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Kirsi Ripatti
Financial Markets Department
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Central counterparty clearing: constructing a framework for evaluation of risks and benefits

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This paper is an updated version of the working paper of Bank of Finland (Financial Markets Department 01/04). First and foremost I would like to express my thanks to Head of Department Heikki Koskenkylä and Head of Division Kari Korhonen for their support and highly valuable comments. I am grateful to Esa Jokivuolle and Jarmo Pesola for their comments and their help in constraining this wide-ranging project to its time limits. This paper has also evolved after presentation of the working paper version at the 21st Symposium of Banking and Monetary Economics in Nice in June 2004 and at the ESCB's Securities Working Group (SWG) meeting in Frankfurt in November 2004. I deeply appreciate the valuable comments I have received from both forums. Finally, a debt of gratitude is owed to Matti Kinnunen (Carnegie) for providing the perspective of market participant in the paper and Kati Salminen and Petri Uusitalo for their technical help during the entire process.

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Abstract

A Central Counterparty (CCP) is an entity that interposes itself between transacting counterparties – a seller vis-à-vis the original buyer and a buyer vis-à-vis the original seller – to guarantee execution of the transaction. Thus, the original transacting parties substitute their contractual relationships with each other with contracts with the CCP.

Central Counterparty Clearing has become increasingly popular in Europe, not just in derivatives markets, where, due to the high risk involved, it has been common for decades, but also in equities markets. Within the European Union, the main factor motivating the increased sophistication in clearing arrangements is the ongoing process of European economic integration, ie the euro's introduction, the ongoing organisation of an internal market for financial services and the corresponding objective of creating a pan-European financial infrastructure for payments and securities clearing and settlement.

Central counterparty clearing houses exert a broad influence on the functioning of financial markets. They can increase the efficiency and stability of financial markets to the extent that their smooth functioning results in a more efficient use of collateral, lower operating costs and greater liquidity. As market players actively try to achieve economies of scale and scope with mergers and through harmonising their technical processes, they inevitably have had to focus on one of the most fragmented areas in Europe's securities market infrastructure – clearing and settlement. Because of the importance of its role, a CCP must have sound risk management. The CCP assumes responsibility in the aggregate and reallocates risk among participants. Moreover, if the CCP fails to perform risk management well, it can increase risk in the markets.

While the big market players dominate the current CCP market in Europe, it is not only the big players who can benefit from a functioning CCP. With the right structure, a CCP enables small players to stay in the market and makes it possible for issuers in a regional marketplace to achieve market funding. Indeed, this is the

tendency currently seen in the newest EU member states – and one of the main arguments against the single European CCP model.

Although, the purpose has been to leave CCP questions to market participants, regulatory, oversight and supervisory issues can drive the actions of market participants. Indeed, authorities must sometimes be actively involved in boosting a CCP project to keep their home markets competitive. This may well be the situation faced by the Nordic/Baltic market in the near future.

Thus, this paper attempts to give a neutral evaluation of the risks and benefits related to the functionality of CCPs in integrating markets and construct a framework for possible future risk-benefit analysis in a Finnish/Nordic-Baltic clearing and settlement infrastructure that incorporates a CCP solution. This is an updated version of a Bank of Finland working paper (Financial Markets Department 01/04).[1]

Key words: central counterparty clearing, clearing, settlement, securities markets, infrastructure, integration

JEL classification numbers: G15, G20, G28, G33, G34

[1] Ripatti (2004).

Keskusvastapuoliselvitys: kehikko riskien ja hyötyjen arvioimiseksi

Suomen Pankin keskustelualoitteita 30/2004

Kirsi Ripatti
Rahoitusmarkkinaosasto

Tiivistelmä

Keskusvastapuoli (Central Counterparty, CCP) on yhteisö, joka asettuu kaupan osapuolten väliin – myyjäksi alkuperäiselle ostajalle ja ostajaksi alkuperäiselle myyjälle – ja takaa kaupan toteutumisen. Tällöin kaupan alkuperäiset osapuolet korvaavat keskinäiset sopimussuhteensa keskusvastapuolen kanssa tekemillään sopimuksilla.

Keskusvastapuoliselvitys on yleistynyt Euroopassa paitsi johdannaismarkkinoilla myös käteismarkkinoilla. Johdannaismarkkinoilla sitä on käytetty jo vuosikymmeniä johdannaiskauppoihin liittyvien suurten riskien vuoksi. Euroopan unionissa tarpeen arvopaperikaupan selvityksen kehittämiselle ovat luoneet ensisijaisesti Euroopan taloudellisen integraation edistyminen eli euron käyttöönotto ja meneillään oleva rahoituspalvelujen sisämarkkinoiden kehittäminen sekä siihen liittyvä tavoite luoda Euroopan laajuinen rahoitusmarkkinoiden infrastruktuuri maksujen ja arvopaperikauppojen selvitykselle ja toimitukselle.

Pyrkiessään aktiivisesti saavuttamaan skaala- ja yhteistuotannon etuja fuusioilla ja sovittamalla yhteen teknisiä prosesseja markkinaosapuolet ovat väistämättä joutuneet keskittymään yhteen Euroopan arvopaperimarkkinoiden pirstoutuneimmista alueista – selvitykseen ja toimitukseen. Keskusvastapuoliselvitysyhteisöjen merkitys rahoitusmarkkinoiden toiminnassa on huomattava. Nämä yhteisöt voivat lisätä rahoitusmarkkinoiden tehokkuutta ja vakautta siinä määrin, että niiden häiriötön toiminta johtaa aiempaa tehokkaampaan vakuuksien käyttöön, vähäisempiin käyttökustannuksiin ja suurempaan likviditeettiin. Keskeisen asemansa vuoksi keskusvastapuolilla on oltava luotettavat riskienhallintamenetelmät. Keskusvastapuoli kantaa kokonaisvastuun kaupasta ja allokoi osapuolten riskit uudelleen. Mikäli keskusvastapuoli epäonnistuu riskienhallinnassa, se voi myös lisätä markkinoiden riskiä.

Vaikka nykyisiä keskusvastapuolipalvelujen markkinoita Euroopassa hallitsevat suuret markkinaosapuolet, toimivat keskusvastapuolijärjestelmät eivät ole vain niiden etu. Rakenteeltaan oikeanlainen keskusvastapuolijärjestelmä mahdollistaa sen, että myös pienet osapuolet voivat toimia markkinoilla ja että alueellis-

ten markkinoiden liikkeeseenlaskijat saavat markkinarahoitusta. Tämä kehityssuunta on tällä hetkellä nähtävissä EU:n uusimmissa jäsenvaltioissa – se on myös tärkeimpiä perusteluja yhteistä, vain yhdestä eurooppalaisesta keskusvastapuolesta muodostuvaa mallia vastaan.

Vaikka keskusvastapuolikysymykset on ollut tarkoitus jättää markkinaosapuolten ratkaistaviksi, sääntelyyn, yleisvalvontaan ja valvontaan liittyvät näkökohdat voivat vaikuttaa markkinaosapuolten toimintaan. Viranomaisten on toisinaan osallistuttava aktiivisesti keskusvastapuolihankkeen edistämiseen omien kotimarkkinoiden kilpailukyvyn säilyttämiseksi. Tämä saattaa hyvinkin olla ajankohtaista Pohjoismaiden ja Baltian markkinoilla lähitulevaisuudessa.

Tässä keskustelualoitteessa pyritään neutraalisti arvioimaan keskusvastapuoliselvityksen toimivuuteen liittyviä riskejä ja etuja integroituvilla markkinoilla. Lisäksi siinä pyritään luomaan kehikko mahdolliselle tulevaisuudessa tehtävälle riski-hyötyanalyysille, joka koskee keskusvastapuolijärjestelyt sisältävää suomalaista/pohjoismais-balttilaista selvitys- ja toimitusinfrastruktuuria. Tämä keskustelualoite on päivitetty versio Suomen Pankin rahoitusmarkkinaosaston työpaperista 01/04.[2]

Avainsanat: keskusvastapuoliselvitys, selvitys, toimitus, arvopaperimarkkinat, infrastruktuuri, integraatio

JEL-luokittelu: G15, G20, G28, G33, G34

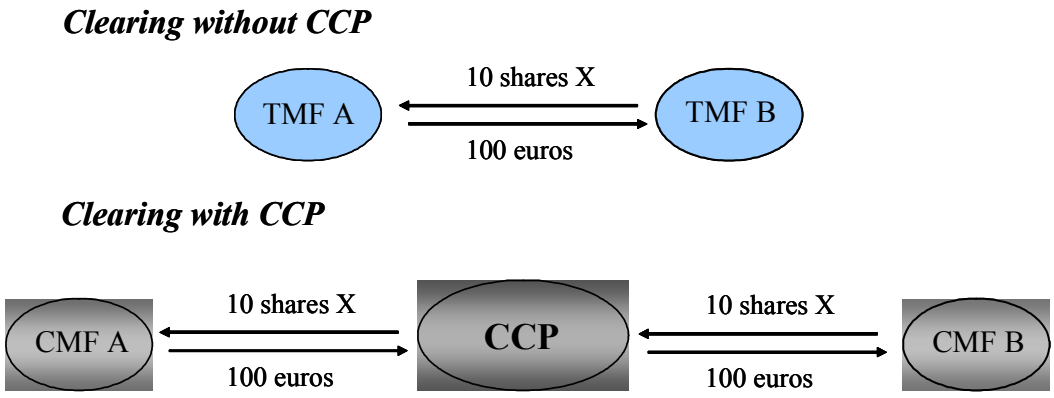
[2] Ripatti (2004).

Contents

1 Introduction

The process of clearing and settling a securities trade has two key steps. After a trade is made, the obligations of the counterparties resulting from the trade are calculated. This is known as clearing. The process ends with the settlement of the obligations and involves the final transfer of the securities (delivery) in exchange for the final transfer of funds (payment). The clearing house acts as a central counterparty (CCP) when it interposes itself as a legal counterparty to both sides of a transaction, ie acts as a buyer to every seller and a seller to every buyer for a specified set of contracts such as those executed on a particular exchange or trading system. From the perspective of market participants, the credit risk of the CCP is substituted for the credit risk of the other participants (Figure 1).[3]

Figure 1. **Interposition of a CCP**



Source: Bank of Finland.

Currently, central counterparty clearing can be seen as an integral part of the modern post-trading processes. Central counterparties are increasingly favoured by market participants as their utility extends beyond derivatives markets to a wider range of financial instruments.

CCPs were established to protect market participants from counterparty risk in exchange-traded derivatives markets. Derivative contracts traded on an

[3] For more about the clearing and settlement process, see eg Bank of Finland (2002).

exchange were executed with a single counterparty, the clearing house, which processed all transactions and guaranteed performance.[4] The organisation of central counterparty services for derivatives markets has been greatly influenced by the current organisation of the exchange markets and by the composition and identify of the parties trading on those markets. Both the exchanges and their associated clearing houses reflect a long history of development. Recently, CCPs have begun to offer clearing services to cash and over-the-counter (OTC) markets.

Finland has a CCP for derivative instruments in the Helsinki Stock Exchanges. Finnish derivatives trading and clearing will be transferred to the Stockholm Stock Exchange at the end of 2004. Thereafter, the execution of Finnish derivatives will take place locally, ie settlements related to the execution of derivatives will be effected in Finland through the Finnish CSD, APK and custodian banks.

As noted, CCPs interpose themselves as principal to both sides of the transaction. The substituting out the original counterparties and replacing them with a new contractual counterparty is called a contract novation. Through novation, the CCP creates more certainty in trading. This is not to say that a CCP removes counterparty credit risk from a market, but it manages and redistributes that risk by establishing rules as to who bears losses arising from a participant default. Novation also replaces market participants' exposure to bilateral credit risks with a standard credit risk to the CCP. The timing of novation has important implications for the distribution of counterparty risk between the CCP and its clearing members.[5]

CCPs typically apply strict access criteria, accepting only the financially healthiest participants. Many CCPs have two-tiered membership structures, where only general clearing members or direct clearing members have a direct relationship with them. They often have a requirement of bank status.[6] The other participants (indirect participants) are forced to use a general clearing member, often a competitor, to gain access to the clearing system.

To protect against a clearing member default, CCPs have developed a variety of risk management procedures such as strict access rules, own funds and separation of clearing and guarantee funds. Anticipatory stress testing and marginal payments are also important tools of risk management. An initial margin is deposited at the start of the transaction by clearing members. Variation margins are called when positions are revalued during the course of a transaction, using a 'marking-to-market' procedure. CCPs may also have access to additional default resources such as mutual guarantee funds or insurance cover. They can require

[4] Central counterparties were either part of a derivatives exchange or independent entities.

[5] The moment the novation occurs depends on the CCP's rules.

[6] General clearing members clear and settle both their own positions and positions of indirect participants. Direct clearing members are only allowed to clear and settle their own positions.

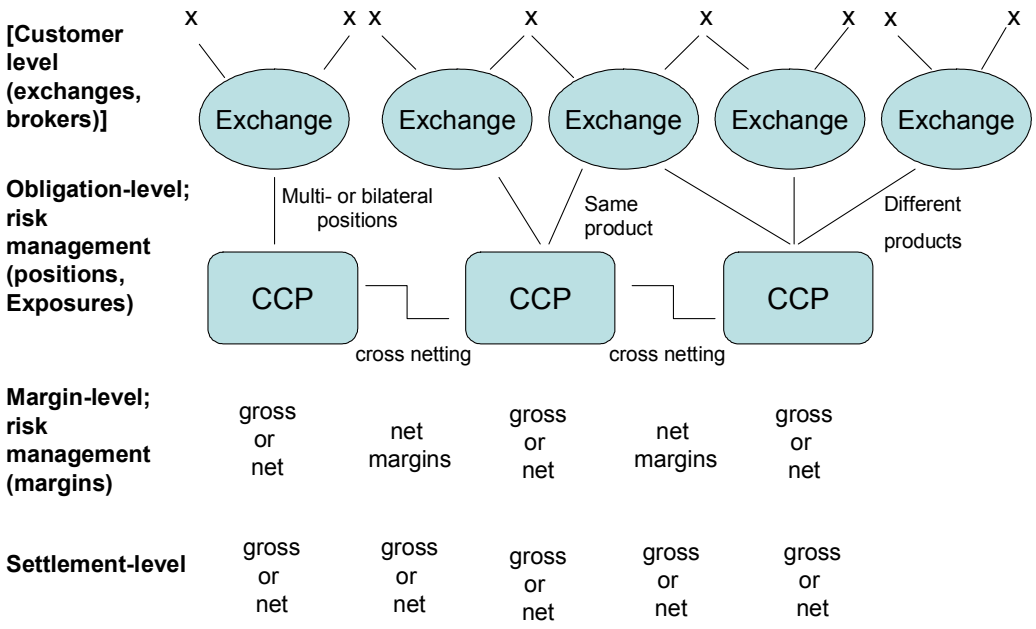
clearing members to fulfil financial requirements to reduce the likelihood of default.

We can distinguish at least three netting levels: margin, obligation and settlement levels (Figure 2). To protect members and the clearing house against client defaults, every member is typically required to set a minimum level of margin for their clients according to rules set down by the clearing house. Under net margining clearing members are permitted to net together their long and short positions of different clients and only post the margin on aggregate net positions. Under gross margining, members are required to deposit a margin with the CCP that is sufficient to cover the gross positions of their clients. While net margining systems predominate,[7] a CCP can in theory handle both net and gross deliveries to the securities settlement system (SSS).

CCPs can also provide service by netting cash or securities deliveries/obligations. Bilateral netting reduces the bilateral flows between each pair of counterparties to a single net obligation. Multilateral netting provides for the netting of all obligations stemming from participants in the system and produces a single obligation due to or owed to individual counterparties within the netting group. This minimises the number of obligations to be settled and increases efficiency. There are two types of multilateral netting: settlement netting and contractual netting. Settlement netting involves offsetting the mutual obligations of all participants, resulting in a single position for a specific security to be delivered or received, and a single cash payment to be made for each participant vis-à-vis all other participants. This service can be provided by either the CCP or the SSS (and unlike contractual netting, which is only provided by CCPs). Contractual netting is used to reduce individual contractual obligations to a single obligation vis-à-vis the CCP, thus reducing the impact of trading volumes on market participants' balance sheets and books.

[7] Bank of England (1999a), (2002).

Figure 2. **Types of netting**



Source: Bank of Finland.

From a participant's standpoint, the CCP is justified by the higher profitability it potentially offers. The CCP directly reduces counterparty credit risk, as well as provides the above-mentioned capital adequacy impact and anonymity of trading. The benefits of a CCP have also become apparent in with increasing cross-border activity. In addition to efficient processing, anonymous trading and multilateral netting benefits that reduce operational and capital costs, the CCP also contributes to risk reduction. How well it accomplishes this, however, depends on how well it manages financial, legal and operational risks. Inadequately protected CCPs can exacerbate systemic risks, while well-run, well-protected CCPs can help contain systemic risks.[8] The possible threat of systemic risk, while small, is a reason central banks are interested in the functioning of CCPs. Of course, regulators also have more mundane responsibilities as well. Given their complementary interests, it generally advisable those authorities cooperate closely.

At present, there are several central counterparty clearing houses operating in Europe and the US. Although the current European securities clearing and settlement infrastructure is still highly fragmented and inefficient, there are several projects under consideration that would set up new CCPs in countries where there is currently no such market infrastructure. Economies of scale and

[8] A risk that inability of one institution to meet its obligations when due will cause other institutions to be unable to meet their obligations when due. See section 2.2, Risks faced by CCPs and their management.

network externalities seem to favour a high degree of concentration. Therefore, several major global investment banks have expressed support for the idea that Europe should have a single central counterparty clearing house, providing multi-currency and multi-product (equities, bonds, derivatives and commodities) service. A core argument articulated in this debate is that the creation of a single CCP in Europe would create clearing arrangements that mirror those in the United States, where clearing arrangements are already more consolidated, and therefore more cost effective than in Europe. There are, however, strong counter-arguments to this view. An ECB study (Occasional Paper No. 5/2002) shows that a critical comparison between the US and European cases leads to different conclusions in the case of derivatives. In some respects, clearing arrangements in the US are in fact less integrated than in Europe.[9] Market structure is one of the most dominant elements when comparing utilities; utilities are different in different markets.

The risk reduction and efficiency improvements arising from a CCP are expected to outweigh their costs in most markets, particularly in high-volume, developed markets. Over time, CCPs may come to be viewed as a core part of the market infrastructure in almost all markets, much as central securities depositories (CSD) became over the past decade. However, there is no single view, particularly within the euro area, about what infrastructure should prevail. The forthcoming chapters do not attempt to answer this question either, but rather seek to illuminate risks and benefits related to the functionality of CCPs.

Section 2 discusses market features that affect the suitability of central counterparty clearing and provides an assessment of advantages and disadvantages of CCPs. Section 3 takes the regulatory view, considering interests of central banks, standardisation and corporate governance issues. Section 4 elaborates possible prospects of central counterparty clearing from the risk perspective and integration perspective. Section 5 concludes.

This paper is intended to help readers with a basic knowledge securities clearing and settlement systems get up to speed on CCP issues. This paper summarises aspects from relevant articles written about the subject, eg Bank of England (1999, 2002), Riksbank (2002) and ECB (2001, 2002) and tries to widen the scope of those by gathering elements (eg views of market participants) relevant for possible risk-benefit analysis of the Finnish/Nordic-Baltic clearing and settlement infrastructure.

[9] ECB (2002).

2 What market features affect the suitability of central counterparty clearing?

Clearing houses earlier operated in the shadows of derivatives exchanges, but this is changing as it becomes evident that the central counterparty clearing houses provide are an important feature of the modern financial landscape.

In addition to exchange-traded derivatives markets, the risks associated with non-performance arise in many other markets, including markets with much shorter settlement cycles (eg rising volumes can increase counterparty risk and allow in unfamiliar remote members). This can rapidly amplify disturbances. In equity markets, where an electronic order book is employed to match trades, participants may be unable – or even have no intent[10] – to manage counterparty risk through their choice of counterparty. As a result, central counterparty services have recently emerged in a variety of cash markets, providing such valuable benefits as cost savings, confidentiality, risk reduction and capital efficiency.[11]

CCPs have also extended their range of services in derivatives markets, with a number of CCPs now clearing a range of OTC contracts. In repo markets, contractual netting offers the advantage of centralised risk management for all the multilateral positions of a specific participant. While CCPs generally provide these services directly to a limited range of clearing members, other market participants can benefit indirectly as clients of direct members.[12] The advantages of a central counterparty further increases when the same counterparty can be used for more than one market. The marginal cost of adding new instruments in an existing central counterparty system is also likely to be low.[13]

Not all the markets and asset categories are necessarily suitable for central counterparty clearing. The potential benefits of a central counterparty may come at a cost and in some markets sufficient benefits may simply not be available.

Whether a market is suitable for central counterparty clearing can therefore be determined by eg exchange, multilateral trading facilities (ECN, some of ATS with standardised instruments), OTC trading and single dealer ATS (which may avoid clients from taking risk on ATS operators which could be a broker)[14] and the trade-off between potential costs and benefits to market participants (including any social costs and benefits). Counterparty credit risk should only be an unwanted by-product of trading activity, rather than a risk deliberately taken by market participants to enhance returns. This would suggest that, in general, firms

[10] This is due to the demand of best execution.

[11] Euronext's 'mother' exchange, SBF, adopted a CCP model for its trading operations (without rolling settlement) in 1990. It was probably the earliest adopter outside futures and options.

[12] Bank of England (2002).

[13] Riksbank (2002).

[14] Korhonen (2001).

want to take on market risk, ie 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. If the credit quality of market participants is relatively uniform and counterparty exposure is an inherent, but unwanted, feature of trading in a particular 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.[15] A central counterparty is not the only way to control counterparty credit risk, traditional trading limits and collateralisation also offer opportunities to control counterparty credit risk. In addition, eg Leinonen (2003) proposes T+0 settlement to minimise counterparty risks.

Another key market feature that affects suitability for central counterparty clearing is the magnitude of counterparty exposure. In general, counterparty risk will be of greater concern to market participants where credit exposures are volatile or prolonged. In some markets, pre-settlement credit risks may already be low – perhaps when the price volatility of the instrument being traded is relatively low or the settlement cycle is short (as in most cash markets). In such cases, the additional benefits of a central counterparty may not materialise.

If the traded good is standardised and market participants have created offsetting[16] exposures, a central counterparty can make settlement by offset feasible as it becomes counterparty to every trade.[17]

CPSS-IOSCO recommendations[18] suggest that, in particular, establishing a robust risk management system for a CCP generally requires significant initial investment and ongoing expenses. Thus, individual markets should carefully balance the benefits and costs of a CCP. This balance will depend on factors such as the volume and value of transactions, trading patterns among counterparties, and the opportunity costs associated with settlement liquidity. A growing number of countries have determined that the benefits of implementing a CCP outweigh the costs.

In markets that currently operate without a CCP, market participants and relevant public authorities need to collaborate when assessing the benefits and costs of establishing and using such an organisation. Broadly speaking, they must choose from two alternatives:

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[15] Bank of England (1999a).

[16] 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.

[17] Bank of England (1999a).

[18] Committee on Payment and Settlement Systems (CPSS) – International Organization of Securities Commissions (IOSCO) (2001).

– Build and operate a new CCP, or
– Use the services of an established CCP in another centre or for another trading market.

Although most markets that currently use a CCP have opted for the first alternative, the latter should not be dismissed, particularly for smaller markets or where a CCP is already used for other products such as exchange-traded or over-the-counter derivatives. Although added concentration of risk may result, it can be appropriately managed and in many cases will be outweighed by the economy-of-scale benefits that can be gained from use of an existing CCP. The cost of adapting and increasing the capacity of an existing CCP is likely to be considerably lower than the costs of building a new CCP. In addition, the operating costs of the one CCP can then be spread over a greater volume of transactions, with a consequently lower unit cost.

As far as possible, a central counterparty should be structured so that participants retain incentives to control the risks they introduce into the system. The allocation of any losses should be transparent, the resources available to the clearing house should be proportionate to the risks to which it is exposed and management should be accountable to those potentially exposed to loss.[19]

To summarise, market participants must weigh the advantages[20] of a central counterparty against the costs of establishing and operating a CCP. If the market can be integrated into an established central counterparty with a technical system already available, the costs may well be limited.

2.1 Benefits of using CCPs

The primary force behind the creation of CCPs is the economic interest of capital market participants in lowering the market-side risks and costs of post-trade processing. The benefits for market participants can be roughly divided into the following categories:

Trading benefits

– Traders value anonymity. The facilitation of full post-trade anonymity through the introduction of CCP benefits both users and trading platforms.
– CCPs help narrow trading spreads. The reduction in market impact allows a trader to offer tighter spreads to buy-side institutional clients. Narrower spreads, in turn, attract further trading activity to the order book.

[19] Bank of England (1999b).

[20] See Section 2.1, Benefits of using CCPs.

Risk benefits

– Decreased (counterparty) credit risk. Use of a CCP offers two credit exposure enhancements. First, it facilitates multilateral exposure netting, which typically reduces overall credit exposure. Second, it consolidates bilateral exposures into a single low risk exposure with a CCP.

Balance sheet benefits

– Increased return on capital via cost reduction.
– Improved credit standing. Firms may elect to retain the released capital and thereby improve their credit standings (contribution to profitability).
– Reduced leverage ratios. Use of a CCP in the repo market has the further benefits of enabling users to net cash assets and liabilities and reducing leverage ratios.

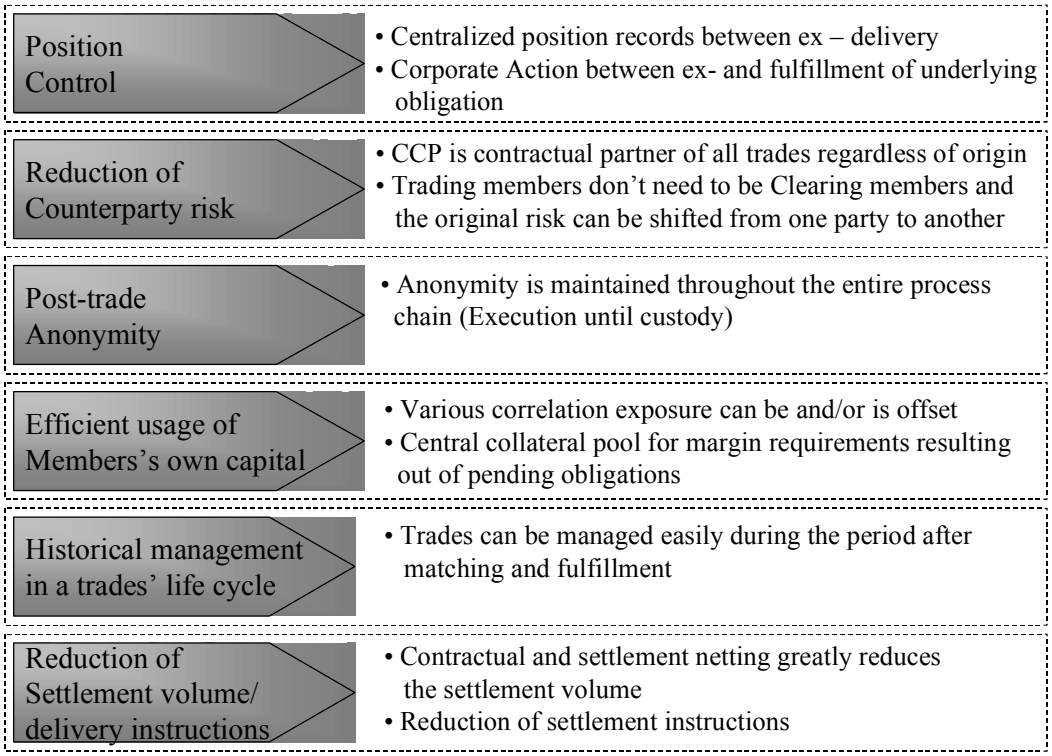
Operational benefits

– CCPs can reduce back-office tasks over the long run. Use of a CCP and accompanying risk management methods introduces significant savings at the operational level.
– Reductions in overall market costs. While the cost discussion often focuses on merger activity at the settlement level, most of these anticipated savings are achieved at the clearing level through the expansion of netting and the appropriate choice of settlement platform.
– Netting cuts settlement costs when fewer trades proceed to settlement. These cost reductions are valuable to private investors.
– Increased straight-through processing (STP). By standardising market processes, documentation and systems and processing trades through a single channel, STP can be increased greatly and costs reduced, optimising the level of capital required to support operational risk.

There are other reasons, but those mentioned above largely explain the increased demand for CCP services (particularly within the euro area). First, the growing volumes in securities trading have increased the demand for netting. Second, the internationalisation of securities trading, the introduction of new electronic platforms and the switch to order-driven anonymous trading systems in national stock exchanges have made it increasingly impossible for trading parties to control counterparty risk themselves. There is, therefore, a rapidly growing need for guaranteed clearing and settlement.[21] Figure 3 offers a functional classification of benefits of CCP services.

[21] ECB (2001).

Figure 3. **Benefits of CCP services**



Source: Eurex.

CCPs have both cost and efficiency benefits for market participants. CCPs generally offer straight-through processing facilities aimed at reducing back-office bottlenecks. However, gains from the reduction in operational costs have to be balanced against the fees and the implicit costs intermediaries must pay. The netting of exposures reduces the capital required to support participants' trading activity and helps improve price liquidity on markets. The redistribution of counterparty credit risk creates social benefits where the risk is reallocated to a greater number of participants better able to bear that risk.

Central counterparty clearing also gives rise to benefits by providing risk management services to market participants. When engaging in a securities trade, market participants are exposed to the risk that their trading counterparties will not settle their obligations when due (liquidity risk) or will not settle their obligations at all (counterparty credit risk). To protect themselves against such risks, market participants can take protective measures such as exposure limits and collateralisation. CCPs manage risks for their members, replacing exposures to multiple counterparties with a single exposure to a single central counterparty. CCPs thus enable market participants to trade without having to worry about the creditworthiness of individual counterparties.

This does not mean that CCPs eliminate counterparty credit risk; they rather manage and redistribute it far more efficiently than market participants could do in isolation. CCPs also do not eliminate liquidity risk; CCPs do not universally guarantee timely securities delivery (although they will typically guarantee timely delivery of money).[22]

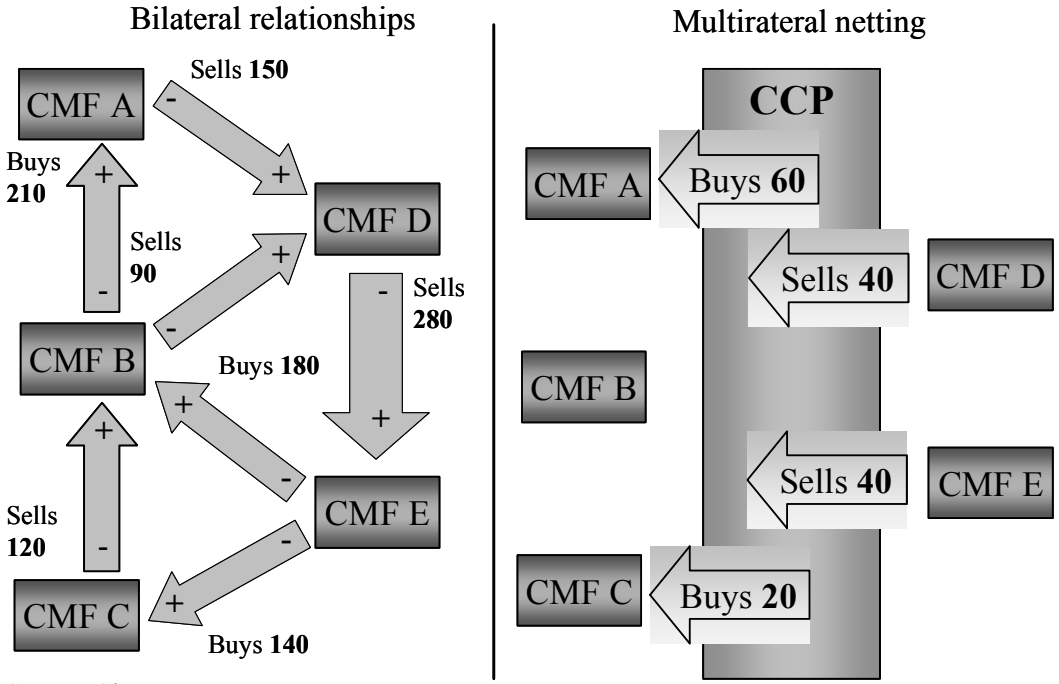
Central counterparty clearing helps maintain anonymity where the trade execution process itself is anonymous. This can be a valuable service when market participants fear a market impact as a result of their trading activities.

The other benefits CCPs can provide depend on the types of functions they offer, but chief among them is netting. Netting can offer lower settlement costs, improved liquidity and higher levels of automation that help minimise processing costs within trading firms.[23] This also depends on the legal framework, eg under indirect holding, settlement procedures are obviously compatible to netting.

One of the main assets of a clearing house lies in its capacity to adopt multilateral netting for positions. Multilateral netting (Figure 4) allows for a substantial reduction in the number of settlements and, therefore, in operational costs, including settlement fees for clearing members. In securities trading, the same security is often sold back and forth between market participants. As a result of these transactions, a number of exposures can arise that offset one another completely or partially. In addition, 'netting by novation,' a service offered by CCPs, allows for a reduction in individual contractual obligations, thus affecting market participants' books and balance sheets. To the extent that national legislation limits the trading volume of a participant to a certain fraction of its balance sheet, netting by novation creates more trading opportunities for the participants. Basel II, with its handling of eg operational risk, could be major incentive to wider use of CCP clearing. Netting by novation may help to reduce the capital required to support participants' trading activity.

[22] See also Section 2.2, Risks faced by CCPs and their management.
[23] DTCC (2001).

Figure 4. **Multilateral netting**



Source: Clearnet.

The biggest CCPs provide netting to their members with positions netted by securities, settlement date and currency.[24] Central counterparty clearing creates benefits for the individual participant and the economy as a whole in terms of market liquidity and efficiency. Trading with a CCP stimulates trading and improves the functioning of capital markets. For instance, the significant increases in trading volumes on the EuroMTS repo market may be attributed at least in part to the introduction of the possibility of using a CCP.[25]

2.2 Risks faced by CCPs and their management

Risk can be legally transferred to the CCP in two ways. Novation replaces the original contract between the buyer and seller shortly after the trade with two new contracts between the CCP and the buyer and the CCP and the seller. Open offer implies that buyer and seller have never have entered into a bilateral contractual

[24] Eg LCH.Clearnet provides high netting ratios: 95% efficiency.

[25] The EuroMTS rules give intermediaries the possibility to trade repos on an anonymous basis relying on LCH.Clearnet as the CCP or, alternatively, to disclose their identity and, possibility, to 'refuse' a counterparty on the basis of its creditworthiness.

relationship. In this situation, the CCP is considered to have stepped in between them at the very moment the transaction was executed.

All CCPs must have sound risk management since they assume responsibility for aggregate and reallocate risk among their participants. If a CCP does not perform risk management well, the CCP may increase risk to market participants. Without well-developed risk management mechanisms, multilateral netting can also entail large risks. Moreover, without sufficient risk management to ensure settlement, the default of just one participant with very small transaction values can stop the settling process when the CCP's risk management techniques fail to provide a sufficiently robust backup to ensure settlement in stress situations. Thus, to realise the advantages of a netting system, the market must have access to an institution offering secure multilateral/bilateral net settlement.

Traditionally, central counterparties were only found in the derivatives markets, where the need for efficient risk reduction is self-evident. Replacement cost risks are much larger and more difficult to manage in the derivatives market than in the cash market as the risk exposure extends over a longer period of time. Most share transactions are currently settled within three days after a deal is concluded (T+3). Thus, derivative transactions give rise to longer exposures and thereby greater replacement cost risks and require good risk management. The repo market falls somewhere in between these derivatives markets and spot markets.

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.[26] On the other hand, the most modern CCPs offer competing additional services that may attract creditworthy firms.

The risks faced by a central counterparty are similar to those faced overall in securities clearing and settlement. However, acting as a CCP also has its own special features, because the CCP can easily take a role of 'centrepiece' in the market.

– **Systemic risk;** a risk that the inability of one institution to meet its obligations when due will cause other institutions to be unable to meet their obligations when due. The failure of a large CCP is a potential source of

[26] Bank of England (1999a).

systemic risk. Systemic risk can be a consequence of the risks mentioned below.

- **Counterparty (credit) risk;** a risk that a counterparty will not settle its obligations for full value at any time. The whole principal amount could be at risk. A CCP redistributes counterparty risk through novation.
- **Pre-settlement risk;** a risk that either counterparty will default before the final settlement. This risk is also called replacement cost risk. The default of counterparty may leave a CCP in a position that the original transaction has to be replaced in prevailing market prices.
- **Liquidity risk;** a risk that a counterparty will not settle an obligation for full value when due, but some unspecified time thereafter. A CCP may be exposed to liquidity risk, if members do not meet margin calls in a timely fashion. If the CCP has insufficient liquidity to meet demands followed by delay, it may have to delay making repayments. Thus, liquidity risk is a part of settlement risk. Securities borrowing is a way to allow settlement in time. The CCP's rules may have clauses that delay final delivery when there are problems with settlement.
- **Investment risk;** a failure of institutions outside the immediate clearing membership may also create risks for a CCP. Many CCPs use a network of private banks to make fund transfers to and from members and may therefore be exposed to settlement bank risk. If margins and other default resources are invested in the market by the CCP, they may also face investment risk.
- **Legal risk;** a risk that a party will suffer a loss because laws or regulations do not support the rules of the securities settlement system, the performance of related settlement arrangements or the property rights and other interests held through the settlement system. Legal risk also arises if the application of laws and regulations is unclear (ie a specific form of operational risk). Where the legal status of CCP's netting arrangement is not protected by national law, or where it clears cross-border trades, it may be exposed to significant legal risks. One of the most significant legal risks faced by a CCP-clearing provider is the risk that bankruptcy administrators might challenge its right to close out positions and liquidate a defaulting participant's assets.
- **Operational risk;** a risk that deficiencies in information systems or internal controls, human errors or management failures will result in unexpected losses. A CCP is also vulnerable to operational risks, ie normal business risks.
- **Technology risk;** a CCP is vulnerable to technology risk – at least, if it does not use software of its own. Technology risk can be also a part of operational/strategic risk.[27]

[27] Bank of England (2002), CPSS-IOSCO (2001), McPhail (2003).

It is of vital interest that oversight bodies ensure that central counterparty clearing houses as an industry adopt appropriate, effective procedures to tackle the risk of default. The supervisor's role then is to inspect individual CCPs. The CPSS-IOSCO has recently published risk management recommendations for CCPs.[28] The CPSS and the IOSCO Technical Committee conclude that international standards for CCP risk management are essential because of CCPs' large and growing role in SSSs and the potential for risk management failures by CCPs to disrupt markets and payment and securities settlement systems.

Safeguards against the default or insolvency of a participant may take three forms. First, there are safeguards designed to minimise the probability of failure of the market participant. In particular, strict access rules with adequate financial and operational requirements for membership of the clearing house fulfil this purpose. Second, there are safeguards designated to minimise the loss to the CCP if a market participant should fail. This category relates to margin requirements that collateralise the current and potential credit exposures stemming from the trades of a participant. The margin has to be paid in cash or high-quality bonds by the participant. Another possibility for minimising losses is to limit the build-up of such exposures by periodically settling positions, especially in the derivatives markets, or by making margin calls. In highly volatile markets, sophisticated systems calculate, if necessary during the day, additional margin requirements that have to be provided immediately. There is a need for stress tests to be flexible enough. Third, there are safeguards designed to cover losses that exceed the value of a defaulting member's margin collateral. For this purpose, central counterparty clearing houses maintain supplementary resources such as capital, pre-funded guarantee funds, asset pools and guarantees. A problem could arise if those guarantees are insufficiently liquid.

From the perspective of counterparties, the credit risk of the CCP is substituted for the credit risk of the other counterparties. As long as the CCP effectively manages the risk it assumes, a CCP tends to reduce the risks to counterparties and systemic risk in the markets it serves. Conversely, a risk management failure by a CCP could impose significant credit losses on its counterparties. In the extreme, it might default on its obligations, forcing its members to close out and replace their contracts with the CCP. Short of that, a CCP might avoid default but only by imposing significant losses on its members under the terms of loss-sharing agreements. In either case, because a true CCP acts as counterparty to all trades in one or more markets, the losses would be widespread. Furthermore, should a CCP default, it would be unable to perform services going forward. The loss of a CCP's services or its imposition of significant losses on its members would disrupt the liquidity of the markets it serves until its services are replaced or its members rebuild their capital.

[28] CPSS–IOSCO (2004). See also Section 3.2, Standardisation.

Particularly in the case of loss of a CCP's services, but also in the case of significant losses to its members, market liquidity could remain impaired for an extended period. Fortunately, there are softer approaches to deal with liquidity risk. Most CCP bylaws have a rule stating that it is possible to postpone the settlement date in severe situations.

The priority, of course, should be to avoid defaults. Indeed, CCP failures have been extremely rare, although the examples of Paris in 1973, Kuala Lumpur in 1983 and Hong Kong in 1987 demonstrate that they do occur. Two of those crisis happened in commodities market (Caisse de Liquidation, Kuala Lumpur Commodity Clearing House) and one in a futures market (Hong Kong Futures Guarantee Corporation).[29] Liquidity problems from settlement delays are more common and can cause serious problems to brokers. A recent example demonstrates the role of the CCP in default situation. In summer 2004, a clearing member with NOS Clearing ASA failed to post margins and has been closed out by NOS. As a guarantor of the clearing market, NOS assured that all clearing members received all settlements in due time by covering outstanding cash calls. The positions of the defaulting member were closed out by NOS and further obligations were not incurred.[30]

2.3 Assessing the advantages and disadvantages of using CCPs

Assessing the advantages and disadvantages of using CCPs is a non-trivial task. A benefit to one market may be a cost or an irrelevancy for another market. Thus, the evaluation process needs to be market specific. This is also a large reason consultants have difficulties answering the questions of market participants who are deciding whether to build a CCP.

Central counterparty clearing can create benefits for individual participants and the economy as a whole. However, in many markets, the costs and benefits of a CCP may not be equally or proportionally shared among various market participants. Large, active participants generally have the most to gain from use of a CCP since they deal with the most counterparties and have greater trade volumes in each security that can be netted. On the other hand, utilisation of the CCP functions can be difficult for small market participants. CCPs are often organised so that it is almost impossible for small brokers to become direct clearing members of a CCP. This limits the opportunities for small players to operate in the market. Of course, this does not have to be the case. With the right

[29] See Appendix 1.

[30] For more information, see http://www.nos.no/pdfs/pressrelease2004.3.pdf.

structure, a CCP can enable small players to stay in the market and makes it possible for issuers of the regional market place to achieve market funding.[31] This should be carefully considered when determining the costs of development and use of a CCP to ensure an equitable outcome for all market participants and encourage broad support and participation.[32] It is also a question of governance.[33] It is important that market participants and other contact groups of the CCP have a possibility to participate to the governance of CCP.

Given the above discussion, could any services offered by a CCP be vital for an entire financial market? If the answer is yes, there should be concrete involvement of public authorities, for example in the form of rules. Here, the CPSS-IOSCO Recommendations for Central Counterparties are a step in that direction. If no, the public authorities should concentrate on ensuring open and fair access to the markets. Open and fair access ensures the soundness and efficiency of clearing and settlement systems and guarantees a level playing field. This supports the view of most relevant authorities, ie that the process of EU/global consolidation should be driven by the private sector (market driven) and authorities only have a role as a catalyst.

Another issue is efficiency. As noted by the Giovannini Group (2001), the importance of removal of cost inefficiencies in clearing and settlement is a necessary condition for the development of large, efficient financial infrastructure, particularly in the European context. Recent research reveals the existence of substantial economies of scale related to both depository and settlement activities. On average, the centralised US system is found to be the most cost-effective settlement system and may act as the cost-savings benchmark.[34] However, settlement institutions from Europe and the Asia-Pacific region show highest potential in unit cost savings. Similar results were found for relatively smaller service providers where a doubling of settlement and depository activities would increase cost only by two-thirds. The findings also suggest that the operating costs for cross-border settlement appear to be much higher than operating a domestic CSD. The evidence further indicates that operating costs tend to decrease continuously over time, possibly due to investments in implementing new systems or upgrading settlement technology.[35] It can be supposed that similar kind of findings prevail also in central counterparty clearing. On the other hand, CCPs have been integral part of the post-trading infrastructure in US securities clearing

[31] This has been the tendency seen in some of the new EU member states. See also Kowalski et al (2003).

[32] G30 (2003).

[33] See Section 3.3, Corporate Governance; ECB (2004).

[34] Only covers cash markets.

[35] Schmiedel, Malkamäki and Tarkka (2002), Schmiedel (2004).

and settlement. In fact, the Giovannini paper implies a great structural difference between Europe and the US as US trades tend to be processed via CCPs.

Similar findings are also presented in the London Economics (LE) study 'Quantification of the Macro-Economic Impact of Integration of EU Financial Markets,'[36] the first substantive piece of empirical research on the impact of financial integration on the costs of raising finance in Europe. The work was begun in late 2001, and consultants were invited to evaluate any impact of integrating EU equity and corporate bond markets on trading costs and the cost of capital. The LE study and expert observations suggest it may be worthwhile to further investigate the aspects of financing costs. The explicit (clearing and settlement) costs rather than implicit trading costs make a considerable difference in terms of the costs of finance. Moreover, the fragmentation of the clearing and settlement operations has been identified as one of the more costly obstacles to an integrated EU market for financial services. When comparing the per-transaction income between the EU and the US, it is clear that the inefficiencies in this area are mainly related to pan-European transactions. The cost for domestic transactions is on average about the same as in the US. A single infrastructure is therefore expected to further reduce costs considerably.[37]

As various studies suggest, greater scale and network externalities are the key responses. Initially, they will favour global players. The results clearly support the formation of mergers and alliances among smaller settlement institutions. In other words, expansions or the pooling of depository and settlement business is also likely to enhance savings in unit costs for small and medium-sized institutions. While continuous change is costly, it is evident that investments in implementing new systems and upgrades of settlement technology arguably improve cost effectiveness over the long run. Against this background, it seems relevant (at least for smaller players) to consider the question of whether it is preferable to build a new CCP, integrate with an existing CCP or set up a new joint CCP. An implication that can be derived from CSD side is that expansions are cost effective in post-trading activities. This would also implies a preference for multi-product CCPs.

Since the interposition of a CCP makes it easier for market participants to manage counterparty credit risk, the number of trading opportunities increases. As a result, market liquidity is increased, trading is stimulated, transaction costs diminish and the functioning of capital market improves. From the risk perspective, however, the effects of a central counterparty are not entirely positive. While central counterparty clearing brings about a significant reduction in risk for participants, it concentrates risks with the central counterparty. Thus, transparent risk management is a crucial requirement for the CCP – and a field

[36] London Economics (2002).

[37] European Commission (2003b).

where the authorities have an important role to play. In addition, it is typical that a single CCP does not accept all shares listed in the certain stock exchange for clearing, but only shares from the main list. This discriminates against issuers (usually the smaller ones) whose shares are not accepted by a CCP and decreases trading in such shares relative to those on the main list.

Over recent years, there has been a trend towards increased internationalisation of market infrastructure providers. Currently, the two largest marketplaces in Europe are Euronext and Deutsche Börse. The London Stock Exchange is also counted among these big players. In the following discussion, I describe possible differences and similarities in the functionality of the major CCPs in Europe, ie Clearnet SA, London Clearing House[38] and Eurex Clearing AG. Clearnet SA and London Clearing House began operating as a combined entity on 1 January 2004 in the forms of LCH.Clearnet.[39]

LCH.Clearnet SA (new name of Clearnet SA)

LCH.Clearnet SA is a credit institution under French law and supervised by the French authorities. LCH.Clearnet SA is a subsidiary of Euronext Paris belonging to the Euronext Group with Euroclear holding.[40]

LCH.Clearnet SA operates as a clearing house for the Euronext markets.[41] It provides clearing and CCP services for French, German, Dutch and Portuguese government bonds. Italian government debt is handled in conjunction with Cassa di Compensazione e Garanzia. LCH.Clearnet SA currently supports the Brokertec, MTS France, MTS Italy, EuroMTS, and e-Speed fixed income trading platforms. In recent years, Clearnet has rolled out its Clearing 21 (C21) cash clearing system to Paris, Brussels, Amsterdam and Lisbon. All French, Belgian, Dutch and Portuguese Euronext cash and derivatives trades are now cleared through C21. The LCH.Clearnet Group's CCPs will progressively migrate to common systems architecture.

Under French legislation, clearing houses must have the status of a credit institution and the full ownership rights over the deposits and margin calls of its

[38] LCH and Clearnet announced their merger on 25 June 2003. For more on the merger, see Section 4, Future prospects – integration perspective.

[39] Based in part on the Final Report by London Economics (2004). See also Appendix 3, Description of selected CCPs.

[40] New corporate structure (2004) of Euroclear group (Euroclear plc) consists of CrestCo, Euroclear France, Euroclear Netherlands and Euroclear Bank.

[41] Established by merger between the Belgian, Dutch and French exchanges. Portugal joined in 2002. Since 1 February 2001, LCH.Clearnet SA has been the single preferred clearing house for the Euronext markets (cash, derivatives and commodities) with the exception of the Euronext.LIFFE which is cleared by LCH.Clearnet Ltd.

members, whether in cash or securities. A clearing member can be a general clearing member, an individual clearing member or an allied CCP depending on capital requirements. The legal basis of CCP service is novation. By novation, LCH.Clearnet SA becomes subject to the rights and obligations arising from the transaction. At the end of the clearing day, LCH.Clearnet SA assumes net payment and delivery obligations through multilateral netting.

Credit institutions, investment firms and entities, whose single purpose is to provide clearing services for financial instruments and which are within the scope of the prudential supervision of the Commission Bancaire can be admitted as members. Some additional criteria, like minimum capital requirements also have to be fulfilled.

The financial guarantee of LCH.Clearnet SA is based above all on a 'defaulter pays' approach, where margins are the first level of financial resources of LCH.Clearnet SA. There are two types of margin requirements:

- Initial margin deposits, whose aim is to cover the upcoming risk on the open positions registered with the clearing house; and
- Variation margin or margin calls, which cover the price difference between the original price of the registered position and the marked-to-market price.

Valuation of exposures and margin calls is performed at least once daily. Additional deposits are required for positions bearing risks that appear to be insufficiently covered by existing deposits. Regarding futures and options, intraday price variation limits apply. If a limit is breached, an intraday margin call is made. In addition, there are additional risk control measures such as individual exposure limits, a clearing fund and LCH.Clearnet SA's own funds.

LCH.Clearnet Ltd (new name of London Clearing House)

LCH.Clearnet Ltd is a public limited company supervised by the British authorities. Prior to 2004, LCH.Clearnet Ltd was owned by its members, the London International Financial Futures and Options (LIFFE), the London Metal Exchange (LME) and the International Petroleum Exchange (IPE), and run on a non-profit basis. LCH.Clearnet Ltd operates as a clearing house for Euronext.LIFFE, IPE and LME. EquityClear offers CCP services for equities transaction in London Stock Exchange (LSE) and virt-x exchange.[42] RepoClear offers CCP services for repo and cash bond transactions in European government bonds and other bonds. SwapClear offers CCP services for interest rate swaps.

[42] The new pan-European exchange was formed by Tradepoint and the SWX Swiss Exchange. Currently, SWX has 100% ownership of virt-x.

EnClear offers CCP services for energy contracts on the US-based Intercontinental Exchange (ICE) and the European Energy Derivatives Exchange N.V. (Endex).

LCH.Clearnet Ltd offers clearing and CCP-services, both directly and through third party clearers, are provided for trades in German, Belgian, Dutch, Austrian, Portuguese, Finnish, Irish and UK government bonds as well as supranational and sovereign Eurobonds and Jumbo Pfandbriefe. US-dollar-denominated Eurobonds will be added in the near future. Trades in baskets for German government bonds, UK gilts and Euro12 general collateral are supported. LCH currently supports the Brokertec, EuroMTS and e-Speed trading platform and Euroclear's ETCMS.

Users of exchanges and markets served by LCH.Clearnet.Ltd must either be members of LCH.Clearnet Ltd or have a direct or indirect clearing relationship with a member of LCH.Clearnet Ltd. LCH.Clearnet Ltd sets minimum capital requirements for clearing members.

LCH.Clearnet Ltd guarantees the financial performance of contracts up to and including delivery, ensuring that delivery has been made accurately and on time, that the relevant documentation is complete and payment is received. Depending on the market in question, LCH.Clearnet Ltd either becomes counterparty to each trade through novation or through open offer. In the case of open offer, there is never any underlying legal bilateral contract between the original trading counterparties.

LCH.Clearnet Ltd uses three forms of safeguards against the default or insolvency of a participant:

- **Safeguards designed to minimise the probability of failure of a market participant;** financial and operational requirements for membership in the clearing house. Members also have to satisfy day-to-day operational requirements, including the adequacy of their back-office and banking arrangements.
- **Safeguards designed to minimise the loss it suffers if a participant should fail;** margin requirements that collateralise the current and potential future credit exposures. LCH.Clearnet Ltd calculates initial margin on all open positions held by members and collects variation margins. It has the possibility to make intraday calls for higher margins as necessary in fast-moving markets.
- **Safeguards concerned with who bears any losses that arise;** capital, pre-funded guarantee funds, asset pools, credit lines, and guarantees to cover losses that exceed the value of the defaulting member's margin collateral.

In June 2003, London Clearinghouse and Clearnet SA announced their intention to merge. The merger was completed on 22 December 2003.

Under the agreement, LCH.Clearnet Ltd and LCH.Clearnet SA became subsidiaries of a new financial holding company LCH.Clearnet Group Limited.[43] As a financial holding company, LCH.Clearnet Group Limited is supervised on a consolidated basis by the French Commission Bancaire. As a Recognised Clearing House, LCH.Clearnet Ltd is supervised by the UK Financial Services Authority. LCH.Clearnet SA is regulated as a credit institution under French law, and has branches in Amsterdam and Brussels.

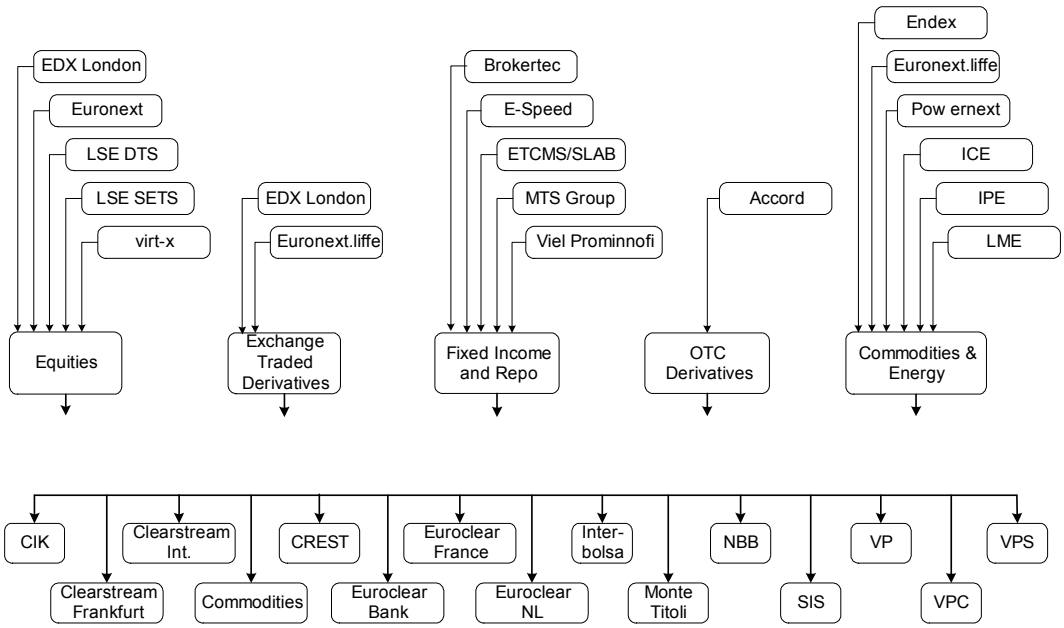
The merged parties have indicated their intention to maintain independence through the ownership structure and voting caps. For instance, the merger agreement provides that 45.1% of LCH.Clearnet Group Limited is owned by exchanges and 45.1% by members, with the balance held by Euroclear (9.8%). Euronext remains the largest shareholder with a 41.5% stake, although its voting rights are limited to 24.9%.

Although the two operating companies remain separate for legal and regulatory purposes, they are managed as a single entity wherever practical and beneficial according to the margining parties. Users are free to hold all their positions and clear either through LCH.Clearnet Ltd or LCH.Clearnet SA.

Oversight of the Euroclear group and LCH.Clearnet involves cooperation with international counterparts. In June 2004, the overseers and regulators of LCH.Clearnet reached agreement on a multilateral memorandum of understanding supporting the efficient sharing of information and a consistent approach across jurisdictions.

[43] www.lchclearnet.com.

Figure 5. **LCH.Clearnet markets served**



Source: LCH.Clearnet.

Eurex Clearing AG[44]

Eurex Clearing AG is a wholly owned subsidiary of Eurex Frankfurt AG[45], founded in 1998 under German law and supervised by the German authorities. It operates as a clearing house for Eurex exchanges in Frankfurt and Zürich. It is the central counterparty for bonds traded on Eurex Bonds GmbH (since October 2000), and for on-exchange trades executed on either Xetra or the floor of the Frankfurt Stock Exchange in equities subject to collective safe custody, denominated in euro and listed on Xetra (since March 2003). Eurex Clearing AG plans to introduce a CCP service for Eurex bonds and Eurex repo markets in the first quarter of 2005 when new CCP Release 3.0 will be installed.[46] Eurex Clearing will extend the trade and delivery management functionalities currently provided for equities to cover fixed income markets. The current risk-based

[44] www.eurexchange.com.

[45] A subsidiary of Deutsche Börse AG. Deutsche Börse has had 100% ownership of the Clearstream group since 2002.

[46] Release 2.0 was installed in summer 2004. It includes changes to the Gross Delivery Management (GDM) and Buy-in procedures. The new rules state that at least one buy-in action must be executed before cash settlement takes place. This will only be initiated if the surplus delivery has a corresponding surplus receipt that is at least 30 days old.

margining concept will be extended to the Eurex repo and Eurex bonds markets.[47] Clearing members can pledge securities or cash to cover their margin requirements, similar to the equity CCP. It is not clear why other stock exchanges in Germany have not migrated to a central counterparty arrangement or whether they intend to do it in the future.

The management and processing of pending transactions for CCP-compatible securities takes place in the CCP's Gross Delivery Management (GDM). The GDM generates DVP instructions for the net obligation and gross transactions and transfers these to the CASCADE, securities settlement system as OTC instructions. In addition, Eurex Clearing AG acts as a clearing house for European Energy Exchange. Eurex Clearing steps in the transactions, becoming the seller to every buyer and buyer to every seller at the moment the trade is executed (open offer), and guarantees the fulfilment of all obligations received by the clearing house. The amount of margin to be deposited is determined using the risk-based method.

Eurex Clearing AG uses different forms of safeguards against the default or insolvency of a participant, which comprise:

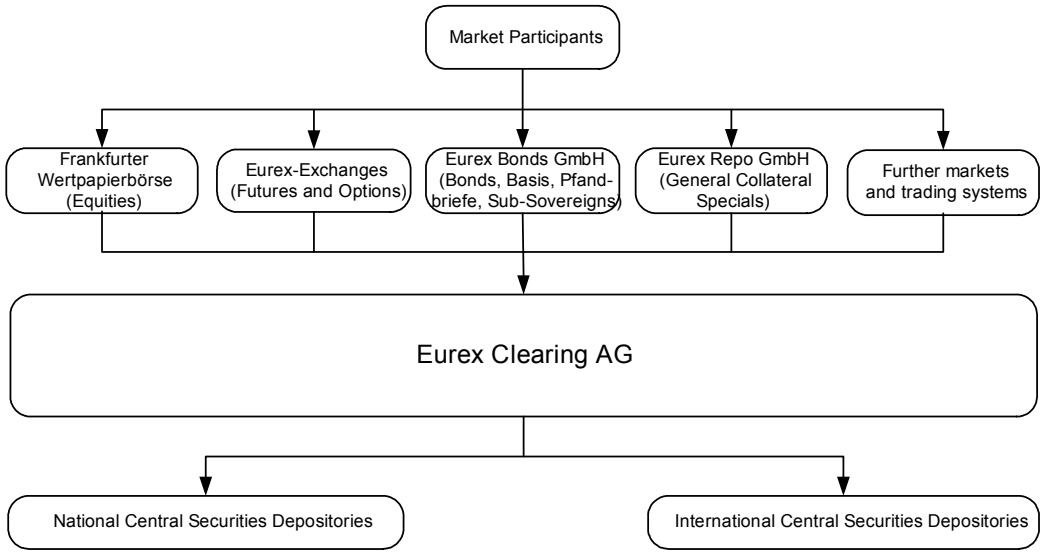
- **Strict access criteria;** only clearing members may be parties to contract with Eurex Clearing AG. Clearing members must be licensed by national supervisory authorities. Since Eurex Clearing AG has introduced the possibility of remote clearing, a banking permit is no longer required. Minimum equity capital requirements are EUR 12.5 million for direct members and EUR 125 million for general members.
- **Risk-based margining;** margining encompasses the entire process of measuring, calculating and administrating the collateral that must be put up to cover open forward positions. The level of margin required from each member is recalculated daily.
- **Clearing fund;** irrespective of the provision of other margin, clearing members have to make a contribution to a clearing fund. The contribution has to be provided in the form of bank guarantees and/or cash or securities collateral.

Eurex Clearing AG and the Chicago-based Clearing Corporation have entered into a long-term partnership to create a transatlantic clearing solution for customers of Eurex and Eurex US. This first Global Clearing Link merges the liquidity pools of

[47] Eurex Clearing AG is the central counterparty for on-exchange trades executed on either Xetra® or the floor of FWB® Frankfurter Wertpapierbörse (Frankfurt Stock Exchange) in equities that are subject to collective safe custody, denominated in euro and listed on Xetra. In its role as clearinghouse, it additionally assures the fulfilment and clearing of trades on the Eurex® derivatives exchange, Eurex Bonds® and Eurex Repo®.

the most traded financial derivatives contracts in the world and offers extended high quality clearing services and risk management around the clock. New trading and clearing opportunities should lead to substantial growth in the futures industry. Eurex Clearing AG and the Clearing Corp. declared in autumn 2004 they will immediately roll out phase one of their global clearing link, which has been approved by US regulators. According to Eurex, the first transatlantic derivatives processing link will lower the cost of access to the Frankfurt-based Eurex exchange from the United States. Hefty savings could be realised by trading firms through collateral pooling and margin offsets. Small and mid-size trading firms could benefit as low clearing fees bring their costs down to the level of wholesale pricing.

Figure 6. **EUREX Clearing AG**



Source: Eurex.

The current structures of major two CCPs differ from each other. According to some market participants, the merger between LCH and Clearnet, though difficult, has ultimately been a successful merger. LCH.Clearnet Group Limited operates on a for-profit basis. In addition to providing ownership and governance rights for users and trading platforms, LCH.Clearnet has undertaken to operate under principles of non-discrimination across its customer base. Eurex Clearing AG is a wholly owned subsidiary of Eurex Frankfurt AG and operates as a commercial entity.

As Figures 5 and 6 reveal, the markets where these CCPs operate differ from each other. LCH.Clearnet serves a wide variety of markets with variety of instruments. Eurex Clearing follows Deutsche Börse's vertical integration strategy

and operates as a clearing house for Eurex exchanges in Frankfurt and Zürich with a clearing licence for derivative, bonds, repo and equities instruments.

The cost structure in different markets also varies. Competition is one of the main motivators for decreasing clearing fees and it has been argued that costs must come down in the long run. The major European players have all lowered their fees over the past year.

Although differences exist between the major CCPs, it is evident that all the major European CCPs comply with the basics of the current EACH standards of risk management[48] and CPSS-IOSCO recommendation (4)[49] for CCPs. In spite of good compliance of current standards and recommendations, it should also be considered that clearing and settlement infrastructure is evolving. There are new requirements from different infrastructures and processes of the newest EU member states. The efforts of the ESCB-CESR working group[50] and the G10 countries (CPSS-IOSCO) in this field highlight the search for answers to these new challenges.

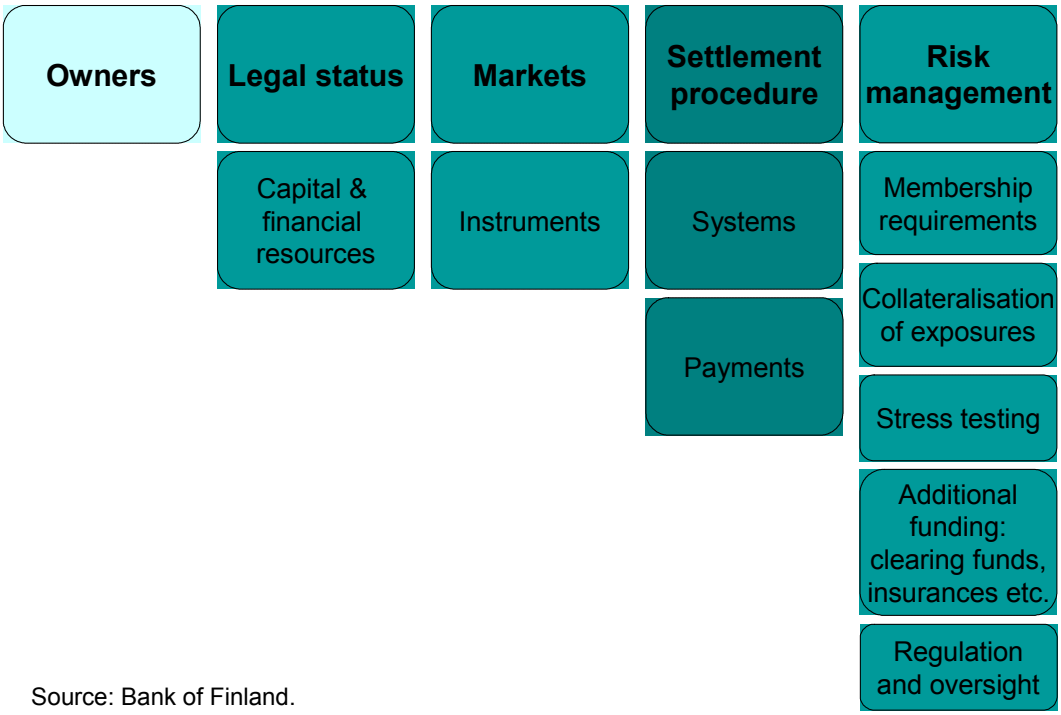
The above discussion provides only short descriptions of main functions of Europe's major CCPs. It is based on fact-finding analysis of the ECB, work done by CPSS-IOSCO and the rules of described CCPs. Figure 7 attempts to construct a framework for evaluation of CCPs describing the main aspects to consider in the evaluation process.

[48] EACH, 2001; http://www.fese.be/each/information.htm.

[49] See Appendix 2.

[50] European System of Central Banks (ESCB) – Committee of European Securities Regulators (CESR) (2004). See also Section 3.2, Standardisation.

Figure 7. **Framework for evaluation of CCPs**



Source: Bank of Finland.

3 Oversight, standardisation and corporate governance

3.1 Interests of Central Banks

Central banks have an interest in ensuring the smooth functioning of securities clearing and settlement systems because of the potential impact a major disruption may have on two of their key responsibilities: the smooth implementation of monetary policy and the smooth functioning of payment systems and overall stability.

The main reason central banks are interested in function of the CCPs from an oversight perspective is that problems with this type of clearing and settlement can spread through the financial system and cause serious disturbances and liquidity effects.

Clearing houses typically undertake activities that support the securities settlement process, eg matching and netting of trade orders. Problems on the clearing side could, therefore, spill over to the settlement side. Moreover, in the case of cross-product clearing and/or cross-currency clearing, there is a risk of contagion from one market to another in the event of the failure of a central

counterparty (or even in the event of doubts over the creditworthiness of the central counterparty).

Where no central counterparty service is provided, counterparty credit risk is managed on a decentralised basis by each participant contracting in the market. Therefore, when a central counterparty is used, the systemic implications of an inappropriately designed clearing or risk management system, or of a management failure, are correspondingly larger than if the clearing house does not offer central counterparty services.[51]

The question of central counterparty clearing gives rise to an important trade off. A central counterparty, by definition, concentrates and reallocates risk. As such, it has the potential either to reduce or increase the systemic risk in the market. It can provide substantial efficiency gains for market participants and lead to more liquid capital markets. On the other hand, it can have following negative effects on financial stability:

- **Concentration of risk;** potential problems can arise as a result of the large risk concentration entailed in central counterparty clearing. The repercussions of insufficient risk management can be substantial.
- **Contagion effect;** in the case of cross-product and cross-currency clearing, risks are concentrated to an even greater extent and may spill over from one market to another.
- **Moral hazard;** the concentration can also lead to moral hazard problems if the central counterparty is considered 'too big to fail.'
- **Information asymmetry;** the market participants may hesitate to trade with counterparties on which they have little information. Such information asymmetry commonly arises in times of financial crisis when there is a general suspicion that counterparties may be close to collapse. The existence of a single counterparty reduces the level of information asymmetry only if there are no doubts about the solvency and competency of the central counterparty clearinghouse itself. If there were fears about the solvency of a central counterparty, the entire market may stop trading.
- **Excessive risk-taking (limited liability);** participants may use CCPs to externalise risk, ie they may not bear all the cost/losses from trading and may trade less prudently, thus increasing the overall level of risk in the market.
- **Race to the bottom;** hard competition between central counterparties (race to the bottom) entails the risk that these service providers may try to improve competitiveness by applying more lenient risk management standards.[52] Cost reduction is generally a high priority in CCP business plans.

[51] ECB (2002).
[52] ECB (2001).

Another interest of central banks appeared after analysis of the infrastructure of several new EU members. It was revealed that some CSDs in those countries also act as CCP or provide services similar to those provided by CCPs. The key issue here is that the functioning of a CSD must not be affected by the potential default of a CCP. There are currently discussions on the functions performed by CCPs and CSDs as well as on the need to separate them. Given that default of a CCP is likely to have adverse effects on securities markets, the effects would likely be worse if the CCP and the CSD were the same entity. In the case where the CCP and CSD belong to the same corporation, central banks have a tendency to prefer balance sheet protection of the two entities.

Central counterparty clearing could have adverse effects on financial stability, so there is a need for transparent oversight and regulation. At both the international and national level, securities regulators and central banks should closely co-operate. When a CCP serves markets in multiple jurisdictions, regulators should make cooperative arrangements. Currently, the supervisor's role is still undefined.

3.2 Standardisation

Several international initiatives completed in the past few years have the goal of maintaining financial stability by strengthening the financial infrastructure. There have been many attempts to standardised functions of CCPs. Below are some of the most important prepared by authorities and market participants.

CPSS-IOSCO recommendations

The CPSS-IOSCO recommendations were published in the end of 2001. These 19 recommendations and accompanying explanatory texts identify minimum standards that securities settlement systems should meet. The recommendations are designed to cover systems for all types of securities (functional approach), for securities issued in both industrialised and developing countries, and for domestic as well as cross-border trades.

Recommendation 4 deals with central counterparties by emphasising that the benefits and costs of a CCP should be evaluated. Where such a mechanism is introduced, the CCP should rigorously control the risk it assumes. CPSS-IOSCO recommendations also list the key questions for assessment of implementation.[53] For further assessment, CPSS and IOSCO published an 'Assessment methodology for Recommendations for securities settlement systems' in November 2002. The

[53] CPSS-IOSCO (2001). See also Appendix 2.

methodology is primarily intended for use in self-assessments by national authorities or in peer reviews of such self-assessments. It tries to give more accurate picture of the assessment process than the original broad-perspective CPSS-IOSCO paper.[54]

In spring 2004, CPSS-IOSCO finished its specific risk management recommendations for CCPs, 'CPSS-IOSCO Recommendations for Central Counterparties.' It was released first in consultative form and followed by the final report at the end of November. Such recommendations and standards are undoubtedly key elements in the toolbox of public authorities. Due to its broad view, however, the ESCB-CESR working group is currently modifying the recommendations for European purposes.

ESCB-CESR standards

CCPs are rather poorly covered in the original CPSS-IOSCO recommendations. As a result, a group of authorities from larger countries have prepared common recommendations for CCPs.[55] Since completing its standard setting work in autumn 2004,[56] ESCB-CESR continues its work and its aim is to produce an assessment methodology for European standards based on the CPSS-IOSCO recommendations and prepare European version of CPSS-IOSCO recommendations for CCPs.

The objective of ESCB-CESR standards is to enhance the safety, soundness and efficiency of the securities market infrastructure. Thus, they basically address the activities of CCPs and CSDs. In addition, there is a separate, more accurate standard to the CCPs. Compared to the original CPSS-IOSCO recommendation, the ESCB-CESR standard gives wider and more specific consideration to assessing the benefits and costs of establishing CCPs. No changes have been introduced with regard to risk management issues mentioned in the CPSS-IOSCO Recommendations for CCPs. This has been left to the 'europeansation' work of CPSS-IOSCO recommendations by ESCB-CESR.

The Giovannini Group reports

The Giovannini Group, whose role is to advise the European Commission on issues relating to EU financial market integration and efficiency in euro-denominated financial markets, published at the end of 2001 the first of two

[54] CPSS-IOSCO (2002).
[55] CPSS-IOSCO (2004).
[56] ESCB-CESR (2004).

reports dealing with clearing and settlement of cross-border securities transactions in the EU. The first report reviewed the current arrangements, highlighting the main inefficiencies in terms of national differences in technical requirements/market practices, taxation and the legal treatment of securities. It sought to identify clearly the sources of these inefficiencies, assess their justification and consider the scope for their removal. In its follow-up report (published April 2003), the Group attempts to provide actions to remove 15 barriers identified in the first report in a strict time frame (within three years). The Group also identifies the party responsible for that action. In addition, the Group examines issues relating to the future infrastructure for providing cross-border clearing and settlement services within the EU, including central counterparty clearing.[57] Notably, the report does not identify in its structural analysis a preferred model for delivering pan-European Union clearing and settlement services, concluding instead that this is a matter primarily for the private actors involved.[58]

The Group of Thirty recommendations

The new Group of Thirty (G30) report 'Global Clearing and Settlement – A Plan of Action' contains 20 recommendations for improving global clearing and settlement. These largely reflect current practices and priorities, but call for increased interoperability, reduced risk and improved governance of post-trade processing houses. While CPSS-IOSCO recommendations set forth 'minimum standards' to be met at the 'earliest opportunities' by all settlement and clearing houses, the G30 promote the 'best practices' most advanced post-trade processing firms should achieve within the next five to seven years. The report promotes expanding the use of central counterparties in recommendation 6. This recommendation endorses CPSS-IOSCO Recommendation 4 (central counterparties),[59] which promotes the assessment of the benefits and costs of CCPs and asserts the need for CCPs to have rigorous risk control. G30 Recommendation 6 is more emphatic, taking the view that CCPs are strongly expected to bring substantial benefits to most markets. The G30 recommendation also emphasises the need for harmonised practises and standards and explicitly encourages the evaluation of using the services of existing CCP as an alternative to building a new system.[60]

[57] The Giovannini Group (2001), (2003).

[58] See also Section 4, Future prospects – Integration perspective.

[59] CPSS-IOSCO (2001), see also Appendix 2.

[60] G30 (2003).

EACH standards

CCPs themselves have also developed risk management standards that draw on their common experience and expertise. At the beginning of 2001, senior executives of the European Association of Central Counterparty Clearing Houses (EACH) developed risk management standards for their organisations. Subsequently, CCP-12, a group that includes CCPs from Asia and the Americas as well as Europe,[61] has been working to revise the EACH standards and broaden their acceptance among CCPs. Finding the common position among the market participants has proven to be very difficult. The group has currently stopped its work and shared their ideas with the CPSS-IOSCO.

The scope of the EACH standards is confined to the core risk management controls necessary for central counterparty clearing houses.

The standards cover:

- counterparty risk,
- valuation and margining,
- money settlement and custodial arrangements,
- financial resources of the clearing house,
- default arrangements,
- risk management arrangements and resources,
- IT arrangements and resources of the clearing house and
- disclosure of risk management practices and the nature of the clearing house 'guarantee.'[62]

In addition to the above mentioned standardisation, there is a need for technical standardisation, eg system interfaces. LCH.Clearnet SA's clearing model C21 is an example of using common technology in Paris, Brussels, Lisbon and Amsterdam. Behind the LCH–Clearnet merger, there is an aim to progressively migrate to a common systems architecture. OM is also a significant technology provider and it is evident that a Nordic-Baltic CCP would use the common OM-based clearing system. Arguably, IT technology and risk management tools embody the core functions of CCPs.

[61] The CCP-12 comprises the following entities: 1) the Australian Stock Exchange, 2) the Brazilian Clearing and Depository Corporation, 3) Eurex Clearing, 4) the Chicago Mercantile Exchange, 5) Clearnet, 6) Hong Kong Exchanges and Clearing Limited, 7) the London Clearing House, 8) SD Indeval, SA de CV, 9) Singapore Exchange Limited, 10) The Canadian Depository for Securities Limited, 11) The Depository Trust & Clearing Corporation, 12) The Options Clearing Corporation, and 13) the Tokyo Stock Exchange. See also Appendix 3.

[62] EACH (2001).

3.3 Corporate governance

Traditionally, a key component of a well functioning corporate governance system is the bankruptcy law and related insolvency procedures. Governance arrangements among CCPs vary. Traditionally, central counterparties have been user-owned, but profit-making limited companies are becoming more comfortable with this role. They encourage efficiency with incentives and reward shareholder institutions that sponsor innovation and investment for the costs they incur and the risks they take. Competitive and profit-making central counterparties may also have an incentive to lower their costs, however, by lowering standards for risk management or for operational security.[63] According to eg Ruben Lee (2002),[64] the main function of a CCP from the corporate governance point of view is to minimise transaction costs. The contact groups of the CCPs are owners, participants, users (eg brokers), managers, CSDs and exchanges. It is important to guarantee that the participants in CCP governance include representatives of non-owner groups. Moreover, CCPs must specifically seek to widen governance to cover systems themselves (system governance).

There is also the question of agency costs. A principal-agent relationship arises as soon as a principal (eg the board of the CCP) uses the services of an agent (eg the management of the CCP) to achieve its goals. The objectives of the agent may differ from those of the principal, since the agent has its own private interests. Under these circumstances, the principal has to bear agency costs in terms of lower productivity of the agent and/or costs of controlling the agent. Informal power has also a great importance. The ownership structure becomes even more important if one takes into account the fact that a central counterparty often holds monopoly position in the market.

According to the CPSS-IOSCO recommendations, the governance arrangements for CSDs and CCPs should be designed to fulfil public interest requirements and promote the objectives of owners and users:

- **Public interests;** The general public is interested in safety, ie risk prevention.
- **Owner interests;** Owners are interested in the efficiency of the institution.
- **User interests;** Users are consumers buying clearing and settlement services. They are interested in receiving the best price with the lowest possible technical investment.[65]

ESCB-CESR standards identify the relevant public policy interest. It requires fitness and propriety for managers in line with requirements applicable to

[63] Riksbank (2002).

[64] Presentation by Ruben Lee at the Bank of Finland (2002).

[65] CPSS-IOSCO (2001).

managers of securities firms and credit institutions. The standard allows for different board structures. It calls on CSDs and CCPs in a particular market to hold consultations or employ other mechanisms to ensure effective user representation. In addition, the standard discusses potential conflicts of interest between the operator of a system and users, as well as those that can arise within the organisation. It requires that these conflicts be identified and managed.[66] Finally, system access is an important aspect of governance of these systems.

EACH has intentionally avoided comment on the debate concerning the ownership, governance and pricing policy of clearing facilities in Europe. However, EACH considers the relationship between the organisational structure of CCPs and their risk management to be critical in systemic risk mitigation. One can question, however, the relevance of EACH's risk control principle[67] (risk management arrangements and resources), which emphasises placing a senior, independent risk management specialist at all clearing houses, regardless of their ownership structure. Moreover, is it necessary to subscribe to the crude supposition that a clearing house owned by a profit maximising exchange will trade-off risk management standards for greater throughput and income or that a clearing house owned by its clearing member participants will be persuaded by them to adopt lax risk management standards to lower capital costs?

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

Corporate governance rules are a crucial ingredient for determining the prosperity of capital markets and clearing and settlement infrastructure, including CCPs. All forms of ownership have their advantages and disadvantages. From the public authority's point of view, it is important to understand these in order to follow up on problems that can arise from the different forms. Full disclosure of corporate governance practices helps markets work efficiently. A sound corporate governance framework can be achieved by determining an appropriate balance between regulatory-based incentives, penalties and market practices, but the priority should always be market discipline.[68]

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[66] ESCB-CESR (2004).

[67] EACH (2001).

[68] For more on corporate governance of CCPs, see the ECB's latest study (2004).

4 Future prospects

4.1 Risk perspective

CCPs are designed to centralise risk control and management for those trading in markets the CCP clears. The systemic importance of existing CCPs has increased in recent years as they have expanded the range of markets in which they operate. CCPs bring the following substantial benefits to a market:

- They can reduce unwanted credit risk taken on by counterparties as a byproduct of trading. This also facilitates anonymous trading on an exchange or trading platform if market participants so desire.
- They enable multilateral netting, which reduces the settlement risk on delivery date. Multilateral netting of trading positions also increases the trading each firm can undertake on a given proportion of its balance sheet, potentially increasing liquidity in a market.
- A single net movement of collateral to the CCP from each clearing member should also reduce the risk of failed trades. The standardised back-office processing required by a CCP can also reduce costs for market participants to the extent that processes are not already standardised.

There are also counterarguments to the desirability of CCPs.[69] For example, is there any advantage to establishing a CCP for cash markets? Moreover, the expansion of CCPs creates an 'all eggs in one basket' risk, which underlines the need for cautious risk management practices. The probability of a CCP failure may be very small, but the consequences of a systemic failure are huge. It is precisely this systemic risk that motivates central banks to focus on CCP risk management, and particularly how procedures are designed to deal with extreme events.

In recent years, CCPs in Europe have rapidly developed new lines of business. To keep pace with these changes, new margining methodologies have been introduced. An important goal for CCPs, which clear many different markets, will be to develop integrated, transparent modelling techniques that can

[69] Recent research (eg Leinonen, 2003) introduces a possible solution based on an international, harmonised and simplified institutional structure operating in an open real-time network structure. All deals are settled in immediate, T+0, real-time, which means that all assets and funds are delivered immediately, thereby removing settlement risk. Under this model, a CCP is unnecessary.

provide a sophisticated assessment of the aggregate risks to the CCP.[70] This is important from stability aspect, because otherwise it is possible that all market players will not realise the extent or nature of the risk they face.

The key is risk management. To assume and manage the risk, the CCP can choose among a variety of funding options, ranging from margins and reserve funds collected from clearing members to additional insurance and the CCP's own capital. These arrangements need to provide the highest level of soundness and safety to markets, ensuring that the CCP always has sufficient resources (eg liquidity and quantity) to handle major participant failures and eliminate post-trade uncertainties. Related to funding options, the CCP's own rules, eg accession rules are important tools in risk management.

While the current trend of offering clearing of cash market instruments in addition to derivatives increases risk for the central counterparty, the efficiency gains to (at least the large) market participants can be considerable. As is the case in all clearing operations, central counterparty clearing has economies of scale that make it more efficient to utilise one and the same system for various markets. Large fixed investment costs that arise on margin are reduced in relation to the size of the system, thereby reducing average cost. In addition, if a central counterparty manages both cash and derivative sides of a market place, it can take advantage of participants with offsetting positions on both sides. In this way, counterparty can have less capital than would have been required for two separate central counterparties.[71] For OTC markets, using of central counterparty can bring structural element and greater transparency.

At the same time, when risks faced by a central counterparty become more complicated, there is a growing need for daily stress tests and other sophisticated risk management methods. Stress testing provides insights into several aspects of the financial resources the CCP may need. In addition to risk management methods, standard-setting work should consider legal risk, because a well-founded legal framework supports the CCP's risk management and operations. Moreover, the money settlement and requirements of Settlement Finality Directive are central, ie fund transfers to the CCP should be final when effected.

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[70] Bank of England (2002). There is little published research that considers the margining of portfolios – and even less that considers other default resources. Keppo (1997) offers a general model of portfolio margining that takes into account the conditional probability of member defaults.

[71] Riksbank (2002).

4.2 Integration perspective

Although there has been progress in financial market integration, the European securities clearing and settlement industry remains highly fragmented. Integration implies access for all users to the same services on the same conditions, regardless of the location of the user or provider. Integration can take two forms. Horizontal integration exists when institutions at the same level (trading, clearing, settlement or custody) merge or adopt other forms of cooperation. Vertical integration exists when institutions merge into 'silos' (which comprise trading, clearing, settlement and custody in a single entity). Recent examples of consolidation demonstrate that vertical integration (which can maximise straight-through processing, STP) does not preclude horizontal integration (in order to maximise netting benefits) at a later stage.

The former HEX Group followed a vertical integration strategy. The first step towards horizontal direction was the Swedish-Finnish OM-HEX[72] merger, which was confirmed on 4 September 2003. Horizontal integration has been deepened with OMX's decision to sell the Finnish central securities depository APK to the corresponding Swedish one, VPC. The sale was confirmed at the end of November 2004.[73]

Consolidation implies a greater concentration among clearing and settlement providers and can be achieved through structural changes (eg mergers and acquisitions) and strategic measures (eg outsourcing, alliances, joint ventures and reorganisations within financial institutions). To date, consolidation has resulted in little more than a restructuring of legal entities. However, consolidation of technical platforms is on its way. Although full consolidation may prove difficult to achieve in the short run, alternatives exist. Other forms of integration in central counterparty clearing include cooperation (dialogue, shared standards, collateral optimisation arrangements and shared technology investment), joint ventures and interoperability.

At the European level, the consolidation process in central counterparty is indisputable. The London Clearing House (LCH) and Clearnet merger was finalised at the end of 2003 and has led to the creation of Europe's largest group of central counterparty clearing houses. These has also been a similar deal last year in settlement with the merger of Euroclear and London's Crest. Although the merger has been complicated, unification with LCH as a user-owned company and Clearnet controlled by Euronext, for-profit company, has been successful. Due to the regulatory and legal complexities, it has been confirmed that the merger will not lead to the creation of a single clearing house governed by a single legal framework. On the contrary, it has been achieved a common solution

[72] The name of OM-HEX AB was changed into OMX AB on 31 August 2004.

[73] See also Bank of Finland (2004).

that LCH.Clearnet SA is a credit institution under French law (formerly Clearnet). It is the sole clearing house and central counterparty for markets operated by Euronext (excluding Euronext.liffe). LCH.Clearnet SA clears trades for Powernext as well as repos and bonds. LCH.Clearnet Ltd (formerly LCH) is the central counterparty clearing house for the Euronext.liffe, IPE, LME and others exchanges (eg Endex, LSE and virt-x).[74] LCH.Clearnet Ltd also offers a broad range of services in relation to the OTC interest rate swap, bond and repo markets. The LCH-Clearnet merger can serve as a catalyst for further CCP consolidation in Europe.

Similar to mergers of SSSs, the merger of LCH and Clearnet will probably increase the synergies and technical efficiency of cross-border securities clearing in Europe. However, the merger will also lead to a higher concentration of credit risk in one institution. It is therefore important to closely monitor the risk mitigation measures of the two clearing houses to avoid the potentially severe disruption of financial markets that a failure of the merged entities could cause.

Some recent mergers in the sector will effectively bring about a less fragmented structure. However, to be sure that an efficient EU-wide clearing and settlement system becomes operational, charging the same for domestic and intra-EU transactions, regulatory action may be required to complement market developments. Currently, EC directives do not set out legislation for CCPs or clearing and settlement. They only address overarching principles such as the single passport. The Investment Services Directive (ISD) contains the principle that an institution regulated in one EU country should be allowed to perform the same activities in other EU countries. However, it is far from being clear that clearing activities performed by clearing participants are covered by the ISD passport. There are very different definitions in different EU countries of what a CCP is. It is insufficient to allow an institution recognised as a CCP in one country to act in other countries as a CCP in the definition of the respective country. This could be the case eg with accession countries. It may even be argued that the single passport for investment services firms has had negative effects on CCPs. In the past, CCPs only had to accept members subject to domestic regulation; now they have to accept members that are subject to foreign regulation (home-country supervision). While this is not supposed to be a problem for large institutions, it can surely be problematic for smaller firms.

The European Commission finished updating the ISD in spring 2004.[75] One of the major changes has been to provide the possibility for market participants to

[74] virt-x, the pan-European securities exchange launched in May 2003, is the central counterparty service resulting from and alliance between the LCH and SegaIntersettle's (SIS) newly created x-clear unit.

[75] Directive of European Parliament and Council of 21 April 2004 on Markets in financial instruments (2004/39/EC).

designate the settlement venue of their choice. The Commission's purpose is clearly to provide level playing field, but the practical implementation could turn out to be difficult. After published its Communication of clearing and settlement in spring,[76] the Commission has turned its focus to impact analysis, studying possible cost and benefits to widen legislative process in the clearing and settlement area.

The problem of competition between CCPs and custodians/general clearing members in the area of cross-border clearing could also be addressed. Currently, it is much cheaper to use a custodian than eg a link between CCPs to clear a cross-border transaction. A main reason is the unequal regulation of custodians and CCPs in the area of capital requirements. The location of the CCP is the relevant question, eg in the case of the possible Nordic/Baltic CCP. According the ECB's current policy, CCPs must situate in the euro area, which in the Nordic/Baltic case means Finland.

Though market participants do not agree on the most efficient market structure to be achieved, consolidation among CCPs is an attractive option in many circumstances. A single CCP that spans several markets can act as a hub among several settlement institutions and depositories. From the viewpoint of larger market participants, such a CCP can be a place where post-trade risk correlations can be recognised and where, correspondingly, capital requirements for risk management can be reduced. This effect can be especially important between derivative and cash securities markets. Operations are simplified when systems, communications and position management are standardised. This is more likely to be the case with a single CCP. The costs for maintaining, enhancing and developing CCP technology can be spread across a larger base of activity.

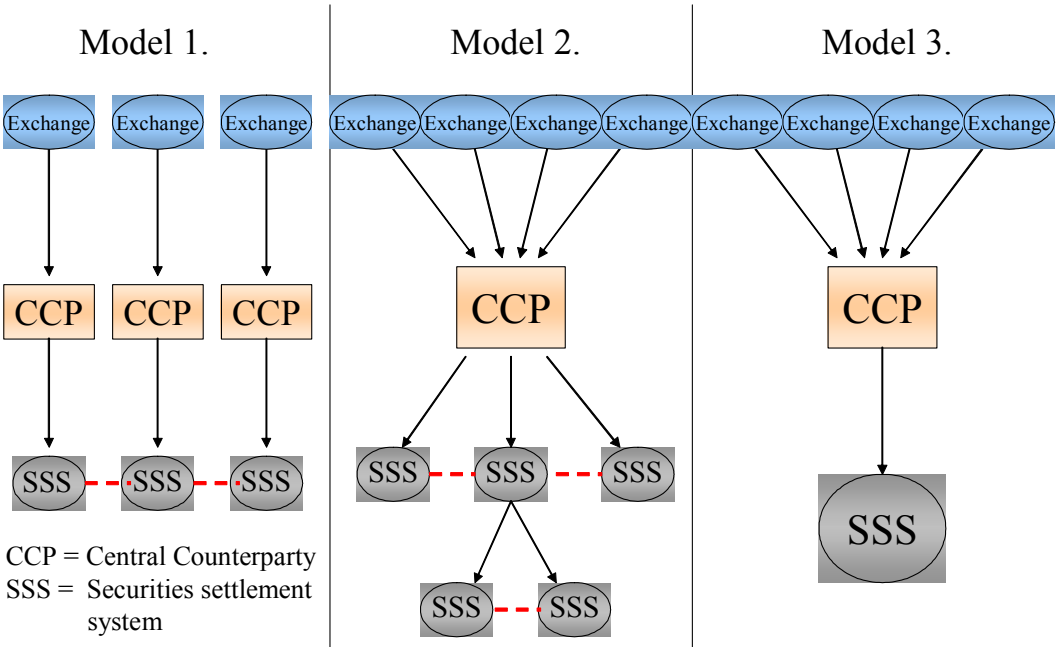
The model of a 'single CCP' is also one of the examples proposed by Giovannini Group in its second report (2003). The group proposed three stylised models based on functional approach (Figure 8). The first model assumes a limited degree of consolidation, with multiple central counterparties and settlement systems remaining in operation (status quo). The second model assumes that consolidation results in a single CCP and multiple SSS. The third model assumes that scale of economies and network externalities result in consolidation to a single CCP and a single SSS. Each of these models has been assessed on the basis of cost effectiveness, competition, and systemic risks.[77] Disappointingly, the report concludes that each has its merits and faults and fails to come down in favour of any model. The group argues that these models are

[76] European Commission (2004a).

[77] It is assumed here that users and providers of clearing and settlement services operate in an integrated, ie barrier-free, environment. See also Giovannini Group (2003), Hirata de Carvalho (2004), Bank of Finland (2004).

only examples of different infrastructures and unsuitable as such for different groups of market participants.

Figure 8. **Consolidation models**



Sources: Giovannini Group and Bank of Finland.

Against the benefits of a CCP, individual capital market participants must weigh the costs of establishing and participating in a CCP. These typically involve capitalisation and finance costs, fees associated with its services and the cost of the participants' systems infrastructures. Where the marketplace is relatively small and no established CCP exists, the costs – and the risk – of setting up a CCP as a separate entity may be significant and counterproductive. This could be the case in several accession countries and emerging market countries. However, where issues of national sovereignty, local market practice, autonomy and local control militate against a simple invitation to an established CCP to enter a local market, the question is whether it would be possible to devise modes of cooperation that achieve most of the benefits of extensions without compromising local interests and concerns.[78] In particular, there would have to be a fair airing of views as to when and where a possible pan-European CCP should be established.

The existence of a domestic infrastructure should not prevent the emergence of international infrastructures such as the Continuous Linked Settlement Bank

[78] DTCC (2000).

(CLS)[79] in the field of securities settlement. International infrastructures are superimposed on domestic infrastructures and not necessarily designed to replace them. From the overseer's perspective, it is a question of whether there is a danger that a counterparty may lose its risk consciousness operating with a single large international CCP.

5 Concluding remarks

Post-trading, while closely related to trading, exists in a profoundly different world. Unlike trading, competition is not the top priority: efficiency and risk minimisation necessarily rank higher. Thus, attention needs to be paid to preventing infrastructure providers from competing by reducing risk management standards or the transparency of risk allocation. Systemic risk avoidance is the foremost task of post-trading system, and well-designed standards for systems and procedures, accepted by the relevant authorities, are paramount.

Clearing and settlement benefit from scale economies that only one or a few centralised systems can offer. In general, users benefit from concentration and new technology via lower costs and easier connectivity.

Central banks have traditionally given less attention to replacement cost risk than principal risk in payments and settlement due to the smaller scale of exposures involved. Nonetheless, replacement cost risk should not be ignored and exposures can swell in times of market stress. For this reason, initiatives to shorten settlement cycles are welcome, provided that the necessary measures to re-engineer post-trade, pre-settlement processing are also adopted. The use of central counterparties can also improve the management of replacement cost risk and may help to keep markets functioning in periods of sharp price movements. Because they concentrate risk, however, it is vital that central counterparties are properly designed and managed.[80]

With regard to efficiency, the main issue is that existing arrangements are too costly and insufficiently smooth and secure relative to domestic arrangements. Full harmonisation of rules and the integration of institutions are complex issues that involve both the public and private sectors. Post-trading systems are closely intertwined with local legal systems and involve issues of national interests.

Related to the surrounding post-trading infrastructure, it is evident that there are still challenges for consolidation – particularly for CCP consolidation. While competition is usually the principal driver for consolidation, real competition

[79] CLS Bank eliminates foreign exchange (FX) settlement risk through a simultaneous global multi-currency settlement system. See also Kemppainen (2003).
[80] Bank of England (1999b).

between central counterparties is difficult in the face of separate jurisdictions, pricing differences and national identity questions. Attempts to establish a Pan-European CCP have failed so far, although the idea has some support.

Overall, the benefits of a CCP are becoming increasingly apparent in a globalised market with greater cross-border activity. In a cross-border environment, through multilateral netting, the CCP reduces the number of settled trades to a single transaction between the two settlement systems and the CCP's own account, thus sharply reducing the costs to firms of cross-border settlement. This, and the possibility of saving collateral through margin offsets in correlated assets, seems to be a decisive argument in favour of CCPs. CCPs can promote greater activity in markets through more efficient use of capital and reduced total infrastructure costs. This is made possible by more efficient distribution of risk through risk sharing, centralised monitoring, greater transparency and netting of settlement instructions.

CCPs are not a cure-all. Their introduction affects financial stability as a potential source of systemic risk. Whereas CCPs – and netting in general – mitigate credit risk, consolidation of settlement capabilities necessarily involves new concentrations of operational risk. Moreover, establishing a CCP is costly.[81]

A well-functioning CCP with proper risk management and governance is undoubtedly a valuable part of modern post-trading infrastructure, yet it remains an open question what is an ideal number of infrastructure that should prevail in Europe. Costs are probably among the main catalysts accelerating the pace of integration.

This paper has set out to give an objective picture of current risks and benefits related to CCP services in the integrating markets. Although, the CCP model is not currently the top priority in Nordic/Baltic countries, it is more or less the standard elsewhere in Europe. Hopefully, this paper provides a basis for risk-benefit analysis of the Finnish/Nordic-Baltic clearing and settlement infrastructure with a CCP solution.[82]

[81] Giordano (2002).

[82] For more about Nordic/Baltic integration, see eg Steil (1999), Bank of Finland (2004).

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Appendix 1

Central Counterparty Clearing House in Crisis

Caisse de Liquidation (Paris), 1974

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 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 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 twelve 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. The task force also highlighted the lack of coordination between the exchange, the clearing house and the Commodity Trading Council.

The task force focused further criticism on brokers who, they felt, should have done 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, rather than the risk, of trades. The task force nevertheless ultimately recommended that the central counterparty be re-established.

Hong Kong Futures Guarantee Corporation, 1987

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 Hang Seng Index futures would fall dramatically when the futures exchange reopened. This 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 separated 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 example, margins on the main Hang Seng Index future had not been raised in line with the 2,000 per cent growth in contract turnover in the two years after 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 recommended that a central counterparty should be re-established. The committee recommended that it should act as counterparty to every trade. Part of its risk should be backed up by the 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.'

Source: Bank of England (1999).

Appendix 2

CPSS-IOSCO Recommendations (2001)

Recommendation 4: Central Counterparties (CCPs)

The benefits and costs of a CCP should be evaluated. Where such a mechanism is introduced, the CCP should rigorously control the risks it assumes.

1. Has a CCP mechanism (or an indemnification arrangement) been introduced? If so, what types of securities and market participants are covered? When does the CCP interpose itself between its participants to assume the role of guarantor to each trade?
2. If no such mechanism has been introduced, have the benefits and costs of such a mechanism been evaluated? By whom? Has the assessment been documented? What was the conclusion?
3. Does the CCP impose financial and operational standards for participation?
4. How does the CCP manage its credit risk vis-à-vis participants? Does it require participants to collateralise their exposures? How often are requirements recomputed and collateral collected?
5. What are the financial resources of the CCP? How does the CCP assess the adequacy of the size and liquidity of its financial resources? Does it require participants to contribute to a clearing or guarantee fund? Does the CCP have legally enforceable interests in or claims on the assets in the fund? Does the CCP have transparent and enforceable loss allocation rules?
6. How does the CCP manage its liquidity risk? Does the CCP have in place agreements permitting it to borrow against collateral?
7. Has a participant ever defaulted? If so, how did the CCP handle the default? In the past year, has the CCP experienced, has the CCP experienced an operational failure that resulted in a delay in completing settlement?

Source: CPSS-IOSCO: Recommendations for securities settlement systems (Nov. 2001).

Appendix 3

Descriptions of some CCPs outside Europe

Australian Stock Exchange Limited (ASX)

ASX provides integrated trading, clearing and settlement facilities for Australia's equities, warrants and equity options markets. It operates 2 clearing houses, one for cash market securities and another for equity derivatives. Both provide central counterparty guarantee facilities which are backed by Australia's National Guarantee Fund. ASX is a listed company with its ordinary shares publicly traded in Australia. Clearing and settlement is done with the CHESS system. More information on ASX is available on the web at www.asx.com.

The Brazilian Clearing and Depository Corporation (CBLC)

The Brazilian Clearing and Depository Corporation (CBLC), as the DNS clearinghouse for the Brazilian securities markets (equities and debt instruments), provides a modern and efficient infrastructure (including multilateral netting) for clearing, settlement, depository and risk management for cash, options and forward markets. Aligned with international best practices, CBLC acts as central counterparty and guarantor of settlements. More information on CBLC is available at www.cblc.com.br.

The Canadian Depository for Securities Limited (CDS)

The Canadian Depository for Securities Limited (CDS) is Canada's national securities clearing and depository service organization, established in 1970 to improve the efficiency of the financial sector through the provision of depository, clearing and related services in both domestic and international markets (equity, fixed income and money markets). CDS processes in excess of 50 million trades annually, holds nearly C$2 trillion on deposit and offers value-added information services to the broader securities industry in Canada. More information on CDS and its services is available at www.cds.ca.

Chicago Mercantile Exchange Inc. (CME)

Chicago Mercantile Exchange Inc. is an international marketplace that brings together buyers and sellers on its trading floors and the GLOBEX®2 around-the-clock electronic trading system. CME offers futures contracts and options on futures primarily in four product areas: interest rates, stock indexes, foreign exchange and commodities. On Nov. 13, 2000, CME finalised its transformation into a for-profit, shareholder-owned corporation as it became the first U.S. financial exchange to demutualise by converting its membership interests into shares of common stock that can trade separately from exchange trading privileges. The CME Clearing house surpassed one billion cleared trades for 2004. LCH and Liffe have initiated the world's first cross-margining programme across international borders. This enables CME and LCH to provide substantial risk-based cost savings to clearing member firms and their affiliates who have positions in CME. CME has had a common clearing link with CBOT since 2003. More information is available at www.cme.com.

The Depository Trust & Clearing Corporation (DTCC)

The Depository Trust & Clearing Corporation (DTCC) is the holding company for The Depository Trust Company (DTC) and National Securities Clearing Corporation (NSCC), which together provide the primary infrastructure for the clearance, settlement and custody of the vast majority of all equity, corporate debt, municipal bond, Unit Investment Trusts, mutual fund and insurance transactions in the United States. In 2000, NSCC processed nearly $105 trillion in equity and bond transactions, while DTC, the world's largest securities depository and a major clearinghouse for institutional post-trade processing and settlement, processed more than 230 million book-entry deliveries valued at more than $116 trillion.

The United States, which is often given as a model for the consolidation of central counterparty clearing houses in Europe, still has separate CCPs for different products. But there are also plans to foster consolidation across products.[83] For more information, see DTCC's web site at www.dtcc.com.

[83] The United States has several central counterparty clearing houses in operation, each of which focuses on clearing on different products. The National Securities Clearing Corporation (NSCC) is the sole clearing house for all equity, corporate debt and municipal bond transactions. Other CCPs provide services for various kinds of options and futures. Central counterparty clearing in the United States has thus achieved full consolidation at the level of each product type, but there is little consolidation in clearing across products. See also ECB (2001).

Hong Kong Exchanges and Clearing (HKEx)

Hong Kong Exchanges and Clearing (HKEx) wholly owns The Stock Exchange of Hong Kong Limited, Hong Kong Futures Exchange Limited and Hong Kong Securities Clearing Company Limited. It provides a comprehensive range of pre- and post-trade investment services and market information services to subscribers of information vendors. More information on HKEx is available at www.hkex.com.hk.

S.D. Indeval, Mexico

Since 1987, S.D. Indeval has been the Mexican Central Securities Depository providing custody, administration, clearing, settlement and book entry-transfer services for the Mexican financial industry. In a daily average, S.D. Indeval settles more than $80 billion in transactions related with capital and debt markets which include equity, corporate bonds, debt instruments issued by Mexican Banks and Government Securities.

In addition, the Mexican Congress has authorised the legal figure of a Central Counterparty. In a first step, Indeval is in the process to develop a CCP for the Mexican Equity Market.

The Options Clearing Corporation (OCC)

The Options Clearing Corporation (OCC), founded in 1973, is the largest clearing organization in the world for financial derivative instruments and was the first clearing house to receive a 'AAA' credit rating from Standard & Poor's Corporation. Operating under the jurisdiction of the Securities and Exchange Commission, OCC is jointly owned by The American Stock Exchange, Chicago Board Options Exchange, International Securities Exchange, Pacific Exchange and Philadelphia Stock Exchange. OCC is headquartered at 440 South LaSalle Street, Chicago, IL. More information is available through its web site at www.optionsclearing.com.

Singapore Exchange Limited (SGX)/ The Central Depository (Pte) Limited

The Central Depository (Pte) Ltd. (CDP), a wholly-owned subsidiary of Singapore Exchange Limited (SGX), provides integrated clearing, settlement, depository and computerised book-entry services for securities traded on

Singapore Exchange Securities Trading (SGX-ST). The CDP also has links with foreign clearing and depository organisations such as DTCC, Japan Securities Clearing Corporation, Clearstream Luxembourg and Shenzhen Securities Registration Company to facilitate settlement of cross-border trades. More information is available at www.sgx.com.

Tokyo Stock Exchange (TSE)

The Tokyo Stock Exchange (TSE), a leading equities and derivatives exchange both in Asia and globally, serves as a clearing organisation with the CCP function for transactions executed in its market. In 2000, the TSE, as a clearing organisation, processed approximately JPY 1,808 trillion for transactions in its equities and derivatives market. More information on TSE is available at www.tse.or.jp.

Source: Euronext (2002) and relevant web pages.

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