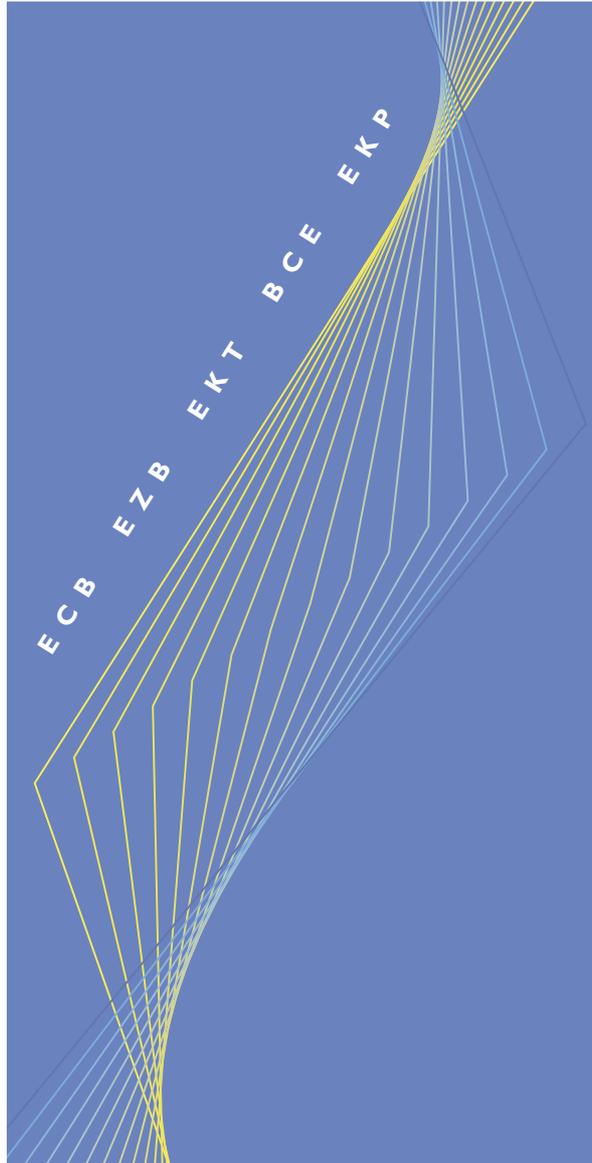




EUROPEAN CENTRAL BANK
OCCASIONAL PAPER SERIES



No. 5

**THE EVOLUTION OF CLEARING
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SERVICES FOR EXCHANGE-
TRADED DERIVATIVES IN THE
UNITED STATES AND EUROPE:
A COMPARISON**

BY

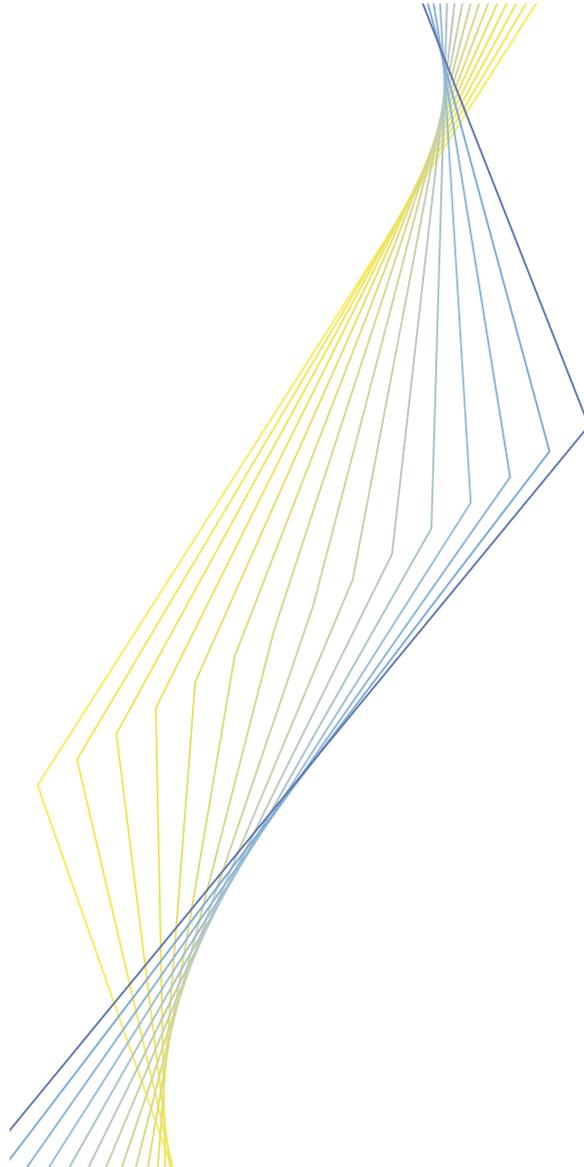
**DANIELA RUSSO, TERRY L. HART
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* Daniela Russo is the Head of the Securities Settlement Policy Division of the European Central Bank (ECB). Andreas Schöenberger is a Policy Expert in the Securities Settlement Policy Division of the ECB. Terry L. Hart is a Project Analyst in the International Organisation of Securities Commissions. The authors wish to thank Victoria Cleland of the Bank of England and Francesco Papadia, Ignacio Terol, and an anonymous referee of the ECB for their comments on this Occasional Paper. Andrea M. Corcoran, Director of the Office of International Affairs of the United States Commodity Futures Trading Commission, also consulted on this document. The views expressed therein are solely those of the authors and do not represent the views of the ECB, the United States Commodity Futures Trading Commission, the International Organisation of Securities Commissions, or any of their respective offices or divisions.

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Address	Kaiserstrasse 29 D-60311 Frankfurt am Main Germany
Postal address	Postfach 16 03 19 D-60066 Frankfurt am Main Germany
Telephone	+49 69 1344 0
Internet	http://www.ecb.int
Fax	+49 69 1344 6000
Telex	411 144 ecb d

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Executive summary

Practices and procedures regarding clearing and central counterparty services provided by derivatives clearing houses in the United States and the European Union are currently undergoing a process of evolution. Developments in technology and electronic commerce, advances in the design and use of derivative products, progress in financial risk management techniques related to derivatives exposures and an increase in the volume of cross-border trading in securities and derivatives have prompted some market participants to advocate the development of clearing arrangements and central counterparty services on an international, i.e. cross-border, basis. The development of these services aims at permitting as efficient a use of capital as possible on a global or international basis, while – at the same time – maintaining the financial soundness of existing clearing arrangements. The most significant trends fall into two categories: on the one hand, developments in operational arrangements between clearing houses, in particular at a cross-border level, and, on the other, horizontal and vertical structural consolidation in the clearing and settlement infrastructure.

In general, trends in the development of derivatives clearing reflect efforts to permit direct access to the clearing house electronically, without requiring their physical presence in the clearing house's jurisdiction or, alternatively, efforts by the clearing house to extend its operations beyond a single market through cross margining or their arrangements. Exchange-traded derivatives markets have always attracted a certain level of international participation. From a business perspective, trends in the development of derivatives clearing reflect innovations in the manner in which international traders gain access to the markets and their associated clearing systems. These innovations are calculated to reduce the costs of trading on the markets and to attract an increased level of international trading.

The ongoing consolidation process in the field of clearing and settlement adds an additional element of complexity to the analysis of

current developments. On the one hand, consolidation helps increase the efficiency of the clearing and settlement process. On the other hand, the potential systemic consequences of a central counterparty's failure increase with its size.

Developments in clearing present numerous challenges to central banks and derivatives regulators. Central banks have an interest in clearing houses and the payment and settlement systems through which derivatives contracts are cleared and settled, given the potential impact a major disruption may have on two of their key responsibilities, namely the smooth implementation of monetary policy and the smooth functioning of payment systems.¹ In addition to these systemic implications, derivatives regulators are concerned with the potential non-systemic impact of a significant failure within the clearing and settlement infrastructure on the financial condition of individual regulated firms and on the protection of individual customers using and holding derivatives positions through the clearing and settlement infrastructure.

When assessing the implications of these recent developments, it is interesting to compare the existing organisation of domestic clearing arrangements in the United States and the European Union, and to analyse both the similarities and dissimilarities in their development. The similarities reflect a variety of factors. The development of electronic technology and electronic communications capabilities that potentially permit 24-hour trading internationally and the development and international acceptance of common risk management models and related computer software for derivatives and cash market products have led to an increase in cross-border trading activity. This, in turn, has led to an increased demand by international investors for maximum cost efficiency in clearing arrangements and for maximum efficiency in

¹ In a press release of 27 September 2001, the ECB provided a comprehensive note which explains the Eurosystem's policy approach with regard to consolidation in central counterparty clearing within the euro area. Moreover, in August 2001, the ECB published an article on this topic in its *Monthly Bulletin*.

the use of capital in the acquisition and collateralisation of securities, derivatives, and other financial instruments. However, investors, intermediaries, clearing houses, financial market regulators and central banks all also insist that these cost efficiencies be achieved in a manner consistent with effective risk management. Finally, the development of niche and special-purpose or limited-access markets requires the organisation of efficient corresponding clearing arrangements.

The dissimilarities reflect some other factors. Competition between exchanges and antitrust law considerations as well as legal and regulatory impediments to the combined clearing of certain kinds of products in the United States have had the most significant influence on the organisation of clearing arrangements there. The diversity in the size and scope of the markets and in the types of market participants in the United States and the European Union has also had a significant influence on the organisation of clearing. In the European Union, the main factor motivating the evolution of clearing arrangements is the ongoing process of European economic integration, mainly triggered by the introduction of the euro, 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 settlements. Since changes in the clearing and settlement infrastructure inevitably involve an evolution of the business opportunities and roles of various market participants and service providers (not to mention the roles of central banks, banking supervisors and financial market regulators), many parties often have an

interest in perpetuating the existing business and regulatory arrangements associated with clearing and settlement. As a result, a fundamental restructuring of the clearing and settlement infrastructure often requires a catalyst with an impact sufficient to override these competing interests. In the euro area, the introduction of the euro is acting as such a catalyst. Indeed, the dynamics associated with the evolution of the internal market in the euro area and the adoption of the euro provide a strong motivation to reorganise and rationalise clearing and settlement arrangements and the financial infrastructure within the euro area. These dynamics are largely absent in the United States; the United States' financial infrastructure for equities clearing and settlement is already structured on a national basis, pursuant to the national market system instituted subsequent to the adoption of prescriptive amendments to the Securities Exchange Act of 1934. The adoption of the Commodity Futures Modernization Act of 2000 permits certain over-the-counter (OTC) instruments to be cleared and provides for the possibility of trading in identical futures contracts developing in multiple markets and of futures clearing houses competing for business from different markets. These legislative innovations may to some extent operate as a catalyst for the evolution of clearing arrangements in the United States.

The differing circumstances explain, in part, the greater vigour with which Europe is currently pursuing a course of consolidation in clearing and settlement arrangements and of further developments in the regulation of financial services in general.

I Introduction

Practices and procedures concerning clearing and central counterparty services are currently undergoing a process of evolution in Europe² and in the United States. These innovations present numerous challenges to central banks and financial market regulators.

Central banks have an interest in the field of securities and derivatives clearing systems for several reasons. First, in Europe, clearing houses are increasingly providing services that were previously provided mainly by securities settlement systems, such as the matching and netting of trades and settlement orders. These activities may have systemic risk implications in cases of mismanagement. Assessing and adopting policies to address potential sources of systemic risk are key functions of central banks. Second, unlike securities depositories, central counterparty clearing houses assume risk in respect of the default of their participants. Competition to gain market penetration could even take the form of relaxing risk control standards. Third, clearing houses for derivatives often settle not only derivatives, but also cash market transactions. Fourth, central securities depositories and central counterparty clearing houses often belong to the same group and share the same management. If central banks were to focus exclusively on payment systems, gaps in the chain of securities clearing and settlement processes could disrupt the smooth implementation of monetary policy and the smooth functioning of payment and settlement systems. Finally, as critical components of the overall structure of financial markets, central counterparty clearing houses have a general influence on the functioning of these markets. They can increase the efficiency and stability of the financial markets to the extent that their smooth functioning results in a more efficient use of collateral, lower operational costs and more liquidity. For instance, the use of central counterparty clearing houses can reduce the overall demand for collateral. These effects are difficult to predict, however, and depend on several features of the market (e.g. market concentration, structure of participation in the clearing system, degree of collateralisation of the financial markets).³

Since the introduction of the euro, there has been a growing demand for central counterparty clearing house services in the euro area. The Eurosystem has been carefully monitoring developments in this area. The Eurosystem shares the view of the Committee of the Wise Men on the regulation of securities markets that the process of consolidation in central counterparty clearing should, in general, be driven by the private sector. It also shares the view that in case of an inability of the private sector to deliver a pan-European clearing and settlement system, “a clear public policy orientation would be needed to move forward.” Against this background, the Eurosystem released a public statement, entitled “The Eurosystem’s policy line with regard to central counterparty clearing” on 27 September 2001 (see Annex I). The policy statement and the related explanatory text are available on the ECB’s website and are therefore not discussed in this paper.

This paper focuses instead on a comparison of the organisation of domestic derivatives clearing in the European Union and the United States, with an emphasis on developments in cross-border clearing arrangements.⁴

A recent debate among market participants regarding the development of central counterparty clearing in Europe has been dominated by some major global investment banks, which have expressed support for the idea of a single European central counterparty clearing house, which would be multi-currency and multi-product (i.e. equities, bonds,

² References to “Europe” in this paper generally refer to the European Union, unless the context indicates otherwise.

³ For a discussion of the various functions fulfilled and services provided by securities settlement systems, clearing houses and central counterparties, see the CPSS/IOSCO Recommendations for Securities Settlement Systems (November 2001) at www.bis.org.

⁴ For the purposes of this analysis, it is not useful to distinguish between euro area and other EU countries. In fact, the regulatory framework for securities and derivatives markets is defined at the EU level and the recently established Committee of European Securities Regulators also operates at the EU level. From an operational perspective, there are no significant differences. Nevertheless, the specific features of the EU’s largest non-euro area central counterparty clearing house are described in Annexes 4 to 7.

derivatives and commodities).⁵ One of the main arguments articulated in this debate is that the creation of a single central counterparty in Europe would create clearing arrangements that mirror those in the United States, where clearing arrangements are more consolidated, and therefore more cost-effective, than in Europe. However, a critical comparison between the US and European cases leads to different conclusions in the case of derivatives. On the one hand, it shows that the main features of central counterparties in the two currency areas are not fundamentally different. On the other hand, when looking at the level of consolidation, the situation is far more complex than is commonly thought. In particular, it may be argued that, in some respects (including regulatory aspects), clearing arrangements in the United States are less integrated than those in Europe. The aim of this paper is to outline the broad elements of this complex picture and to provide an objective assessment of the main strengths and weaknesses of the clearing arrangements in the United States and the European Union.

This paper is organised as follows. Section 1 explains why issues concerning central counterparty clearing houses are of direct concern to central banks and why a comparison of the European and the US situation is of interest. Section 2 provides a comparative overview of the organisation of derivatives exchanges in the United States and in Europe. Section 3 focuses on the organisation of clearing, covering a broad range of aspects. Section 4 analyses operational developments in international risk management practices and arrangements. Section 5 discusses various forms of structural consolidation in the clearing and settlement infrastructure by highlighting the different approaches taken in the United States and in Europe. Section 6 is devoted to the roles of central banks and financial market regulators regarding clearing and to the challenges they face as a result of current innovations in clearing arrangements. Finally, Section 7 summarises some of the main findings.

⁵ See, for example, the publications of the European Securities Forum at <http://www.eurosf.com>.

2 The organisation of derivatives trading in Europe and the United States

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 identity of the parties trading on those markets. Both the exchanges and their associated clearing houses reflect a long history of further development.

The most typical basis on which to differentiate derivatives exchanges is by reference to the nature of the underlying products or reference values on which the derivatives contracts traded on the exchange are based. Moreover, the types of contract traded on an exchange will largely also identify the composition and identity of the parties that trade on the exchange. An analysis, on this basis, of exchanges in the United States and Europe reveals some patterns in the types of contracts that are traded on individual exchanges. Overall, however, it is difficult to identify any definitive pattern. Whether trade execution is accomplished by an exchange

through open outcry in trading rings or through the electronic matching of bids and offers, derivatives exchanges specialise in providing trade execution services. Once a derivative exchange has in place the personnel, procedures, processes and techniques necessary to provide trade execution services in connection with derivatives contracts, the nature of the underlying product or reference value does not necessarily alter (delimit) the trade execution function. While the design of a derivatives contract may require knowledge of the organisation of the cash market for the product or instrument underlying the contract and the organisation of arrangements for the delivery of the underlying product or instrument in case the contract would otherwise not be closed out upon expiration, a derivatives exchange generally has no difficulty, if it desires to do so, in designing and listing contracts and executing trades for contracts based on various kinds of underlying products or reference values.⁶

2.1 The organisation of derivatives exchanges in Europe

The trading of futures contracts in Europe has a long history. There is historical evidence of the development of futures contracts in the Netherlands for the trading of tulip bulbs in the 17th century. The trading of futures contracts on metals and international agricultural commodities historically came to be centred in London. Futures contracts on agricultural products were also developed and offered on other exchanges to support agricultural production and marketing in the national domestic economy, such as at local commodity exchanges in Paris, Lille and Le Havre for the French agricultural markets. Euronext Paris, the successor to these exchanges, continues to offer these agricultural contracts.⁷ With the recent development of financial futures products, one or more futures exchanges generally were organised in each national jurisdiction within Europe for the trading of futures based on national money market interest rates or the interest rate payable on national government bonds, on

currency exchange rates and on the stock indices of the national stock exchanges. Options on individual securities also came to be traded on exchanges. In several jurisdictions, the exchange markets for equities, options and futures, while separate, are operated by the same management company. Exchanges, such as Eurex in Germany, MEFF in Spain, and MIF-MTO in Italy, have by choice restricted themselves to offering financial derivatives contracts based on an underlying financial instrument or reference value and do not offer contracts based on

⁶ See G. Tsetsekos and P. Varangis, "The structure of derivatives exchanges: lessons from developed and emerging markets," World Bank Policy Research Working Paper WPS1887 (28 February 1998), at <http://www-wds.worldbank.org>, which contains a compilation of empirical data on the development of derivatives exchanges, including specifically Tables 3 and 6 regarding the chronology of the introduction of various kinds of futures contracts and the year of establishment of the more prominent futures exchanges.

⁷ In 1988, the *Marché à Terme d'Instruments Financiers* ("Matif"), the predecessor of Euronext Paris, began trading commodities after merging with the local commodity exchanges in Paris, Lille and Le Havre.

agricultural or physical commodities. Two futures exchanges in London offer contracts related to specific industries, namely the International Petroleum Exchange for energy-related products and the London Metals Exchange for metals. The London International Financial Futures and Options Exchange offers both financial futures products and contracts on both domestic and international agricultural commodities. Euronext Paris offers both financial futures products and contracts based

on domestic agricultural commodities. Small regional commodities exchanges offer futures contracts on agricultural products that support specific local agricultural industries, such as the FC & M, Sociedad Rectora del Mercado de Futuros y Opciones sobre Cítricos, S.A., in Valencia, Spain, for citrus products, the Finnish Options Exchange for paper-related products and the Warenterminbörse Hanover for wheat and potatoes.⁸

2.2 The organisation of derivatives exchanges in the United States⁹

In the United States, exchange trading of futures contracts dates back to the 1850s. Historically, futures contracts in the United States were based on agricultural products or other physical commodities, such as petroleum products or metals. Over time, the principal futures markets came to be organised primarily in two cities, New York and Chicago. In New York, exchanges were organised mainly to trade futures contracts on petroleum products, metals, international agricultural commodities (such as coffee, sugar and cocoa) and other domestically produced agricultural products. In Chicago, exchanges were organised primarily to trade futures contracts on agricultural products produced and marketed in the central United States, for which Chicago was a major distribution centre, such as butter, eggs, grains and livestock. Smaller regional exchanges also were organised in other cities, such as Minneapolis and Kansas City, to trade futures contracts on locally produced agricultural products, primarily grains.

Approximately thirty years ago, the members of the Chicago Board of Trade, a futures exchange, also organised the Chicago Board Options Exchange as an independent entity for the trading of listed options on equity securities. At around that time, in response to deregulation of currency exchange and interest rates, the monetary policies adopted by the Federal Reserve Board and other legislative changes, the futures exchanges in both New York and Chicago also began to list financial

futures contracts based on interest rates, foreign exchange rates and, subsequently, stock indices. Consequently, many futures exchanges in the United States offer a mix of contracts based on both agricultural products and other physical commodities as well as on financial instruments, values, indexes or rates. Some exchanges historically specialised in futures contracts for particular industries. However, several exchanges for these specific industries have merged. For example, the exchanges for petroleum products and metals have merged into the New York Mercantile Exchange, which continues to focus on contracts for energy products and metals. The Coffee, Sugar and Cocoa Exchange and the New York Cotton Exchange merged under the corporate structure of the New York

⁸ The small number of agricultural futures contracts traded in Europe relative to the United States reflects the different policy choices and different arrangements in Europe and the United States for the management of price risk in the agricultural markets. Developments in agricultural policy, e.g. those arising from a liberalisation of trade in agricultural products under the Agreement on the World Trade Organization and the General Agreement on Tariffs and Trade, may therefore have a bearing on the use of futures contracts in both jurisdictions in the future. Each European futures exchange also provides a brief history of its operations on its respective website, see e.g. a brief history of Euronext Paris at <http://www.matif.fr/index.l.htm>; a history of the London Metals Exchange, at http://www.lme.co.uk/about_lme/docs/lme_history.pdf; a brief history of LIFFE in "An Introduction to LIFFE" at <http://www.liffe.com/>.

⁹ This paper does not comprehensively address the securities options markets in the United States for which the Options Clearing Corporation acts as a central clearer as such markets for these purposes are treated as securities subject to regulation under the securities laws by the Securities and Exchange Commission and not the CFTC.

Board of Trade. While still listing contracts in these industries, the subsidiary exchanges of the New York Board of Trade now also offer

a significant number of financial futures contracts.¹⁰

2.3 Comparison of the factors influencing the organisation of derivatives markets in the United States and Europe

The identities of the parties that trade at each exchange reflect the types of contract traded on the exchange. Parties in the metals and energy industries concentrate on their specialised exchanges. Regional agricultural exchanges attract producers and distributors active in the regional agricultural markets. Exchanges specialising in financial products attract national investors and, if the contracts have international use or significance, international investors. Exchanges that trade both financial and agricultural products attract a broad variety of investors. Consequently, some exchanges have a high degree of homogeneity in the types of investors trading at the exchange, while others have a high degree of heterogeneity in the types of investors trading at the exchange. Brokers or other intermediaries may also specialise in the provision of services related to a particular type of commodity or contract and may congregate as market members or users at the exchanges and associated clearing houses that specialise in those kinds of products. Other brokers and intermediaries may offer services related to commodities or futures products more generally. Those brokers or intermediaries may be members of, or offer services with respect to, multiple kinds of markets.

The brief overview below demonstrates various factors that have influenced the organisation of futures markets, namely:

- the needs of particular industries and the desire of traders in those industries to address price volatility and to trade under circumstances that maximise the liquidity of the instruments or products traded;

- the needs of international agricultural commodities markets;
- the needs of domestic agricultural and financial markets; and
- the ability of exchanges to design and list derivatives contracts and provide trade execution services for them, irrespective of the nature of the underlying product or reference value.

The foregoing overview also reflects that derivatives exchanges rarely offer duplicate contracts on their respective markets and that the trading of particular contracts (and the liquidity associated with that trading) tends to concentrate on a single market (or at least on one market per time zone). Without fungibility traders may be unwilling to split liquidity between markets. On the other hand, where fungibility of contracts exists across exchanges, as is the case in US markets for options on equities, the clearing of those markets by a single clearing house is workable.¹¹

¹⁰ For a more detailed history of US futures markets, see, S. Gidel, "100 Years of Futures Trading: From Domestic Agricultural to World Financial", *Futures Industry Magazine*, December/January 2000, at <http://www.futuresindustry.org/fimagazi-1929.asp?iss=93&a=607>. Each US futures exchange also provides a brief history of its operations on its website, see e.g. the "chronological history" of the Chicago Board of Trade at <http://www.cbot.com/cbot/www/page/0,1398,10+13+87,00.html> and the history of innovation at the Chicago Mercantile Exchange at http://www.cme.com/about_cme/about_history.cfm.

¹¹ The US markets for equity options were compelled to register fungible option contracts on single stocks with the US Department of Justice and the US Securities Exchange Commission in response to antitrust law (i.e. competition) concerns.

3 The organisation of derivatives clearing in the United States and the European Union

Historically, the organisation of the clearing and settlement of exchange-traded derivatives mirrored the organisation of the exchanges. Each exchange operated, or was affiliated to, a clearing house that cleared contracts only for that exchange, with the clearing services being offered as an adjunct of the trade execution services provided by the exchange.¹² From the perspective of the exchange, the reliability of the clearing arrangements could also be viewed as part of the product offered by the exchange to its customers. As customers will not invest in contracts where there is uncertainty as to the integrity of the transaction, which depends upon the creditworthiness of the clearing house and the reliability of the clearing arrangements, an exchange had an interest in maintaining control over its clearing arrangements in order to assure their reliability. Moreover, to a large extent, the basic risk management practices and techniques used by derivatives clearing houses are common across clearing houses, notwithstanding the underlying product or reference value on which the cleared contracts are based. A derivatives clearing house that trades physical commodities or other contracts which envisage an actual delivery of the underlying upon expiration may be required to organise specialised delivery arrangements to support the operation of the contract and may institute a risk management programme that

reflects the risks unique to that commodity. Generally, however, it has not been difficult for derivatives clearing houses to develop the expertise to clear contracts based on a variety of products or reference values.¹³ The similarity in the risk management techniques used for various kinds of derivatives contracts has also facilitated the mergers of derivatives exchanges and their associated clearing houses.

Technological advance and developments in markets and in risk management techniques have motivated a re-examination of this historical business model. Historically, for instance, in order to clear cross-border transactions at a clearing house, a non-domestic trader was required to take steps to extend his operations or business arrangements to the jurisdiction of the clearing house by establishing a presence and maintaining assets there or to retain a local intermediary through which to clear his transactions. With the advent of modern electronic communications technology, a clearing house can explore ways to bring a trader to the clearing house electronically, without their being required to establish a physical presence in its jurisdiction or, alternatively, to extend its clearing arrangements electronically to the jurisdiction of the trader.

3.1 General aspects of clearing houses

A derivatives clearing house may be a department within the exchange for which it clears or an independent legal entity. If organised as an independent legal entity, the clearing house is typically owned by the exchange for which it clears or by its clearing members. Historically, a derivatives exchange was typically owned by its members (primarily brokers, banks, investment companies and insurance companies). The members were also generally the exchange's largest users. Recently, however, many exchanges have been de-mutualised and have become profit-oriented organisations, or are investigating

that possibility. De-mutualisation gives rise to numerous issues relating to market access, access to clearing, exchange and clearing

¹² While there are no impediments for a clearing house to clear fungible contracts traded on more than one exchange, there are some practical impediments to an exchange clearing the same contract through more than one clearing house. Clearing through one clearing house allows an exchange's member to net debits and credits owing with respect to all contracts traded on the exchange for purposes of meeting margin requirements. Clearing through one clearing house also allows traders to close out their positions without having to return to their original counterparty.

¹³ This is especially so because, in most instances, the commodity underlying the futures contract is not actually delivered upon expiration of the contract. Rather, the party with a delivery obligation will offset that obligation by taking an opposite

house governance, and potential anti-competitive or monopolistic behaviour.¹⁴ Demutualisation also raises the question as to whether the clearing and settlement functions associated with on-exchange trading should be distinguished from the trade execution function fulfilled by the exchange and whether clearing and settlement may properly be undertaken by a profit-oriented enterprise or are more effectively conducted as a kind of public utility on a non-profit basis.¹⁵

The framework for supervision and oversight of the derivatives clearing houses varies from country to country. In most cases, the financial market regulator plays a leading role in the supervision of the clearing house, with the central bank taking an oversight role with respect to the possible systemic implications of clearing activities. Banking supervisors may also have a role through their supervision of the settlement banks used by the clearing house. However, the allocation of competence among banking supervisors, financial market regulators and central banks regarding clearing and settlement varies significantly from jurisdiction to jurisdiction.¹⁶

The clearing of derivatives usually takes place within a tiered structure. The derivatives clearing house restricts direct participation in the clearing process to the most creditworthy subset of the exchange's members; these are those clearing members that have a principal-to-principal relationship with the clearing house in its capacity as central counterparty for all contracts submitted and accepted for clearing.¹⁷ Market participants that are not clearing members must establish an account relationship directly or through another party (a non-clearing broker) with a clearing member to effect settlement. Generally, there is no contractual relationship between the derivatives clearing house and these non-clearing member market participants (irrespective of whether they are non-clearing member brokers or end-users). The development of electronic technology makes it easier for an end-user to become a clearing member, assuming that it can meet the capital and other financial requirements. If an investor

clears directly with the clearing house, however, either the investor or the clearing house may lose the benefit of ancillary services historically provided by the clearing intermediary (e.g. investment advice, back office record-keeping or risk management support).

A clearing member is generally required by law to maintain two separate accounts at the clearing house: one to hold its own assets and positions and another to hold its customers' assets, collateral and positions. In some jurisdictions, a clearing member is required to maintain all of its customers' assets, collateral and positions in a single omnibus clearing account. This requirement helps protect the clearing house against loss, in that all assets in the customer omnibus account are available to pay amounts owing with respect to positions held through the omnibus account. The consequence of this requirement is that a customer of a derivatives broker is subject to loss if another customer of his broker defaults and the broker does not have adequate capital

position in the market. The result is that the parties to futures contracts generally exchange the cash flows representing the changes in value of the underlying commodity and the associated contract, rather than making a delivery of the underlying commodity in exchange for a cash payment. This greatly simplifies a derivatives clearing house's operations as it primarily handles exchanges of cash between the parties. However, the petroleum markets present an exception to this practice as petroleum traders often use the futures markets to take delivery of the petroleum covered by the futures contract.

14 For further details, see IOSCO Technical Committee, "Issues Paper on Exchange Demutualization," (June 2001) at <http://www.iosco.org/iosco.html> and CFTC Commissioner Thomas J. Erickson, "Going for the Gold: Futures Exchanges Begin to Demutualize," 20 Futures and Derivatives Law Report 1 (September 2000), available at <http://openinterest/comm/erickson/fdlrdmtl.pdf>.

15 The development of electronic trade execution technology has influenced the dynamic associated with the creation of new risk-management products. Historically, futures exchanges themselves were the principal architects of new futures products. However, new electronic trading technologies permit groups of market participants themselves to consider mechanisms and contracts to organise both the cash markets in a commodity (e.g., electricity) and the risk management contracts (e.g. futures) associated with those cash markets. Those new niche markets and their participants may seek out expertise in clearing from clearing houses, rather than expertise in contract design and trade execution from an exchange.

16 For further details, see Section 6.3 regarding a "Regulatory consequences of the US and EU regulatory schemes for financial services with respect to clearing".

17 Of course, a financially qualified member or other market participant may choose not to become a clearing member for its own business reasons.

to cover the loss. Upon a default with respect to a position held in the broker's omnibus account, the clearing house will sweep the omnibus account to cover the loss on the position in that account. In such event, the assets of one customer held in that account may be used to defray the obligations owing by the defaulting customer. While the broker is obligated vis-à-vis its non-defaulting customers to reimburse them for any assets that are swept out of the omnibus account by the clearing house, this obligation of the broker is meaningless if the broker does not have sufficient assets to reimburse all customers. Moreover, the guarantee provided by the clearing house as a central counterparty does not protect such non-defaulting customers against loss. Rather, the central counterparty guarantee protects the clearing house itself and its ability to permit anonymous contracting and offsetting of positions; this protects customers of other brokers on the other side of the market.¹⁸ However, a clearing house cannot use assets held in the customer omnibus account to defray obligations owing with respect to positions held in the broker's proprietary account. Therefore, while a broker's customer is exposed to a potential loss of its collateral with respect to a default by its broker's other customers, it is not subject to such a loss as a result of its broker's default with respect to its

proprietary trading. This treatment of customer funds is generally deemed to be necessary to protect the clearing house and the public markets. Some jurisdictions, however, permit a clearing member to establish a separate account for each client at the clearing house. In such cases (assuming that all customer funds are properly handled), a client's assets cannot be used to defray the obligations of the broker or its other customers. This treatment of customer funds extends the maximum level of protection to customers.

Brokers are generally also required by law or regulation to maintain records and books of account to identify all of their customers' assets and positions on a gross basis on their own books. The clearing members are free to set their own requirements vis-à-vis their customers regarding the conditions under which they are willing to carry and clear positions on behalf of the customer in question. The clearing members may set credit limits or collateral requirements more severe than those set by the clearing house or the exchange. Minimum safeguards that clearing members must use with their clients (i.e. minimum margin levels and the type of collateral that may be accepted) are sometimes specified by the clearing house or the exchange.

3.2 Sources of risk and risk management procedures of clearing houses

As a central counterparty to its clearing members, a derivatives clearing house assumes a variety of risks which must be managed. More specifically, the clearing house must have adequate risk management measures in place to cover (i) the default of a clearing member, (ii) the default of a settlement bank and (iii) a number of other risks.

3.2.1 Defaults of clearing members

The defaults of clearing members on their outstanding contracts may expose the clearing

house to principal (delivery) risk, replacement cost risk and liquidity risk.

Principal risk can occur if contracts are settled through delivery of the underlying commodity or instrument. For example, if a commodity or underlying instrument is delivered prior to receipt of payment, the deliverer risks losing its full value. If payment is made prior to delivery, the payer risks losing the full value of

¹⁸ Some clearing houses may maintain a trust fund that can be used on a discretionary basis to reimburse customers whose losses are not covered by the central counterparty guarantee.

the payment. Such principal risk does not exist if the product traded by the derivatives exchange calls for cash settlement rather than delivery. Otherwise, a delivery-versus-payment (DvP) mechanism can be used to eliminate principal risk.¹⁹

The clearing house faces *replacement cost risk* if a member defaults. In such a case, the clearing house has an obligation to the clearing member on the other side of the contract, so that it must take a position identical to that on which the clearing member has defaulted. However, as time passes after the default, market prices will tend to move away from the level that existed at the time the defaulting clearing member last posted margin to cover its obligations under the contract. As a result, the obligations of the clearing house may fluctuate from the time of the default until the clearing house covers and closes out the position.

The clearing house may also be exposed to *liquidity risk* since it must fulfil its payment obligations without delay even if one or more members default or their performance of their settlement obligations is delayed. This is particularly critical because, owing to the central counterparty's central position, any doubts about its ability to conclude settlement may create systemic disturbances.

In order to protect themselves against the risks emerging from a clearing member's default, clearing houses typically apply a range of *risk management* procedures. In particular, every clearing member must post an initial amount with the clearing house as margin (initial margin) upon the creation of a position. The margin necessary to secure each position is then recalculated at least once a day and, at many exchanges, more often per day, with any additionally required margin (maintenance margin) having to be paid accordingly.²⁰ The kinds of assets that may be posted as initial and maintenance margin are specified by the clearing house and generally include cash, government securities and bank guarantees or letters of credit. More and more often, clearing houses are also accepting shares in

money market mutual funds and listed equities as initial margin. Variation margin is typically paid in cash.

A clearing member is in default when it fails on time to meet an obligation to post variation margin to secure an on going position or to make delivery of, or make payment for, the commodity underlying the derivative contract upon its expiration. Consequently, a liquidity or solvency problem is most likely to arise when the derivatives contract becomes subject to extremely adverse price variations.

In becoming a central counterparty to every trade, the derivatives clearing house must have the means to cover the default of any clearing member. The following measures are taken to limit this risk:

- the imposition of membership requirements, including capital requirements, and an ongoing monitoring of compliance with such requirements in order to limit the likelihood of defaults;
- the imposition of security deposit, collateral requirements and exposure ceilings to limit

¹⁹ Delivery versus payment (DvP) describes a link between securities or commodity transfers, on the one hand, and fund transfers, on the other, which ensures that delivery occurs if, and only if, payment occurs.

²⁰ In the United States, the margin for a futures transaction is generally categorised as a performance bond. A futures margin is not considered a partial payment against a purchased asset, as is the case when an equity security is acquired on margin, but as a guarantee for the central counterparty of the completion of settlement upon contract expiration. However, the credit risk associated with a position may not be totally eliminated by the posting of a margin. To the extent that a clearing member posts a letter of credit as a margin or the clearing member borrows the funds or securities to post as a margin, the credit risk associated with the clearing member's positions is shifted into the banking system or the credit markets. This technique of shifting credit risk is also utilised by central securities depositories (CSDs) in the settlement of securities transactions. The creation of a central counterparty for securities settlements that guarantees the performance of the buyer's and seller's settlement obligations is another mechanism to shift credit risk away from a CSD. Central counterparties for securities also use the techniques used by derivatives clearing houses to shift credit risk to the banking system and the credit and securities lending markets. Shifting credit risk in this way, away from central counterparty clearing houses and CSDs, works towards protecting the public markets for derivatives and securities. For further details, see CPSS/IOSCO, Recommendations for Securities Settlement Systems (November 2001) at www.bis.org.

the potential losses and liquidity pressures that arise upon default;²¹ and

- the maintenance of additional clearing house resources, including – in some cases – the right to make assessments against clearing members.

None of these measures are claimed to be foolproof on their own, but weaknesses in one type of safeguard may be compensated for by strengths in other safeguards.

3.2.2 Settlement bank failures

If clearing houses effect money settlements through private settlement banks, they are exposed to the risk of settlement bank failure. Such failures could expose a clearing house to both credit risk and liquidity risk.

In the United States, a derivatives clearing house effects money settlements and settlements in US government bonds posted as margin through accounts it maintains at one or more private settlement banks. Only specified types of depository institutions are allowed to maintain a deposit account with a US Federal Reserve Bank, as is necessary to have access to central bank money. Moreover, generally US government bonds can only be held through a depository institution that participates in the Federal Reserve System's Fedwire system.²² US government bonds can only be held by, or in an account with, such a depository institution. Many of the clearing members of US derivatives clearing houses are not depository institutions with access to central bank money or to the Fedwire system. Consequently, the clearing house and the clearing members establish accounts at designated private settlement banks that have direct access to central bank money and the Fedwire system and through which they effect money and government bond settlements. US derivatives clearing houses protect themselves against the risk of loss arising out of a settlement bank failure by selecting only the most well-capitalised banks to serve as settlement banks and by spreading the risk of

loss by using more than one settlement bank. Another technique to minimise the risk of settlement bank failure is to convert customer cash held in deposits at the settlement bank into securities, e.g. Treasury bonds, held by the settlement bank. While a cash deposit account creates a debtor/creditor relationship between the bank and its customer for the amount on deposit and a customer claim against the assets of the bank in the event of its insolvency, customer securities held by a settlement bank are segregated for the benefit of the customer on its books, are not included in its assets upon its insolvency and can be recovered by the customer free of any claims against the bank.

In Europe, derivatives clearing houses may effect money settlements in central bank money or through one or more private settlement banks.²³ Whether a derivative clearing house opens its cash settlement account with a central bank or with a private bank depends on a number of factors, such as access of clearing members to central bank accounts, access to intraday credit and the terms upon which credit may be provided, or the time at which finality can be achieved for

²¹ In order to have sufficient assets to discharge its obligations, a clearing house generally maintains one or more reserve, guarantee or indemnity fund(s), usually composed of funds deposited by the clearing members, its own retained earnings and internal capital as well as insurance against losses arising from a clearing member's default. The order in which these various sources of funds are applied to cover amounts owed by a defaulting member is set out in the clearing house's internal rules. To address potential liquidity needs, a clearing house also typically maintains a stand-by line of credit facility with a commercial bank.

²² Individual investors who intend to hold US Treasury securities to maturity often hold the securities through the US Treasury's "Treasury Direct" programme. See <http://www.treasurydirect.gov/>.

²³ For further details, see Section 3.3 below. The relative merits of settling in central bank money versus commercial bank money are the subject of an ongoing debate among central banks and securities regulators. Both types of settlement asset have advantages and disadvantages in a given context. The use of central bank money as a settlement asset is generally viewed to involve less risk than settlement in commercial bank money because there is virtually no risk that a central bank will fail. However, there are some practical impediments to the effective use of central bank money in some contexts. Consequently, in the CPSS-IOSCO Recommendations for Securities Settlement Systems, settlement in either type of asset is currently deemed acceptable. Whatever type of asset is used to effect settlement, it is critical that the clearing house consider and effectively manage the risks and practical impediments associated with the kind of asset used to effect settlement.

payments. If a private settlement bank is used and the settlement bank fails before the clearing house has received payments for its credit positions, but after making payments for its debit positions, the clearing house may suffer losses significantly higher than those arising from the default of a clearing member. Furthermore, the obligations of a private settlement bank with respect to monies and securities deposited with the bank are not collateralised, as is the case with clearing members' obligations. Legal agreements governing the use of the settlement bank account, the right to net obligations between settlement banks and any guarantees with respect to the obligations of the failed settlement bank by other settlement banks will also be of vital importance in these circumstances.

As a matter of public policy, however, once a market participant has initiated a payment instruction to its settlement bank to transmit the settlement payment to the clearing house and once the market participant's settlement bank has confirmed to the clearing house that a settlement payment will be made, the insolvency of the settlement bank should not result in a reversal of the settlement instruction, and the settlement payment should be completed as if the bankruptcy had not occurred. A contrary policy would be likely to have catastrophic implications for the clearing house and public markets in general. Such a policy does, however, favour the clearing house and the public markets over the unsecured and uninsured creditors of the settlement bank.

Another mechanism to attenuate the risk of loss upon the failure of a settlement bank would be for the clearing house to obtain intraday credit from its settlement banks, so that debits and credits to its accounts can be posted simultaneously. This would reduce the clearing's house exposure to the net amount collected (if any) and not to the sum total of its credit positions. If netting is not used, it is important to reduce the time period between the irrevocable transfer of funds to members that hold a credit position and the receipt of

payments. By contrast, there is no risk of settlement bank failure if settlement is made in central bank money and the central bank payment system is a real-time gross settlement (RTGS) system.

3.2.3 Other risks to which the derivatives clearing houses may be exposed

In addition to defaults by clearing members and settlement bank failures, clearing houses can be exposed to a number of other risks.

While the clearing house typically does not assume *market risk* in its capacity as a central counterparty, given that there is a corresponding short position for every long position it holds, and vice versa, the clearing house is exposed to market risk with regard to the investment of its own funds. However, these market risks are negligible for clearing houses, since these funds are usually held in highly liquid, short-term government securities or bank deposits. Furthermore, a clearing house may be subject to market risk if it accepts securities as margin. Clearing houses usually address this market risk by discounting the value of non-domestic currencies and securities posted as margin (i.e. by subjecting them to "haircuts") and by marking them to market daily.²⁴

Currency exchange risks are present if the clearing house accepts non-domestic currency as margin or if it clears contracts that are denominated and settled in a non-domestic currency, but that are collateralised with domestic currency or assets denominated in domestic currency. Clearing houses usually address this risk by subjecting non-domestic currency and assets denominated in non-

²⁴ While clearing houses are not generally directly subject to market risks, there is a relationship – to the extent that their customers assume market risk – between the customers' market risk and the potential future credit exposure to which the clearing house is subject. Changes in market price which cause customers to incur losses on their positions result in an increase in the credit risks undertaken by the clearing house unless the clearing house has adequate collateral to cover the loss or until the customer meets a margin call and provides additional margin collateral.

domestic currency to haircuts and by marking all assets to market daily.²⁵

Operational risks are of great significance to clearing houses and it is vital that they be managed appropriately. Fulfilment of its role as a central counterparty requires a derivatives clearing house to monitor its credit exposure on a real-time basis and also to ensure that collateral can be accessed at any moment, if necessary. Back-up procedures and facilities are also maintained to assure this ability.

Derivatives clearing houses are potentially also subject to a wide variety of *legal risks*. The enforceability of netting arrangements, the ability to realise a defaulting member's assets, the finality of payments and securities transfers, the enforceability of the clearing house's internal rules and the general legal

framework applicable in the jurisdiction in which the clearing house operates must be subject to a high degree of legal certainty. The European Union has addressed these risks to a significant extent through its Settlement Finality Directive.²⁶ The United States has addressed these risks through its laws on federal securities, futures, banking and bankruptcy. While some issues remain unresolved in each jurisdiction, both the European Union and the United States have a highly developed legal framework to support the operation of derivatives clearing houses. However, clearing houses in both the European Union and the United States may be forced to address issues relating to conflicts of law when operating on a cross-border basis or through links with non-domestic clearing houses.

3.3 A comparison of the organisation of clearing in the United States and in Europe

With regard to legal forms and ownership structures, a comparison of the largest derivatives clearing houses in the United States and the European Union yields a rather diversified picture.²⁷ In the United States, trading on each derivatives exchange, with some exceptions, is cleared and settled through an affiliated clearing house. The clearing house may be a division of the exchange or may be a separate legal entity. For example, Chicago Mercantile Exchange Inc. (CME) was de-mutualised and transformed itself from a non-profit, membership-owned organisation to a profit-oriented, shareholder-owned corporation. The CME's clearing house operates as a division of the exchange. The Board of Trade Clearing Corporation (BOTCC) is a business corporation and is owned by member clearing firms that trade on the Chicago Board of Trade (CBOT) and the MidAmerica Commodity Exchange. The New York Mercantile Exchange (NYMEX) is a business corporation owned by its members, and its clearing house operates as a division of the exchange

In Europe, historically, each derivatives exchange also cleared and settled through an affiliated clearing house, but European Union (EU) clearing houses have different legal forms and ownership structures. Clearnet is a credit institution under French law and a subsidiary of Euronext Paris. Eurex Clearing is a wholly owned subsidiary of the Eurex exchange. The London Clearing House (LCH), by contrast, is structured as a private limited company, is owned by its members and is run on a non-profit basis. Moreover, clearing for derivatives exchanges in the European Union has recently undergone a certain degree of consolidation. Clearnet, Eurex Clearing, and LCH now clear multiple products, including exchange-traded futures and options, equities, cash market debt instruments, repurchase agreements and OTC derivatives products (collectively referred to

²⁵ See also Section 6.2 focusing on the increasing importance of clearing arrangements between clearing houses at a cross-border level which implies risks and presents particular challenges to central banks and regulators.

²⁶ Directive 98/26 on settlement finality in payment and securities settlement systems. Official Journal L 166, 11/06/1998, pp. 45–50. For further details, see Section 3.2.

²⁷ See Annexes 4 and 6 for further details.

as “financial instruments”). In addition, Clearnet and Eurex Clearing have extended their services across jurisdictions as part of a merger or reorganisation of the operations of their associated exchanges.

Probably the most striking difference between US and EU clearing houses is to be found in the scope of their business. In fact, the clearing houses in the United States tend to be more specialised, while EU clearing houses offer cross-product clearing. Indeed, Clearnet, Eurex Clearing, and LCH offer services for a very broad range of financial products covering stock exchange transactions, bonds, repurchase agreements, financial and exchange-traded commodity futures and options, equity and index options and OTC securities trades. By contrast, the CME clearing house, the BOTCC and the clearing house of NYMEX act as central counterparties principally for the products traded at their respective exchanges. This difference has resulted from different consolidation processes in the financial market infrastructure in the United States and in the European Union.²⁸

With regard to settlement procedures, there is tendency in the European Union for clearing houses to settle cash transactions in central bank money. This holds true of both Clearnet and Eurex Clearing regarding settlement in euro. Non-euro transactions may be settled in commercial bank money. On the other hand, LCH settles in commercial bank money. The situation is very different in the United States, where a tiered structure for cash settlement is predominant. CME, BOTCC and NYMEX all settle their cash transactions via accounts at one of several commercial banks.

As far as risk management procedures are concerned, all clearing houses in both the European Union and the United States apply similar techniques.²⁹ Differences between individual clearing houses exist, but there is no indication of fundamental differences in the general approaches to conducting risk management in the United States and the European Union. In fact, all clearing houses use safeguards designed to minimise the probability of a failure of a market participant. In particular, financial and operational requirements for membership of the clearing house fulfil this purpose. All clearing houses also use safeguards designed to minimise their losses if a market participant should fail. This category relates to margin requirements that collateralise the current and potential future credit exposures stemming from the trades of a participant. Margin has to be paid in cash or high-quality bonds by the participant itself. 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 very volatile markets, sophisticated systems calculate, if necessary during the day, additional margin requirements that have to be provided immediately. All clearing houses also use safeguards designed to cover losses that exceed the value of the defaulting member’s margin collateral. For this purpose, clearing houses maintain supplementary resources such as capital, pre-funded guarantee funds, asset pools, guarantees and insurance schemes.

28 The differences in the main operational features of the major central counterparty clearing houses for derivatives in the United States and in the European Union will be discussed in greater detail in Section 5.

29 See Annexes 5 and 7 for further details.

4 Operational developments in international risk management practices/arrangements

Responding to the increase in cross-border trades, clearing houses have developed, and are in the process of developing, innovative practices to clear and to collateralise derivatives transactions on a global basis. Operational innovations that reflect the internationalisation of risk management practices and clearing arrangements include:

- the acceptance of collateral in the form of non-domestic currencies or securities of non-domestic issuers at a local bank or intermediary;
- the settlement of obligations by payments or delivery of securities to a bank or intermediary in a non-domestic jurisdiction or in multiple jurisdictions;

- the execution of clearing trades at an exchange in one jurisdiction through a clearing house located in another jurisdiction;
- mutual offsetting arrangements between a domestic and a non-domestic clearing house; and
- cross-margining arrangements between a domestic and a non-domestic clearing house.

Operational innovations can involve a single clearing house changing its own operational procedures to facilitate cross-border clearing or two clearing houses harmonising their operational procedures to enhance the interoperability of their respective systems.

4.1 Acceptance of non-domestic currency or non-domestic securities

Historically, clearing houses generally accepted as collateral only domestic currency or securities posted through a local, domestic clearing member in the jurisdiction of that clearing house. These requirements were prompted by technological limitations on the ability of the clearing house to deal with assets held at a distance and the need to eliminate both foreign exchange risk and any legal risk related to the potential failure of a non-domestic market participant. Modern communications technology facilitates transfers of funds and assets denominated in non-domestic currency or securities, irrespective of whether they are held domestically or on a cross-border basis. As a consequence, market participants have put some pressure on clearing houses to accept non-domestic currencies and securities as collateral. Acceptance of non-domestic currencies or securities of non-domestic issuers as collateral may decrease the non-domestic trader's costs of depositing margin at a clearing house. If non-domestic funds or assets are accepted, the trader saves the costs associated with exchanging or converting them into domestic funds or assets.

However, accepting non-domestic currencies or securities of non-domestic issuers as margin exposes the clearing house to several risks that are not given when margin is accepted only in domestic currency or securities. Most obviously, the clearing house is exposed to foreign exchange risk (unless the contract is settled in the same non-domestic currency). Normally, a clearing house protects itself against this foreign exchange risk by super-collateralising the positions (through the haircuts applied to the non-domestic assets) or by hedging its foreign exchange risk in the market. In addition, if margin is held in the form of securities of non-domestic issuers, the clearing house takes risks associated with the holding system through which the non-domestic securities are held.³⁰

If a clearing house accepts non-domestic currencies or securities as margin, it will need

³⁰ Because most securities are immobilised or dematerialised and transferred by book entry internationally, unless the clearing house is a direct participant in the central securities depository (CSD) of the jurisdiction in which the securities have been issued, the clearing house must maintain the securities through accounts at one or more intermediaries. As a consequence, the clearing house may be at a risk of loss if one of these intermediaries becomes insolvent. Regulators may also impose limitations on the extent of the margin that can be denominated in a foreign currency.

to protect itself against legal uncertainties associated with admitting non-domestic clearing members and/or holding margin in a non-domestic jurisdiction. One way of addressing these risks is for the clearing house to hold the non-domestic funds or assets in accounts at settlement banks or other intermediaries within its own jurisdiction. This type of arrangement, however, may not eliminate all legal issues relating to the participation of remote clearing members in the clearing house. Even where the assets posted as margin by that remote clearing member are held in accounts at domestic settlement banks or other intermediaries, the clearing house remains subject to some legal risk of that remote clearing member failing and a bankruptcy court in the jurisdiction of the remote clearing member asserting jurisdiction over the assets posted domestically with the clearing house and entering an order regarding the disposition of those assets which is inconsistent with the rules of the clearing house and the laws of the clearing house's jurisdiction. However, from a policy perspective, the courts of all jurisdictions, but particularly the courts of the clearing house's jurisdiction, should take a contrary view. If a clearing house holds margin or collateral through accounts at settlement banks or other intermediaries located in the jurisdiction of the clearing house, then the rules of the clearing house and the domestic law of the clearing house's jurisdiction should govern the disposition of those assets, superseding, or taking priority over, any laws of the non-domestic jurisdiction. The public interest in assuring the viability of the risk management procedures of the clearing house and the

integrity of the clearing house's operations clearly justifies and necessitates such a result.

Some clearing houses facilitate their non-domestic traders' operations by providing a foreign exchange service. In these arrangements, the clearing house opens accounts with financial intermediaries in other jurisdictions in which a large number of its traders operate. The clearing house then accepts as margin the deposit of non-domestic currency or securities in its accounts at the non-domestic intermediaries. It can then transfer the non-domestic currency to a non-domestic currency account in its own jurisdiction or can execute an exchange transaction to convert the assets into its domestic currency and transfer the converted funds to a domestic currency account at a bank located in its own jurisdiction. The clearing house charges traders a fee to cover the costs of the foreign exchange service.³¹

Under any of the foregoing techniques, the clearing house is generally assured that, while the funds or assets initially posted as margin are not domestic, they will be held in the jurisdiction of the clearing house, will be subject to legal process there and would be treated, in the event of the insolvency of a market participant, in accordance with the bankruptcy laws and rules of the clearing house's jurisdiction. In addition, if funds or securities are held domestically, the clearing house, domestic derivatives regulators and the domestic central bank also are in a better position to monitor the financial capacity of any settlement banks or other intermediaries through which the margin assets are held.

4.2 Acceptance of margin at a non-domestic bank or other intermediary

Because of the risks associated with holding margin outside the jurisdiction of the clearing house, most clearing houses require that margin (or a substantial portion thereof) be maintained in the jurisdiction of the clearing house. However, this requirement may create certain operational complexities for market

31 Clearing houses also may establish an account at a non-domestic financial institution through which its domestic members may make deliveries under a contract denominated in a non-domestic currency or based on a non-domestic asset. In such circumstances, the clearing house may also organise an exchange service for its domestic members to convert domestic currency or assets into non-domestic currency or assets for transfer to such a non-domestic account so as to effect deliveries under the cleared contract.

participants. These operational complexities may be simplified for the trader if the clearing house maintains accounts at banks or other intermediaries in the jurisdiction in which the trader is located (or otherwise maintains assets) and the clearing house accepts the delivery of funds or securities as margin by credits to such accounts. Such arrangements may also facilitate the trading of remote participants at the exchanges cleared by the clearing house. The remote participants can execute trades on an exchange in one jurisdiction, but collateralise those trades by depositing funds or securities in accounts maintained by the clearing house with intermediaries in its own jurisdiction.

However, accepting margin in a non-domestic jurisdiction may also exacerbate the risks to which the clearing house is subject. In particular, the clearing house is exposed to the risk that the assets will become subject to legal process in the jurisdiction in which the account is maintained and that the courts in that jurisdiction will order disposition of the assets in a manner not anticipated by the clearing house and in a manner other than that specified in the rules of the clearing house. Such a result would obviously disrupt the assumptions implicit in the clearing house's risk management procedures. Given that risk, clearing houses exercise extraordinary care when designing and negotiating such arrangements and verify that they are enforceable under the legal framework in the relevant jurisdictions by obtaining supporting legal opinions. However, a legal opinion is not a guarantee and does not obviate the risks of accepting margin in a non-domestic jurisdiction.

The European Union has taken steps to facilitate cross-border clearing arrangements within the Community through the provisions of the Investment Services Directive (ISD)³² and the Settlement Finality Directive (SFD)³³. The ISD facilitates the right of banks and investment firms authorised in an EU Member State, under specified conditions, to provide trade execution services in other Member States in which an electronic regulated market

is authorised through remote access to the market (i.e. through electronic access which does not require the physical presence of the authorised firm in the jurisdiction of the market). The ISD also facilitates the right of such an authorised firm to have access to the clearing house of the regulated market.³⁴ The SFD harmonises the laws of the Member States regarding the netting of obligations in designated securities settlement systems.³⁵ It also harmonises the finality of transfer orders entered to settle obligations in those settlement systems, and the treatment in the case of bankruptcy of assets posted as margin to secure obligations owing to those settlement systems.³⁶

Consequently, it is now possible to regard the European Union as having an integrated legal environment for payment and securities settlement systems.³⁷ Cross-border clearing arrangements within the Community, such as a clearing house's acceptance of assets by credits to accounts with banks or other intermediaries in other EU Member States, take place within this integrated environment and obviate the risks associated with the acceptance of collateral in a non-domestic

³² Directive 93/22 on investment services in the securities field. Official Journal L 141, 11/06/1993, pp. 27– 46.

³³ See footnote 27.

³⁴ However, under the ISD, the clearing house has the option to provide only indirect access to the clearing house if providing direct access may compromise its right to dispose of margin. As noted above, clearing houses generally require non-domestic traders to clear through a local, domestic clearing member to assure that the assets posted as margin at the clearing house are present in the jurisdiction of the clearing house and to assure the clearing house that the assets will be treated in a manner consistent with the rules of the clearing house and the laws and rules of the clearing house's jurisdiction.

³⁵ All clearing houses for regulated derivatives markets within the Community have been designated as securities settlement systems under the directive.

³⁶ Through the SFD, the rules or regulations under which obligations to the clearing house are netted are legally sanctioned and rendered enforceable. Instructions entered to settle obligations owing to the clearing house are rendered final and irreversible from the moment they are entered at the clearing house, notwithstanding the ordinary operation of any national insolvency law rules. Moreover, the availability of the margin posted to discharge obligations owing to the clearing house is assured, notwithstanding the bankruptcy of the party posting the assets or of the intermediary through whom the assets are posted.

³⁷ The legal environment regarding the taking of collateral to secure uncleared, bilateral transactions in the OTC market outside the operation of a designated securities settlement system will only be fully integrated upon adoption of the proposed Directive on collateral.

jurisdiction. As long as assets held by a designated securities settlement system, including a derivatives clearing house, are posted in accordance with the rules of the system, they must be treated as provided for in the SFD, irrespective of the Member State in which they are posted. In this manner, the ISD and the SFD facilitate both remote membership in a clearing house by clearing members from other Member States and cross-border clearing arrangements within the Community organised by the clearing house. German and Swiss authorities also have taken actions to achieve similar results with respect to the operations of the Eurex exchanges. Trading on Eurex Deutschland and Eurex Zürich takes place through a common platform pursuant to common internal rules. Eurex trades are cleared through Eurex Clearing, a German corporation located in Frankfurt. Eurex Clearing accepts specified securities as margin in accounts in both Germany and Switzerland. It also accepts the deposit of Swiss francs to its account at the National Bank of Switzerland, while accepting

euro, and other specified currencies, at accounts at Clearstream Bank in Germany. Regulatory actions of the German and Swiss authorities support this cross-border organisation of the operations of Eurex Clearing.

Several clearing houses in the United States and Europe currently engage in this practice at an international level and accept specified types of margin collateral, generally specific non-domestic currencies and securities of non-domestic issuers, in non-domestic accounts maintained by the clearing house at non-domestic intermediaries. These clearing houses may be exposed to some risk of the margin assets posted in this manner being treated in a manner inconsistent with the rules of the clearing house and the laws of their domestic jurisdiction in the event of the insolvency of the clearing member that has posted the assets. For this reason, the clearing house may limit the amount of margin posted in non-domestic accounts to a specified proportion of the required aggregate margin.

4.3 Clearing in another jurisdiction

In certain arrangements, trades that are executed on an exchange in one jurisdiction are cleared through a clearing house located in another jurisdiction. In these arrangements, the trades are cleared and the positions are held in accordance with the rules of the local clearing house and the laws of the jurisdiction in which it is located.

The clearing for Euronext Brussels is an example of this kind of arrangement.³⁸

The Chicago Mercantile Exchange (CME) and the Spanish MEFF Rentas Variables Exchange recently concluded an arrangement through which certain contracts executed on MEFF will be cleared through the CME's clearing house in Chicago. Trades involving those contracts executed at the MEFF will be carried as positions at the CME's clearing house pursuant to the CME's normal clearing procedures. Moreover, for the purpose of paying and

receiving margin in connection with the clearing of the contracts, CME and MEFF have established separate accounts at banks located in the European Union (in the United Kingdom or Spain) and authorised to effect transfers

³⁸ Euronext Brussels, Euronext Amsterdam and Euronext Paris are part of Euronext N.V., a Dutch corporation. Trades on Euronext Brussels are cleared through Clearnet SA, a French bank which maintains branches in Belgium and Amsterdam. Margin in the form of euros may be deposited directly into Clearnet's account at the Banque de France through the TARGET system. Margins in the form of cash other than euro may be deposited in a Clearnet account at one of Clearnet's private settlement banks. Securities deposited as margins to secure positions at Euronext Brussels are deposited in Clearnet's account at Euroclear France, the French CSD. The arrangements for Euronext Brussels stand in contrast to the arrangements for Euronext Amsterdam. Clearnet also clears trades at Euronext Amsterdam. However, margin securing positions on Euronext Amsterdam, irrespective of whether in the form of securities or cash, are currently held in Clearnet's accounts at De Nederlandsche Bank, the Dutch central bank.

between the accounts.³⁹ Otherwise, the clearing is treated and handled as a domestic US operation.⁴⁰ Because MEFF has become a special clearing member of the CME through

which its members' positions are held, MEFF has personal liability for the obligations of its clearing members to the CME's clearing house.

4.4 Mutual offsetting arrangements

Mutual offsetting between derivatives clearing houses is another operational method by which clearing houses meet the demands of their clearing members to facilitate cross-border trading of derivatives contracts. Mutual offsetting systems are generally designed to facilitate trading in designated fungible contracts (MOS contracts) that are traded on exchanges operating in different time zones. Through the mutual offsetting system, a trade in an MOS contract executed at one exchange (domestic exchange) can be offset by taking an opposite position at the exchange operating in the other time zone (non-domestic exchange). In this manner, the participating exchanges can extend the hours that a trader can trade in the designated MOS contracts. The extended trading hours permit a trader to take or offsetting positions at the non-domestic exchange even when its local, domestic exchange is closed.

In a mutual offsetting system, the initial MOS contract trade is cleared and held through the clearing house of the exchange at which the trade was executed (domestic clearing house) and the trader posts margin through its clearing member according to the normal procedures of that (domestic) clearing house. If the trader later wishes to offset that position at a time when the initial exchange is closed, it can arrange to have a trade for an opposite position executed at the non-domestic exchange. That trade is then registered with the non-domestic exchange's clearing house (non-domestic clearing house). The obligation of the trader vis-à-vis the non-domestic clearing house is transferred to the domestic clearing house either directly or indirectly through entries in the accounts of its clearing member(s). When the obligation related to the second, offsetting trade is finally, legally transferred to the domestic clearing

house, it is simultaneously legally discharged at the non-domestic clearing house, thereby legally and finally offsetting the original trade carried at the domestic exchange.⁴¹

From a collateral management perspective, a mutual offsetting system requires that a trader have sufficient margin or collateral at each clearing house to support the positions that will ultimately be offset. A review of the treatment of the margin supporting each position as it is processed through the system demonstrates this point. When the trader initially takes a position in a designated MOS contract at the domestic exchange, it must post margin at the domestic clearing house,

³⁹ Two futures clearing houses in the United States are using a similar technique to facilitate the use of collateral domestically on an experimental basis. Pursuant to this pilot programme, each clearing house has opened an account with the same settlement bank. Market participants that are members of, and maintain funds at, both clearing houses can settle their margin requirements by a transfer of available funds or US government securities via book entries to the accounts of the clearing houses at that settlement bank. Moreover, those transfers can be completed with immediate intraday finality. In this way, the clearing member can collateralise positions at two clearing houses using the same collateral pool (maintained in the two accounts of the clearing houses at the one settlement bank). However, this kind of arrangement restricts the kind of asset that can be posted as margins to funds and securities that may be held in accounts at the settlement bank.

⁴⁰ The Commodity Futures Trading Commission has granted relief to US futures commission merchants, which execute transactions in the specified contracts on the MEFF regarding the segregation of customer funds, posted as margins at the CME to collateralise the positions created. Amounts deposited as margins by customers in a US futures commission merchant may be segregated as if the MEFF position were a US domestic futures transaction. This provides greater protection to those customers than if the funds were treated as funds deposited in respect of a non-domestic position. CFTC Release 6351-01, Order dated 20 June 2001.

⁴¹ Prior to the time that the transfer of a position becomes final, the clearing houses carry provisional entries in holding accounts on their books that represent the amount of the obligation that will be transferred between the clearing houses. While these entries are provisional, the obligation to be transferred represents an obligation of the transferring clearing house to the receiving clearing house. Each clearing house typically secures its obligations for pending provisional transfers by providing a letter of credit issued by a third party bank to the other clearing house.

either directly or through its clearing member, sufficient to support the contract. If, subsequently, it desires to offset that position through execution of an off-hours trade at the non-domestic exchange, the non-domestic clearing house will require that the trader post margin sufficient to support that offsetting trade. That margin must remain posted with the non-domestic clearing house until all of the accounting entries necessary in the books of the domestic and non-domestic clearing houses to effect the transfer of the offsetting position to the domestic clearing house become final. Once the obligation is finally transferred to the domestic clearing house, the margin supporting the trade executed at the non-domestic exchange can safely be released by the non-domestic clearing house for use by the trader. Moreover, because the final transfer of the position offsets the original position held at the domestic clearing house, any remaining margin supporting the initial trade at the domestic clearing house can also be released for the use of the trader once the offset is given effect. Through this treatment of

the margin posted at both exchanges, the positions can be offset without any direct transfer of funds between the clearing houses. The clearing house accounts on each others books, however, always hold the net position transferred which is marked to market and variation is paid.

A mutual offsetting system works best when the levels of trading on each exchange are roughly equal and the exposures between the clearing houses are comparable. If the levels of trading at the different exchanges are uneven, then the intraday exposures of one clearing house vis-à-vis the other and its members would also be unequal.⁴² A mutual offsetting system also can create operational, credit and liquidity interdependencies between the linked clearing houses. An operational problem at one clearing house may immediately be transferred to the other clearing house. A delay or default in the payment of margin to one clearing house also may subject the other clearing house to increased credit and liquidity exposures.

4.5 Cross-margining arrangements

Cross-margining arrangements can be designed to allow a trader to trade on more than one exchange and to collateralise its positions using assets held in one or more collateral pools. However, because of legal impediments, there are only a few examples of such arrangements internationally. Cross-margining arrangements can be structured in several ways. In one possible structure, each clearing member participating in the cross-margining programme grants each clearing house a joint first-priority lien on all assets held in either clearing house to secure its obligations vis-à-vis both clearing houses. Alternatively, the two clearing houses may open a joint account into which the required margin on specified contracts is deposited. In that case, the clearing house's joint first-priority lien would be limited to the funds in that joint account. In the event of a default by the clearing member, the assets of the clearing member on which the clearing houses have a joint first-priority

lien would be applied to obligations owing to each clearing house *pro rata* and *pari passu*. Generally, each clearing house can access funds in such a joint cross-margin account only upon the joint instructions of both clearing houses. There also may be restrictions on a clearing house's ability to apply funds in the joint cross-margin account to obligations

⁴² Arrangements that operate similarly to a mutual offset system are used to establish links between CSDs. In these arrangements, each CSD becomes a member in and opens an omnibus account at the other CSD. The local CSD can then hold securities for the benefit of its members in its omnibus account at the other non-domestic CSD. Transfers of securities between members of the local CSD that are held and deposited in the non-domestic CSD can then be transferred in the books of the local CSD without the necessity of effecting a transfer in the books of the non-domestic CSD. Through their reciprocal omnibus accounts, the CSDs can also settle trades between their respective participants across the link by debits and credits to their respective omnibus accounts. For a discussion of the risks associated with these kinds of links and the methods by which those risks are managed, see the CPSS/IOSCO Recommendations for Securities Settlement Systems (November 2001) at www.bis.org.

owing with respect to non-cross-margined positions.

Yet another structure is for the clearing member to deposit collateral with each clearing house and for each clearing house to take a first-priority lien only on the assets deposited with it. Each clearing house then guarantees the obligations of its clearing member vis-à-vis the other clearing house with respect to specified cross-margined contracts and obtains the agreement of its clearing member to reimburse it for any funds that it is required to pay to the other clearing house under the guarantee. The clearing house then also takes an additional lien on the clearing member's assets to secure its obligation to make the reimbursement. If the clearing member defaults, the clearing house will pay the amounts it has guaranteed to the other clearing house and will offset the margin it holds to discharge the clearing member's obligations vis-à-vis itself, both on positions held at that clearing house and with respect to amounts paid under the guarantee.⁴³

Arrangements with respect to the margining of contracts also can vary. In the abstract, margin owing to each clearing house by the participating clearing member could be calculated in the ordinary course of business by each clearing house and each clearing house would continue to operate its own risk management programme. Available assets posted at one clearing house (i.e. assets not supporting existing positions at one of the clearing houses) would be deemed to be available to satisfy margin requirements with respect to new positions established in either clearing house. However, clearing houses generally limit a cross-margining programme to specified contracts that are economically correlated and the clearing member is permitted to net offsetting exposures across the correlated products for the purpose of calculating margin requirements. This cross-clearing house netting reduces the aggregate level of margin a clearing member is required to post to collateralise the positions held through the participating clearing houses. Decreasing the aggregate level of collateral

clearing members are required to maintain to collateralise offsetting positions held on multiple exchanges maximises the efficient use of a trader's collateral and is one of the principal benefits sought by clearing members through a cross-margining programme.

Cross-margining programmes also allow clearing members to consolidate their accounting with respect to their trading on both exchanges, to reduce their clearing costs and to lower the operational risks associated with making multiple international asset transfers between the clearing houses of the two exchanges involved. Cross-margining programmes are also an alternative to a consolidation of clearing houses as a method of achieving cross-product clearing. For example, the Options Clearing Corporation, either itself or through its subsidiary, the Intermarket Clearing Corporation (ICC), has concluded cross-margining arrangements with the CME and the Board of Trade Clearing Corporation (BOTCC) to net and cross-margin options on equities and futures on stock indices that are economically correlated.⁴⁴

Cross-border cross-margining arrangements can involve significant legal risk. First, the legal regimes of the relevant jurisdictions may not support the inter-creditor agreement between

⁴³ The advantage of this structure is that it obviates any conflict of law issues arising out of holding assets or securing obligations on a cross-border basis. The arrangements instituting this kind of cross-margining programme are carried out as completely domestic operations vis-à-vis each respective clearing house and the clearing member.

⁴⁴ However, mandatory requirements regarding the disposition of margins upon the insolvency of a US futures commission merchant requires that preferential treatment be given to certain futures customers pursuant to these cross-margining arrangements. These mandatory rules require that customers of a futures commission merchant that do not participate in the cross-margining programme never be disadvantaged by its application. Further, if both securities and futures positions are cross-margined, the futures clearing house is given a priority claim over the securities clearing house in the event of the bankruptcy of a cross-margined clearing member. However, in such circumstances, the futures customers of the insolvent clearing member have no claim against the Securities Investor Protection Corporation that secures the claims of the customers of US broker/dealers against losses arising out of the broker/dealer's insolvency. The organisation of cross-margining arrangements for options on equities and futures on individual securities is also anticipated as soon as futures on single securities begin to be traded under recent amendments to the Commodity Exchange Act.

the clearing houses. In many jurisdictions, the assets deposited as margin at a clearing house must be handled and used in a specified way upon the insolvency of a clearing member. This mandatory disposition of assets by a clearing house upon a clearing member's insolvency may not support the agreements between the clearing houses granting each a first-priority lien on the assets posted as margin and a right to apply those assets to the clearing member's obligations vis-à-vis both clearing houses upon default. Unless the inter-creditor agreement is clearly legally enforceable, a bankruptcy court with jurisdiction may be inclined not to enforce it. Setting aside the inter-creditor agreement would increase the returns to unsecured creditors of the defaulting clearing member. In this case, too, one of the clearing houses will have an unanticipated, uncollateralised exposure and the defaulting clearing member will probably not have sufficient unencumbered assets to cover it.

Over and beyond that, each clearing house participating in a cross-margining programme will face additional legal issues relating to the perfection of its liens on any assets posted as margin in the other clearing house. The netting of obligations owing under economically correlated contracts for the

purpose of calculating margin requirements is justified only if each clearing house has access to the proceeds of the offsetting contract cleared through the other clearing house. Each clearing house will need to take steps to verify that its liens are valid under the law of both relevant jurisdictions. Lastly, each clearing house may face issues relating to its right to liquidate, or to have the other clearing house liquidate, the margin held at the other clearing house. Each clearing house may have the right to liquidate collateral held by it in a particular manner under its own internal rules and under the law of the jurisdiction in which it is located. However, clearing house rules often operate without regard to requirements relating to a debtor's rights under due process to receive notice of disposition of its assets and other requirements with respect to the manner of disposition of those assets. This preferential treatment of clearing houses reflects a policy choice to protect the public markets. In some circumstances, however, that preferential treatment may not extend to a disposition of collateral held by a domestic clearing house for the benefit of a non-domestic clearing house.

These legal constraints have generally impeded the conclusion of cross-border cross-margining arrangements.

4.6 Comparative overview of international risk management practices/arrangements in the United States and in Europe

The table below summarises the operational developments discussed above. It concentrates on those central counterparties that are strongly involved in international derivatives trading.

Table I

Operational developments in international risk management practices/arrangements	Europe	United States
• Acceptance of collateral in the form of non-domestic currencies or securities of non-domestic issuers at a local bank or intermediary	Clearnet, Eurex, LCH, OM Stockholm, Wiener Börse AG	CME, BOTCC, NYCC
• Acceptance of margin at a bank or intermediary in a non-domestic jurisdiction or in multiple jurisdictions	Eurex	BOTCC, CME (as part of its currency exchange service), NYCC
• Clearing trades executed at an exchange in one jurisdiction through a clearing house located in another jurisdiction	Clearnet (trades executed at Euronext Brussels) Eurex Clearing (trades executed at Eurex Switzerland)	CME (trades executed at the Spanish MEFF) NYCC (NYBOT's FINEX Division) operates a trading floor in Dublin, whose trades are cleared in New York*
• Mutual offsetting arrangements between a domestic and a non-domestic clearing house	None	CME/Singapore
• Cross-margining arrangements between a domestic and a non-domestic clearing house	CME/LCH/LIFFE (CME's Eurodollar contract and LIFFE's Euribor or euro LIBOR contracts)	CME/LCH/LIFFE (CME's Eurodollar contract and LIFFE's Euribor or euro LIBOR contracts)

* Although the floor of NYBOT's FINEX Division is in Ireland, it is a US exchange that complies with all CFTC regulations.

5 Consolidation in the financial market infrastructure

At present, there are several central counterparty clearing houses operating in Europe and in the United States. In addition, in the euro area, there are several projects under consideration to set up new central counterparty clearing houses in countries where there is currently no such market infrastructure.

There are a number of models for structural consolidation that derivatives clearing houses can pursue, in addition to innovations in operational arrangements to facilitate the cross-border clearing of derivatives internationally. The first model is domestic horizontal consolidation, i.e. consolidation between derivatives clearing houses in the same jurisdiction, but attached to different exchanges. The second and the third models consist of horizontal consolidation with derivatives clearing houses in other jurisdictions (to permit cross-border clearing), on the one hand, and horizontal consolidation with securities clearing houses (or clearing houses for other kinds of markets or products regulated separately from derivatives) in their own and other jurisdictions (to permit cross-product clearing), on the other. The fourth model is vertical consolidation with exchanges, clearing houses and central securities depositories (to create integrated trading, clearing and settlement silos).

However, it is important to note that the welfare effects of consolidation are ambiguous. On the one hand, consolidation can help to increase efficiency. First, the clearing industry typically exhibits *network externalities*, i.e. the value of the services and products a clearing system offers an investor depend on the number of investors purchasing the same services and products. Thus, an increase in the number of participants joining the clearing system will have benefits that accrue to existing members, as they will be able to share a credit pool with more counterparties. Second, the clearing industry is also strongly characterised in operational terms by the existence of *economies of scale*, i.e. the average cost of clearing per transaction diminishes as the number of cleared transactions increases.

The information technology (IT) infrastructure, such as a database engine (the clearing platform), networks and interfaces, is a component of the market infrastructure characterised by relatively high fixed costs. Therefore, it would be more efficient to have a single database engine clearing transactions on multiple markets than to have several database engines for each local market. In particular, an uncontrolled proliferation of clearing infrastructures could create inefficiencies. For instance, the existence of a fragmented infrastructure would oblige banks and investment firms to participate in more than one central counterparty clearing house and, therefore, to maintain several interfaces and to cope with different standards, market practices and clearing rules. Third, the clearing industry is characterised by the existence of a *strong vertical relationship* between the various complementary components of the market infrastructures. The settlement of a securities transaction takes place only after the matching and clearing of the transaction has occurred. Therefore, a further integration of the complementary components of the infrastructure (along the value chain of a securities transaction) allows economies of scope, i.e. efficiency gains from the joint operation of complementary components of the infrastructure, to be realised. A single supplier may be able to provide a package of services at a cost lower than multiple suppliers supplying components of the same services individually. In addition, the participants will benefit from not having to set up different interfaces and implement different procedures in order to reach various components of the infrastructure. From a risk management perspective, consolidation permits the central counterparty to gain access to information on the exposures of clearing members across multiple markets. This information allows the central counterparty to manage the aggregate risk assumed by clearing members across exchanges on a consolidated basis. In an environment where multiple central counterparties exist and operate separately, without a mechanism to share information on exposures, no single central counterparty is able to analyse the exposures of its

clearing members vis-à-vis other central counterparties. This is particularly the case in jurisdictions, such as the United States, where there is a high degree of commonality in the identity of clearing members at the various derivatives clearing houses.⁴⁵

Consolidation can also result in a number of inefficiencies and risks. Consolidation may lead to conflicts of interest and governance problems within the clearing house. In particular, there are difficulties in organising equitable guarantee arrangements (e.g. what incentive does an equity market participant have to share in the costs of a derivatives market participant's failure?). In addition, the interests and needs of local market players and those of larger global market players are quite distinct and hard to reconcile. Moreover, the potential cost savings of consolidation through the organisation of cross-margining arrangements may be limited in that cross-margining is only possible in cases of contracts with reciprocal or highly correlated risk. Any increase in legal risk arising from cross-margining arrangements must also be assessed relative to the benefits of those arrangements. Furthermore, the consolidation process is costly in itself and, in a consolidated structure, there is a lack of competition among clearing houses that may lead to limited incentives to improve services and to reduce prices.⁴⁶ There may also be limited incentives to foster innovation and a high risk of x-inefficiencies. Moreover, consolidation results in a concentration of risk and entails the danger of spillover effects. In other words, any disturbance in one segment of the financial market may result in similar corresponding disturbances in other segments.⁴⁷ As a result, consolidation may have serious systemic implications. Finally, in the case of systemically important entities, there is a risk of moral hazard if systems are considered "too big to fail." Consolidation also can create additional legal or regulatory burdens. Multi-product clearing, for instance, requires more risk controls, more demanding and costly risk management techniques and more rigorous oversight on the part of regulators and central banks. In addition, there can be co-ordination

problems between authorities with competence over different products and an increased risk of conflicts of law in the case of cross-border consolidation. Lastly, there are a number of further legal uncertainties in the case of cross-product and cross-currency clearing relating to netting, insolvency and the general risks incident to all currency exchange transactions.

Finally, since central counterparty clearing houses monitor participants' trading books, if a particular class of members dominates the governance process, other members or users of the clearing house may fear that those dominant members will abuse the information gathered by the clearing house or otherwise adversely affect its operations, unless appropriate measures are put in place. Governance arrangements that do not assure the fair and proper operation of the clearing house would lead to an unacceptable increase in social costs. As a result, additional regulation, supervision or oversight of clearing houses may be necessary.⁴⁸

Potential efficiency gains through consolidation depend on whether central counterparty

⁴⁵ US clearing houses have the ability to share exposure information regarding positions on domestic exchanges through the Joint Audit Committee. The Board of Trade Clearing Corporation also operates an on-line collateral surplus and excess and net pay and collect information system through which all US futures clearing houses and the Options Clearing Corporation can access information on the level of profits and losses and available collateral regarding all participating clearing members.

⁴⁶ However, the United States' experience suggests that innovation may be driven by the demands of market users, irrespective of the level of competition among clearing houses.

⁴⁷ Clearing different kinds of contracts in a separate clearing house can limit the exposure of clearing members to those specified kinds of risks. For example, an agricultural trader may not want to take or share the risk that a trader in the financial futures market will default. Agricultural traders may determine to clear their agricultural contracts in a separate clearing house to limit their exposure to defaults by other agricultural traders. Clearing system designers and clearing system members must assess the extent to which the cost savings associated with economies of scale outweigh any increased potential exposure associated with clearing unrelated types of contracts in a single clearing house. However, clearing different kinds of contracts in different clearing houses may impact on the ease with which an individual broker may be able to provide services relating to different kinds of contracts and may create artificial, practical barriers to firms engaging in business at multiple clearing houses.

⁴⁸ However, current evidence indicates that clearing houses in both Europe and the United States have been effective in preventing the abuse of confidential financial information in their possession.

clearing is a natural monopoly. In the short term, consolidation helps to maximise network externalities and economies of scale. However, these short-term advantages have to be balanced against the inefficiencies that may be caused by the absence of competition (e.g., lack of dynamism, lack of innovation) in the long run. Indeed, there are numerous examples of natural monopolies – for instance, in the field of telecommunications, energy and transportation – which are progressively being dismantled.

Put in economic terms, consolidation will help to increase efficiency to some extent, through economies of scale and scope as well as network externalities. Beyond a certain point, however, further consolidation may lead to diseconomies of scale resulting in a welfare loss.

The following sections will discuss in greater detail the consolidation processes in central counterparty clearing in Europe and in the United States.

5.1 Vertical and horizontal structural consolidation in Europe

5.1.1 Examples of consolidation in Europe

In Europe, most countries have established central counterparty clearing houses which are attached to particular local organised markets (stock exchanges or derivatives exchanges). As a result, central counterparty clearing houses in Europe have traditionally confined their services to single countries. However, the pattern of a single central counterparty clearing house serving one market in one country is changing. At the same time, EU clearing houses are expanding the range of products they are able to clear.⁴⁹

There are numerous examples of this structural consolidation in Europe. Examples of horizontal consolidation among derivatives clearing houses include:

- the London Clearing House, which clears all futures exchanges in the United Kingdom (reflecting a domestic horizontal consolidated approach to clearing);⁵⁰
- Clearnet SA, which now clears the principal derivatives exchange markets in France, Belgium and the Netherlands (reflecting a cross-border horizontal consolidation); and
- Eurex Clearing, which now clears derivatives for Eurex Deutschland and Eurex Switzerland as well as certain derivatives contracts cross-listed with the

Helsinki Exchanges (also reflecting a cross-border horizontal consolidation).

Examples of horizontal consolidation among derivatives and securities clearing houses include: the London Clearing House, which now clears both derivatives and equities, and Clearnet SA, which also clears both derivatives and equities. Eurex Clearing, too, has announced its intention to begin clearing equities, along with cash market debt instruments and derivatives.

Examples of vertical integration (the creation of silos for trading, clearing and settlement) include:

- the consolidation of Deutsche Börse, Eurex Deutschland, Eurex Switzerland, Eurex Clearing and Clearstream, an international central securities depository, into the same corporate structure; and
- the ongoing consolidation of the Paris, Brussels and Amsterdam exchanges, Clearnet SA (their clearing house), Sicovam, Necigef and CIK (the French, Dutch and

⁴⁹ For a discussion of proposals to offer centralised collateral management services for OTC derivatives that are concluded and collateralised bilaterally without interposition of a central counterparty, see Kathleen Tyson-Quah, "Collateralisation v. Clearinghouse: Credit Risk Management for OTC Derivatives," in *Swaps and Off-Exchange Derivatives Trading: Law and Regulation* (E. Bettelheim, H. Parry, and Prof. W. Rees, Eds., London 1996).

⁵⁰ Except for OMLX, which is cleared by OM Clearing.

Belgian central securities depositories respectively) and Euroclear (an international central securities depository) into an affiliated corporate structure.

Examples of the development of cross-product clearing include:

- the London Clearing House, which now clears equities, cash market debt instruments, repurchase agreements, options, futures, and OTC derivatives;
- Clearnet, which now clears equities, repurchase agreements, cash market debt instruments, options, and futures; and
- Eurex Clearing, which now clears cash market debt instruments, repurchase agreements, options, and futures.

Cross-product clearing arrangements do vary, however. Clearing houses may specify various methods of calculating the contribution clearing members in each product class must make to a reserve, guarantee or indemnity fund. Clearing houses may also specify various methods of, or limitations on, a clearing member's ability to net obligations between economically correlated products across product classes for purposes of calculating margin requirements.

5.1.2 Factors underlying the consolidation process in Europe

Several factors unique to Europe underlie this structural consolidation.

5.2 Vertical and horizontal structural consolidation in the United States

5.2.1 Examples of consolidation in the United States

In the United States, horizontal consolidation in the clearing and settlement infrastructure for equities, US government securities, emerging market debt securities and

In the euro area, the adoption of the euro has accelerated the consolidation process in the financial market infrastructure. By eliminating exchange risks, the introduction of the single currency resulted in a dramatic rise in cross-border trades and contributes to the completion of the internal market for financial services in the European Union. These developments motivate a reorganisation of the EU financial infrastructure and permit a rationalisation of the organisation of the financial infrastructure to reflect the current state of the art in trading, clearance and settlement arrangements.

The EU approach to the regulation of financial services and markets is intended to facilitate structural consolidation. The regulation of the investment services activities of banks and investment firms has been co-ordinated through the Consolidated Banking Directive,⁵¹ the Investment Services Directive, and the Capital Adequacy Directives.⁵² Authorised firms can hold securities, futures, options and other OTC derivatives on behalf of a customer in the same account.

Markets for securities, futures and other OTC derivatives are regulated in a co-ordinated and unified regime in each EU Member State, and the Investment Services Directive and the Settlement Finality Directive facilitate the cross-border operation of securities, futures and other derivatives markets and settlement systems in the EU internal market. In this way, regulatory barriers to a structural consolidation of securities and derivatives clearing and settlement systems are progressively being removed in Europe.

⁵¹ Directive 2000/12 relating to the taking up and pursuit of the business of credit institutions, Official Journal L 126, 26/05/2000, p. 1, as amended by Directive 2000/28, Official Journal L275, 27/10/2000, p. 37.

⁵² Directive 93/6 on the capital adequacy of investments firms and credit institutions, Official Journal L 141, 11/06/1993, p. 1, as amended by Directive 98/31, Official Journal L 204, 21/07/1998, p. 13, and by Directive 98/33, Official Journal L 204, 21/07/1998, p. 29.

mortgage-backed securities, respectively, has already occurred. Legislative amendments to US securities law have resulted in the consolidation of securities clearing and settlement primarily in the subsidiaries and affiliates of the Depository Trust Clearing Corporation (DTCC).⁵³ The Depository Trust Company (DTC), the National Securities Clearing Corporation (NSCC), the Government Securities Clearing Corporation (GSCC), the Emerging Markets Clearing Corporation (EMCC) and the MBS Clearing Corporation have all been consolidated within an affiliated corporate structure, headed by DTCC.⁵⁴

DTC, the US central securities depository (CSD), settles all corporate, municipal and mortgage-backed securities in the United States.⁵⁵ NSCC clears and provides central counterparty services for all retail equity, corporate and municipal bond transactions in the United States, processes most mutual fund orders and provides clearing services for some markets in US government securities, mortgage-backed securities and emerging market debt instruments. EMCC provides clearing, multilateral netting, central counterparty and risk management services for emerging market debt products. GSCC provides trade comparison, netting, central counterparty and settlement services for US government securities markets. MBS Clearing Corporation provides post-trade comparison, netting, risk management and pool notification services to the mortgage-backed securities market. A separate company not affiliated with DTCC, the Options Clearing Corporation (OCC), provides clearing and central counterparty services for exchange-traded options on securities. However, there is an element of competition in the provision of settlement services in the United States. Service providers other than DTCC affiliates may provide competing services in some areas, e.g. securities trade matching services for institutions with an interface to DTC.

This overview reflects that there are four central counterparties for securities within the United States: NSCC for equities and

corporate and municipal bonds, EMCC for emerging market debt instruments, GSCC for US government securities, and Options Clearing Corporation for exchange-traded options on securities.⁵⁶ MBS Clearing Corporation is considering offering central counterparty services for mortgage-backed securities.

Each of these clearing houses has separate rules for defining the amounts that clearing members are required to post in the clearing house's indemnity fund and as margin on individual positions. Each clearing house also has separate rules regarding the allocation of losses upon a default by a clearing member. One result of this corporate structure for securities clearing is a limitation on the liability of the clearing members of the respective clearing house. A clearing member has liability only with respect to losses arising from contracts in the product class cleared by the clearing house of which he is a member. Moreover, the affiliation of all the clearing houses, other than OCC, within the corporate structure of DTCC also facilitates the coordination of their activities from an operational and technical perspective.

5.2.2 Factors underlying the maintenance of multiple clearing houses in the United States

Notwithstanding the experience of the securities clearing arrangements under the national market system, futures clearing organisations have not consolidated, although there are no regulatory impediments to their consolidation, and studies have also indicated

53 For an overview of the history of the consolidation of the clearing of equities and options on equities in the United States, see European Securities Forum, Euro CCP, ESF's Blueprint for a Single Pan-European Central Counterparty at <http://www.eurosf.com/publications/~Blueprint.pdf>.

54 The Boards of Directors of GSCC, EMCC, and MBS Clearing Corporation have recently also approved proposals to become wholly-owned subsidiaries of DTCC.

55 The CSD for US government securities is the Federal Reserve System that holds government securities through its Fedwire system.

56 These clearing houses have instituted various cross-margining arrangements to achieve cross-product netting for purposes of establishing margin requirements.

that significant cost savings may be realised if futures clearing houses were consolidated.⁵⁷ However, several factors may explain the maintenance of a decentralised futures clearing environment in the United States:

- Industry-specific markets may result in a lack of commonality in the identity of traders from market to market and may obviate the traders' business interest in mutualising the risk of loss across exchanges through a single clearing house. The practice among US clearing houses of requiring clearing members to take joint and several liability for the obligations of the clearing house arising from cleared trades, a practice uncommon in Europe, also may lead clearing members to conclude that a single clearing house is not in their business interest. The organisation of multiple clearing houses may operate to limit their liability.⁵⁸
- The risks associated with clearing certain kinds of contracts or for certain kinds of traders (e.g. petroleum contracts for major oil companies) may lead to variations in risk management practices across clearing houses. For example, the capital requirements imposed on clearing members may vary from clearing house to clearing house.
- Each clearing house generally clears transactions on one exchange in the United States, and the exchanges are often competitors. The exchange may perceive its clearing operations to be an adjunct of its trade execution services and may perceive that its clearing arrangements give it a competitive advantage over other competing exchanges. Differences in corporate culture at the exchanges and their associated clearing houses may also make co-operation between exchanges with respect to clearing difficult.
- A consolidation of futures clearing houses would concentrate risks in one entity and could potentially increase systemic risk.

However, current market forces may ultimately prompt a re-examination of the structural organisation of clearing arrangements for futures and other derivatives in the United States. Investors and financial services companies have an increased desire to invest in products and instruments, and to engage in activities, that are currently regulated in a different manner on a sectoral basis (i.e. across the banking, securities, futures, and insurance sectors) in the United States.

Some initial steps have been taken to modify the regulatory regimes for banks, securities firms and futures commission merchants as well as securities and derivatives markets that might ultimately lead to an evolution in the structure of clearing and settlement arrangements for securities, futures and other derivatives. The adoption of the Gramm-Leach-Bliley Act permits banks, securities firms and insurance companies to be held within the same corporate structure. Entities in different sectors held in the same corporate structure might desire the ability to clear and settle within a single operation all products and positions held within the financial group.

The Commodity Futures Modernisation Act (CMFA) of 2000 also introduced the following changes regarding clearing:

- a clearing house designated by the Commodity Futures Trading Commission is now permitted to clear futures traded on a designated contract market, a derivatives

⁵⁷ The Chicago Mercantile Exchange and the Board of Trade Clearing Corporation (which clears for the Chicago Board of Trade) formally explored a merger in the late 1990s, but ultimately decided not to complete it.

⁵⁸ In situations where a clearing member has unlimited liability to the clearing house regarding defaults in cleared contracts, a parent company of a clearing member can control the extent of its liability through its control over the level of capitalisation of the clearing member. The practice of requiring unlimited liability of clearing members is also being abandoned in some cases. The Chicago Mercantile Exchange recently amended its clearing rules in a way that limits the liability of its clearing members. Under the rules of some clearing houses, a clearing member can also withdraw its obligation to cover losses at the clearing house with respect to trades consummated subsequent to the notice of withdrawal. However, in such a case, the clearing member must take steps to terminate its status as a clearing member.

transaction facility, contracts on commodities exempted or excluded from the application of the Commodity Exchange Act and certain other cash market products and OTC derivatives contracts;

- contracts based on commodities exempt or excluded from the Commodity Exchange Act and those other cash market products and OTC derivatives contracts can also be cleared by a clearing house that is registered or designated by other US financial regulators, e.g. by a securities clearing agency registered with the Securities and Exchange Commission;
- futures on individual securities can be cleared at a clearing house approved by either the Securities and Exchange Commission or the Commodity Futures Trading Commission;
- clearing houses that clear single stock futures must ultimately arrange linkages with each securities clearing agency to provide for delivery-settled single stock futures products and must establish linkages with each other to facilitate cross-market fungibility and offsetting; and
- foreign clearing houses can clear exempt foreign government securities for US customers if permitted to do so by a banking regulator, the Securities and Exchange Commission or the CFTC.

However, even under the new provisions of the CFMA, securities and futures can be cleared in the same clearing house only if the clearing house is registered as both a derivatives clearing organisation by the Commodity Futures Trading Commission and a securities clearing agency by the Securities and Exchange Commission. Moreover, margin held by such a dually registered clearing house with respect to futures and most securities products could not be held and treated in the same way in the same account upon the

bankruptcy of an intermediary. Generally, the rules regarding the treatment of amounts posted as margin vary with respect to futures and securities. Rules regarding the disposition of margin on futures on single stocks, which constitute both a future and a security, are currently under review by the Securities and Exchange Commission and the CFTC. Consequently, while the new regulatory scheme reflects a general movement towards cross-product clearing and will encourage the conclusion of cross-margining arrangements between securities and futures derivatives clearing houses for single stock futures, some regulatory impediments remain regarding cross-product clearing in the United States.

Historically, the approach of the Commodity Futures Trading Commission has been to allow the structure of futures clearing to be determined by the markets, subject to certain requirements for participants and certain “core requirements” that must be met by a clearing house. Moreover, it is unlikely that this regulatory approach will change. The financial services industry itself, however, may ultimately conclude that securities, futures and other derivatives should be permitted to be cleared and held through the same intermediary in the same account. This would permit the most flexible use and management of an investor’s capital and would permit the continuing evolution in risk management practices supporting the financing and holding of financial instruments, both on a domestic and on an international basis. However, such an evolution in the public policies regarding clearing in the United States may ultimately require legislative action by the United States Congress. The costs to clearing houses, their members and other market users of such a re-organisation of clearing arrangements relative to the benefits that would be derived is likely to be the primary factor in both the financial services industry’s and the Congress’ assessment of the utility of any such proposed reorganisation.

5.3 Comparative overview of structural consolidation in the United States and in Europe

The following table summarises the various examples of structural consolidation in the United States and in Europe, distinguishing between different models of structural consolidation that derivatives clearing houses can pursue.

Table 2

Type of Consolidation	Europe	United States
A domestic horizontal consolidated approach to derivatives clearing in the same jurisdiction	London Clearing House (clearing all future exchanges in the United Kingdom, except OMLX)	OCC (clearing all exchanges trading standardised options on equities)
Horizontal consolidation with derivatives clearing houses in other jurisdictions (to permit cross-border clearing)	Clearnet (derivatives and securities in France, Belgium, and the Netherlands); Eurex (derivatives in Germany and Switzerland)	None
Horizontal consolidation with securities clearing houses in their own and other jurisdictions (to permit cross-product clearing)	Clearnet (derivatives and securities); London Clearing House (derivatives and securities)	None
Vertical consolidation	Clearnet (clearing) with Euronext (trading) and Euroclear (settlement); Eurex (clearing) with Deutsche Börse (trading) and Clearstream (settlement)	DTCC (only clearing and settlement)

6 Issues for central banks and regulators

From an oversight and regulatory perspective, the organisation of risk management practices on an international basis presents certain challenges to central banks and financial market regulators. Central banks have an interest in ensuring the smooth functioning of clearing and settlement systems because of the potential impact a major disruption may have on the smooth functioning of payment systems and on financial stability in general. Disruptions in the derivatives trading and clearing process might prevent market participants from receiving timely funds that they had intended to use to make other payments. As a result, the risk of bottlenecks in the payment systems would be very large and could substantially affect financial markets. In addition to these systemic implications, derivatives regulators are concerned with the potential non-systemic impact of a significant failure within the

clearing and settlement infrastructure on (i) the financial condition of individual regulated firms, (ii) the protection of individual customers using and holding derivatives positions through the clearing and settlement infrastructure and (iii) the functioning of the market for its intended purposes, i.e. price discovery and risk transfer.⁵⁹

As noted earlier in this paper, the most significant trends in the development of derivatives clearing fall into two categories: the increasing importance of operational clearing arrangements between clearing houses at a cross-border level and structural consolidation in the clearing and settlement infrastructure. Both developments imply particular risks and present particular challenges to central banks and regulators.

6.1 Risks and regulatory challenges relating to cross-border clearing activities

The growing internationalisation of markets creates new sources of risk. In particular, the following risks and regulatory challenges are relevant.

6.1.1 Contracts denominated in non-domestic currencies

Derivatives in which the underlying asset is a foreign exchange rate, a foreign interest rate or a foreign stock index are often denominated in the associated foreign currency. Moreover, money settlements on these contracts will typically be carried out in a foreign currency. Volatility of the foreign currency must be taken into account when determining the adequacy of the collateral posted by the clearing member to secure its positions or exposures.

If domestic assets⁶⁰ are used as margin collateral for a contract denominated in a non-domestic currency and if the contract envisages settlement by delivery of the non-domestic currency, the clearing house must

take two implications into account. First, the clearing house will need additional time in its default procedures to convert the proceeds of the collateral into the non-domestic currency in order to cover the defaulting clearing member's positions. Second, for this purpose, the clearing house may use accounts denominated in the non-domestic currency in a domestic bank or maintain accounts in the non-domestic currency at banks abroad. Occasionally (although this is most important in the case of a cross-border link), a clearing house will open an account with the central bank of the currency of issue. If remote access to that central bank is not provided, the clearing house will have to depend on commercial bank settlement. If a correspondent bank abroad is used, the

⁵⁹ The 1987 market crash in the United States prompted recognition that the central bank, the finance minister and financial markets regulators all have an interest in the design and functioning of the financial infrastructure. This recognition led to the formation of the President's Working Group on Financial Markets, composed of the Federal Reserve Bank, the Treasury Department, the Securities and Exchange Commission and the Commodity Futures Trading Commission.

⁶⁰ Or other assets which are denominated in a currency different to that of the derivatives contract.

settlement period may be extended because of delays inherent in correspondent banking operations (i.e. delays due to operating across different time zones or due to the need to confirm the finality of cross-border transfers).

6.1.2 Collateral issued in a non-domestic jurisdiction and held in a non-domestic central securities depository

Securities issued in a non-domestic jurisdiction and deposited and held in a non-domestic central securities depository (CSD) may also be accepted as margin collateral. Non-domestic securities may be held by a clearing house in one of three ways: indirectly through a global custodian bank or other local CSD member; indirectly through a link maintained by the domestic CSD with the foreign CSD; or directly by means of remote access of the clearing house to the non-domestic CSD. The complexities inherent in holding securities cross-border through a chain of intermediaries or by remote cross-border access may extend the time required to deal with assets held in a non-domestic CSD. Those complexities may increase both the risks and the costs of holding non-domestic securities.

6.1.3 Non-domestic participants

The evaluation of a non-domestic member's financial capacity and the monitoring of its open positions can become more complex as a consequence of variations in legal, accounting and regulatory requirements applicable to the non-domestic member in its home jurisdiction. In the event of the default of a non-domestic clearing member, actions of the clearing house could be challenged under the insolvency laws in the other jurisdiction. In the field of derivatives settlement, in which the clearing house acts as the central counterparty, membership requirements are of the utmost importance. This means that, in practice, many procedural requirements may be imposed regarding settlement to ensure the solvency of a non-domestic clearing member or the ability

of the clearing house to realise the assets posted by the non-domestic clearing member as collateral. In particular, a legal assessment of potential conflicts between the clearing house's default procedures and the insolvency laws in the country of the non-domestic member must be carried out. Information-sharing agreements with non-domestic regulators or clearing houses are also important.

In order to evaluate and address cross-border risk management practices and clearing arrangements in their respective jurisdictions, central banks and financial market regulators are interested in ensuring that their own domestic legal framework and the legal framework of other jurisdictions with whose clearing houses their own clearing houses are connected or linked support enforceable arrangements for cross-border risk management and clearing. Aspects of the legal framework with which central banks and financial market regulators may be concerned include laws on the netting of obligations in the linked systems, laws on the finality of settlement instructions and the finality of payments and deliveries of securities, laws on the perfection and enforcement of rights against collateral in the other jurisdiction and insolvency laws specifying the treatment of claims and the disposition of assets held in the other jurisdiction, imposing an automatic stay, or reversing transactions pursuant to "zero-hour" rules.

Regulators charged with assuring the integrity of a clearing house's risk management practices and protecting domestic customers and investors must also be mindful of the variations in laws and rules regarding the segregation of customer assets and in the holding systems for financial instruments internationally. The nature of a clearing house's interest in margin that may be posted with a non-domestic clearing house, or through an international chain of intermediaries, may vary significantly across jurisdictions. Variations in the rights and property interests inuring to the benefit of a clearing house regarding cash or securities

held through an international chain of intermediaries may bear on the integrity of the clearing house's risk management practices and on the risks undertaken by its customers. Cross-border clearing also requires central banks and financial market regulators to address issues relating to the provision of

liquidity in a financial crisis to support firms operating internationally, the concentration of information outside their jurisdiction and the need for arrangements to exchange information between the clearing houses directly and between central banks and regulators internationally.

6.2 Risks and regulatory challenges relating to structural consolidation

Because central counterparties become the buyer to every seller and the seller to every buyer on cleared contracts, thereby replacing the original counterparty on each side of the transaction vis-à-vis the other, counterparty credit risk is managed on a centralised basis by 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 a central counterparty service.⁶¹ Since such risks increase with the size of the central counterparty, consolidation among central counterparty clearing houses may increase the concentration of risk. Moreover, horizontal and vertical consolidation of clearing houses and settlement systems and cross-product clearing of equities, cash market debt instruments and derivatives contracts may also result in a decrease in the overall amount of collateral currently supporting positions held within the international financial system and in a corresponding increase in the degree of leverage in the financial system.⁶²

Moreover, consolidation may create the risk of spillover or contagion effects in the case of cross-product clearing. To an important extent, clearing systems determine the exposures among and linkages between financial institutions. Therefore, clearing systems are channels through which contagion effects can be transferred through the financial

system. Disturbances in the equity market, for instance, may result in similar, corresponding disturbances in the derivatives market, and vice versa. As a result, consolidation among central counterparty clearing houses may have serious systemic implications.

Another closely related issue is that consolidated entities, once they have become systemically important, might be perceived to be "too big to fail." Consolidation may, therefore, create moral hazard for regulators and central banks.

Furthermore, consolidation creates additional risk management and regulatory burdens. In particular, multi-product clearing requires increased risk controls and more demanding and costly risk management techniques. In addition, cross-border consolidation can make co-ordination between regulatory authorities both more difficult and more important, can give rise to gaps or inconsistent application of regulatory schemes due to variations in the

⁶¹ However, although a clearing house does not provide a central counterparty service, it can provide other services related to counterparty credit risk management, including monitoring the level of credit or potential future credit exposures, issuing margin calls and issuing or processing settlement instructions.

⁶² If a trader today maintains positions in more than one market and if those markets are each cleared by a separate clearing house, the trader must collateralise the full amount of his net obligation to each clearing house. If the clearing houses (but not necessarily the markets) consolidate and if certain of the positions taken in one market will hedge or offset exposures taken in the other market, the trader will be able to take advantage of an enhanced ability to net the exposures owing to the consolidated clearing house, thereby reducing his overall exposure and reducing the amount of collateral or margin he is required to post at the clearing house to support his positions. If many traders are able to take advantage of this opportunity, the overall amount of collateral posted in the financial system as a whole may potentially be significantly reduced, thereby increasing the degree of overall leverage in the financial system.

regulatory approaches or techniques used by different regulators and can exacerbate the risk of conflicts of law. In addition, cross-product and cross-currency clearing can give rise to significant legal uncertainties.⁶³

Finally, because central counterparty clearing houses monitor participants' trading books, there is a risk that information will be improperly used. Such an abuse of information might lead to significant social costs. As a result, additional regulation and supervision may be necessary.

In view of the above, there is a strong case for regulatory oversight of derivatives exchanges and clearing houses in order to ensure that financial safeguards reflect the potential for systemic risk. This is particularly true because financial market participants may not be prepared to plan for and address contagion or other cross-border risks without the assistance of a regulatory and legal framework that supports maintaining the integrity of the market and the use of collateral for the purposes posted. First, as demonstrated by certain failures of financial institutions (e.g. Herstatt, Barings plc, etc.), markets do not price very low probability risks of catastrophic events properly. Second, market participants

may not be in a position to assess the increasingly complex clearing house risk management practices. Finally, and perhaps most importantly, market participants cannot and will not take into account the system-wide consequences of a default even if they are fully informed about the relevant risk exposures and linkages. As a result, central banks and financial market regulators should be sure that the legal framework for clearing and settlement both creates the right incentives for clearing providers and members to handle potential problems and supports the liquidity of the markets.

Lastly, however, any risks or challenges associated with consolidation among central counterparties must be evaluated in light of the risks existing in the current clearing environment. While consolidation in central counterparty clearing may present numerous risks and challenges to regulators, it may represent an improvement over, and diminution of the risks inherent in, existing clearing arrangements.

⁶³ *Cross-product clearing gives rise to legal uncertainties relating to the netting of obligations and the disposition in bankruptcy of assets posted as a margin by a market participant. Clearing in multiple currencies gives rise to legal risks relating to netting and the timing of finality of currency exchange transactions.*

6.3 Consequences of the US and EU regulatory schemes for financial services with respect to clearing

Differences in the general approach to financial services regulation in the United States and the European Union bear significantly on the organisation of clearing and on the trends in the development of clearing in the two

jurisdictions. The following table provides a comparative overview of the general approach to financial services regulation and the general structure of the markets in the United States and the European Union.

Table 3

Issue	United States	European Union
Basic approach to regulation	<ul style="list-style-type: none"> • Sectoral approach to financial services regulation. The banking, securities, futures, and insurance sectors are regulated separately. • Universal banking is not permitted. • Each sector uses different regulatory mechanisms. • FLittle attempts have been made to harmonise requirements across sectors. • A sectoral approach minimises the circumstances requiring co-operation between regulators. Each sectoral regulator focuses primarily on its own sector. The Federal Reserve Board exercises a general oversight authority. Cross-sectoral issues relating to clearing and settlement are co-ordinated through the President's Working Group on Financial Markets. 	<ul style="list-style-type: none"> • Functional approach to financial services regulation. Activities and products regulated in a substantially similar way, independently of the sector of the firm engaged in the activity or offering the product. • Universal banking is permitted. • High degree of commonality and harmonisation in regulatory mechanisms across sectors (in particular for capital requirements).
Allocation of regulatory competence	<ul style="list-style-type: none"> • The United States operates a dual banking system. Both federal government and state governments have competence to authorise the operation of a bank. National banks are regulated only at the federal level. State banks are regulated at both the state and the federal level. • Securities underwriting, brokerage and dealing are regulated at both the federal and the state levels. National securities exchanges are authorised at the federal level by the Securities and Exchange Commission. Federal law pre-empt state law in the case of any inconsistency between them. • The CFTC authorises futures brokerage and futures exchanges at the federal level. Federal law on futures pre-empt state law to the extent necessary to assure the proper operation of the futures markets. The CFTC can also prosecute fraud and other misconduct with respect to certain OTC contracts. • Insurance companies are regulated primarily at the state level. 	<ul style="list-style-type: none"> • Each EU Member State may authorise the operation of a bank, subject to minimum EU requirements. It has discretion to determine how to allocate regulatory competence over banks between competent authorities. • Each EU Member State authorises the operation of each investment firm or regulated market, subject to minimum EU requirements. It also allocates regulatory competence on investment firms between competent authorities. • Each EU Member State authorises the operation of an insurance company, subject to minimum EU requirements. Each Member State also allocates the regulatory competence over insurance companies between authorities.

Table 3 (continued)

Issue	United States	European Union
Structural differences	<ul style="list-style-type: none"> • Banking groups generally are generally limited to banks and bank-related subsidiaries. The primary function of banks is deposit-taking and lending. • Securities firms generally are generally restricted to securities brokerage, dealing and underwriting (but may conduct other kinds of business in unregulated affiliates). • Futures brokerage is handled by specialised entities that also may also be licensed to handle securities business. • The Gramm-Leach-Bliley Act (1999) permits the organisation of financial holding companies with ownership interests in banks, securities firms, and insurance companies within the same corporate structure. • Bank management has less influence on the management of non-financial companies relative to the influence exercised by bank management in the European Union. • Corporate control is traded on the market to a greater extent than in the European Union. • There is a high degree of retail participation in US securities markets. • The percentage of issued securities of public companies registered for public trading (the “public float”) is higher than that of EU registered public companies. 	<ul style="list-style-type: none"> • Financial services are offered through complex financial groups composed of banks, securities firms, insurance companies, and non-financial companies. • Investment services can be offered directly by banks. • Futures are regulated within a co-ordinated regime together with securities, each being categorised as financial instruments. • Bank management has a relatively high degree of influence on non-financial company management. • Corporate control is traded off the market in many continental EU jurisdictions • The level of public float is low relative to that of registered companies in the United States
Regulatory mechanisms	<p><i>Regarding banking:</i></p> <ul style="list-style-type: none"> • High degree of commonality in the regulatory mechanisms used by bank supervisors in the United States and Europe. As an exception, the United States has organised an only limited degree of consolidated supervision of banking with other sectors. <p><i>Regarding securities:</i></p> <ul style="list-style-type: none"> • The US securities market is very open and transparent reflecting a consistent approach to capital formation and corporate governance. • The United States does not require futures exchange members who trade only for their own account (other than “floor traders”) to be authorised. (Securities dealers are required to become authorised.) • Regarding exchange-traded derivatives, there is a high degree of commonality in exchange regulation, customer protection and risk management techniques between the United States and Europe. 	<p><i>Regarding banking:</i></p> <ul style="list-style-type: none"> • Europe organises a high degree of consolidated supervision of banking with other sectors. <p><i>Regarding securities:</i></p> <ul style="list-style-type: none"> • The European Union relies to a lesser extent on self-regulation than the United States. • EU jurisdictions generally require authorisation for exchange members trading only for their own account. • There are variations in accounting and disclosure requirements relating to issuers both between EU Member States and relative to those applicable in the United States and other third countries. • There are significant differences in the capital requirements for EU intermediaries compared to the capital requirements imposed in the United States. There are also some variations in securities holding systems and in customer protection mechanisms relating to the holding and use of securities by broker/dealers both between the European Union and the United States and within the European Union.

Table 3 (continued)

Issue	United States	European Union
Securities settlement systems	<ul style="list-style-type: none"> The SEC authorises all securities clearing agencies. The clearing and settlement system is largely centralised under one holding company – the Depository Trust and Clearing Corporation (DTCC). Subsidiaries of this holding company clear all exchange-traded securities (other than exchange-traded options) and a substantial percentage of certain types of OTC securities in the United States. A separate clearing house clears exchange-traded options listed on multiple exchanges. Clearing houses authorised by the CFTC, the SEC or a banking regulator can now clear certain types of OTC transactions. 	<ul style="list-style-type: none"> Authorisation requirements depend on national law. Clearing was historically conducted on a decentralised basis in each individual jurisdiction. However, some cross-border consolidation has occurred and is expected to continue. The European System of Central Banks accesses clearing systems as a user.
Derivatives clearing and settlement	<ul style="list-style-type: none"> The SEC has competence over the clearing of derivatives that are securities (e.g. options on equities). The SEC and the CFTC share competence over the clearing of futures on single stocks. The CFTC regulates futures clearing houses (Commodity Futures Modernization Act of 2000) and aspects of the operation of designated foreign clearing organisations acting with US products and customers. Generally, a separate clearing house clears for each futures exchange. There is currently little legislative or political pressure for a consolidation of derivatives clearing houses. The exchanges and brokers have varying opinions on this issue. There is considerable pressure from brokers to allow cross-product clearing. 	<ul style="list-style-type: none"> Authorisation requirements depend on national law. Some structural consolidation has occurred, both on a domestic and a cross-border basis, with several clearing houses clearing multiple products and serving multiple exchanges.
Laws relating to the posting of collateral	<ul style="list-style-type: none"> Commercial laws relating to the posting of collateral in securities and derivatives transactions have been informally harmonised in the United States through the adoption of the Uniform Commercial Code. Approval of clearing house rules by the competent federal regulators reinforces the laws and procedures relating to the disposition of margin and collateral held by a clearing house. Some issues relating to the notice and other due process requirements that must be observed by a private party when it realises collateral taken in a bilateral, principal-to-principal transaction remain unresolved. 	<ul style="list-style-type: none"> Commercial laws relating to the posting of collateral in securities settlement systems have been minimally harmonised through the adoption and implementation of the Settlement Finality Directive. Commercial laws applicable to the posting of collateral in bilateral, principal-to-principal transactions vary from Member State to Member State. The proposed Directive on collateral, if adopted, would minimally harmonise the laws in the Member States to facilitate the taking of cross-border collateral.

The regulatory structure in the United States has the following consequences with respect to clearing:

- Securities clearing and derivatives clearing are regulated by different federal regulators and take place in separate clearing houses.

- Neither securities broker/dealers nor futures commission merchants can hold both securities and futures in the same account at the same clearing house.
- Cross-product clearing is difficult, impeding a totally efficient use of investors' capital.

- There are legal impediments to a clearing house netting the obligations owing by entities in a company group to the clearing house.

The regulatory structure in the European Union has the following consequences with respect to clearing:

- There is no single Community clearing house regulator, nor is there currently a single passport for clearing houses who wish to provide cross-border clearing services within the EU internal market. Consequently, in many respects, EU clearing houses continue to have to work with multiple regulators and to comply with multiple regulatory schemes to operate on a cross-border basis within the Community.
- Clearing remains largely fragmented along national lines.
- While legal impediments to posting non-domestic collateral in a designated securities settlement system have largely been obviated with the adoption of the Settlement Finality Directive, practical operational impediments continue to hamper the posting of collateral on a cross-border basis. Furthermore, there are numerous legal and operational impediments to the posting of collateral on a cross-border basis in the OTC markets where transactions are not cleared through a designated securities settlement system.
- Cross-product clearing is facilitated.

7 Conclusions

The foregoing review indicates that there are both commonalities and differences in the present situation and in the trends in the evolution of derivatives clearing in the United States and in the European Union.

Clearing houses on both continents are trying to develop a more integrated domestic infrastructure for securities and derivatives.

In the European Union, the fragmentation of derivatives clearing results from the historic market organisation within EU Member States and the continuing development of a less-than-fully integrated infrastructure. This is particularly relevant in the euro area. In this respect, EU clearing houses are pursuing both horizontal and vertical consolidation of the trading, clearing and settlement infrastructures in Europe. However, conflict of interests, co-operation failures and competition between financial centres are hampering the process of integration. A process of convergence and further harmonisation of the requirements for admission to regulated markets, central counterparty clearing houses and settlement systems will be helpful in this regard. Common organisational and functional requirements, including risk management procedures, ensure a level playing field for different systems and facilitate their access to foreign market participants. The European Commission is considering these issues in the proposed amendments of the Investment Services Directive and has dealt with them in its communication on issues concerning clearing and settlement, released in June 2002. This could lead to a new Directive on these subjects. In addition to supporting the work of the European Commission, the Eurosystem is contributing to removing obstacles to integration, acting along two main lines. On the one hand, it acts as a catalyst for improvement by encouraging discussions among the relevant players and, on the other, it is considering how to harmonise its own procedures and operations relating to the operation of the TARGET system and the clearing and settlement of transactions incident to its monetary policy operations. Lastly, the Eurosystem, the European Commission and

EU securities regulators, acting through the Committee of European Securities Regulators (CESR), have instituted a forum to review the standards applicable in the field of clearing and settlement in Europe.

In the United States, the decentralised clearing of futures transactions derives primarily from the business decisions of exchanges and clearing houses to maintain separate operations. In addition, the sectoral regulatory regimes in the United States impede the development of cross-product clearing arrangements.

If current trends in the development of clearing arrangements continue, it is likely that there will be an increasing consolidation of clearing and central counterparty services for derivatives within Europe and that EU clearing houses soon will clear all financial instruments, including both securities and derivatives, within the same clearing house on a cross-border basis. Derivatives clearing houses in the United States will continue to explore operational arrangements to achieve cross-border and cross-product clearing. If these operational arrangements do not prove adequate to meet the demands of market participants, the financial services industry may ultimately request that the United States Congress adopt legislation to facilitate cross-border (i.e. international) and cross-product clearing in the United States.⁶⁴ The trends in Europe also reflect the fact that the adoption of the euro and the general effort to complete the internal market for financial services within the European Union provide a catalyst for innovations in the fields of clearing and settlement that does not exist in the United States. As a consequence, developments in these areas are currently being pursued with more vigour in Europe than in the United States.

As a general proposition, clearing houses in both the United States and the European

⁶⁴ *The development of clearing arrangements for securities futures products may lead to further innovations in clearing in the United States. However, the ultimate effects of these developments are not yet apparent.*

Union are exploring ways to facilitate cross-border clearing at a global level. There is some pressure on clearing houses on both continents to develop ways to collateralise trades and positions at multiple exchanges using the same collateral pool in one jurisdiction. Clearing houses are generally attempting to respond to this pressure by developing operational arrangements between clearing houses. There is also some pressure on clearing houses on both continents to provide arrangements for cross-product clearing to achieve the benefits of netting offsetting positions in correlated products for the purpose of setting margin requirements.

Lastly, trends in the evolution of clearing and settlement will continue to challenge central banks and financial market regulators internationally. Given their mutual interest in the robustness of clearing and settlement arrangements, there may be an increasing need for central banks and financial market regulators to collaborate and co-operate on an international basis to fulfil their respective roles and objectives in the oversight, supervision and regulation of cross-border clearing and settlement systems.

Annex I

The Eurosystem's policy line with regard to consolidation in central counterparty clearing

I Background

Since the introduction of the euro in 1999, there has been growing demand for central counterparty clearing. Several central counterparty clearing houses already exist in the euro area and a number of mergers and alliances are currently under consideration or being implemented. Economies of scale and network externalities seem to favour a high degree of concentration. A group of major global investment banks has therefore expressed support for the idea that Europe should only have one central counterparty clearing house, which would be a multi-currency and multi-product (equities, bonds, derivatives and commodities) service. However, there is no single view, particularly within the euro area, about the infrastructure that should prevail.

The Eurosystem is carefully monitoring and analysing these developments. Indeed, central counterparty clearing could have implications for the smooth execution of monetary policy operations, the smooth operation of payment and settlement systems and the stability of the financial markets in general. The consolidation process adds to the complexity of the issue: on the one hand, consolidation in central counterparty clearing could help to increase efficiency in the clearing and settlement of securities; on the other hand, the potential systemic consequences of a central counterparty's failure increase with its size.

2. Policy concerns

(a) *The need for risk management standards*

In view of its statutory responsibilities with respect to the smooth operation of monetary policy and payment systems and its concerns in the field of financial stability, the Eurosystem has an interest in the functioning of central counterparties that clear substantial amounts of euro-denominated assets.

It is essential that standards for risk management be established for central counterparties. This work will be conducted in co-operation with the other relevant authorities (and, in particular, with the newly created Committee of European Securities Regulators). The process of setting standards has already started, with initiatives driven by market participants or pursued within the framework of international co-operation between regulatory bodies. The European Association of Central Counterparty Clearing Houses (EACH), for instance, has developed standards for central counterparties, which should now be assessed by the Eurosystem.

(b) *The need for a "domestic" infrastructure located in the euro area*

Currency areas have traditionally developed their own domestic infrastructures for payment systems, securities settlement systems, stock exchanges, etc. In this regard, it is important to distinguish clearly between "domestic" systems, on the one hand, and "international" (or "global") systems, on the other. A "domestic" system is a system which handles mainly or exclusively assets denominated in one currency. An "international" system is a system which handles several currencies at the same time.

Defining a domestic system on the basis of currency enables public authorities (and the Eurosystem in particular) better to address their regulatory/oversight concerns. In practice, the logical geographical scope of a market infrastructure is the currency area, as witnessed by the ongoing consolidation of stock exchanges, payment systems and securities settlement systems in the euro area. Indeed, payment, clearing and settlement systems may trigger liquidity problems, which

can only be addressed by competent local authorities, in particular central banks. This is the case today in the United States and Japan. Now that the need for securities clearing is growing rapidly in the euro area, it would appear that a coherent domestic infrastructure for the euro will have to develop.

Such an infrastructure should logically be located in the euro area, as is the case with core infrastructures in other monetary areas. This would be preferable from a regulatory perspective and would help the Eurosystem, as the “central bank” of the euro, to ensure the smooth functioning of payment systems, efficient monetary policy implementation and financial stability. Existing agreements among central banks give a prominent role to “domestic” authorities, as do international agreements among central banks and, possibly, with securities regulators. The existence of such agreements would make it easier to achieve effective oversight of central counterparties established in the euro area. Furthermore, the location of central counterparties in the euro area would facilitate the provision, when deemed necessary and appropriate, of central bank money in euro.

(c) *Neutrality: market forces, co-operation and public policy decisions*

There are various forms of integration in central counterparty clearing, such as interoperability, alliances, joint ventures and mergers. All of these approaches have in common that they could help to improve market efficiency. Market participants need to look for solutions that are optimal in the long run, i.e. capable of maximising economies of scale and minimising the average transaction costs for the final users. However, it is acknowledged that interim solutions could be necessary in practice. The Eurosystem intends, at this stage, to remain neutral on the path that will eventually be taken towards improved efficiency and the optimal solution.

The three main driving forces pushing market participants to adopt efficient solutions in the

field of central counterparty clearing are competitive pressures, co-operation between market participants and, when needed, policy decisions. The Eurosystem shares the view of the “Committee of Wise Men” that the process of consolidation should, in general, be driven by the private sector, which does not mean, however, that there are no public policy issues involved. Public authorities should help by removing unfair and unjustified barriers to integration and competition, such as legal impediments and a lack of standardisation.

(d) *Defining efficient market structures*

The issue of efficient market structures is closely related to the question of whether or not central counterparty clearing is a natural monopoly. It is clear that, in the short term, a single infrastructure would maximise network externalities and economies of scale. However, these short-term advantages have to be balanced against the inefficiencies that may be caused, in the long run, by the absence of competition (e.g. a lack of dynamism and innovation). At a time when former natural monopolies, in the fields of telecommunications, energy and transportation for instance, are progressively being dismantled, the emergence of new monopolies in the financial sector might be questionable.

Vertically integrated structures where trading, clearing and settlement are made available to the customer as a package enable local markets to be more efficient by providing better and lower-priced services. However, they may also present some drawbacks in terms of lack of competition. The disadvantages can be overcome provided that customers can choose between systems along the “value chain” (i.e. trading, clearing and settlement). It is therefore crucial that access to essential facilities, whether vertically integrated or not, should not be unfairly impeded. In the case of common ownership of trading platforms, the central counterparty clearing house and settlement systems, for example, access to post-trading facilities should not be made conditional upon the execution of trades on the affiliated trading

platform. The Eurosystem is aware that full inter-connectivity of trading, clearing and settlement systems may not be easy to achieve because it may present operational difficulties and have the potential for systemic risks. It should be noted that no central counterparty clearing house or settlement system can be compelled to establish links if this is not commercially viable or compromises the sound prudential operation of the system. However, the reasons for failing to make links available should not be so open-ended as to allow abuse. Finally, open access to essential facilities must ensure a level playing field for service providers. In particular, legal difficulties, preferential taxation rules and lack of standardisation must not lead to unfair competition.

(e) *Co-operation at a global level*

The existence of domestic infrastructures does not prevent the emergence of international infrastructures. The international infrastructures are superimposed on domestic ones, however, and are not designed to replace them.

The Eurosystem supports co-operation in central counterparty clearing at a global level. Key concepts in this respect are legal feasibility and interoperability. Interoperability means agreeing upon common processes, methods, protocols and networks to enable co-operation between central counterparties at a technical level. This would allow central counterparty clearing houses worldwide to develop links between them so that agreements on cross-collateralisation and cross-margining could be reached. This may or may not lead to the creation of international or global clearing houses.

Furthermore, when global multi-currency systems handling euro are up and running, the Eurosystem should be involved in their oversight, given its interest – as the euro's

central bank of issue – in the smooth functioning of such systems.

In the light of the analysis above, the Governing Council of the European Central Bank has come to the following conclusions:

- a) Owing to the potential systemic importance of securities clearing and settlement systems, the Eurosystem has an interest in central counterparty clearing and considers that it is essential to establish, in co-operation with the other relevant authorities, effective risk management standards.
- b) The natural geographical scope for any “domestic” market infrastructure (including central counterparty clearing) for securities and derivatives denominated in euro is the euro area. Given the potential systemic importance of securities clearing and settlement systems, this infrastructure should be located within the euro area.
- c) The process of consolidation of central counterparty clearing infrastructure should be driven by the private sector, unless there are clear signs of market failures.
- d) Whatever the final architecture, it is essential that access to facilities for trading, clearing and settlement should not be unfairly impeded. This policy of open and fair access should ensure the safety, legal soundness and efficiency of securities clearing and settlement systems, guarantee a level playing field, and avoid excessive fragmentation of market liquidity.
- e) The Eurosystem supports co-operation between providers of central counterparty clearing services at a global level and should be involved in monitoring global multi-currency systems handling euro as part of its interest in ensuring their smooth operation.

Annex 2

Table 4
List of US derivatives clearing houses

Clearing house	Exchanges cleared
New York Clearing Corporation	Cantor Financial Futures Exchange New York Board of Trade
Board of Trade Clearing Corp.	Chicago Board of Trade MidAmerica Exchange Merchant's Exchange of St. Louis
BrokerTec Clearing Company, LLC	BrokerTec Futures Exchange
Chicago Mercantile Exchange (Clearing Division)	Chicago Mercantile Exchange
EnergyClear Corporation	EnergyClear is a derivatives clearing corporation not affiliated with a trade execution facility that provides clearing and settlement services for OTC energy derivatives contracts concluded between eligible commercial entities on a principal-to-principal basis.
FutureCom	FutureCom
Intermarket Clearing Corporation (a subsidiary of Options Clearing Corporation)	Amex Commodities Corporation Philadelphia Board of Trade
Kansas City Board of Trade Clearing Corp.	Kansas City Board of Trade
Minneapolis Grain Exchange	Minneapolis Grain Exchange
New York Mercantile Exchange	New York Mercantile Exchange
OnExchange Clearing Corporation	OnExchange Board of Trade
Options Clearing Corporation	American Stock Exchange (options) Chicago Board Options Exchange (options) International Securities Exchange (options) Pacific Exchange (options)

Annex 3

Table 5
List of EU derivatives clearing houses

Clearing house	Exchanges cleared
Athens Derivatives Clearing House (ADECH)	Athens Derivatives Exchange (ADEX)
Bolsa de Derivados do Porto	Bolsa de Derivados do Porto
Clearnet SA	Euronext Paris SA Euronext Brussels Euronext Amsterdam [Euroclear (international central securities depository)]
Cassa di compensazione e garanzia	MIF-MTO (Italian government bond derivatives market) IDEM (Italian stock derivatives market).
Eurex Clearing AG	Eurex Deutschland Eurex Zurich Helsinki Exchange (specified contracts)
FUTOP	Copenhagen Stock Exchange (CSE) (equities and derivatives)
HEX Helsinki Exchanges	HEX Helsinki Exchanges (equities and derivatives)
London Clearing House	London Stock Exchange Virt-x LIFFE London Metal Exchange International Petroleum Exchange Intercontinental Exchange (certain contracts) RepoClear (OTC repurchase agreements) SwapClear (OTC swap agreements)
MEFF RF and MEFF RV	MEFF RF and MEFF RV
OM Stockholmsbörsen AB	OM Stockholmsbörsen and Oslo Børs (equities and derivatives) Fixed income derivatives traded OTC, but reported to the PMX exchange (a subsidiary of OM) Other OTC derivatives
Wiener Börse AG	Wiener Börse AG

Annex 4

Table 6
General background information – EU clearing houses

Clearing house	Clearnet	Eurex Clearing AG	London Clearing House
Legal form and ownership	<p>Clearnet is a credit institution (limited-purpose bank) under French law.</p> <p>Clearnet is a subsidiary of Euronext Paris, thus belonging to the Euronext Group with Euroclear holding a 20% stake in Clearnet.</p>	<p>Eurex Clearing AG is a wholly owned subsidiary of Eurex Frankfurt AG, founded under German law in June 1998. Eurex Clearing AG is owned at 50% by the groupe of Deutsche Börse¹. AG and 50% by the Swiss Stock Exchange.</p>	<p>London Clearing House (LCH) is a public limited company (plc). Since October 1996, it has been owned by its members (75% of the share capital), the London International Financial Futures and Options (LIFFE), the London Metal Exchange (LME) and the International Petroleum Exchange (IPE) (25% of the share capital), and is run on a non-profit basis.</p>
Scope of the business	<p>Central counterparty for the three Euronext markets (Euronext Paris SA, Euronext Brussels, Euronext Amsterdam). Until the implementation of the single common platform (Clearing 21), all branches will operate their own systems.</p> <p>Services for stock exchange transactions, financial and exchange-traded commodity futures and options, equity and index options and OTC securities trades.</p>	<p>Clearing house for the Eurex exchanges in Frankfurt and Zürich which operate according to the same rules.</p> <p>It clears futures, options, and options on futures (pre-paid and deferred style) on financial instruments, like interest, bonds, indexes and stocks. It also clears repurchase agreements and cash bonds of its own ECN markets and will implement clearing on cash equities (Euro nominated, collective safe custody German shares, executed on Xetra and Frankfurt Stock Exchange) by 1 quarter 2003. It has plans to extend its services to other securities and OTC markets during 2003 and 2004. Eurex Clearing AG also operates as a clearing house facilitator for the European Energy Exchange.</p>	<p>LCH clears all trades executed on LIFFE, LME and IPE. LCH also acts as central counterparty for trades executed through the London Stock Exchange's SETS system.</p> <p>LCH has added a service for Pfandbriefe repurchase agreements and cash bonds to its RepoClear system, in addition to Belgian, Dutch and German government repurchase agreements and cash bonds. LCH also offers services for standard ("vanilla") interest rate swaps (Swapclear).</p>
Settlement procedures	<p>Cash deposits and margin calls of clearing members are settled in the three RTGS systems (ELLIPS, TBF and TOP). OTC positions in repurchase agreements and securities transactions traded on Euronext regulated markets are settled through the securities settlement systems of the three countries. Euro transactions are settled in central bank money. Non-euro transactions may be settled in commercial bank money.</p>	<p>Eurex uses central bank money and securities as collateral for the settlement of margins. Clearing members need a securities account and a pledged securities account with Clearstream Banking and/or Segal-InterSettle and an account with the central banks in Germany and/or Switzerland. Eurex Clearing may allow the use of a correspondent bank recognised by Eurex Clearing for cash clearing with Eurex Clearing. There are plans to implement in 2003 collateral holdings at CrestCo and to implement GBP as clearing currency.</p> <p>The settlement of cash underlying products is done as DvP/RvP. Today, members have the choice of using the following SSSs:</p> <p>For exercised/assigned/delivered derivatives CBF/Deutsche Bundesbank or Segal/InterSettle/SNB.</p> <p>For repurchase agreements and cash bonds CBF/Deutsche Bundesbank, CBL or Euroclear.</p> <p>Cash equities will be settled CBF/Deutsche Bundesbank as of its launch date in 2003.</p>	<p>Margin payments are made via LCH's Protected Payment System (PPS). Each clearing member has an account with at least one participating bank and LCH with all participating banks. After confirmation of the margin payment on the member's behalf to LCH, a bank is irrevocably committed to do so. Payments made by transfers between the accounts of clearing members and LCH at each participating bank.</p>

¹ The ownership structure of the Deutsche Börse AG, which was previously concentrated in the German banking industry, changed after the completion of the exchange's initial public offering in February 2001.

Annex 5

Table 7
Risk management – EU clearing houses

Clearing house	Clearnet	Eurex Clearing AG	London Clearing House
Membership requirements	<p>Credit institutions, investment firms and entities whose single purpose is to provide clearing services for financial instruments and who fall within the scope of the prudential supervision of the Commission Bancaire can be admitted as members. Additional criteria (such as minimum capital requirements) also have to be fulfilled.</p> <p>Former clearing members of the Brussels and Amsterdam Exchanges became remote clearing members of Clearnet. By 31 December 2002, Belgian and Dutch clearing members not fulfilling Clearnet's financial criteria have to submit and implement a plan indicating how they intend to comply with them. Fulfilment of financial and operational access criteria is checked for new applicants, and monitored on an ongoing basis.</p>	<p>Eurex has a flexible licence approach and imposes a number of access requirements on its members:</p> <p>Basic Requirements</p> <p>(i) Requirements regarding the legal status of clearing members (members must be licensed by their national supervisory authorities for deposit-taking business, lending operations and commission business);</p> <p>(ii) operational reliability;</p> <p>Capital Requirements</p> <p>Derivatives Clearing: minimum equity capital requirements EUR 12.5 million for direct clearing members and EUR 125 million for general clearing members.</p> <p>Bonds and repurchase agreement clearing: minimum equity capital requirements EUR 17.5 million for direct clearing members and EUR 175 million for general clearing members</p> <p>Equity clearing: minimum equity capital requirements EUR 2.5 million for direct clearing members and EUR 25 million for general clearing members (this equity capital must be on the top of any capital if one of the previously mentioned clearing licences exist)</p>	<p>Users of exchanges and markets served by LCH must either be members of LCH or have a direct or indirect clearing relationship with a member of LCH. LCH sets minimum capital requirements for clearing members. These members also have to satisfy LCH regarding their ability to meet day-to-day operational requirements, including the adequacy of their back-office and banking arrangements. Trading levels and patterns are monitored throughout the day. Thus, LCH imposes a minimum standard of creditworthiness on firms to which it may be exposed.</p>
Collateralisation of exposures	<p>“Defaulter pays” approach where margins are the first level of financial resources. There are two types of margin requirements:</p> <p>(i) initial margin deposits (to cover the upcoming risk on the open positions registered with the clearing house); and</p> <p>(ii) variation margin or margin calls to cover the price difference between the original price of the registered position and the marked-to-market price.</p> <p>Valuation of exposures and margin calls at least daily. Additional deposits required for positions bearing risks that are insufficiently covered by existing deposits. Intraday price variation limits apply to futures and options. If a limit is breached, an intraday margin call is made.</p>	<p>The margin required from each member is recalculated daily on the basis of the total risk exposure of the member's entire account. Further on Eurex calculates intra-day margin at the same basis.</p> <p>Eurex may demand at any time that a clearing member maintain a higher or supplementary margin in cash or in securities or book-entry securities acceptable to Eurex on the basis of the risk assessment it makes. Supplementary margin in the appropriate currency must be transferred immediately to the relevant central or correspondent bank account, or to the pledged securities account with Clearstream or SIS (the Swiss CSD).</p>	<p>LCH accepts cash or high-quality bonds as margin to cover the value of amounts owed to LCH. It calculates initial margin on all open positions, but also collects variation margin to re-establish this protection at close of business and, if necessary in fast-moving markets, makes intraday calls for more margin. Variation margin must be provided in cash for most contracts, while initial margin may be provided in cash or acceptable non-cash collateral. It restricts the types and amounts of collateral that it will accept as initial margin, mainly to government bonds, cash and bank guarantees.</p>

Table 7 (continued)

Clearing house	Clearnet	Eurex Clearing AG	London Clearing House
Additional resources	<p>Following the implementation of Clearing 21, Clearnet plans to establish a single clearing fund for all clearing members, which will total at least EUR 220 million. A separate clearing fund will be created for the OTC markets.</p> <p>Beside margins and funds, Clearnet relies on its insurance arrangements and its own capital. Clearnet's net equity capital of EUR 130 million is supplemented by insurance covering potential losses of up to EUR 150 million and by an unconditional "parental" guarantee from Euronext Paris.</p>	<p>In addition to margin, clearing members have to contribute to a clearing fund, the amount of which is determined by Eurex Clearing AG for each clearing member. This contribution can be provided in the form of bank guarantees and/or cash or securities collateral. Eurex Clearing AG may use funds from its annual surplus to set aside reserves for the clearing fund to contribute to the fulfilment of the obligations of any clearing member that may default on its obligations. If the clearing fund should be used to cover a default the clearing member will have to make a contribution to the clearing fund within 10 days to re-establish the fund's original amount exchange days.</p>	<p>In the event of a default by a clearing member causing LCH to incur a loss greater than the defaulter's margin, LCH has the following financial resources at its disposal:</p> <ul style="list-style-type: none"> (i) a cash-based default fund, to which all members of LCH contribute (totalling over GBP 330 million as at April 2002); (ii) up to GBP 10 million of LCH's profits in the current year; (iii) GBP 100 million of insurance cover, in the event of losses of GBP 150 million or more; and (iv) own funds of over GBP 50 million.

Annex 6

Table 8
General background information – US clearing houses*

Clearing house	Chicago Mercantile Exchange	Board of Trade Clearing Corporation	New York Mercantile Exchange
Legal form and ownership	On 13 November 2000, Chicago Mercantile Exchange Inc. (CME) de-mutualised and transformed itself from a non-profit, membership-owned organisation to a profit-oriented, shareholder-owned, public corporation established in Delaware. As part of its de-mutualisation, the CME issued Class A and B common shares to its former members. On 3 December 2001, the CME was reorganised into a holding company and the exchange became a wholly owned subsidiary of Chicago Mercantile Exchange Holdings Inc. (CME Holdings) through a merger of CME into a subsidiary of CME Holdings. Shareholders in CME automatically became shareholders in CME Holdings. The clearing house operates as a division of the exchange.	The Board of Trade Clearing Corporation (BOTCC) is a business corporation established in Delaware and owned by clearing member firms that trade on the Chicago Board of Trade (CBOT) and the MidAmerica Commodity Exchange.	The New York Mercantile Exchange (NYMEX) is a business corporation owned by its members. The clearing house operates as a division of the exchange.
Scope of the business	The CME offers futures and options on futures in four product areas: interest rates, stock indices, foreign exchange and physical commodities. The CME clearing house division acts as central counterparty for all futures and options transactions traded at the exchange.	BOTCC acts as central counterparty for all transactions traded at the CBOT, the MidAmerica Commodity Exchange and the Merchant's Exchange of St. Louis. The CBOT and its affiliated MidAmerica Exchange offer agricultural, financial, stock index and metals products. The Merchant's Exchange of St. Louis primarily offers futures on freight rates.	The NYMEX conducts trading through two divisions, the NYMEX Division and the COMEX Division. Generally, futures and options on futures on energy products are traded through the NYMEX Division, while futures and options on futures on gold, silver, copper and the FTSE Eurotop 100 index are traded through the COMEX Division.

* The clearing houses covered by these tables were selected at random as representative of clearing houses operated in the United States. Other US clearing houses share attributes similar to the clearing houses covered. Reference should be made to the internal rules and bylaws of each individual exchange for a complete exposition of the matters summarised in these tables. The information included in these tables was extracted from information included on the internet websites of each respective clearing house: <http://www.cme.com/>; <http://www.botcc.com/>; and <http://www.nymex.com/>.

Table 8 (continued)

Clearing house	Chicago Mercantile Exchange	Board of Trade Clearing Corporation	New York Mercantile Exchange
Settlement procedures	<p>Currency and US government securities posted with the clearing house are settled by deposits and credits to CME's accounts at one of several commercial settlement banks. The settlement banks settle cash transfers in central bank money through the Federal Reserve System's Fedwire system. Transactions in US government securities are also settled through the Fedwire system. Equity securities posted as a security deposit or initial margin are settled by credit to a CME account at Deposit Trust Corporation (DTC), the CSD for equities in the United States, or to a CME account at a securities broker/dealer. [CME accepts foreign currency through accounts at non-domestic commercial banks that may be converted into US dollars to be posted as margin or that may be used to effect delivery of a foreign currency under a futures contract traded on the exchange.] Margin posted in connection with MEF contracts cleared through the clearing house may also be deposited in a CME account at a commercial bank in London or Spain.</p>	<p>Currency and US government securities posted with the clearing house are settled by deposits and credits to BOTCC's accounts at one of several commercial settlement banks. The settlement banks settle cash transfers in central bank money through the Fedwire system. Transactions in US government securities are also settled through the Fedwire system. Equity securities posted as a security deposit or initial margin are settled by credit to a BOTCC account at DTC or to a BOTCC account at a securities broker/dealer. Non-domestic, G-7 government bonds posted as a security deposit or initial margin are settled by credit to a BOTCC account at a commercial bank in London. BOTCC's London commercial bank maintains an account in its name at Euroclear through which it holds those securities for the benefit of BOTCC.</p>	<p>Currency and US government securities posted with the clearing house are settled by deposits and credits to NYMEX's accounts at one of several commercial settlement banks. The settlement banks settle cash transfers in central bank money through the Fedwire system. Transactions in US government securities are also settled through the Fedwire system. Equity securities posted as a security deposit or initial margin are settled by credit to a NYMEX account at DTC or to a NYMEX account at a securities broker/dealer.</p>

Annex 7

Table 9
Risk management – US clearing houses

Clearing house	Chicago Mercantile Exchange	Chicago Board of Trade	New York Mercantile Exchange
Membership requirements	<p>CME clearing members must meet fiscal and moral integrity requirements, as well as demonstrate sufficient financial capitalisation to justify the risks assumed in clearing their trades. Clearing members may be corporations, limited liability companies, partnerships (including limited partnerships and general partnerships) or co-operative associations.</p> <p>Clearing members must maintain adjusted net capital in excess of the greatest of:</p> <ul style="list-style-type: none"> • USD 2 million; or • 8% of domestic and foreign domiciled customer and 4% of non-customer (excluding proprietary) risk maintenance performance bond requirements for all domestic and foreign futures and options on futures contracts, excluding the risk margin associated with naked long option positions; or • CFTC minimum regulatory capital requirements; or • SEC minimum regulatory capital requirements. 	<p>BOTCC's Risk Committee oversees applications for membership. The Risk Committee has approved objective membership admission standards addressing each applicant's creditworthiness, operational capacity, experience and competence. Applicants must meet the BOTCC's minimum capital requirements, have appropriate back-office arrangements, provide specified parent guarantees, purchase the prescribed number of shares of stock in the BOTCC and meet any other requirements imposed by the BOTCC. After being admitted to the BOTCC, clearing members must continue to meet and comply with the ongoing qualifications for membership.</p> <p>Capital requirements for clearing members are established by the Risk Committee, based on the type of entity, the nature of the entity's business and the entity's trading volume. Thus, a clearing member's capital requirements may vary over time based upon a clearing member's business activity. Generally, BOTCC's ongoing capital requirements for registered entities track those imposed by the CFTC and/or SEC.</p>	<p>Clearing members must have a minimum working capital of USD 2 million, calculated in accordance with generally accepted accounting principles or, if it is a CFTC-registered clearing member, in accordance with CFTC regulations, and must maintain an account with a bank in the City of New York which meets exchange capital and rating requirements. In addition, the clearing member, like all member firms, must own and hold two seats on the exchange.</p> <p>Clearing members must also make a deposit of an amount that reflects the firm's capital (and the size of trades they can guarantee) to the guarantee fund of the clearing house. On the NYMEX Division, the minimum deposit is USD 100,000 in cash or US Treasury bills with a face value of USD 120,000. The maximum deposit is USD 2 million. The capital-based floating scale for guaranty fund deposits of NYMEX Division clearing members is posted on the NYMEX' website. COMEX Division clearing members must deposit the equivalent of 10% of the firm's capital, up to USD 2 million.</p> <p>The clearing house also imposes capital-based position limits on its members.</p>
Collateralisation of exposures	<p>Clearing members post initial margin and variation margin on behalf of themselves and their customers. Variation margin calls are made several times a day. The clearing house may use any other assets of a defaulting clearing member available to the clearing house, such as the proceeds of the sale of any membership or any shares owned in the exchange assigned to the exchange for clearing qualification, to defray obligations vis-à-vis the clearing house.</p> <p>Customer funds are segregated pursuant to CFTC requirements.</p>	<p>Clearing members post initial margin and variation margin on behalf of themselves and their customers. Variation margin calls are made several times a day. The clearing house may use any other assets of a defaulting clearing member available to the clearing house, such as the proceeds of the sale of any membership or any shares owned in the exchange assigned to the exchange for clearing qualification, to defray obligations vis-à-vis the clearing house.</p> <p>Customer funds are segregated pursuant to CFTC requirements.</p>	<p>Clearing members post initial margin and variation margin on behalf of themselves and their customers. Variation margin calls are made several times a day. The clearing house may use any other assets of a defaulting clearing member available to the clearing house to defray obligations vis-à-vis the clearing house.</p> <p>Positions taken in excess of capital-based position limits must be super-collateralised at the clearing house through the deposit of additional margin.</p> <p>Customer funds are segregated pursuant to CFTC requirements.</p>

Table 9 (continued)

Clearing house	Chicago Mercantile Exchange	Chicago Board of Trade	New York Mercantile Exchange
Additional resources	<p>If those amounts are insufficient to discharge the defaulting member's obligations vis-à-vis the clearing house, the obligations are discharged by use of funds from the following sources (listed in the order of priority):</p> <ul style="list-style-type: none"> (i) surplus funds of the exchange; (ii) the security deposits posted by other clearing members pro rata in proportion to their aggregate security deposits; and (iii) proceeds from any default insurance maintained by the exchange. <p>Any remaining balance is assessed against all clearing members pro rata in proportion to their aggregate security deposits up to the limits of their liability as set out in the exchange rules.</p> <p>The clearing house also maintains a standby credit facility to address liquidity needs.</p>	<p>The clearing house has discretion to use one or more of the following resources to satisfy the BOTCC's obligations arising from a clearing member's default:</p> <ul style="list-style-type: none"> (i) committed standby credit facilities from a consortium of banks; (ii) default insurance; and (iii) the capital of the clearing house. <p>The clearing house also maintains a trust fund for the benefit of customers of its clearing members. The trustees of this fund have the sole discretion to utilise these funds for the purpose of reimbursing the customers of a failed clearing member.</p>	<p>If those amounts are insufficient to discharge the defaulting member's obligations vis-à-vis the clearing house, the obligations are discharged by use of:</p> <ul style="list-style-type: none"> (i) the exchange's surplus, as determined by the Board of Directors; (ii) the guarantee fund; and (iii) funds based on a prorated assessment of other clearing members, according to trading participation.

Glossary

Cash clearing: a method for clearing futures contracts in which positions are periodically marked to market and the resulting obligations are satisfied by cash payments, known as variation margin. See non-cash clearing and variation margin.

Central counterparty: an entity that is the buyer to every seller and seller to every buyer of a specified set of contracts, e.g. those executed on a particular exchange or exchanges.

Clearing link: an arrangement in which the same contract is traded on exchanges affiliated with two clearing houses, but all positions are transferred daily to a single clearing house where they are carried until expiration or offsetting. See mutual offsetting system.

Clearing house: a department of an exchange or a separate legal entity that provides a range of services related to the clearance and settlement of trades on the exchange and the management of risks associated with the resulting contracts. A clearing house is often central counterparty to all trades on the exchange, i.e. the buyer to every seller and the seller to every buyer.

Clearing member: a member of a clearing house. All trades must be settled through a clearing member. A direct clearing member is able to settle only its own obligations. A general clearing member is able to settle its own obligations as well as those of clients. Variations of these two types of clearing member may also exist.

Client: a party that is not a member of the clearing house and must settle through a clearing member. Also known as customer.

Close-out: the process of offsetting existing contracts. Close-out may be used by the clearing house to prevent further losses from positions carried by an entity that has defaulted.

Credit risk: the risk that a counterparty (such as a clearing member) will not settle an obligation for full value, either when due or at any time thereafter. Credit risk includes replacement cost risk and principal risk.

Custody risk: the risk of a loss of securities held in custody occasioned by the insolvency, negligence or fraudulent action of the custodian or of a sub-custodian.

Default: failure to satisfy an obligation on time. More generally, a clearing house may declare a member in default in a variety of circumstances, including a failure to satisfy obligations on time, insolvency, suspension of trading privileges on an exchange for which the clearing house provides services, or other events that the clearing house deems to have had a material adverse effect on the member's capacity to meet its obligations.

Delivery versus payment: a link between a securities transfer system and a funds transfer system that ensures that delivery occurs if, and only if, payment occurs.

Derivative: an instrument whose value is determined by the value of an underlying asset.

Exchange member: a member of an exchange with certain trading privileges. An exchange member may not necessarily be a member of the exchange's clearing house.

Final: irrevocable and unconditional.

Forward contract: a contract that obligates one party to buy, and the other to sell, an underlying asset at a specific price and date in the future.

Futures contract: a standardised forward contract traded on an exchange.

Haircut: the difference between the market value of a security and its collateral value. The haircut is intended to protect a lender of funds or securities from losses owing to declines in collateral values.

Initial margin: cash or collateral that is deposited with the clearing house to ensure performance on obligations vis-à-vis it. Also known as performance bond and original margin.

Legal risk: the risk of loss because of the unexpected application of a law or regulation or because a contract cannot be enforced.

Liquidity risk: the risk that a counterparty (such as a clearing member) will not settle an obligation for full value when due. Liquidity risk does not imply that a clearing member is insolvent since it may be able to settle its obligations at some unspecified time thereafter.

Margin: see initial margin and variation margin.

Market risk: the risk of losses in on and off-balance-sheet positions arising from movements in market prices.

Mutual offsetting system: a link between clearing houses in which positions entered into on one exchange can be, but need not be, transferred to the clearing house of another exchange, and vice versa. See clearing link.

Omnibus account: a single account for the commingled funds or positions of multiple parties. A clearing member will often maintain an omnibus account at the clearing house for all of its clients. In this case, the clearing member is responsible for maintaining account records for individual clients.

Operational risk: the risk of human error or a breakdown of some component of the hardware, software or communications systems that is critical to settlement.

Options contract: a contract that gives the buyer the right, but not the obligation, to either buy or sell an underlying asset, depending on the type of option, by a certain date for a certain price. For this right, the buyer pays the seller a “premium”.

Over the counter (OTC): a method of trading that does not involve an exchange. In OTC markets, participants trade directly with each other, typically through telephone or computer links.

Position limit: a restriction on the number of contracts or share of a contract’s open interest that a single entity may hold.

Principal risk (or delivery risk): the risk that the seller of a security delivers a security, but does not receive payment, or that the buyer of a security makes payment, but does not receive delivery. In this event, the full principal value of the securities or funds transferred is at risk. See also credit risk.

Real-time gross settlement (RTGS): the continuous settlement of funds or securities transfers individually on an order-by-order basis.

Replacement cost risk: the risk that a counterparty to an outstanding transaction for completion on a future date will fail to perform on the settlement date. The resulting exposure is the cost of replacing, at current market prices, the original transaction. See credit risk.

Segregation: a method of protecting client assets and positions by holding or accounting for them separately from those of the carrying firm or broker.

Settlement bank: either a central bank or a private bank used to effect money settlements.

Substitution: the substitution of one party for another in respect of an obligation. In the context of a futures or options clearing house, the term usually refers to the interposition of the clearing house as buyer to the seller of a contract and as seller to the buyer.

Systemic risk: the risk that the failure of one participant in a payment or settlement system, or in financial markets generally, to meet its required obligations when due will cause other participants or financial institutions to be unable to meet their obligations (including settlement obligations in a transfer system) when due. Such a failure may cause significant liquidity or credit problems and might, as a result, threaten the stability of financial markets.

Trade matching: the process of matching trade details (such as the number of contracts, the contract month and price) submitted by the trade counterparties. The clearing house often guarantees a trade at the time it is successfully matched.

Trade registration: the process by which matched trades are formally recorded in the books of the clearing house. For clearing houses that act as central counterparties, registration may also be the time at which the clearing house substitutes itself as counterparty to the clearing members.

Unwinding (or settlement unwind): a procedure followed in certain payment and settlement systems in which transfers of securities or funds are settled on a net basis, at the end of the processing cycle, with all transfers remaining provisional until all participants have discharged their settlement obligations. If a participant fails to settle, some or all of the provisional transfers involving that participant are deleted from the system and the settlement obligations from the remaining transfers are then recalculated.

Value at risk: an estimate of the upper bound on losses an institution would expect to incur during a given period (e.g. one day) for a given confidence level (e.g. 95%).

Variation margin: funds that are paid to (or received from) a counterparty (clearing house or clearing member) to settle any losses (gains) that are implied by marking open positions to market. In some markets, the term is also used to describe the transfer of collateral to (from) a counterparty to cover an initial margin deficit (surplus) in a non-cash clearing or options-style margining system.

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