

# Central counterparty clearing houses and financial stability

Bob Hills, David Rule and Sarah Parkinson, Market Infrastructure Division, and  
Chris Young, Foreign Exchange Division, Bank of England

Clearing houses have often been in the shadows of the derivatives exchanges with which they are typically associated. But this may be changing. There are signs that the central counterparty services that clearing houses provide could be an increasingly important part of the modern financial landscape, alongside exchanges and other trading mechanisms. The London Clearing House (LCH), for example, is about to extend its services to new markets, previously uncleared in the UK. Before the end of 1999, LCH plans to launch a central counterparty service for the over-the-counter derivatives market (Swapclear) and for the bond repo market (RepoClear); the latter is one of several plans for clearing European government bond repos. In addition, it is envisaged that trades on the joint London Stock Exchange/Deutsche Börse trading platform will be cleared by some form of central counterparty. Central banks have a core interest in understanding the ways in which these developments change the distribution of risk and the possibility of systemic risk within financial markets.<sup>1</sup> This article, taking a general perspective, considers why demand for central counterparty services has arisen from market participants, how central counterparties alter the distribution and form of risk, the characteristics of markets for which they might be suitable, and their implications for financial stability more generally.

## The evolving role of central counterparty clearing houses

A clearing house acts as a central counterparty when it interposes itself as legal counterparty to both sides of transactions in a market. Contracts are entered into bilaterally and then transferred to the clearing house by novation. It becomes the buyer to every seller, and the seller to every buyer. This model contrasts with a bilateral or decentralised market in which participants retain credit exposures to their trading counterparties (or their guarantors) until the transaction is complete (see diagram, Central Counterparty: Simple Models).

The major central counterparty clearing house currently operating in the United Kingdom is LCH. It clears transactions on LIFFE (the London Financial Futures and Options Exchange), the London Metal Exchange, the International Petroleum Exchange and Tradepoint, an electronic exchange for UK equities.

LCH is proposing to extend its central counterparty services to over-the-counter (OTC) derivatives markets. It plans to offer clearing of standard (“vanilla”) interest rate swaps and forward rate agreements (FRAs) of up to ten years’ maturity in dollars, sterling, yen and euro; LCH aims to launch “Swapclear”, this new service, in August 1999<sup>2</sup>.

As central counterparty to both swaps and LIFFE-traded financial futures and options, LCH’s cross-margining provisions will take account of the use of futures and options to hedge swap positions. Contracts will continue to be traded over-the-counter but, where both counterparties are accredited as Swapclear dealers (dealers in turn have a relationship with a Swapclear clearing member), they may choose to have the contract cleared centrally by LCH. Margin requirements will be calculated and paid for in a similar way to futures and options contracts, and the provisions in the event of a member default are also expected to be substantially alike.

LCH’s other major new project is a central counterparty service for government bond repos, which will be known as RepoClear. RepoClear will offer its services for repo of German government bonds (Bunds) in the first instance, with repo of other major EU government bonds planned to follow at a later date. LCH will take margin on both sides of a repo trade, collecting initial margin and giving or receiving variation margin daily to cover both changes in the value of collateral and in the market value of a participant’s positions. This contrasts with a decentralised repo market, in which, by definition, only one party can be over-collateralised and positions (as opposed to collateral) are not typically marked to market.

There are likely to be at least two competing central counterparties for repos of European government bonds. First, the Government Securities Clearing Corporation (GSCC) (the central counterparty clearing house for the Treasury bond market in the US) and Euroclear (an international central securities depository [ICSD]) — are working together to develop an alternative scheme for repo in euro-denominated bonds of major government issuers from early 2000<sup>3</sup>. Euroclear and GSCC say that the proposed service might be expanded in due course to include other instruments, and multiple currencies.

Second, in France a central counterparty clearing house, “Clearnet”, is already operating for secondary market cash and repo trades in French and German euro-denominated government bonds. It was launched in October 1998, having been developed jointly by MATIF, the derivatives exchange, SBF Paris Bourse and Sicovam, the French central securities depository. In the future, Clearnet aims to allow margin offsets against MATIF futures contracts.

Meanwhile in the equity market, the consultative paper released in March of this year by the London Stock Exchange: Deutsche Börse alliance states that their planned joint order book will probably be accompanied by “some sort of central counterparty”.<sup>4</sup> This raises the prospect of a

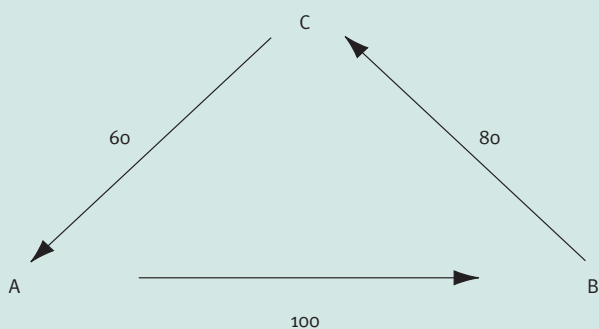
central counterparty for secondary market trades on the proposed common European share trading platform. It is not yet clear how this would be owned or structured, although central counterparties do already exist in a number of equity markets worldwide: for example, for trades on the Paris and Amsterdam Stock Exchanges and in the US equity markets (including the New York Stock Exchange and NASDAQ), which are cleared by the National Securities Clearing Corporation (NSCC).

Along with the recently-announced link-up between Cedelbank (an ICSD) and Deutsche Börse Clearing (the German CSD) — which Sicovam has indicated it will join — the Stock Exchange alliance is one of the most prominent examples of planned consolidation within European capital markets. Central counterparty clearing houses may have an important part to play in this emerging European market infrastructure.

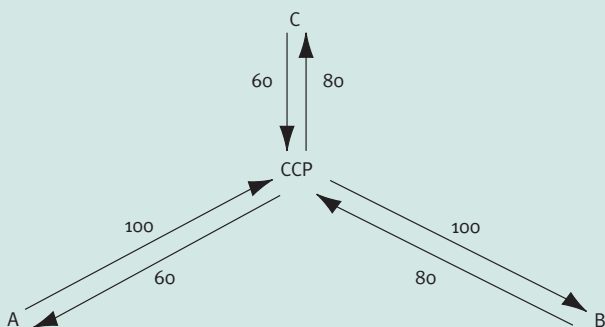
#### **What features of a market affect the suitability of central counterparty clearing?**

Not all markets are necessarily suitable for central counterparty clearing. The potential benefits that a central counterparty can bring may come at a cost and in some markets may simply not be available. Whether a market is suitable for central counterparty clearing can therefore be

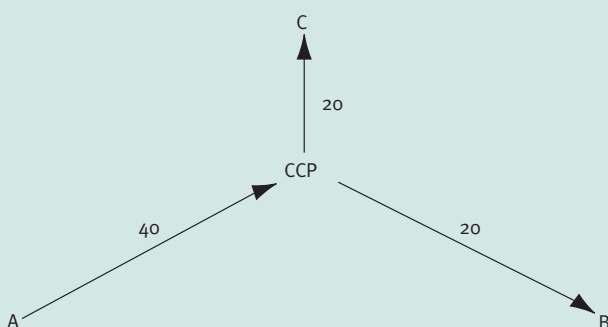
## Central Counterparty: Simple Models



**Bilateral model** In this model, each of the market participants has a legal relationship with, and separate gross exposure to each of the other participants.



**Central counterparty model, without multilateral netting** In this model, each of the market participants has a legal relationship with and gross exposure to the central counterparty only, regardless of the identity of their counterparty in the underlying trade.



**Central counterparty model, with multilateral netting** In this model, each of the market participants has a legal relationship with and net exposure (net of all of their trades in the market) to the central counterparty, regardless of the identity of their counterparty in the underlying trade.

determined by the trade-off between potential costs and benefits to market participants (including any social costs and benefits). This section outlines the key questions relevant to determining whether a central counterparty would enhance market efficiency and promote financial stability.

First, counterparty credit risk should be an unwanted by-product of trading activity, rather than a risk deliberately taken by market participants to enhance returns.<sup>5</sup> This would suggest that, in general, firms want to take on market risk — in other words, to take on exposure to the future price movements of a particular asset. Alternatively, the type of trading may preclude a detailed assessment of counterparty credit risk — for instance, pit trading in futures markets relies on firms trading on the basis of the best price offered. If the credit quality of market participants is relatively uniform and counterparty exposure is an inherent but unwanted consequence of trading in the market, sharing risk by pooling or insurance is more likely to be attractive because of the limited opportunity to reduce risk by screening of counterparties based on credit analysis.

Of course a central counterparty is not the only means of controlling counterparty credit risk. Indeed, in most markets participants use mechanisms such as counterparty exposure trading limits, collateralisation and (in recent years) credit derivatives to address the effects of counterparty default. These mechanisms are not mutually exclusive, and indeed may be used in a market intermediated by a central counterparty.

Another key feature of a market affecting its suitability for central counterparty clearing is the scale of counterparty exposures. In general, counterparty risk will be of greater concern to market participants where credit exposures are more volatile or prolonged. In some markets, pre-settlement credit risks may already be low — perhaps if the price volatility of the instrument being traded is relatively low or the settlement cycle is short (as in most cash markets).<sup>6</sup> In such cases, the additional benefits of a central counterparty may not be material.

If the traded good is standardised (perhaps with relation to maturity date and underlying instrument), and market participants have created offsetting exposures, a central counterparty can make settlement by offset feasible, because it is the counterparty to every trade.<sup>7</sup> Settlement by offset means that a firm can extinguish a position by entering into an equal and opposite trade with any other central counterparty participant. In a decentralised market,

this would neutralise market risk but at the cost of increasing counterparty risk, by adding a credit exposure to the new counterparty without affecting the credit exposure to the original counterparty. It is often attractive, particularly in a futures market where the purpose is to take on price risk rather than to receive the underlying instrument, for firms to close out exposures before settlement. Indeed, Edwards (1983) asserts that “the ability to settle contracts by offset is a critical element of a futures market: without offset, futures contracts are not liquid financial instruments and will not attract the same degree of market participation”. This is less likely to be a strong motivation in the cash markets, where participants are typically keen to obtain the underlying instrument.

A further and related advantage is the possibility of multilateral netting of exposures, including for balance sheet reporting where accounting standards allow. The diagram shows the effect of netting. Multilateral netting reduces participants’ balance sheet size, which can facilitate greater activity in a particular market. The scope for multilateral netting is greatest in markets where a number of firms trade intensively amongst each other, with each firm both extending and receiving credit, creating a web of bilateral exposures. Again, this is most typical in an inter-dealer market. Because it becomes the counterparty to every trade, a central counterparty can allow these exposures to be netted off provided the netting is legally and operationally robust. Market participants say that the possibility of multilateral netting of balance sheet exposures is the most important benefit to them from adopting the central counterparty model in repo markets. In other markets, however, major participants may already have in place separate bilateral or multilateral netting arrangements, which would limit the further reductions in exposures that netting through a central counterparty could bring.

Where a clearing house acts as central counterparty to several markets which are subject to identical or highly correlated risks, the benefit of exposure netting may extend to market risk. This creates the possibility of margin offsets where firms are long in one market and short in another (for instance, margin against a long position in a bond futures contract might be offset against margin against a matching short position in repo). To the extent that supervisors recognise these offsets where a central counterparty exists and not otherwise, regulatory capital requirements may also be lower. So there may be economies of scope in central counterparties clearing for a number of linked markets.

#### Box 1

#### Lamfalussy Minimum Standards for Netting Schemes

The “Lamfalussy” minimum standards for cross-border and multi-currency net payment systems, as outlined in BIS (1990), provide a useful starting point for considering whether netting systems more generally are operationally and legally robust. While recognising that the ultimate responsibility for risk management lies with participants, the Lamfalussy report recommends, at a minimum, that:

- netting schemes should have a well-founded legal basis (under all relevant jurisdictions);
- participants should understand how the netting scheme alters the balance of financial risks;
- systems should have clearly-defined procedures for managing credit risks, which incentivise participants to manage and contain the risks they bear;
- systems should have the resources to settle all the outstanding positions of any single participant;
- systems should have fair and open admission criteria;
- systems should have reliable technical systems and back-up facilities.

The operational intensity of the market may also encourage the development of a central counterparty. For example, in a decentralised repo market, the volume of bilateral collateral movements is a major source of operational risk: in particular, where chains of linked transactions require securities to pass through many hands in a short time as part of the settlement process. The alternative of a single net movement of collateral to the central counterparty from each clearing member (settlement netting) should reduce the risk of failed trades. Equally, a standardised process for valuation of securities, margin calls and payments of dividends on repoed stock should make the market more straightforward and reduce back office costs.

In some markets the central counterparty may facilitate anonymous trading. This can be attractive to firms that, for example, may not want to reveal that they are large buyers or sellers because they fear a market impact. In the first instance, anonymous trading requires a trading platform that allows market participants to place orders without

disclosing their identities (eg they might put trades on an electronic order book or use inter-dealer brokers). Such a system, however, raises the problem that it leaves market participants with bilateral exposures to unknown counterparties of which they cannot undertake a credit assessment. Firms may be reluctant to take this risk. The attraction of a central counterparty is that participants are exposed to a standard credit risk, whatever the identity of their trading partner. There are, however, other solutions to this problem, including insurance and the use of limits.

Potential costs and risks accompany the benefits of a central counterparty. As with any risk pooling or insurance scheme, central counterparties are vulnerable to adverse selection. Firms with above-average creditworthiness may choose not to use the central counterparty, because it reduces their comparative credit advantage. In particular, if the central counterparty sets uniform margin requirements to protect itself against firms with average credit quality, more highly-rated counterparties may decide to trade bilaterally so that they do not have to provide margin. Trades through the central counterparty will then be biased towards the less creditworthy firms.

But adverse selection is less likely if the creditworthiness of firms in the market is relatively uniform or if there are

other powerful reasons for trading through the central counterparty that encourage more creditworthy firms to do so, such as the benefits of multilateral netting or settlement by offset. Central counterparties are therefore better suited to markets where these conditions apply. For example, direct membership of the central counterparty might be limited to the main dealers in a market so that only those dealers have direct exposures to the central counterparty, and would clear trades for non-members (in practice, markets are usually tiered in this way, to a greater or lesser extent). Credit quality is then kept relatively uniform and a single margining framework for all is acceptable.

Alternatively, the central counterparty might set margin on the basis of the creditworthiness of individual firms, provided it can find a fair and reliable means of credit assessment.

### Risk allocation

A central counterparty does not of itself remove credit risk from a market.<sup>8</sup> If a market participant becomes insolvent, its losses will still be borne by some or all of its creditors in some manner. Rather, a central counterparty redistributes counterparty risk, replacing a firm's exposure to bilateral credit risks (of variable quality) with the standard credit risk on the central counterparty.<sup>9</sup> Some tests of whether this redistribution benefits society include:

Market model	Loss allocation
1. Bilateral, decentralised market without collateralisation.	Market counterparties of the insolvent firm with outstanding exposures share losses with other creditors in proportion to the size of their claims (after any secured, or higher-ranking creditors have been discharged).
2. Bilateral, decentralised market with full collateralisation of potential exposures.	Market counterparties of the insolvent firm are protected by collateral; its other, unsecured creditors bear losses.
3. Bilateral, decentralised market with liabilities "accepted" (guaranteed) by third parties.	Acceptors or guarantors of the insolvent firm's market exposures share losses with its other creditors in proportion to the size of their claims.
4. Market with a central counterparty, which takes initial and variation margin to cover its actual and potential exposure in full.	The central counterparty is protected by the margin payments it has received; unsecured creditors of the insolvent firm bear losses.
5. Market with a central counterparty, which is backed by a mutual guarantee fund to which all clearing members contribute. No margin taken.	Central counterparty shares losses with other creditors of the insolvent firm in proportion to the size of their claims (although the central counterparty might have a lien over a particular contract); in turn, clearing members share the losses to the central counterparty according to the rules of the guarantee fund.
6. Market with a central counterparty, which is backed by a third party (eg external insurance) rather than margin or a fund.	Third party shares losses with other creditors of the insolvent firm in relation to the size of their claims.

... A central counterparty does not of itself remove credit risk from a market. Rather, a central counterparty redistributes counterparty risk, replacing a firm's exposure to bilateral credit risks (of variable quality) with the standard credit risk on the central counterparty ...

- whether those now at risk are better able — and more willing — to bear the risk than those exposed previously;
- whether the redistribution reduces transactions costs by improving the monitoring of risk, for example by improving the information available to those at risk or their agents;
- whether the redistribution reduces transactions costs by aligning risk and reward better in the market and thus improves incentives for market participants to control and monitor risk; and
- whether the redistribution improves transparency and predictability, so that it is clear where the potential losses would fall. Where this is unclear, asymmetric information about exposure to risk has the potential to create systemic problems.

The table on the previous page sets out some possible models for financial markets and describes where losses would fall following the insolvency of a counterparty as a result of an exogenous decline in its net worth.

In practice, most central counterparties combine elements of models 4, 5 and 6. Safeguards against the default or insolvency of a participant can take three forms: those designed to minimise the probability of failure of a market participant, those designed to minimise the loss to the central counterparty if one should fail, and those concerned with who bears any losses that do arise.

The first of these categories concerns the financial resources (eg capital adequacy requirements) and other initial conditions that the central counterparty requires of any firm seeking direct access to its services. In this way, it imposes a minimum standard of creditworthiness on the firms to which it may be exposed.

The second category relates to the collateralisation of positions taken by individual participants using margin requirements (model 4). Margin is paid in cash or high-quality bonds to cover the current, and often the possible future, value of amounts owed to the central counterparty as a result of positions taken.<sup>10</sup>

Initial margin is deposited at the start of the transaction. Variation margin is called when positions are revalued during the course of a transaction, using the procedure known as “marking to market”. This usually occurs daily although, in some cases, it is more frequent and intra-day margin might be called, particularly if market movements are large. Margin requirements can either be calculated on a gross basis, with separate margin required for every position, or a net basis, with long positions netted against shorts and margin required against the aggregate position only.<sup>11</sup> Broadly, gross margining gives the central counterparty better protection against large price swings, and increases the incentive for clearing members to collect full margin from their customers, but it is correspondingly more onerous for market participants.

The third category concerns what happens when a market participant is unable to meet a margin call and defaults, leaving the central counterparty with uncollateralised losses. It will usually attempt to crystallise the loss immediately by closing out the defaulting member's proprietary positions and closing out or transferring any customer positions to other market participants. Central counterparties can then have various ways of allocating losses. These may include a pre-funded guarantee fund to which market participants have contributed ex ante or an arrangement to recover losses ex post from market participants that have agreed limited or unlimited liability (model 5). Recourse to shareholders' funds (if the central counterparty is privately owned) or third party insurance cover may be used alternatively or in combination (model 6). Losses may either be shared equally or perhaps

weighted towards those that had traded most with the defaulting firm.

How does the redistribution of risk that a central counterparty brings stand up to the four tests set out above? In other words, how do models 4, 5 and 6 compare with models 1, 2 and 3?

*Risk sharing* In a decentralised market, losses from direct credit exposures following the default of a counterparty are likely to fall disproportionately on a few exposed firms. Market participants may prefer to replace this risk of a potentially large loss with a more predictable chance of a smaller loss. This will be more so where they feel they cannot reduce counterparty risk significantly through bilateral limits: for example, where the credit risk of market participants is relatively homogenous and where full participation in the market requires the firm to trade with a wide variety of names. The use of a central counterparty with a guarantee fund to which all contribute (model 5) achieves this risk-sharing. Firms are able to hold less capital individually.

By pooling the capital that they devote to bearing counterparty risk in the market, firms in effect ensure that the capital is deployed where it is most needed. In this way, central counterparties with a member default fund have the potential to improve social welfare. Central counterparties where third parties (eg insurance companies) bear losses (model 6) may also reduce the cost of risk bearing if these external providers are more willing to bear the risk of default than market participants in a bilateral market.

*Risk monitoring* The central counterparty is likely to be able to monitor a firm's aggregate exposure within a market more easily than each of its counterparties in a decentralised structure, which can see only their own bilateral trades. In addition, firms may be more open with a central counterparty than with bilateral counterparties which are also potential competitors (indeed, this might be a condition of membership). The central counterparty can impose surveillance requirements, such as the reporting of large trades conducted by a member's customers. This better information puts the central counterparty in a good position to monitor counterparty risk effectively, even if it is still not able to see risks taken by its members in markets that it does not clear. A central counterparty can also give market participants central confirmation of trades and positions, as well as independent daily valuation of positions, which may help to improve their monitoring of exposures to market risk.

*Incentives to manage risk* It is less clear that a central counterparty structure creates better incentives to manage risk. In a decentralised market, firms remain exposed to counterparty risk when they enter into a transaction. They therefore have a direct incentive to manage that risk — for example, by monitoring credit quality, taking collateral and marking it to market. Interposing a central counterparty removes that direct incentive to consider credit risk at the time of the trade, because the risk is transferred to the central counterparty. Rochet and Tirole (1996) develop the idea that a decentralised model of interbank credit exposures may maximise social benefits by increasing the incentive for banks to monitor their peers. They argue that “the flexibility afforded by decentralised interbank transactions can be made consistent with protecting the central bank against undesired rescue operations”, as long as this flexibility corresponds to effective peer monitoring (and “restoring the central bank's credible commitment not to intervene in most cases of bank distress”).

One way to guard against excessive risk-taking within the central counterparty model is to require market participants to collateralise any exposure that the central counterparty has on them, using initial and variation margining.<sup>12</sup> In the event of the firm making large losses in its trading activities, this reduces the availability of assets to repay unsecured creditors and shareholders, compared with a position in which no collateral had been granted. If margin is collected on a gross basis by the central counterparty, then a clearing member has a greater incentive to collect margin from its own (non-clearing member) customers to meet their requirements at the central counterparty, so that margin reflects more accurately the underlying positions.

It is important that market participants do not regard the central counterparty's guarantee of performance as a free good. Ideally the central counterparty should be structured in a way that gives market participants a continuing interest in the credit quality of the entities with which they trade and in the central counterparty's ability to monitor and control its credit risk. Equally, market participants should not feel able to treat the effective credit enhancement that the central counterparty gives them as costless. For this reason, firms should remain at least partially exposed to any additional risks that they take in search of higher returns in the underlying market.

One means of preserving such incentives is to give market participants a direct exposure to any losses of the central counterparty. For example, contributing to a default fund (particularly where a participant is subject to top-up calls

## Box 2 Central Counterparty Clearing Houses in Crisis

### Caisse de Liquidation (Paris) (1974)<sup>14</sup>

Prices in the Paris White Sugar Market doubled between September and November 1974, but were then subject to a correction. This volatility was partly caused by the entrance into the market of speculative investors, who may not have been fully aware of the risks they were taking. Some clearing members put forward orders on behalf of their customers without obtaining their prior authorisation. Many participants were unable to meet the margin calls to meet this market volatility, and the losses of one sugar operator in particular, the Nataf Trading House, prompted the Ministry of Commerce to close the market.

The clearing house (Caisse de Liquidation) exacerbated the situation in three ways:

- it did not adjust margin requirements, which were set on absolute amounts, to respond to the rapid rise in prices, even after being requested to do so by market participants in September;
- it was aware that one clearing member (Nataf) held a sufficiently large proportion of the sugar futures contracts in the market to have an effect on market prices, but failed to inform the exchange; and
- the allocation of losses was not transparent.

A regulation, Article 22, was applied, so that on the reopening of the market contracts would be settled at the average price of the last 20 days (which was considerably higher than the price at the suspension of trading). This was followed by considerable legal wrangling, which included a decision by a court of appeal to reverse this judgement, and the refusal of two of Nataf's guarantors to cover the sums they were deemed to owe. The clearing house, which was liable to settle the outstanding contracts, became insolvent when it was clear that its shareholders were not indemnified. The sugar market did not reopen until June 1976, under new clearing rules.

### Kuala Lumpur Commodity Clearing House (1983)

Massive defaults on the Kuala Lumpur Commodity Exchange Palm Oil contracts occurred following market concentration, a squeeze on prices and an accumulation of uncovered selling positions by a particular broker. As a

result, six brokers defaulted on positions of \$70 million and trading was suspended.

A task force, set up by the Malaysian government, issued a report that laid much of the blame for the crisis on management inaction in the clearing house: in particular there was a period of 12 days between the market squeeze and the broker default, during which margin was raised but disputed contract registrations were not speedily addressed and emergency powers were not invoked. Officials at the three-year-old Kuala Lumpur Commodity Clearing House lacked experience, and lack of co-ordination between the exchange, the clearing house and the Commodity Trading Council was highlighted.

The task force also focussed criticism on brokers who, they felt, should do more to assume their share of the risk monitoring — in particular, showing due caution in the acceptance of clients and not trading beyond their abilities. Higher minimum capital requirements were suggested as a means of improving the quality of brokers and that brokers should leave deposits with the exchange in relation to the volume of their trading. The latter was a rudimentary attempt at margining as the deposits were to be related to the volume rather than the risk of trades. In conclusion, though, the task force recommended that the central counterparty be re-established.

### Hong Kong Futures Guarantee Corporation (1987)<sup>15</sup>

During the stock market crash of 1987, both the stock and futures exchanges in Hong Kong were closed for four days. It was clear that the value of long positions in the Hang Seng Index future would fall dramatically when the futures exchange reopened, which prompted fears that participants would default on margin calls. Indeed, the fear that the scale of losses would exceed the total reserves of the guarantee fund prompted the government and private institutions to prepare a rescue package for the fund, much of which was required to meet defaulters' positions.

The guarantee fund (HKFGC) was separate from the clearing house (ICCH (HK) — itself separate from the futures exchange). This meant that there was an asymmetry of information and risk: the clearing house was responsible for monitoring positions, but was not exposed to losses in the event of default, whereas the guarantee fund was exposed to losses but dependent on the clearing



house for its risk monitoring. This meant not only that the guarantee fund was exposed if information was not effectively shared, but that traders, who were not exposed to the losses of the guarantee fund, had little incentive either to monitor the clearing house's risk management or to follow prudent trading strategies. In practice, there had been failures of risk management: for instance, margin on the main Hang Seng Index future had not been raised in line with the 2,000 per cent growth in turnover of the contract in the two years since it had been introduced.

Despite the fact that these failures in the management of the clearing house actually increased risks in the system during the crash, the report of the committee set up to investigate the response of Hong Kong's financial system to the stock market crash of October 1987 (Hay Davison

1988) recommended that a central counterparty should be re-established. The committee recommended that it should act as counterparty to every trade, and that part of its risk should be backed up by a fund made up of deposits from clearing members, and part laid off externally (via a guarantee from a banking syndicate or insurance).

The committee argued that the advantages of having "a single body to monitor and control the risks in the system on the basis of daily information on the position of all the brokers in the market" and the operational benefits outweighed any possible disadvantages associated with the concentration of risk, as long as effective risk management can be assured. It described the prudent operation of central clearing houses as "perhaps the single most important objective for market authorities and regulators."

as well as up-front contributions) might give them a reason to ensure that the central counterparty's risk management procedures are adequate. It also reduces any incentive to take excessive trading risks or trade with less creditworthy counterparties in search of higher returns. There is, however, a danger that the mutualisation of risk may still lead some firms to exceed the levels of risk that they would be willing to bear privately, since they will be exposed to only a proportion of any losses — in other words, the costs to an individual participant will not necessarily reflect the risks that they have introduced into the system.

Finally, it is important that those at risk of loss if the central counterparty faces a default are able to monitor and give incentives to the management of the central counterparty to ensure that its risk control procedures reflect their appetite for risk. This suggests that the providers of the central counterparty's guarantee fund or other capital should also be its owners, or at least that management should be accountable to them in some way. It also suggests that the central counterparty should be transparent regarding its risk exposures.

*Transparency and predictability of risk-bearing* In a decentralised market, each firm knows its own exposures to other counterparties but rarely does it know their exposures to each other. So it is unclear where all the losses will fall following a counterparty default or even how large they will be. The losses also fall unevenly across the market, depending on which firms had trades outstanding with the failed firm at the time of the default. This can leave firms

unwilling to trade with large numbers of other firms after the failure of a major market participant for fear that other firms are heavily exposed and therefore at risk themselves. In this way, indirect contagion from a failure reduces market liquidity more generally.

A central counterparty has the potential to prevent this indirect contagion because it should be clear ex ante where the total loss falls and how it will be shared. A vital condition, however, is that the allocation of any losses is transparent, recognised by those at risk and adequate given the potential scale of those losses. If it is uncertain where losses will fall, or those bearing the risk underestimate it, the central counterparty may, in fact, reduce transparency.

A key requirement is that the allocation of losses according to the rules of the central counterparty cannot be overturned under domestic law: in the case of any cross-border transactions, the allocation must be robust under all relevant jurisdictions.

An important factor in reducing any such ambiguities in Europe is the EU's Settlement Finality Directive (SFD), which is to be implemented in all Member States by December 1999. The SFD protects transfer orders and collateral in payment and settlement systems against any risk that they will subsequently be unwound, particularly following the insolvency of a participant.<sup>15</sup>

In summary, a central counterparty has the potential to reduce the aggregate cost of risk bearing within a market

### Box 3 Prominent clearing houses

This box describes some prominent clearing houses which act as a central counterparty for markets other than financial futures and options exchanges.

Since October 1996, the London Clearing House has been a private company owned by its 112 members and the three exchanges for which it clears — LIFFE, the London Metal Exchange and the International Petroleum Exchange.

LCH also clears for Tradepoint, the electronic equity trading market. It is the world's third largest clearing house in terms of volume (and second largest in terms of open interest). Unusually, LCH is neither a department of an exchange nor owned exclusively by banks. It is also unique in that it clears for four markets and accepts nine currencies.

LCH becomes counterparty to trades completed on one of the four exchanges within one hour of the close of trading at that exchange on the day of the trade. Both initial and daily variation margin are calculated on a net basis, so that each member's daily net profit or loss, valued at the daily settlement price, is paid out or recovered daily. LCH routinely calls for margin intra-day when price movements in one or more contracts approach current margin levels. Money settlement occurs on T+1 (for sterling, euro and US dollar trades).

In the repo market, the most significant clearing house that provides multilateral netting is the Government Securities Clearing Corporation (GSCC), in the USA. GSCC is a subsidiary of the National Securities Clearing Corporation (NSCC) which is owned by a consortium of exchanges, but GSCC itself is around 80 per cent owned by market participants. Repos are netted with participants' other US government securities trading activities. Since 1996, GSCC has accepted brokered repos executed on an anonymous basis. If a default exceeds the participant's margin and clearing fund deposits, the remaining loss is allocated amongst those members who had traded the most recently with the failed firm.

The only major market in which OTC derivatives are currently cleared to any significant extent is Sweden, where the derivatives exchange and clearing house OM Stockholm (which is owned by outside shareholders rather than its members) clears both off-exchange standard contracts and tailor-made contracts (although so-called "exotic" derivatives tend not to be offered since margin requirements are typically high for such products). Broadly the same procedures are used for OTC as for exchange-traded contracts, and initial and variation margin is provided in the same way. If a participant's losses cannot be covered by the margin it had posted, OM itself will meet the requirements. It also has third party insurance against losses. OM serves a primarily domestic market.

through sharing, better monitoring and greater transparency. But it must be structured to preserve incentives to control risks as far as possible and so that the allocation of risk is clear. Box 2 describes a few cases where central counterparties throughout the world have experienced problems in the past because incentives were wrong or the allocation of risk was opaque.

#### Effects on financial stability

A central counterparty, by definition, concentrates and re-allocates risk. As such, it has the potential either to reduce or to increase the systemic risk in a market.<sup>16</sup> In general, there are good reasons to suppose that a central counterparty can insulate a market against crisis. But this requires the risks arising to be identified, priced fully and backed by adequate capital, and the procedures for allocating losses to be clearly defined and made transparent.

If the procedures followed are not predictable and transparent, then the presence of a central counterparty in a market may serve to exacerbate systemic risk. A particular problem may occur if market participants do not share in the default risk to the central counterparty and so have no interest in the exposures that it takes on. If there is not some incentive compatibility between the backers and users of the central counterparty — in other words, if the users do not have an exposure to the losses of the central counterparty — the users may be less likely to trade prudently, increasing the overall levels of risk in the market.

Even if the central counterparty's risk management procedures are in theory sound, their effectiveness is still dependent on the competent implementation of those procedures by its management. The concentration of operational risk in a central counterparty is considerably greater than that in any individual participant in a

... there are good reasons to suppose that a central counterparty can insulate a market against crisis. But this requires the risks arising to be identified, priced fully and backed by adequate capital, and the procedures for allocating losses to be clearly defined and made transparent. ...

decentralised market, and the repercussions of incompetent management would be correspondingly larger.

Management failings and inadequate risk monitoring by market participants may be more likely if it is ambiguous or ill-defined where any losses to the central counterparty would fall. There is a risk in such circumstances of a general presumption that the authorities would intervene to bear any large losses and provide support, which creates a danger of moral hazard. In order to address this risk it is vital that the allocation of any losses is clear *ex ante* and that the central counterparty's resources are adequate in relation to the risks to which it is potentially exposed.

A central counterparty can also provide a bulwark against more indirect forms of market contagion during a crisis. Specifically, it can reduce the level of asymmetric information in the market, and so make liquidity crises less likely. For example, if participants in a decentralised market know that one of their number has collapsed, they may not know who was exposed to that participant, and might suspect that one, or a few of their number would have taken a disproportionate share of the losses and might be close to collapsing themselves. In such a situation, market participants might prefer not to trade in the market at all. With a well-constituted and managed central counterparty, market participants know that losses have been mutualised (or insured against), and that it is consequently less likely that another participant is exposed disproportionately. In this way, a central counterparty could benefit market liquidity in a crisis. By the same token, though, if there are doubts about the solvency or the competency of the central

counterparty itself, the whole market might refuse to trade.<sup>17</sup> Again, this highlights the need for the central counterparty to be transparent about its own financial position.

As discussed, it is likely that at least three central counterparties will be competing to clear repos in European government bonds from next year. Competition between service-providers raises new issues since until now central counterparties have typically been monopoly suppliers to one or more exchanges. It will be vital that central counterparties do not compete by reducing risk management standards or the transparency of risk allocation. Some market participants believe that, in the long run, one system will come to dominate the market, which would maximise their netting and offset opportunities. As new market participants use a particular central counterparty, they will benefit existing users by giving them additional netting opportunities and additional opportunities to settle by offset. The existence of such network externalities suggests increasing returns to scale. The example of the US, where GSCC is the only large provider of repo netting facilities (even though Delta was the first provider to come to the market) also points in this direction.

A single central counterparty providing its services to multiple markets also raises additional issues. On one hand, this concentrates risk (both credit and operational) to an even greater extent. Even without market disruption, there may be problems of organising the guarantee fund (where there are significantly different participants in the markets cleared, who may have divergent interests), and in ensuring

a consistent level of monitoring of participants, where the markets cleared are located in different jurisdictions.

Yet at the same time central counterparties can obtain significant benefits for their participants from diversifying across markets — such as cross-margining. Moreover, they are in a much stronger position to monitor participants' overall trading books (information that could also under certain circumstances be passed to supervisors or market authorities, for instance if there is a threat to a firm). A central counterparty's ability to monitor participants' positions is a potentially large benefit to financial stability — indeed, in some instances, the central counterparty may be in a better position than supervisory authorities.<sup>18</sup> Equally, if members bear a clear and unambiguous shared liability for any losses incurred in the market, their incentive to ensure that each member's positions are effectively monitored is correspondingly strong.

If the presence of a central counterparty leads firms to believe falsely that they have eliminated counterparty credit risk from the market, and they therefore trade recklessly, and if the central counterparty's risk management fails to prevent these excesses, then central counterparties can be a threat to financial stability.

Previous failures (though rare) provide some cautionary tales. Yet a central counterparty that functions well can reduce transactions costs and the cost of risk bearing, producing social benefits in increased market efficiency, liquidity and confidence. Arguably this can occur without any overall increase in systemic risk. This is potentially compatible with a variety of structures of ownership, guarantees and insurance — but paramount is that there should be definite incentives for market participants and the central counterparty management to manage risk prudently, and a predictable and transparent allocation of the residual risks.

#### References

- Bank for International Settlements (1990) *Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries*, Basel, November
- Bank for International Settlements (1997) *Clearing Arrangements for Exchange-Traded Derivatives*, Basel, March
- Bank for International Settlements (1998) *OTC Derivatives: Settlement Procedures and Counterparty Risk Management*, Basel, September
- Bank of England (1989) *Payment and Settlement Systems Risks and Efficiency: A Discussion Paper*, London, November
- Bernanke, Ben S (1990) "Clearing and Settlement during the Crash", *Review of Financial Studies*, Vol.3 No.1, pp.133-151
- Brady, Nicholas F (1988), *Report of the Presidential Task Force on Market Mechanisms*, Washington DC: US Government Printing Office, January
- Dale, Richard (1997) "Derivatives Clearing Houses: The Regulatory Challenge", *JIBL* (2), pp.46-55
- Edwards, Franklin R (1983) "The Clearing Association in Futures Markets: Guarantor and Regulator", *Journal of Futures Markets*, Vol. 3, No. 4, pp.369-392
- Gemmill, Gordon (1994) "Margins and the Safety of Clearing Houses", *Journal of Banking and Finance* 18, pp.979-996
- Geva, Benjamin (1991) "The Clearing House Arrangement", *Canadian Business Law Journal*, Vol.19, pp.138-165
- Hay Davison, Ian (1988) *The Operation and Regulation of the Hong Kong Securities Industry: Report of the Securities Review Committee*, Hong Kong: Government Printer, May
- Leigh Pemberton, Robin (1989) "Challenges facing the Sterling Wholesale Payments Systems: Ernest Sykes Memorial Lecture" *Bank of England Quarterly Bulletin*, August
- Moody's Global Investors Service (1995) *Credit Risks of Clearinghouses at Futures and Options Exchanges*, *Global Credit Research Special Comment*, June
- Rochet, Jean-Charles and Jean Tirole (1996) "Interbank Lending and Systemic Risk", *Journal of Money, Credit and Banking*, Vol.28, No.4, pp.733-762
- Simon, Yves (1981) "Bourses de commerce et marchés à terme de marchandise", 2nd ed., Paris: *Daloz Gestion Finances*

## Notes

- 1 The Bank of England's interest in central counterparty clearing houses derives from its responsibility for the "overall stability of the financial system as a whole", and for promoting "the efficiency and effectiveness of the financial sector, with particular regard to international competitiveness", as set out in paragraph 2 of the Memorandum of Understanding between HM Treasury, the Bank of England and the Financial Services Authority. See also Leigh Pemberton (1989) and Bank of England (1989).
- 2 LCH press release, 9 July 1998: "LCH announces Swapclear go ahead".
- 3 Joint press release, 15 March 1999: "Euroclear and GSCC initiative to provide repo netting services".
- 4 London Stock Exchange and Deutsche Börse European Alliance Joint Briefing, March 1999.
- 5 The clearest example of the latter is the loan market, in which an assessment of credit risk by the lending bank is integral to the purpose, and hence the pricing and terms, of the transaction.
- 6 Shortening the standard settlement cycle in itself reduces credit and market risk, although it may increase operational risks if participants' systems are unable to cope with the shorter time frame.
- 7 The existence of a central counterparty may induce moves towards standardised contracts — for instance, if the basis of multilateral netting is common maturity dates. If the central counterparty clears for more than one market, it may also be possible to settle by offset across markets.
- 8 This point is raised in the Bank's 1989 discussion paper on payment and settlement systems: Bank of England (1989).
- 9 Clearing houses rarely become central counterparty precisely at the point of trade (usually doing so at the end of day on trade date). This means that the underlying counterparties to the trade still have a period of bilateral exposure (albeit typically only an intra-day one).
- 10 In some central counterparty clearing houses, participants may be granted an exemption from limits and/or lower margin requirements for trades which are undertaken for the purpose of hedging underlying positions in the cash market rather than for speculation. Under such circumstances, it is vital that the central counterparty clearing house obtains accurate information about the nature of the positions held by clearing members and their customers. Moody's Investors Service (1995) gives an example that bears this out: in 1993, MG Futures Inc (the US trading affiliate of the German metals and mining conglomerate Metallgesellschaft A.G.) had taken out a position in energy futures on the New York Mercantile Exchange (NYMEX) to hedge its parent's long-term supply agreements and received a hedging exemption from NYMEX position limits. "As futures prices declined steadily toward the end of 1993, MG Futures Inc experienced a liquidity problem stemming from the margin calls on its short-term position hedging longer-term contracts. MG Futures Inc had to liquidate its position at large losses, which nearly caused the collapse of its parent" (p6).
- 11 For instance, of the major central counterparty clearing houses, LCH, BOTCC, DBAG, SOFFEX, MATIF, MONEP, TIFFE and GSCC/NSCC calculate margin on a net basis, whereas the OM, SIMEX and NYMEX use gross margining. BELFOX and OCC both apply net margining to clearing members, but require gross margining for underlying clients. On May 17 this year, the CME changed its margin requirements for the house accounts of clearing member firms from a gross margin to a net margin basis.
- 12 It is of course important to ensure that any security posted as collateral or margin is relatively liquid, that its price is not excessively volatile, and that the central counterparty is aware of the time at which settlement with finality is achieved.
- 13 The London Clearing House is currently protected against specific areas of UK insolvency law by virtue of Part VII of the Companies Act. The SFD will additionally ensure that LCH cannot be challenged by liquidators in other EU countries.
- 14 For further information, see Simon (1981).
- 15 See Hay Davison (1988) for further details.
- 16 It is worth noting in this context that a central counterparty cannot address, and indeed is itself exposed to settlement and operational risks in payment and securities settlement systems. Bank for International Settlements (1997), for instance, recommends that central counterparty clearing houses should "[strengthen] arrangements for meeting margin obligations by utilising payment systems and securities settlement systems that provide real-time or at least intra-day finality of transfers".
- 17 *The Report of the Presidential Task Force on Market Mechanisms* (Brady 1988), which examined the market break in the US in October 1987, discusses concerns about the ability of the clearing house of the Chicago Mercantile Exchange to meet its obligations (similar problems were faced by the Options Clearing Corporation). It reports that fears of a default led some market makers to curtail their activities and contributed to investor uncertainty more generally, inhibiting market liquidity. According to the then rules of the clearing house, those members with intra-day margin obligations resulting from the sharp price correction on October 19 were required to post the margin on the day itself, but the clearing house did not pay out margin owed until the next day — indeed, not until after members had met any new margin calls on that day. Under such circumstances, members would usually have looked to their commercial bankers for liquidity, but some banks were unwilling to lend, partly because they feared that the clearing house would fail to collect all of the high margin payments and consequently be unable to meet its obligations. In the event, the CME clearing house made all its margin payments as they fell due, and market liquidity was sustained by the Federal Reserve, but uncertainty regarding the clearing house served to exacerbate market volatility. See also Bernanke (1990).
- 18 Hay Davison (1988) in the report of the committee that investigated the response of Hong Kong's financial system to the stock market crash of October 1987, placed considerable importance on the social benefits arising from the ability of central counterparty clearing houses to monitor their participants' positions. For instance, the report recommended that "machinery should be established to ensure that the senior management and surveillance staff of the two [Stock and Futures] Exchanges and their respective clearing agencies co-ordinate properly and fully; and further that there should be no obstacles to a proper and full exchange of information". Further, the commission recommended that the exchanges should "establish relations with other market authorities and supervisors to ensure that they would be warned if one of their members was experiencing difficulties; for example, the futures clearing house should be confident that it will be told by clearing houses elsewhere in the world if a member of the HKFE [Hong Kong Futures Exchange] member has defaulted on a margin payment. It is equally important that there should be reciprocal arrangements, with warnings going out from the Exchanges and clearing houses, if they detect problems with a Hong Kong dealer".