F CENTRAL COUNTERPARTY CLEARING HOUSES AND FINANCIAL STABILITY

Central counterparty clearing houses (CCPs) play an important role in efficiently reallocating counterparty credit risks and liquidity risks in financial markets. However, as systemically important players, they must manage their risks in an adequate way in order to avoid creating new risks for financial stability.

INTRODUCTION

In financial markets, the clearing of transactions involves the calculation, usually on a net basis, of the obligations of market participants that result from their trading activities. Clearing takes place after the matching of buy and sell orders and prior to the legal fulfilment of the respective obligation. In many markets, clearing is performed by a CCP, in which case the CCP interposes itself between the original buyer and seller, acting as the buyer to each seller and the seller to each buyer. In recent years, CCPs have been playing an increasingly important role in the clearing of transactions in financial markets. In particular, against a background of rising trading volumes, derivatives and repo markets have become heavily reliant on CCPs for the clearing of transactions. In addition, CCPs have been increasingly serving outright securities markets, including OTC markets. In many major markets, traders are obliged to use a CCP to clear all of their trades, either as direct or indirect participants of the CCP.

CCPs can play an important role in the functioning of financial markets, as they have the potential to reduce the counterparty credit risks that financial market participants face when they enter into transactions. In addition, they can contribute to improving efficiency in financial markets by providing multilateral netting of trades and by facilitating anonymous trading. However, because a CCP also concentrates risks, significant disruptions in the financial markets that they serve could arise if the risk management procedures they have in place prove inadequate. Thus, a CCP's risk management procedures play a crucial role in safeguarding financial stability.

This Special Feature discusses the ways in which the core functions of CCPs can contribute to financial stability. It also describes the risks that CCPs are exposed to, and what CCPs can, or should, do to manage such risks appropriately.

COUNTERPARTY CREDIT RISK AND LIQUIDITY RISK

Transactions in the financial markets involve a trading phase and one or more settlement phases. The trading phase is the moment when two parties conclude an agreement. In an outright securities transaction, for example, the parties agree to exchange securities for funds typically within one or two days. In the case of derivatives transactions, for example a futures contract, the parties will agree to exchange the underlying security for funds at a later (expiry) date. And in the case of a repurchase agreement, the parties agree to exchange the underlying security for funds within one or two days and to redeliver the underlying security at a later date.

The settlement phases of a transaction are when obligations from the trading phase are fulfilled, i.e. when assets are exchanged for funds and – in the case of a repurchase agreement – redelivered when due. Outright transactions are characterised by a single settlement phase, while for example repurchase transactions have two settlement phases, first as assets are delivered, and then as they are redelivered later on.

There is a time-lag between the trading and the settlement phases in particular for derivatives and repurchase transactions, and even in the case of outright transactions. This time-lag appears to be the main reason why the two parties in a transaction are exposed to counterparty credit risk and to liquidity risk.

Counterparty credit risk is the risk that one party in a transaction is unable to fulfil its obligations, typically as a consequence of insolvency between the trading and the settlement phase. Liquidity risk is the risk that the trading party cannot fulfil its obligations when due, but only with a delay, for example because of operational problems.

Nowadays, the settlement of cash market transactions typically takes place in DVP mode; i.e. when assets are to be exchanged for funds, the assets are delivered if and only if the funds are delivered. Accordingly, the risk that the non-defaulting trading party delivers to a defaulting party while the defaulting party does not deliver to the non-defaulting party (so-called principal risk) should be negligible, so that the non-defaulting party should not lose the full principal value of the assets or funds delivered.

However, counterparty credit and liquidity risks can still imply significant losses for the non-defaulting party. For example, if the non-defaulting party urgently needs the assets that the defaulting party failed to deliver, it has to replace the failed trade by a new one. The price of the new trade can however be less favourable than that of the failed trade.

Counterparty credit risk and liquidity risk can pose risks for financial stability, especially through a domino effect. For instance, suppose that two parties, *A* and *B*, conclude a trade and that *A* fails to deliver. *B*, however, in the expectation of receiving assets from *A*, may in the meantime have assumed in another trade the obligation to deliver the assets to a third party *C*. The failure of *A* may then also entail a failure of *B* to deliver to *C*, and so on.

REALLOCATION OF RISKS BY CCPs

In order to limit the potential impact of counterparty credit and liquidity risks, CCPs have been established in many financial markets. A CCP is a special purpose entity that interposes itself between the buyer and the seller in a securities transaction, acting as the seller to the buyer and as the buyer to the seller. In the simple case of an outright securities transaction, the seller must deliver the securities when settlement is due to the CCP rather than to the buyer. Similarly, the seller receives the funds from the CCP, the buyer delivers the funds to the CCP, and receives the securities from the CCP. In doing so, the CCP assumes the counterparty credit and liquidity risk from the trading parties. If, for example, the buyer fails to pay, then the CCP must still settle the transaction with the seller, while the transaction between the buyer and the CCP is cancelled or settlement is postponed. Hence, the seller will not be affected by a default of the buyer. The CCP thus acts as guarantor for the fulfilment of obligations from trades.

Historically, most CCPs tended only to be found in derivatives and repo markets, as the time-lag between the trading and the settlement phase is longer in these markets than in outright securities markets. This longer time-lag implies that the risk of one party becoming insolvent before settlement (the counterparty credit risk) is also greater in derivatives and repo markets than in outright markets.[1] However, many CCPs have recently started serving outright securities markets as well.

It should be noted that CCPs do not eliminate counterparty credit risk and liquidity risk; instead, they reallocate it. The risk that, for example, the buyer will not be able to fulfil its obligations will now be borne by the CCP rather than by the seller. The seller is only left with the risk that the CCP cannot fulfil its obligations towards the seller. However, CCPs specialise in managing exposure to counterparty credit and liquidity risks. If adequate procedures are in place, then they are in a better position than the trading partners behind the transactions to cope with such risks.

1 On the other hand, liquidity risk may under certain circumstances decline as the time-lag between the trading and settlement phase increases. A greater time-lag gives a trading party which is short in an asset that it has to deliver more time to close its position.

CCPs are therefore expected to reallocate these risks in an efficient way, thereby contributing to financial stability.

RISKS AND RISK MITIGATION IN CCP CLEARING

To ensure that CCPs do indeed contribute to financial stability, it must be ensured that they cannot default on their own obligations. CCPs should and indeed do use various measures to this end, some of which are discussed below.

FINANCIAL RESOURCES

Suppose that two parties, *A* and *B*, conclude an outright trade according to which at settlement day, *A* has to deliver assets to *B* and *B* has to make a payment to *A*. If there is a CCP interposed between *A* and *B*, and *A* now defaults, then the CCP is released from the obligation to make a payment to *A*, although it will not receive assets from A either. Despite this, the CCP is obliged to deliver the assets to *B* (and *B* has to make a payment to the CCP). To fulfil its obligation towards *B*, the CCP might now have to buy the assets in the market from a third party. However, the price of the assets may in the meantime have increased so that the CCP will incur a loss. To avoid the risk that such losses could result in insolvency and, as a consequence, that CCPs could default on their own obligations, CCPs typically use a variety of financial resources for protection.

As a first line of protection, CCP participants are normally subject to margin requirements, i.e. they must post collateral in the form of cash or other assets. Several types of margins can be distinguished, depending on how margins are determined. *Initial margins*, for example, are margins that are to be posted to the CCP when a participant opens a position, for example when it buys a futures contract. The amount to be posted typically depends on the volatility of the respective futures price. If the participant defaults, then the CCP uses the margins posted by the defaulting participant as compensation for its losses from such a default. *Variation margins* are margins that are to be posted when the price of an earlier opened position varies. Participants whose positions have lost value will post collateral to the CCP; the CCP then passes the collateral on to participants whose positions have gained in value. A stylised example of the variation margining process for a futures contract is provided in Box F.1 below.

Box F.1

STYLISED EXAMPLE OF A TYPICAL LIFECYCLE OF A FUTURES CONTRACT WITH AND WITHOUT VARIATION MARGINING

Consider a derivatives exchange that offers the trading of a futures contract. The first trading day is Day 1, the last trading day and delivery day is Day 3. The underlying security is a government bond. A CCP clears all trades on the exchange.

Three parties (B_1, B_2 and S) trade the futures contract. On Day 1, B_1 buys 10, B_2 buys 20 and S sells 30 contracts. For simplicity, it is assumed that throughout the day the price of the contract remains f_1. Thus, the CCP buys 30 contracts from S and sells 10 to B_1 and 20 to B_2 at price f_1 respectively. At the end of Day 1, B_1 has a long position of 10 contracts, B_2 has a long position of 20 contracts and S has a short position of 30 contracts.

On Day 2, B_1 sells 10 contracts and S buys 10 contracts while B_2 does not trade. Again, it is assumed that the price of the contract remains the same throughout Day 2, now at f_2. Thus, the CCP buys 10 contracts from B_1 at f_2 and sells 10 contracts to S at f_2. At the end of Day 2, B_1 has

accordingly closed its position, B_2's position remains unchanged, and S has reduced its short position by 10 to 20 contracts.

The contract is not traded on Day 3. The price of the government bond is f_3. The futures contract stipulates that any trader with a long position of x at the end of Day 3 will receive x bonds from the CCP, while any trader with a short position of y must deliver y bonds to the CCP.

Table F.1.1 shows the asset value flows in a case where variation margining is not applied and where there are no defaults. On Day 1, B_1 pays $10f_1$ and B_2 pays $20f_1$ to the CCP, while the CCP pays $30f_1$ to S. The flows for Day 2 are interpreted in a similar way. On Day 3, S must deliver 20 bonds to the CCP. As the price of the bond is f_3, this implies an asset value flow of $20f_3$ from S to the CCP. Finally, the CCP must deliver 20 bonds to B_2.

Now consider again a case where the CCP does not apply variation margining, but S defaults after Day 2 and thus cannot fulfil any obligations on Day 3, thus obliging the CCP to step in. The resulting asset value flows are presented in Table F.1.2. The CCP now makes a loss of $20f_3$. As compensation, it can now claim the initial margins posted by S when S opened its position on Day 1. However, the calculation of the initial margins was based on the price f_1 of Day 1. If f_3 is significantly higher than f_1, then the initial margins may not be sufficient to cover the CCP's losses.

Tables F.1.3 and F.1.4 show the effects of introducing variation margining. On Day 1, no asset flows occur (except for initial margins which are not considered in the tables). On Day 2, B_1 pays $10(f_1-f_2)$ to the CCP. If S defaults after Day 2 so that it cannot fulfil its obligations, then the CCP realises a gain of $20(f_2-f_3)$ which is negative (a loss) if f_2 is smaller than f_3. A comparison of the situations described in Table A.2 and in Table A.4 shows that variation margining reduces the CCP's potential losses.

Table F.1.1 Net asset value flows without variation margining, no default

	Day 1	Day 2	Day 3	Sum
B_1	$-10\,f_1$	$10\,f_2$	0	$-10\,(f_1-f_2)$
B_2	$-20\,f_1$		$20\,f_3$	$-20\,(f_1-f_3)$
S	$30\,f_1$	$-10\,f_2$	$-20\,f_3$	$30\,f_1-10\,f_2$ $-20\,f_3$
CCP	0	0	0	0

Table F.1.2 Net asset value flows without variation margining, S defaults after Day 2

	Day 1	Day 2	Day 3	Sum
B_1	$-10\,f_1$	$10\,f_2$	0	$-10\,(f_1-f_2)$
B_2	$-20\,f_1$	0	$20\,f_3$	$-20\,(f_1-f_3)$
S	$30\,f_1$	$-10\,f_2$	0	$30\,f_1-10\,f_2$
CCP	0	0	$-20f_3$	$-20f_3$

Table F.1.3 Net asset value flows with variation margining, no default

	Day 1	Day 2	Day 3	Sum
B_1	0	$-10\,(f_1-f_2)$	0	$-10\,(f_1-f_2)$
B_2	0	$-20\,(f_1-f_2)$	$-20\,(f_2-f_3)$	$-20\,(f_1-f_3)$
S	0	$30\,(f_1-f_2)$	$-20\,(f_2-f_3)$	$30\,f_1-10\,f_2$ $-20\,f_3$
CCP	0	0	0	0

Table F.1.4 Net asset value flows with variation margining, S defaults after Day 2

	Day 1	Day 2	Day 3	Sum
B_1	0	$-10\,(f_1-f_2)$	0	$-10\,(f_1-f_2)$
B_2	0	$-20\,(f_1-f_2)$	$-20\,(f_2-f_3)$	$-20\,(f_1-f_3)$
S	0	$30\,(f_1-f_2)$	0	$30\,(f_1-f_2)$
CCP	0	0	$20\,(f_2-f_3)$	$20\,(f_2-f_3)$

Margins are collateral posted by a CCP participant and are used by the CCP in case this participant defaults. As a second layer of protection, many CCPs use clearing funds. A clearing fund is a pool of collateral to which every participant contributes. Thus, it constitutes a type of mutual insurance. If the CCP is forced to have recourse to the clearing fund, then all participants will share in the losses incurred by the CCP.

Some CCPs buy insurance against losses from defaulting participants or have contingent claims on a participant's resources or on the resources of a participant's parent company. Finally, if all other layers are exhausted, the CCP's own capital must counterbalance all remaining losses. The CCP should therefore have sufficient own capital to cope with extreme losses.

Credit lines and liquidity of financial resources

When a CCP participant defaults and the CCP is forced to step in instead, the obligations that arise from the participant's default must be fulfilled in a timely manner. Ideally, the assets that the CCP must deliver to the non-defaulting participants are already part of the CCP's financial resources. If this is not the case, then it is important that the CCP can easily buy or borrow the assets in the market. An adequate part of the CCP's financial resources should therefore be sufficiently liquid to be used to buy any required assets or to be used as collateral to borrow them. Sufficient credit lines should allow the CCP to borrow what it needs.

The way in which CCPs hold financial resources not only determines whether they can fulfil all obligations that arise owing to defaulting participants in a timely manner, but also determines the extent to which they can incur losses from investments. Risky assets expose CCPs to additional risks. It may, for example, be appropriate that CCPs hold cash positions mainly in central bank money, i.e. on accounts with a central bank.

Participation requirements and limits

To a certain extent, it might be advisable to restrict participation in a CCP by imposing participation requirements. Institutions that are characterised by a relatively high probability of default, for example because they are undercapitalised, may be excluded from participation in a CCP. At the same time, position limits may be in place, i.e. limits on the amount that the CCP is ready to guarantee.

Setting the optimal level of participation requirements and limits is a difficult task. If they are too demanding, then too few trades will be cleared through the CCP, and market participants will then be exposed to counterparty credit and liquidity risks. Most CCPs, however, allow their participants not only to clear their own obligations through the CCP, but also those of market participants which do not participate directly in the CCP.[2]

Operational procedures

Finally, it is important to note that CCPs rely on technologically sophisticated procedures for transferring assets from, or to, participants and for calculating collateral requirements. This not only involves procedures operated by the CCP, but also those of cash and securities settlement systems. All of these procedures must be operationally reliable. This is especially important given that many transactions are cleared and settled "straight through", i.e. automatically in a central routine procedure. If such a procedure fails, major – though hopefully only temporary – disruptions of financial markets could ensue. Business contingency facilities should support the operational reliability of the CCP.

CONCLUDING REMARKS

As CCPs are now starting to serve an increasing number of markets – including outright securities markets – their systemic importance

2 CCP participants that are able to clear only their own obligations are often called "individual" or direct clearing members, whereas those that are also able to clear obligations of their clients are typically called general clearing members.

has grown in recent years. Additionally, consolidation has significantly reduced the number of CCPs in Europe[3], leading to a concentration of more risk in each of the remaining CCPs. Insolvency or operational problems of a CCP could therefore lead to severe disruptions in the financial markets.

CCPs apply sophisticated risk management measures and are highly regulated by public authorities. However, in an ever-changing environment, new risks may occur that must be detected in time and adequately monitored.

3 See Section 6.