether a risk management measure is enforceable, depends not only on the legislative infrastructure in a country, but also of the appropriate contractual arrangements between the stock exchange and its participants or, when the clearing and settlement is organized by some other entity such as a clearinghouse or the CSD, between the system provider and the participants.

For the sake of clearness it should be mentioned that principal risk, liquidity risk or market risk could also occur in gross settlement systems.

### ***3.2 Principal risk***

Principal risk is the risk that the seller of a security could deliver but not receive payment or that the buyer could make payment but not receive delivery. To prevent principal risk, the availability of an adequate Delivery versus Payment (DvP) mechanism is crucial. Most often in a DvP procedure, at the start of settlement process the securities to be delivered are blocked prior to the settlement of the multilateral net positions at the cash side. If the settlement of the cash positions has taken place the blocked securities are transferred to the buyer or, if netting takes place at the securities side, to the participants with a credit position in that security fund. It is important that the blocking of the securities, from a legal point of view, is seen, as a start of the settlement, and third parties should not be able to lay a claim on these blocked securities. If a participant fails to deliver the securities the stock exchange or the system provider should have the right to retain the corresponding payment or, if the participants is unable to pay, to retain the securities to be delivered to this participant.

### ***3.3 Liquidity risk***

If a participant fails to meet its obligation liquidity risk occurs for the other participants. Liquidity risk includes that the seller of a security who does not receive the payment may have to borrow or liquidate assets to complete other payments. It also includes the risk that the buyer of the securities does not receive delivery when due and may have to borrow the securities in order to complete its own delivery obligations. Liquidity problems have the potential to create systemic risk. Particularly if they occur at a time when securities prices are changing rapidly and failures to meet obligation when due are more likely to create concerns about solvency.

#### ***3.3.1 Liquidity risk on the securities side***

To address liquidity risk at the securities sides there are three possible solutions. First, the stock exchange or the system provider could try to borrow the securities in the market based on an ad hoc bilateral agreement, for instance, by means of a repo using the retained cash as collateral. Another way to borrow the securities is to implement an automatic lending and borrowing program. In this kind of programs participants in the clearing or other financial institutions capable of lending securities from their portfolios (either own or clients accounts) offer periodically securities they are willing to lend during a specified period. These securities form the pool from which the stock exchange or the system provider can automatically borrow the securities needed. Normally a special mechanism is in place to allot from which participant the securities will be lent (a so-called carousel). If the securities are still to be delivered by the failing participant and the lender might need the securities to fulfill its own obligation these systems normally allow for substitution of one lender for another. Also in automatic lending and borrowing programs, normally the securities loan is collateralized. Mostly the latter method is the fastest way to solve the liquidity problem and to ensure timely settlement. A third solutions is to demand or to obliged the issuers to issue over the counter new securities in the same fund (isin code) to replace the securities that are not delivered. This solution is for instance implemented in Sweden and in Belgium. In Belgium the system provider (National Bank of Belgium) could issue on behalf of the government, on a temporarily basis the lacking government paper. If, later on, the failing participant will deliver the securities, the securities are redeemed and the issue is brought back to its original amount. Also a mixture of these solutions is possible.

#### ***3.3.2 Liquidity risk on the cash side***

To address liquidity risk at the cash side in a multilateral netting scheme, the best practice is to arrange in advance a liquidity agreement between the stock exchange or the system provider and a bank or consortium of banks. Also a collective agreement with all the participants is possible. The agreement should specify that, at first demand, the provider(s) of the credit facility will transfer immediately the amount of cash needed for the timely settlement. Normally, the retained securities are used as collateral for this loan. The maximum amount of the contracted credit line should at least be sufficient to cover the payment obligation of the participant with the largest net debit position. In some countries the central bank is willing to act as liquidity provider to the system. This is for instance the case in the Netherlands where an intraday credit arrangement is concluded between the Nederlandsche Bank and Euronext Amsterdam.

If the retained securities or cash and the collateral pledge by the failing participant to cover the market risk in his position (see next paragraph) are not sufficient to collateralize the securities or cash loan in full, the failing participant should offer on first demand additional collateral. If the participant is not being able to do so, collateral provided by the failing participant under a defaulters pay-scheme and/or a mutual guarantee scheme (see paragraph on market risk) should be usable for this purpose. Under a mutual guarantee scheme often the system provider is also allowed to use the collateral provided by other participants.

To ensure that there are no legal restriction on the use of the retained cash or securities the responsibilities of all parties involved in the clearing and settlement should be clearly defined and the consequence of the failing of each of the different chains in the settlement cycle should be disclosed.

### ***3.4 Replacement cost risk or market risk***

#### ***3.4.1 Market risk in transactions in the spot market***

A failure to fulfill its obligation from one party will leave the solvent counterparty with the need to replace the original transaction at current prices. When the solvent counterparty replaces the original transaction at current prices, however, it will lose the gain that had occurred on the transaction in the interval between the time of the trade and the default. The unrealized gain, if any, on a transaction is determined by comparing the market price of the security at the time of default with the contract price; the seller of the security is exposed to a replacement cost loss if the market price is below the contract price, while the buyer of the security is exposed to such a loss if the market price is above the contract price. Because future securities price movements are uncertain at the time of the trade, both counterparties face replacement cost risk. The magnitude of the replacement cost risk depends on the volatility of the security price and the amount of time that elapses between the trade date and the settlement date or the date a buy in or sell out transaction is conducted if it is clear that the participant will definitely not fulfill its obligations to deliver or to pay. The volatility can differ depending on the type of instruments that are settled. For equities the volatility is far higher than for bonds and money market paper. However, participants are always exposed to market risk especially in settlement cycles of one day or more, as often, is still the standard in financial markets. Even for systems that settle at the end of the trading day market risk occur. The only way to eliminate market risk in spot transaction is to have locked-in trades that settle immediately on a real time trade for trade mode after the trade is conducted and matched.

Often the buy in or sell out procedure is not started at the contractual settlement date (the standard settlement time set in the relevant trading system). In many cases, the participant is

given some time to find a solution to the problem, especially in cases of a failure to deliver the securities. Failures will more often exist if short selling is permitted, for example as a way to increase the liquidity in the market. Also the settlement of cross border trades causes often delays due to late confirmation by the foreign client or its broker/custodian. Even, when it is clear that the participant is insolvent, it may take some time to execute a sell in or buy out procedure in order to settle the open positions in an orderly way and to prevent unacceptable pressure on the price level, that may occur if the market knows about the positions to be liquidated.

The legally binding multilateral netting scheme reduces the replacement cost risks by netting gains and losses. This is not only true for positions in the same fund but also over funds if a participant has a net long position in one fund and net short position in an other fund and the prices of these different securities correlate and move in the same direction.

### ***3.4.2 Different solutions to address market risk***

There are different ways to address replacement cost risk or market risk:

- A defaulter pay scheme;
- A survivors pay or mutual guarantee scheme;
- An insurance concluded with a independent insurance company;
- The availability of sufficient capital of the system provider;
- A guarantee given, for instance, by the stock exchange or a governmental body;
- A combination of these different types of measures (a so-called system of different lines of defense).

#### *Defaulters pay scheme*

In a defaulter pay scheme the participant that fails has to provide collateral to cover the market risk in his positions. While every participant might be a potential defaulter, in a defaulter pay scheme every participant has to cover the market risk in all its positions still to be settled. How longer the settlement cycle how more positions are involved. For instance in a t+3 settlement cycle, at the end of each trading day there is market risk in the positions to be settled on the next day (t+1), on the positions that have to be settled the day after (t+2) and the position traded on t which has to be settled in three days (t+3). The positions on t+1 and t+2 stem from the trading on t-2 and t-1. Often it takes time to calculate the market risk and to deliver the collateral, thus an uncovered risk occur in the interval between the time of the trade and the time of delivery of the collateral. Especially, in short term cycles (t+1) there is hardly any time to deliver the collateral while there may be still (intraday) price movements between the trading and settlement. In such cases an amount of collateral could be transferred in advance to cover potential market risk in future positions. However, positions may vary widely and may be unpredictable. In that case there is always a change that not all market risk is covered. In that case the residual might be covered by a mutual guarantee fund or an other measure. Sometimes also trading limits are used to cover the problem of uncovered market risk in the position (see also paragraph 4 of this paper).

If a participant fails but is not declared insolvent its (still) open positions should be mark to market daily and, if occur, losses should be collateralized by means of a margin call in order to prevent an upsurge of uncovered losses. It forms also a way to prevent speculation on future price movements via deliberately postponement of the delivery. Some exchanges in Europe also mark to market positions during the regular settlement cycle (for instance Euronext Amsterdam). If a participant is not able to grant the request for addition collateral it

should trigger immediate actions such as to suspend the participants right to trade on the stock exchange or on the OTC market and liquidation of all open positions.

Normally collateral exists of pledged securities. However, the use of this kind of collateral for liquidity purposes or the immediate realization of the collateral in case of a bankruptcy might be blocked by legal impediments. If no legal ways exist to ensure the immediate use of the pledge securities of a bankrupt participant for liquidity purposes another options such as the use cash collateral or a mutual guarantee fund should be used (see the next paragraph). Also special attention should be paid to situations in which an immediate buy in or sell out is not possible due to the provisions in the bankruptcy law (for instance while an agreement has to be conducted with the receiver first).

#### *Survivors pay scheme*

In a survivors pay scheme a mutual guarantee fund is implemented to which every participant has to contribute in proportion to its trading volume. Normally the contributions are delivered in the form of pledge securities which can be re-pledge by the system provider in case of emergency situation or can be sold if market risk have to be covered. The guarantee fund should at a minimum cover the market risk to occur in case the participant with the largest positions might fail. As was indicated before, one reason to implement a mutual fund might be the legal impediments for a defaulter pay scheme. Another reason might be that it reduces the participants' (opportunity) cost relative to a defaulter pay scheme, while the individual contribution to a mutual fund is normally substantially smaller than the amount of collateral to be offered under a defaulter pay scheme. A disadvantage of a mutual guarantee fund is, however, that it may lead to unhealthy market practice (moral hazard) of an individual trader or broker at the expense of the community of participants of the Stock exchange or CSD.

#### *Other risk management measures*

A third possibility is that the market risk in part or in total is covered by an insurance or that the Central Counterparty or system provider is willing and is able to guarantee the settlement by covering the losses out of its reserves. However, it takes time to build up sufficient capital and the building up might be costly for the participants while normally a rise in the fees to be paid for trading or settlement is necessary. This might create an impediment for the development of the market or the international competitive position.

#### *Different lines of defense*

Last but not least a different mixture of the aforementioned measures is possible, as is often the case for a central counterparty. For instance some central counterparties have implemented a mutual fund complementary to a defaulter pay scheme to cover the residual risks. Other central counterparties cover this residual risk by means of insurance and the availability of reserves.

#### *Stresstests and backtests*

The system provider should periodically examine by means of stress testing or back testing whether the risk management measures are sufficient. Also an adequate collateral management should be in place (list of eligible paper, proper haircuts, mark to market of collateral etc.).

### **3.4.3 Market risk in repo transactions**

Special attentions should be paid to situations wherein the securities settlement system does not only settle spot transactions but also repo transactions. For spot transaction the market risk

inter alia depends on the length of the settlement cycle. For repo transactions the market risk is related to the maturity of the transaction. One way to address the market risk in repos is to register the return leg in the system and require the normal collateral margin for spot transactions while during the maturity the repo is daily mark to market. If the daily value of all outstanding repos of a participant is below the market value additional collateral should be required.

A problem could arise if the participants themselves already cover the market risk in their repo transactions. In that case the best solution might be to settle the repo on a gross basis.

#### **4 A system of limits**

In netting schemes for inter-bank payments sometimes limits are used to confine the liquidity risk and the principal risk. However, the use of limits do not eliminate the risks and there are still risk measures to be implemented to address the existing risks within these limits by means of a liquidity arrangement and a loss-sharing scheme.

However, limits in a securities settlement system could influence the functioning of the market especially for market makers and primary dealers. As is already mentioned, in a good securities settlement system no principal risk will occur due to the DvP procedure. In a netting scheme for securities settlement the liquidity risk is more easily to deal with than in a straight through payment system; while in a securities settlement system, if there are no legal constraints, the retained securities or the retained cash can be used as collateral for a cash or securities loan. If there is a liquidity arrangement in place to ensure the timely settlement in the event that the participant with the largest payment obligation is unable to settle there will no liquidity risk in the system. In that case, if limits are used in a securities settlement system, the limits should especially focus on the capping of market risk, which is normally a fraction of the total position<sup>3</sup>. However in systems where liquidity is scarce limits could also be used to cap the maximum cash obligation. Such might be the case if the settlement takes place in commercial bank money or in a non-domestic currency.

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<sup>3</sup> To promote an orderly market sometimes limits are set for the position a single trader or broker may have in a specific fund.