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**RISK MANAGEMENT IN  
US DERIVATIVE CLEARING HOUSES**

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## I. INTRODUCTION

Concerns about risk management techniques in the clearing and settlement of exchange-traded derivatives have increased in recent years for a number of reasons. First, the Barings disaster has exposed the potential for contagious disturbances affecting derivatives exchanges and clearing houses. Second, the extraordinary expansion of derivatives markets world-wide over the past decade and a half has underlined the increasing systemic sensitivity of clearing and settlement procedures in this area. And, finally, regulatory authorities have been giving more attention of late to payments, clearing and settlement systems in their efforts to strengthen the international financial infrastructure and thereby reduce the financial sector's vulnerability to external shocks.

The concern with prudential safeguards in derivatives clearing houses has been reflected in a number of international initiatives. The Windsor Declaration of May 1995, signed by regulatory authorities from 16 countries responsible for supervising the world's leading futures exchanges, proclaimed the need for international co-operative work<sup>1</sup> which has since been carried forward under the auspices of the International Organisation of Securities Commissions (IOSCO)<sup>2</sup>. In June 1995 the Global Task Force on Financial Integrity established by the Futures Industry Association published 60 good practice recommendations aimed at (1) exchanges and clearing houses, (2) brokers and intermediaries and (3) customers<sup>3</sup>. And in May 1997 the Committee on Payment and Settlement Systems of the central banks of the Group of Ten Countries published an analysis (the "Parkinson Report") of the risks incurred by derivatives clearing houses and the techniques used to contain them<sup>4</sup>.

This article examines the risk management practices of three of the world's leading derivatives clearing houses: the Clearing Division of the US Chicago Mercantile Exchange (CME), the US Board of Trade Clearing Corporation

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<sup>1</sup> See joint press release by the UK Securities and Investment Board (SIB) and the US Commodity Futures Trading Commission (CFTC): "SIB and CFTC Chairmen welcome Windsor Declaration", May 17, 1995.

<sup>2</sup> See, for instance, Report on Co-operation between Market Authorities, IOSCO, March, 1996; Report on Default Procedures, IOSCO, March, 1996; and Report of the Technical Committee on Client Asset Protection, IOSCO, August 1996.

<sup>3</sup> Financial Integrity Recommendations for Futures and Options Markets and Market Participants, Futures Industry Association (FIA), Washington DC, June 1995.

<sup>4</sup> Clearing Arrangements for Exchange-Traded Derivatives, Report prepared by the Committee on Payment and Settlement Systems of the central banks of the Group of Ten countries, Basle, March 1997.

(BOTCC), which is a subsidiary of the Chicago Board of Trade (CBOT), and the US Options Clearing Corporation (OCC).

The first section outlines the functions of derivatives clearing houses, the different types of risk they face and the safeguards they adopt to contain these risks. The second section describes the institutional structure of the CME Clearing Division, the BOTCC and the OCC and the regulatory framework governing their operations. The third section considers membership criteria, capital adequacy requirements and other safeguards designed to ensure the financial integrity of clearing house members. The fourth section examines the collateralisation or margining regime that underpins all derivatives clearing arrangements. The fifth section deals with default procedures and financial back-up arrangements that come into play when default by a clearing house member has occurred. The final section provides a conclusion.

## **II. RISKS AND RISK CONTROLS IN DERIVATIVES CLEARING HOUSES**

Derivatives contracts that call for the future delivery of a commodity or financial asset are clearly exposed to the risk of non-performance or counterparty default. Clearing arrangements for derivatives contracts may be viewed as a process through which market participants seek to control this risk. Such arrangements embrace both “clearing” in the sense of reconciling and resolving obligations between counterparties and “settlement” which finally extinguishes those obligations. In “direct” settlement systems, obligations are both reconciled and settled on a bilateral basis; in “ringing” settlement systems contract obligations are reconciled on a multilateral basis but settled bilaterally; and in the “complete” clearing and settlement systems utilised by modern derivatives clearing houses both reconciliation and settlement are conducted on a multilateral basis, the clearing house becoming counterparty to every transaction undertaken on the exchange.<sup>5</sup>

Multilateral netting through a central counterparty (the clearing house) achieves two objectives. First, it secures a degree of risk-reduction for clearing members. This is possible because legally enforceable multilateral netting has the effect of offsetting what would be the net claims of the

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<sup>5</sup> See James Moser, *Origins of the Modern Exchange Clearing House: A History of Early Clearing and Settlement Methods at Futures Exchanges*, Working Paper Series, Federal Reserve Bank of Chicago, April 1994; and Herbert Baer, Virginia France and James Moser, *Opportunity Cost and Prudentiality: An Analysis of Futures Clearing House Behaviour*, University of Illinois Working Paper, January 1996.

defaulter on some members against other members' net claims on the defaulter.<sup>6</sup> Therefore, clearing members as a group benefit at the expense of other unsecured creditors who must share between them larger losses as a consequence of the netting arrangement. This preferential position for clearing members may conflict with national insolvency laws, thereby necessitating special statutory recognition of clearing house netting procedures.<sup>7</sup>

Second, by interposing itself between clearing members and becoming counterparty to all transactions undertaken on the exchange, the clearing house achieves a degree of risk-spreading. In the typical case, clearing members own the clearing house, commit resources to it and/or are subject to ex post assessments in the event that the clearing house incurs losses. Under these circumstances clearing house losses are mutualised and counterparty risk is in effect spread across the clearing membership.

Clearing houses run a perfectly matched book, in that every obligation to a clearing member is matched by a precisely equal and offsetting claim against another clearing member. Therefore clearing houses do not incur market risk. However, they do face other categories of risk, notably counterparty risk vis a vis their clearing membership. The Parkinson Report lists the following concerns and types of risk to which clearing houses are exposed:

1. Defaults by clearing members:

Replacement cost risk: if a clearing member defaults the clearing house must still fulfill its obligation on the other side of the contract by entering into contracts identical to those on which default has occurred. The cost of replacing such contracts will fluctuate with the market.

Liquidity risk: a clearing house must meet its own obligations on schedule whether or not it has received all funds due to it from clearing members. In the event of a clearing member default, the defaulter's non-cash assets would have to be sold or pledged, which might be difficult to complete in the time required.

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<sup>6</sup> For an analysis of the legal underpinning and financial consequences of multilateral netting see Benjamin Geva, *The Clearing House Arrangement*, Canadian Business Law Journal, Vol. 19, 1991, pp. 138-165.

<sup>7</sup> For instance, various provisions of the US Bankruptcy Code protect the rights of clearing houses to close out the positions of a defaulting member while also preventing margin or settlement payments from being 'clawed back' by the court to satisfy other creditors' claims. See p. 7 of text.

Physical (delivery) risk: principal risk may arise if contracts provide for delivery (rather than cash settlement) and a delivery-versus-payment (DVP) mechanism is not used.

2. Settlement bank failures: in those cases where clearing houses use private banks rather than central banks to effect money settlements, another source of credit and liquidity risk is the possibility of failure of a settlement bank. A clearing house would be exposed to such risks if the failure occurred after its account with the settlement bank had been irrevocably credited (and the clearing member's obligations to the clearing house thereby discharged) but before the settlement bank had irrevocably transferred the clearing house's balance to another settlement bank.

3. Operational risk: since replacement cost exposures increase with the passage of time, any operational problem that delays settlement or prevents the clearing house from resolving a default could increase counterparty exposures. In addition, an operational breakdown might prevent a clearing house from monitoring its exposures.

4. Legal risks: these take a variety of forms, but a particularly important risk is that the multilateral netting arrangement between the clearing house and its members might not be upheld in all relevant national jurisdictions.

5. Investment of clearing house funds: a clearing house's own financial resources are exposed to default, market and custody risk in the normal way.

Clearing houses typically incorporate three tiers of financial safeguard in order to control the risks they face. First, clearing members are subject to minimum financial and capital adequacy requirements as well as periodic monitoring of their risk management policies. In the words of one leading rating agency, "a clearing house's first line of defense against loss is the creditworthiness of its [clearing] members ..."<sup>8</sup>. By regulating the quality of its membership the clearing house achieves a degree of risk control.

Second, the clearing house/exchange imposes a margining regime which seeks to ensure that obligations of both clearing members and their customers are collateralised.<sup>9</sup> For this purpose the clearing house sets an 'initial margin' on clearing members' open positions that is intended to reflect the risk of an

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<sup>8</sup> Financial Institutions Rating Service: Credit Comments, Standard and Poor's, November 30 1995, p. CC-230.

<sup>9</sup> For a description of margining arrangements in the US context see Roberta Romano, A Thumbnail Sketch of Derivatives Securities and Their Regulation, Maryland Law Review, Vol. 55, No. 1, 1996, pp. 1-83.

adverse price move over one day. Margin accounts are then adjusted daily in response to changes in the mark-to-market value of positions. If a member's position is revalued upwards, the account balance is increased and the profit may be withdrawn. If the position is revalued downwards, and as a result the margin account falls below the 'maintenance margin' (the minimum amount per contract that must be collateralised at all times and which may be set at, for instance, 75% of initial margin) then additional margin must be posted to bring the balance up to the required level. This additional sum, termed 'variation' margin, must generally be paid in cash - unlike initial margin where specified securities as well as bank guarantees may be treated as eligible collateral. Some clearing houses routinely effect intraday variation margin calls but in other cases such intraday calls are made only on a discretionary basis when market prices are especially volatile.<sup>10</sup>

Margining requirements apply also to non-clearing members of exchanges and other customers who undertake transactions through clearing members. The exchange (rather than the clearing house) typically requires non-clearing members and customers to pay minimum initial and variation margin to clearing members in respect of their positions. The minimum margin payments may be passed on in full by the clearing member to the clearing house without offsetting or netting one customer's account against another's, in which case it is characterised as a gross margining regime. Alternatively, a clearing member, under a net margining regime, may be permitted to post margin to the clearing house after netting offsetting customer positions. However, since in the latter case the clearing member will continue to hold the 'excess' (i.e. gross minus net) margin collected from customers, the same amount of margin will be taken from customers under either regime.

The effect of the daily mark-to-market revaluation of margin accounts is to close out each contract daily and substitute a new contract that is priced at the

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<sup>10</sup> It should be stressed that the protection afforded by margin requirements depends crucially on the payments system used by the clearing house. If an end-of-day net settlement system is employed intraday margining payments cannot become final until the end of the day, in which case a member default may trigger a reversal of such payments. Furthermore, in the more typical situation, where the clearing house conducts a single margin settlement each day (based on clearing members' end of day market positions), funds transfers associated with margin payments will generally be effected the following morning. Therefore, while margin requirements are usually based on estimates of potential losses over one day, more than one day may elapse before the clearing house can eliminate its counterparty exposure on positions that a defaulting member has held - exposures that may, furthermore, have been increased by new positions on which no initial margin has yet been paid. The shift towards real-time-gross settlement (RTGS) systems in many countries will, however, reduce the risks associated with delayed settlement. On these issues see "Clearing Arrangements for Exchange-Traded Derivatives" *op.cit.*, pp. 31/32 and pp. 35/36.

market and therefore valued at zero. In this way a member's (or customer's) losses (and profits) are settled in cash as they arise rather than in one lump sum payment at the end of the contract. If a variation margin call cannot be met, the position is closed out. Accordingly, the margining regime introduces an element of risk control by preventing the accumulation of open-ended losses either on the part of clearing members or their customers. At the same time it seeks to ensure that there is sufficient collateral to cover any reasonably foreseeable losses arising from market movements occurring between daily settlements.

Risk-segregation is another principle generally incorporated into clearing and margining arrangements. Under this principle customer assets are segregated<sup>11</sup> from those of the clearing house member, the objective being to enhance public confidence in financial markets by ensuring that investors are not adversely affected by the insolvency of firms that control assets on their behalf.<sup>12</sup>

A few clearing houses segregate all accounts and for this purpose set up individual customer accounts which cannot be commingled. Some others allow clearing members' proprietary accounts and customer accounts to be combined into a single account. However, the most common regime is one in which customer accounts are commingled in a single account but segregated from clearing members' proprietary positions. Under this last arrangement customers are insulated from the trading risks incurred by a clearing member since customer funds/margins cannot be used to meet the members' margin requirements. Clearing members, on the other hand, are responsible for the margin obligations of their customers.<sup>13</sup> If a default occurs in a clearing

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<sup>11</sup> 'Segregation' in this context may refer merely to a record-keeping function, where no title or rights to assets are conferred on a third party, or to a physical separation of assets that has the effect of conferring such rights. In general, segregated accounts maintained by a clearing house are a matter of record-keeping, whereas at the clearing member level physical segregation of assets may be required. For instance, under the rules of the London Clearing House (LCH) monies that would be payable by LCH to a member in respect of the member's segregated customers account cannot be used by LCH to offset losses on the member's account in the event of default by the member. To this extent segregated customer funds are protected. However, if LCH were to become insolvent these funds would be available to meet the claims of general creditors. Contrast the situation of clearing members who, under UK rules, must physically segregate customer monies and hold them in a customer bank account on trust for such customers.

<sup>12</sup> See Report of the Technical Committee on Client Asset Protection, International Organisation of Securities Commissions (IOSCO), August 1996.

<sup>13</sup> Derivatives exchanges typically operate on a principal to principal basis, meaning that the clearing house has no contractual relationship with clearing members' customers, but rather looks to the clearing member for performance of its contracts.

member's customer account the clearing house typically has the right to make good this shortfall from other, non-defaulting, customer margin deposits held by the defaulting clearing member. In this sense customers are at risk from defaults by other customers and do not benefit from the clearing house guarantee that applies to transactions undertaken by clearing members.

The third category of clearing house safeguard consists of emergency procedures and financial back-up arrangements once default by a clearing house member has occurred. The principles applied here are generally those of risk-control (immediate close out of the defaulting member's proprietary positions) and risk segregation (transferring customer positions and funds from the defaulting member to another clearing member). Where a defaulting clearing member's margin is insufficient to satisfy the member's obligations, the principle of loss-spreading applies, which may involve reliance on ex ante security deposits paid in by the clearing membership in the form of a guarantee fund; ex post assessments made against clearing members; and back-up insurance arrangements when losses exceed all other available financial resources.

In summary, the risk management regime typically associated with derivatives clearing houses utilises a number of techniques designed to safeguard the financial integrity of exchange-traded derivatives markets. Multilateral netting involves a degree of risk-reduction; the presence of a central counterparty coupled with loss allocation rules ensures a degree of risk-spreading; membership financial standards are designed to achieve risk control; the margining arrangements provide collateral or risk cover while daily cash settlement of losses and profits introduces a further element of risk control. At the same time the treatment of customer assets aims to achieve effective risk segregation as between customers and clearing members.

### **III. THE CLEARING ORGANISATIONS**

The three major US derivatives clearing houses, the BOTCC, the OCC and the Clearing Division of the CME, have distinctive organisational structures as well as operating procedures - although they also share important common characteristics.

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Similarly, the clearing member has a principal to principal relationship with its customers as well as with non-clearing members who choose to route their transactions through the clearing member; while non-clearing members have a principal to principal relationship with their own customers.

*Risk Management in US Derivatives Clearing Houses*

Both the CME and the CBOT are not-for-profit organisations, owned by their members, which trade futures and options on futures in agricultural and financial products. However, the BOTCC is an incorporated clearing house owned by its clearing membership and managed separately from the CBOT exchange it serves, whereas the CME has a Clearing Division (hence forward referred to as “the CME”) which is accountable to the CME’s Board of Directors.

The OCC is a separately incorporated clearing house that handles clearing for all US exchange-traded equity options as well as a major share of equity index and listed currency options. The OCC is owned by five participating exchanges, namely the American Stock Exchange, Chicago Board Options Exchange, New York Stock Exchange, Philadelphia Stock Exchange and the Pacific Stock Exchange. The OCC also has a wholly owned subsidiary, Intermarket Clearing Corporation (ICC), that clears for the Philadelphia Board of Trade and Amex Commodities Corporation.

Table I		
Data on CME, BOTCC and OCC		
Clearing Organisation	Number of Clearing Firms	Average daily volume*
CME	83	634
BOTCC	124	920
OCC	147	1,140
* volume in thousands of contracts traded, 1995.		
Source: US General Accounting Office, Payments, Clearance and Settlement, Washington DC, June 1997, p69, 82.		

The OCC provides centralised clearing for all exchange-traded equity options. This reflects a 1974 amendment to the Securities and Exchange Act calling for the “... linking of all clearance and settlement facilities and the development of uniform standards and procedures for clearance and settlement”.<sup>14</sup> In contrast, the US futures industry has distinct clearing organisations linked to particular exchanges, despite the advantages - in the form of reduced margin requirements and risk-offsetting - that centralised

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<sup>14</sup> Section 17Aa(1)(D) of Act.

clearing confers on market participants. This fragmentation of futures clearing has been attributed to “protectionism” on the part of clearing houses<sup>15</sup> which are said to enjoy some measure of monopoly profit. However, the costs which separate clearing imposes on exchange users and clearing members (see discussion of cross-margining below) prompted the CME in September 1997 to submit a proposal to the FIA and the CBOT for the creation of an independent entity to clear and guarantee all products on the two exchanges as well as other exchanges which choose to participate.<sup>16</sup>

Regulatory oversight of US exchanges/clearing houses is divided between the Commodity Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC) dependent on whether the traded contracts are considered to be “commodities” or “securities”. Accordingly, the CFTC oversees CME and CBOT/BOTCC while the SEC oversees the actions of OCC with regard to equity, equity index and currency options while the CFTC oversees the actions of OCC/ICC with regard to options on futures.

Under this regulatory regime the three exchanges/clearing houses have the status of self-regulatory organisations (SROs). Each SRO’s by-laws and rules must be approved by the CFTC or SEC, as appropriate, and the SROs are also responsible for establishing standards of admission, financial condition and rules of conduct which they must also enforce under their statutory powers to fine, suspend or even expel members. The CFTC and SEC conduct periodic examinations of SROs to ensure, inter alia, that they are enforcing compliance with their own rules.

It may be noted that the above regulatory framework governing exchanges and clearing houses is very much industry-led, with the CFTC and SEC playing a responsive rather than pro-active or rulemaking role. This may be considered particularly appropriate for financial market organisations which are at the leading edge of financial innovation and dynamic change. One of the few areas where the official regulatory agencies have laid down specific standards is in relation to capital adequacy: here both the CFTC and SEC apply detailed minimum requirements to exchange/clearing house members (see below), although there are no minimum financial or capital requirements covering the exchanges/clearing houses themselves.

The netting and margining procedures of US derivatives clearing houses are recognised and protected by various provisions of the US Bankruptcy Code<sup>17</sup>. Sections 555 and 556 of the Code permit a clearing house to exercise a contractual right to close out any open positions under a futures or options

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<sup>15</sup> See Albert Kyle and Terry Marsh, *On the Economics of Securities Clearing and Settlement*, Working Paper, Options Clearing Corporation, Chicago, December 1993.

<sup>16</sup> See “CME Initiates Detailed Common Clearing Proposal”, CME Press Release, September 11, 1997.

<sup>17</sup> See Credit Comments, Standard and Poor’s, November 30 1995, p. 229.

contract based upon the bankruptcy of a clearing member. In addition Section 362(b)(6) in effect allows clearing houses to foreclose on cash, securities or other property securing an obligation to make a margin or settlement payment whenever a clearing member defaults. Finally, Section 546(e) of the Code protects margin and settlement payments made prior to a clearing member's bankruptcy filing so that they cannot then be "clawed back" by the court to satisfy other creditors' claims.

#### **IV. MEMBERSHIP CRITERIA**

The first level of protection available to clearing houses is the quality of their clearing membership and the monitoring and enforcement of members' compliance with financial requirements. In the case of futures exchanges minimum requirements are laid down by the CFTC, while for OCC clearing members the relevant standards are set by the SEC.

The CFTC minimum capital requirement for futures commission merchants (FCMs) is the greater of \$250,000 or four per cent of customer funds required to be segregated. An FCM which is in breach of this requirement has a maximum of 10 business days to comply or face cessation of business and transfer of its customer accounts. Capital-or "adjusted net capital" - is for this purpose defined in a way that takes account of the FCM's proprietary risks. Specifically:

1. Unsecured receivables are deducted from capital. It therefore becomes very expensive for an FCM to extend credit to its customers.
2. Marketable securities are subject to varying "haircuts" depending on the potential cost of liquidating positions.
3. Proprietary futures and written options positions carried by clearing member FCMs are charged to capital at 100% of clearing margin. This means that the underlying methodology for calculating clearing house margin requirements is carried over to clearing member capital adequacy standards.

Clearing members of the OCC, as registered securities broker-dealers, are subject to the SEC's capital requirements or Net Capital Rule.<sup>18</sup> As with the CFTC's approach, net capital is for this purpose defined as total capital less (a) a deduction for illiquid assets e.g. unsecured receivables and (b) a further

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<sup>18</sup> If a firm is dually registered as both a broker dealer and a futures commission merchant, the regulatory capital requirement is the greater of the CFTC and SEC requirements. For a discussion of the SEC's Net Capital Rule see Richard Dale, *Risk and Regulation in Global Securities Markets*, John Wiley, 1996, pp. 60-100.

deduction to reflect the riskiness of assets held (“haircuts”). The resulting “net” capital is then compared to one of two alternative measures of the scale of a broker-dealer’s business, namely aggregate indebtedness (“basic method”) or customer related receivables (“alternative method”). A broker-dealer must maintain a minimum net capital level of the greater of \$250,000 or 6 % of aggregate indebtedness (or, if the firm chooses the alternative method, 2% of customer related receivables).

Within this general SEC capital adequacy framework the SEC originally imposed haircuts on options based on risks associated with particular positions (the “specific strategy” approach). This contrasts with the practice of options traders, who typically enter into complex offsetting positions, using strategies based on mathematical formulae. However, with effect from September 1997 the SEC amended its rule to permit broker-dealers to employ theoretical option pricing models to calculate required net capital for listed options and the related positions that hedge those options.<sup>19</sup>

Both the CFTC and the SEC have adopted early warning levels for capital, which prohibit withdrawals of capital if the effect would be to cause net capital to fall below specified levels (e.g. 5% of customer-related receivables under the SEC alternative method, 7% of customer funds required to be segregated under the CFTC rules).

The clearing houses’ own capital requirements are more stringent than the minimum specified by the regulatory agencies. With effect from January 1<sup>st</sup> 1998 the CME, CBOT and BOTCC adopted a risk-based capital requirement equal to 10% of customer maintenance margin requirements plus 4% of non-customer maintenance margin requirements.<sup>20</sup> However, breaches of the clearing houses’ capital standards do not necessarily have the same far-reaching consequences as breaches of the CFTC’s (lower) minimum requirements: for instance, clearing members of the BOTCC with capital below the clearing house minimum level are required to increase their margin level rather than to wind down their business.

The OCC requires clearing members to have initial capital of \$1mn or more. Those which, under the SEC rules, adopt the “basic” method must also have initial capital of at least 12½% of aggregate indebtedness while those who choose the “alternative” method must have initial capital of at least 5% of customer related receivables. These capital levels may subsequently decline in the ordinary course of trading, but the (lower) SEC minimum requirements apply at all times, and there are also early warning triggers when capital falls

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<sup>19</sup> See SEC, Securities Exchange Act Release No. 34-38248, 2 July 1997.

<sup>20</sup> Non-customers are persons closely related to the FCM such as directors, as well as affiliated firms.

below 10% of aggregate indebtedness (basic method) or 5% of customer related receivables (alternative method).

It may be noted that because the CFTC's main emphasis has traditionally been on investor protection, its capital rules are based on a leverage constraint linked to the scale of customer business rather than to the volume of clearing members' proprietary trading. On the other hand clearing houses are concerned above all to protect themselves against counterparty risk vis a vis clearing members, which is presumably why the CME and BOTCC have imposed an additional restriction, linked to clearing members' proprietary margining requirements. However, since the Barings crisis of 1995 the CFTC along with other derivatives regulators has tended to focus more on systemic risk. In this context, the CFTC is examining the merits of basing an FCM's minimum capital requirements on positions carried by the FCM rather than on customer funds.<sup>21</sup>

Capital requirements do not in themselves provide adequate protection if capital levels are not continuously monitored and related to risks incurred. Accordingly, all three clearing houses require member firms to have a system which permits them to demonstrate that they are in compliance daily. At the same time large risk exposures are monitored through a large trader reporting system which enables the CFTC/SEC to aggregate large exposures across derivatives exchanges, whether incurred by clearing member or their customers, and to report this data back to the clearing houses. In fulfilling their role as SROs the clearing houses also make periodic assessments of each clearing member's internal controls, risk management policies and back office operations.

Finally, capital adequacy assessment raises the question of whose capital is at risk and to what extent. Here the clearing houses have different approaches. The CME follows a policy of "down to the last drop", meaning that each FCM clearing member is jointly and severally liable for clearing house losses which exceed available resources (see loss-sharing rules in Section 5 below). As a separate matter, the parent of a CME clearing member is required to guarantee 100% of that member's own-account obligations.<sup>22</sup>

The BOTCC also adopted a parent guarantee rule in 1986 to ensure the financial commitment of owners of clearing members for the latter's non-customer accounts, although exceptions to the requirement have been made for some heavily capitalised investment banks. In contrast to the CME, the

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<sup>21</sup> See Third Annual Report to the Board of Governors of the Federal Reserve System on the Review of Stock Index Futures and Option Margining Systems by the Commodity Futures Trading Commission, CFTC, June 1996, p. 23.

<sup>22</sup> Both the CME and BOTCC parent guarantees (see text) cover the trading of employees and affiliates of the clearing member as well as the latter's own trading activity.

BOTCC does not impose open-ended liability on clearing members who may, at least in theory, walk away from their investment in the clearing corporation.<sup>23</sup> The OCC is different again in that it does not seek to impose a parent guarantee and clearing members have defined and limited obligations under the loss-sharing rules (see Section 5 below).

The relative merits of these alternative arrangements are a matter of some controversy. The CME's 'down to the last drop' approach gives clearing members a strong incentive to monitor each other, but on the other hand may encourage the creation of special purpose subsidiaries designed to limit the parent group's exposure to a major default.<sup>24</sup> In any event, the issue would become relevant only if the triple protection afforded by capital adequacy rules, margining requirements and back-up financial resources were to prove inadequate in the face of extraordinary losses.

## **V. MARGINING REQUIREMENTS**

Margining requirements imposed on clearing members and their customers, as described in Section 1 above, lie at the heart of the risk management regime for exchange-traded derivatives. These requirements can be considered under the following headings:

### **A. Futures versus Options Margining**

Under a futures margining regime contracts are marked to market daily and margin accounts are also balanced daily through variation payments. Clearing members either receive or pay variation margin depending on whether the revaluation of their positions shows a profit or a loss, and since the revaluation profits and losses are symmetrical variation margin payments and receipts are offsetting.

Under the OCC's margining regimes for options and the CME's and BOTCC's margining regime for options on futures the purchaser of the option pays the premium for the option up front, and thereafter has no further

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<sup>23</sup> The BOTCC may require clearing members to subscribe to a new issue of shares in proportion to their holdings as needed to provide an infusion of capital to the Clearing Corporation, but there is no legal impediment to a firm withdrawing as a clearing member if it does not wish to subscribe to such an issue.

<sup>24</sup> For instance, Goldman Sachs has established a special purpose affiliate, GSA Clearing L.P., as a CME clearing member. Because of its partnership structure, Goldman Sachs is particularly sensitive to the issue of open-ended liability.

obligation to the clearing house. The purchaser of the option therefore pays neither initial nor variation margin.<sup>25</sup> The seller/ writer of the option, on the other hand, receives the premium and has a continuing obligation to perform. The seller must therefore pay initial margin to cover the current market value of the option (the premium) plus a cushion to cover potential future increases in the option's market value. The option is then marked to market daily and the seller must post additional margin as need be. Under this regime, which resembles non-cash clearing in futures markets, cumulative losses on open positions are collateralised rather than settled.<sup>26</sup> Furthermore, unlike futures margining, collateral payments are non-symmetrical, with the seller but not the buyer of the option facing risk from adverse price movements and having to provide cover accordingly.

### **B. Methodology of Margin Calculation**

Both the CME and the BOTCC use a portfolio-based margining model known as "SPAN" (Standard Portfolio Analysis of Risk). This values positions under 16 alternative market scenarios and then sets the initial margin as the maximum loss calculated on the basis of the alternative scenarios. In essence SPAN estimates losses that might reasonably be generated by potential one-day changes in underlying market prices or (in the case of options) shifts in implied volatility. The clearing houses are responsible for determining what is considered a "reasonable" one-day loss and for setting the basic SPAN parameters accordingly. If, for instance, the objective is to cover the largest loss for between 95% and 99% of trading days, as observed over a recent interval of time, SPAN sets the margin requirement to cover this one-day loss. Where there are price covariances between contracts, this can be factored into SPAN, thereby permitting margin offsets or "inter-commodity savings" which reduce the overall margin requirement for a portfolio.

The key point about SPAN is that it is a technical aid for determining margin requirements, but does not itself establish basic risk criteria for this purpose. The relevant risk parameters, in the form of confidence intervals,

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<sup>25</sup> However, the marked-to-market option value, subject to a risk haircut, contributes asset value toward satisfying margin requirements.

<sup>26</sup> The above arrangements are referred to as "options-style" margining. Under "futures style" margining of options, as for instance practised by the London Clearing House, the option premium is not paid up front and initial margin is paid by both buyer and seller who are also subject to variation margin (thereby periodically eliminating the clearing house's credit exposures to clearing members through money settlements). The CFTC has recently issued a proposal that would allow for futures style margining of options in US exchanges.

observation periods, volatility changes and allowable margin offsets are factored in by the clearing houses that use the SPAN system.

The OCC has developed its own parallel margining model known as "TIMS" (Theoretical Intermarket Margin System). This is used to calculate margin requirements for its option contracts, comprising a daily mark to market (premium margin) plus a cushion to cover the risk of an adverse price change (risk margin). TIMS uses option price theory and portfolio theory to project theoretical liquidation values for portfolios on the basis of multiple market scenarios and calculates a level of risk margin appropriate to the worst case scenario. Again, TIMS is a risk measurement system that operates on the basis of risk parameters factored into it by the OCC or other clearing house subscribers.

### **C. Margin Cover**

From the above it should be clear that such differences as there may be in clearing houses' approach to margining lie not in the margining models they use but rather in the risk parameters they choose to factor into those models. The most important consideration here is the selected confidence interval, which in the case of the three major US clearing houses has been more or less standardised at 95% to 99%. That is to say, clearing houses set margin levels to cover at least the maximum one-day price move on 95% of the days during selected historical observation periods. Empirical analysis by the CFTC suggests that in practice margin requirements tend to be set above the 95% confidence interval.<sup>27</sup>

### **D. Gross versus Net Margining**

As explained in Section I above, clearing house margin requirements may be imposed on a gross or net basis, depending on whether a clearing member is permitted to post margin to the clearing house after netting all offsetting customer positions or whether customer margin payments must be passed on in full to the clearing house. Both the BOTCC and the OCC have adopted net

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<sup>27</sup> The CFTC calculates (a) the percentage of daily price moves that would have been covered by current maintenance margins, had those margins been in effect for the whole of the relevant period; and (b) the percentage of historical daily price changes that was actually covered by prevailing margin levels. For stock index futures the coverage measured by calculations (a) and (b) was 98 to 100% in the six months to March 15 1995; but this had fallen to 96-100% (calculation (a)) and 93-100% (calculation (b)) in the six months to March 31 1996. See Intermarket Co-ordination Report, CFTC, June 1995, p. 39 and Third Annual Report to the Board of Governors, CFTC, op.cit., p. 7.

margin systems but the CME applies gross margining, albeit with some limited allowances for ‘spreads’ or offsets.

The main claimed advantage of gross margining is that it “provides greater immediate assurance that market participants have the financial ability to support their market activity”.<sup>28</sup> However, the significance of net versus gross margining has to be understood in the context of a possible clearing member default arising from the default of a customer. In that event, under a gross margining regime where customer margin is held by the clearing house, there is more customer margin available to meet any shortfall in the clearing house’s customer margin account. In other words, the clearing house is to this extent better protected, but at the cost of exposing non-defaulting customers to greater risk (under a net margining regime a failed clearing member would hold (segregated) customer margin but this would presumably not be available to meet either the clearing member’s or the clearing house’s obligations.)

The OCC has a three-way margining system embracing (i) customers, (ii) market-makers and (iii) clearing member proprietary positions: in respect of (ii) and (iii) margin requirements are imposed on a gross basis but some offsets are permitted on customer accounts (i.e short calls and puts may be offset but not long calls and puts).

### **E. Frequency of Margining**

As discussed in Section 2 above, most clearing houses conduct one routine margin settlement per day, based on positions and market prices at the end of the trading day. The funds transfers associated with these margin adjustments are typically effected early the next day. In the words of the Parkinson Report:

“In effect, a settlement of losses and margin deficits that arise because of changes in market prices and clearing members’ open positions between the end of day T-1 and the end of day T are settled early on day T+1 ... a clearing house generally would not begin to close out a defaulting members’ positions until after trading reopens on T+1, and this process could not be completed instantaneously. Thus, under the best of circumstances, a clearing house that conducts a single margin settlement each day would, in fact, need something

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<sup>28</sup> The Financial Safeguard System, CME, 1996, p. 3. It may also be argued that gross margining provides an additional incentive for clearing members to have prudent collection policies from their customers as a greater proportion of customer margin must be passed through to the clearing house. Finally, gross margining may improve a clearing organisation’s ability to transfer the positions and associated funds of non-defaulting customers in the case of a default.

more than one day to eliminate its counterparty exposures on positions that a defaulting clearing member had held as of the end of T-1.”<sup>29</sup>

The above underlines the point that where clearing house counterparty exposures are concerned, time is risk. Accordingly, the major US clearing houses have sought to reduce counterparty risk by introducing an intraday margin call and/or by establishing intraday risk monitoring procedures with discretion to require additional margin in appropriate cases.<sup>30</sup>

The CME makes two daily margin calls, one based on mark to market values at the end of the trading day and settled by 6.40 a.m. the next morning, the second 2.00 p.m. call based on positions (including newly matched trades) at 11.30 a.m. and market prices at 12.15-12.30 p.m. with settlement at 3.00 p.m. The CME makes additional intraday mark to market calculations and has the authority to call for immediate payment of variation margin where, for instance, a clearing member has concentrated positions on the losing side of the market. This policy of active intraday risk management ensures that 80-90% of total margin adjustments for any day’s trading activity is collected on that day.

It may be noted that the CME releases only 90% of intraday variation payments on an intraday basis and, furthermore, prohibits intraday payments to clearing members in excess of the total original margin deposits the clearing house holds for such clearing member. Accordingly, the amount collected by the clearing house tends to exceed the amount paid out on an intraday basis.

Like the CME, the BOTCC makes two daily margin calls, one after the day’s trading has ended, with settlement again at 6.40 a.m., and the second at 2.00 p.m., with settlement by 3.00 p.m. However, there are some timing differences between the CME and BOTCC: for instance, the latter’s intraday margin calculation covers trades matched up to 1.20 p.m., and uses market prices at 2.00 p.m. In addition the BOTCC’s intraday margining has two particular features. First, variation margin credits are reduced by the amount of any original margin deficit but afternoon variation debits are not increased by any original margin deficit. In other words the BOTCC requires original margin settlement at 6.40 a.m. only. However, this relaxation of intraday margin requirements is offset by a second feature of the BOTCC regime which is that 10% of intraday variation margin to clearing members with net gains is held back until the 6.40 a.m. final settlement on the following morning, thereby providing the clearing house with a protective cushion against any

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<sup>29</sup> Clearing Arrangements for Exchange-Traded Derivatives, op.cit., p. 27.

<sup>30</sup> For details of US clearing houses’ margin calls and settlement procedures see Payments, Clearance and Settlement, US General Accounting Office, Washington DC, June 1997, pp. 66-90.

original margin shortfall. With the aid of its intraday margining regime, BOTCC aims to ensure that at least 85% of variation settlement for any trading day's activity is collected that day.<sup>31</sup>

The BOTCC also operates a net settlement trigger point system to monitor the accumulation of trading losses during the day. For this purpose every clearing member has a trigger point or credit cap against which the size of the expected intraday variation margin call is measured. These exposures are calculated on the basis of mark to market valuations made at least 5 times prior to the afternoon call. When exposures reach the cap level an investigation is undertaken which may result in an early variation margin call for the clearing member concerned.

The position of the OCC in relation to margining is rather different from the CME and BOTCC. This is because the options markets serviced by the OCC are viewed as more "position" than "trading" markets, meaning that they are characterised by a low trading volume relative to open interest as compared with futures markets. In view of the lower intensity of trading, intraday risk management may be considered less crucial for the OCC than for the CME and BOTCC.

Given this context, the OCC makes one routine daily margin call at 6.30 a.m. which must be met by 9.00 a.m., with credits paid at 10.00 a.m. Discretionary intraday margin calls may be made for a particular contract when initial margin is eroded by 50% during the trading day; and intraday margin can also be required of individual firms in certain circumstances.

## **F. Margin Settlement**

The settlement of payment transfers between the clearing house and clearing members represents an area of potential risk for the clearing house. Essentially, there are two types of risk here: delayed finality of settlement leading to continuing counterparty exposures and the risk of failure of a settlement bank. A closely related concern is that legal uncertainties regarding finality could, in the event of a default, result in damaging disputes between the clearing house and clearing members and/or between the clearing house and settlement banks. In this context it may be noted that the safeguard provided by intraday margin calls may be illusory if intraday variation payments involve provisional rather than final funds transfers: the clearing house might then be in the position of an unsecured creditor of a clearing member that is unable to cover its net obligations at the end of the day.

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<sup>31</sup> A CFTC report shows that in March 1995 80% of daily price changes were collected intraday at the CME and 88% at the BOTCC. Intermarket Co-ordination Report, June 1995, p. 30.

So far as the finality issue is concerned, there are contractual issues involving the parties to settlement and there is the settlement system itself. Reflecting joint recommendations made by the CFTC and SEC the three major US clearing houses have developed uniform agreements with their settlement banks that unambiguously require each settlement bank either to pay member obligations through irrevocable credits to the respective clearing house's account or to inform the relevant clearing house that the payment cannot be processed by a time certain before the opening of regular trading hours.<sup>32</sup>

Each of the three major US clearing houses uses Fedwire funds transfers with immediate finality to make balancing transfers between settlement banks. In February 1994 the Federal Reserve Board approved an expansion of Fedwire funds transfer operating hours to 18 hours per day, effective 1997. The CFTC had favoured this move on the grounds that earlier opening "would facilitate systemic risk reduction by permitting irrevocable funds movements and interventions to address potential default in the futures and options markets prior to the opening of trading".<sup>33</sup>

A key point here is that the time gap between (a) settlement banks irrevocably committing themselves to meet clearing members' settlement obligations to the clearing house and (b) the actual transfer of final funds through Fedwire, exposes the clearing house to the risk of settlement bank failure.<sup>34</sup> Earlier funds transfers through Fedwire, by reducing the commitment/funds transfer gap, also reduces the clearing house's exposure to settlement bank risk. On the other hand, an earlier obligation to transfer funds on the part of settlement banks exposes them to greater liquidity risk in the event of default by a clearing member to whom credit has been provided.<sup>35</sup>

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<sup>32</sup> By ensuring contractually that transfers between clearing members and the clearing house on the settlement bank's books are final, the clearing house's exposure to its clearing members can be extinguished prior to payment finality being achieved as between clearing members and the settlement bank. However, the effect of such finality agreements may be to shift risk from the clearing house to the settlement banks. Furthermore, the clearing house's exposure to settlement banks generally cannot be eliminated until balancing transfers among settlement banks have taken place through Fedwire funds transfers.

<sup>33</sup> Intermarket Co-ordination Report, CFTC, May 31 1993, p. 68.

<sup>34</sup> A clearing house's legal agreement governing the use of its accounts at its settlement banks may reduce or eliminate this exposure, but in that event the risk of a settlement bank's failure may be shifted from the clearing house to other (non-defaulting) settlement banks.

<sup>35</sup> In discussing the issue of expanded Fedwire operating hours, the Federal Reserve commented as follows:

[f]or some futures exchange settlements, the convention today is to accept irrevocable commitments to pay from designated settlement

The US clearing houses seek to reduce their exposure to settlement bank default by specifying a list of approved settlement banks. The CME uses eight authorised settlement banks, the BOTCC nine and the OCC seventeen. Balancing transfers between the clearing house accounts at the settlement banks occurs after the opening of Fedwire (7.30 a.m. Chicago time). However, in the case of the CME and BOTCC, settlement banks make irrevocable commitments to meet clearing members' obligations to the clearing house at 6.40 a.m., so that there is a period during which the clearing houses face the risk of settlement bank failure. The one hour gap between the CME/BOTCC's 2.00 p.m. intraday margin call and 3.00 p.m. final settlement through Fedwire funds transfers may also result in exposure to settlement bank risk. Similarly, in the case of the OCC, there is a one hour gap between settlement banks irrevocably crediting the clearing houses' accounts at 9.00 a.m. and associated Fedwire transfers at 10.00 a.m.<sup>36</sup>

### **G. Cross-Margining**

Cross-margining is based on the idea that certain intermarket trading positions with offsetting risk characteristics can be margined together as a single portfolio. Cross-margining allows traders to use positive cash flow generated in the futures market to cover losses in the equity market and accrued profits on equity options to reduce margin required on offsetting futures positions. Cross-margining may also contribute towards systemic financial stability and it is significant that prior to the conclusion of a network of intermarket cross-margining agreements in the early 1990's the Federal Reserve expressed concern about the absence of such arrangements:

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banks to cover clearing members' settlement obligations prior to the start of the current day's trading, with the settlement banks actually fulfilling the obligation via Fedwire funds transfers by 10.00 a.m. e.t. The futures clearing organisations and the ..... [CFTC] have expressed a desire for settlement to occur in final funds before the commencement of trading. Such earlier settlement is viewed as reducing risks to futures exchanges and the financial markets despite some concerns that it would merely shift risks from the clearing organisations to their settlement banks.

Cited in Intermarket Co-ordination Report, CFTC, May 1994, Note 40, p. 38.

<sup>36</sup> It should be emphasised that a clearing house's debit and credit positions vis a vis clearing members will generally be netted on the books of the settlement bank and that it is therefore only the net balance that is exposed to theoretical settlement bank risk prior to final inter-bank transfer.

“Because no widespread system of cross-margining yet exists, liquidity problems can occur when clearing members are required to post margin for their positions in all markets, regardless of whether the risk of a position in one market is offset by a position in another market. The risk of a major intermarket liquidity problem is of great concern.”<sup>37</sup>

Against this background the CFTC has approved a variety of cross-margining programmes, including trilateral cross-margining between the CME, OCC and the New York Commodity Clearing Corporation, and bilateral cross-margining between the CBOT and OCC. In addition the OCC allows cross-margining across the five exchanges for which it clears. Where different clearing houses participate in cross-margining they typically hold a first lien on and security interest in the positions in cross-margined accounts and all margin deposits associated with these accounts are jointly held.

Despite the considerable potential benefits that would accrue to clearing members, in terms of reduced total margin requirements<sup>38</sup>, there is as yet no trilateral/quadrilateral cross-margining agreement covering the CME, BOTCC and OCC/ICC. However, as noted above, the CME, CBOT and other exchanges are currently discussing the establishment of a single clearing entity for futures exchanges.

## **H. Acceptable Margin**

The eligibility criteria governing initial margin (variation margin is paid in cash) is an important aspect of a clearing house's risk management. The margin assets of a defaulting clearing member should be realizable in time to be used to meet the clearing house's own obligations and should therefore be (a) immediately available at all times and (b) relatively liquid i.e. convertible into cash.

So far as the first condition is concerned, worries have been expressed that letters of credit (LOCs), which have traditionally been accepted as an alternative to margin deposits, have a number of drawbacks. First, there is the risk of default by the issuing bank, in which case funds would not be forthcoming. Second, there may be delays in completing the draw-down of LOCs: it has, for instance, been suggested that banks can take up to 3 days to

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<sup>37</sup> An Overview of the Operations of the Options Clearing Corporation, Federal Reserve Bank of New York, April 1989, pp. 27-28.

<sup>38</sup> The CFTC has calculated that the trilateral cross-margining between the CME, OCC and ICC has resulted in clearing member margin savings of between 50 and 95%. See Third Report to the Board of Governors of the Federal Reserve System, op.cit., p. 15.

honour such commitments,<sup>39</sup> although much shorter time-frames can be agreed (see below). Finally, it is conceivable that a bank might decline to honour an LOC in a crisis. The CFTC has drawn attention to this last possibility when recommending that clearing houses “consider arrangements to reduce further the possibility that an issuing bank might attempt, during a crisis, to abrogate its obligations to perform immediately under an LOC”.<sup>40</sup>

Such concerns have led the CFTC to require the phasing out of LOCs in futures clearing houses’ guarantee funds (see below), while also encouraging reduced reliance on LOCs as initial margin. The CME now limits LOCs to 50% of a clearing members’ total margin while the BOTCC imposes a limit of 25% of a clearing member’s net capital. Both clearing houses require a one hour draw-down under the LOC agreement. In practice LOCs tend to constitute a relatively small proportion of margin collateral for the futures clearing house.<sup>41</sup>

The OCC has also sought to reduce reliance on LOCs so that between 1990 and 1994 LOCs fell from 57% to 36% of OCC total margin<sup>42</sup>. This decline was due in part to the lowering of “haircuts” on securities collateral (below), thereby encouraging a switch to securities margining. However, in contrast to the CME and BOTCC, the OCC allows a two-day draw-down period for LOCs on the grounds that the clearing house has adequate liquid resources to bridge the time gap.

In addition to immediate or near-immediate availability, margin assets should be relatively liquid. The CFTC/SEC permit foreign currency cash, government securities and (since 1993) certain equities to be posted as margin, subject to appropriate ‘haircuts’ or deductions (30% in the case of equities) to allow for possible marketability risks or liquidation costs. However, there is some variation in the eligibility criteria adopted by individual clearing houses: for instance the BOTCC does not currently accept equities as margin. In this context the Parkinson Report points out that the same-day sale or financing of securities other than short-term government paper might be difficult, “especially in the turbulent conditions that may be the cause or consequence of

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<sup>39</sup> See Bank Ratings Analysis: Options Clearing Corporation, Standard and Poor’s, December 1995, p. 5.

<sup>40</sup> Intermarket Co-ordination Report, CFTC, May 1991, p. 44.

<sup>41</sup> For instance, the CME reported that as of March 1993, LOCs comprised less than 11% of total original margin: Intermarket Co-ordination Report, CFTC, May 1993, p. 63. As of March 1992, the equivalent figure for the BOTCC was approximately 15%: Intermarket Co-ordination Report, CFTC, May 1992, p. 55. By the end of 1997 the BOTCC’s reliance on LOCs had fallen further to a mere 4%.

<sup>42</sup> See Bank Ratings Analysis: Options Clearing Corporation, Standard and Poor’s, op.cit, p. 5.

a clearing member's default".<sup>43</sup> That is why back-up liquidity resources are a key additional safeguard for clearing houses (see Section 4 below).

## **I. Customer Segregation**

US clearing houses are obliged to maintain separate accounts for funds and positions of customers and funds and positions of the clearing member. The customer account is an omnibus account for all customers of the clearing member.<sup>44</sup> Similarly, at the clearing member level, client funds and positions are required to be in accounts segregated from the clearing member's funds and positions. In practice, the clearing member typically holds a single customer account at the clearing level which contains all its customer positions. This segregation regime fulfills two functions: it facilitates the transfer of customer positions from an insolvent or troubled firm to a solvent firm; and it protects customer assets from the insolvency of a clearing firm caused by proprietary trading losses. Segregation is intended to promote confidence in financial markets, although it does reduce the protection afforded to the clearing house in the event of default by a clearing member due to own account trading.

Despite the presence of the above segregation arrangements, customers are still exposed to the risk of losses due to (a) a clearing member default caused by another customer at the firm or (b) default by a clearing member which has failed to comply with segregation requirements. The futures clearing houses have therefore provided a further tier of protection in the form of trust funds established for the benefit of the customers of clearing members.<sup>45</sup>

The OCC is in a different position from the futures clearing houses because its clearing members, being registered broker-dealers, are covered by the Securities Investor Protection Corporation (SIPC) created by the Securities Investor Protection Act of 1970. SIPC protects securities customers of a member broker-dealer which fails, covering customer claims up to a maximum of \$500,000, including up to \$100,000 on claims for cash (as distinct from claims for securities). For the purposes of SIPC, exchange-traded equity options, but not options on futures, are considered to be "securities".

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<sup>43</sup> Clearing Arrangements for Exchange-Traded Derivatives, op.cit., p. 24.

<sup>44</sup> Under the OCC's segregation regime, the accounts of customers and market-makers are segregated from one another as well as from the clearing member. Clearing members may also choose to hold sub-accounts for market-makers (but not for customers) which results in individually segregated accounts at the clearing house.

<sup>45</sup> Towards the end of 1996 these funds stood at \$15mn (BOTCC) and \$41.4mn (CME).

## **VI. DEFAULT PROCEDURES AND FINANCIAL RESOURCES**

The third category of clearing house safeguard consists of emergency procedures and financial bank-up arrangements that come into play once default by a clearing member has occurred. US clearing house procedures are designed to ensure that neither defaulting clearing members nor their customers are locked into positions with resulting open-ended exposure to losses. The essential safeguards here are twofold. First, the clearing house must be in a position to liquidate a clearing member's proprietary positions as soon as that member is declared to be in default through failure to meet a margin call. Second, the clearing house must be able to transfer customer positions and funds held by a defaulting member to another clearing member so that customers can continue to manage their risk exposures.

A problem that may arise in this context is that solvent clearing members may be unwilling to accept the transfer to them of customer positions held by a defaulting member. In order to minimise this potential difficulty the US regulatory authorities encourage the transfer of customer positions from a troubled clearing member at the earliest indication of financial distress.

Once default has occurred the clearing house looks to the defaulter's margin deposit to cover any losses and to enable it to meet its own obligations. However, there are two possible problems here. First, the available margin assets may not be immediately convertible into cash, so that interim liquid resources may be needed pending sale of these assets and receipt of the proceeds. Second, the liquidation value of the margin assets may conceivably be insufficient to meet the defaulter's losses, necessitating reliance on the clearing house's own capital resources and/or other sources of long-term funding.

The amount of liquidity needed by a clearing house depends on the quality, marketability and settlement procedures governing the margin assets it holds, so that, for instance, the CFTC, in approving the use of equities as margin, requires that adequate liquidity back-up be available to the clearing house to cover possible delays in disposing of this class of asset. Similarly, special liquidity arrangements may be needed to cover the time gap between sale of foreign currency margin and receipt of the US dollar proceeds (see below).

In order to meet these additional funding needs, the major US clearing houses have established (1) short-term liquidity facilities in the form of committed bank credit lines; (2) loss-sharing arrangements as between clearing members; and (3) access to permanent capital funding in a variety of forms. It may be noted that some funding sources may be dual purpose in the sense of

being available to meet either temporary liquidity or permanent capital needs. The resources available to each of the three major clearing houses (as of 1997) are as follows:

*CME*

1. \$350mn unsecured credit facility which can be drawn upon at one hour's notice.
2. Clearing house surplus funds of some \$74mn.
3. Security deposits of some \$133mn. Each clearing member is required to maintain a security deposit equal to the greater of \$300,000 or the results of a formula under which 80% of the total deposit requirement is based on a member's proportional contribution to aggregate margin requirements over the previous month and 20% is based on a member's contribution to contract volume over the most recent 3 months.
4. The 'common bond' or joint and several guarantee provided by clearing members. The balance of any unsatisfied default losses would be allocated among the clearing membership, taking into account each member's net capital, trading volume and share of open interest.

*CBOTCC*

1. Committed bank credit facilities totalling \$200mn, which can be drawn upon on one hour's notice.
2. Clearing house 'liquid net worth' of \$155mn, representing 5-6% of average margin requirements. This is functionally equivalent to a guarantee fund.
3. Clearing members may be required to purchase stock in the clearing house based on their trading volume and open interest. (However, a member may in principle, avoid such a capital call by withdrawing its membership.)
4. \$100mn default insurance policy with Lexington Insurance, subject to certain deductions, to be available in the event of member default.<sup>46</sup>

*OCC*

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<sup>46</sup> See BOTCC Press Release, May 27, 1997.

1. \$150mn committed bank facility for general liquidity purposes. \$928mn committed bank facility specifically for the purpose of covering settlement period where foreign currency margin is liquidated.

2. Liquid clearing fund of some \$600mn equivalent to 7% of daily average margin. Clearing members contribute to the fund on the basis of their share of open interest.

3. The OCC can make a further assessment on clearing members equal to their clearing fund contributions which, by prior contractual agreement, they are obliged to meet.

Each of the three clearing houses therefore has access to back-up resources comprising (a) liquidity support; (b) a combination of ex ante and ex post assessments on clearing members and (c) net worth, with the BOTCC having additionally arranged an element of insurance. However, there are significant differences of emphasis: the CME has immediate access to capital resources (surplus funds and security deposits) equivalent to less than 2% of average margin<sup>47</sup>, and relies for substantive backing on the joint and several guarantee provided by clearing members. In contrast both the BOTCC and OCC have access to capital resources equivalent to 5-7% of average margin, with the former relying on 'voluntary' and the latter on mandatory member assessments for further financial support.

In order to monitor the adequacy of available financial backing, each of the three clearing houses conducts stress tests under a variety of market scenarios. For instance, the OCC conducts daily tests based on a market move equivalent to 1.5-3.0 times initial margin levels, dependent on the product in question, as well as a quadrupling of implied volatility. The OCC also conducts monthly tests on the assumption of a 1,000 point drop in the Dow Jones Industrial Average. The purpose of these simulations is to calculate which firms would fail, what their losses would be and the extent to which their losses would be covered by clearing house resources.

The default procedures that apply in any particular case of default depends on the origin of the failure. If a clearing member were not able to meet its financial obligations to the clearing house and the default occurred in the customer account, the clearing house may (1) seek to transfer other customer

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<sup>47</sup> See Third Annual Report to the Board of Governors of the Federal Reserve System, CFTC, op.cit., p. 17/18. It should be noted, however, that the CME percentage is calculated against a gross margin base whereas the BOTCC and OCC numbers are calculated against a (smaller) net margin base.

positions and funds to a healthy clearing member; (2) take control of or liquidate the involved customer positions as well as the defaulting clearing member's proprietary positions; (3) apply the clearing member's margin deposits to the failed obligation; and (4) if (3) is insufficient, apply toward the default all customer margin deposits in the defaulting clearing member's customer account.<sup>48</sup>

If a clearing member were unable to meet its financial obligation to the clearing house and the default occurred in its proprietary trading account the clearing house may immediately: (1) seek to transfer all segregated customer positions and funds to another clearing member; (2) take control of or liquidate the clearing member's proprietary positions; (3) apply the clearing member's margin deposits and security deposits (below) to the failed obligation; and (4) invoke any parent guarantee.<sup>49</sup>

If the above procedures are insufficient to satisfy the defaulting clearing member's obligations, the clearing house must resort to back-up financial arrangements that go beyond the margining requirements, comprising (a) liquid net worth; (b) ex ante security deposits paid in by clearing members by way of a guarantee fund; (c) ex post assessments or capital calls and (d) catastrophe insurance (if any).

One should add that the US derivatives exchanges have broad discretionary powers to deal with market emergencies quite separate from the clearing house procedures to deal with defaults by individual clearing members. For instance, if the CME determines that there exists an emergency which threatens the integrity, liquidity, or orderly liquidation of any contract, it may, inter alia, terminate trading, liquidate positions, modify trading hours, fix the settlement price at which contracts are liquidated and/or require additional margin.

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<sup>48</sup> See *The Financial Safeguard System*, CME, 1996, pp. 6-7.

<sup>49</sup> *Ibid*, p. 6.

## **VII. CONCLUSION**

US Derivatives clearing houses have developed advanced risk management techniques aimed at minimising counterparty risks vis a vis clearing members. A comparison of the financial and operational safeguards adopted by the CME, BOTCC and OCC reveals some important differences, notably in corporate structure and in the scope and form of financial back-up arrangements. However, the three clearing houses share a common approach to margining requirements, although even here there are some significant disparities, for instance with respect to gross versus net margining, margin eligibility criteria and the intensity of intraday risk management.

Perhaps the greatest concern relates to the possibility of a settlement bank failure. It was noted in Section 4 that for each clearing house there are significant time gaps between (a) settlement banks irrevocably crediting the clearing house's account and (b) actual transfer of final funds through Fedwire, thereby exposing the clearing house to settlement bank counterparty risk. In this context the Parkinson Report suggests that "a settlement bank's default ..... could be perilous if the bank was utilised by multiple clearing members which owed large amounts to the clearing house or if the settlement bank was also relied upon heavily as a guarantor of other clearing members or a provider of liquidity to the clearing house or many of its members".<sup>50</sup>

The overall safety record of US derivatives clearing houses is impressive. No customer of a US futures exchange has lost money due to the insolvency of a clearing member since the inception of the CFTC in 1974. For the major futures clearing organisations this unblemished record goes back a good deal further. In the nearly 100- year history of the CME and its predecessor organisation, no clearing member has failed to meet a margin call and there has never been a failure of a clearing member resulting in a loss of customer funds. The BOTCC's record, too, is untarnished, although in 1992 the clearing house had temporarily to utilise its own resources when a clearing member (Lee B. Stern and Co) failed to meet a margin call on time. Similarly, since its inception in 1973 the OCC has experienced only one clearing member default (H.B. Shaine in 1987) that caused the clearing house to draw on its clearing fund.

One explanation for the successful safety record of the US clearing houses is that market forces themselves promote high standards of prudential self-regulation. An essential condition for sound clearing and settlement procedures is that incentives to monitor and control risk should coincide with the capability to fulfill the monitoring/control function. In terms of the BIS' recommended minimum standards for netting schemes, "... procedures should ... ensure that

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<sup>50</sup> Clearing Arrangements for Exchange-Traded Derivatives, op.cit., p. 33.

all parties have both the incentives and the capabilities to manage and contain each of the risks they bear...<sup>51</sup> In general, clearing houses are structured to conform to this principle. The clearing house is typically owned by its members who have the incentive and capability to monitor and control its risk procedures. The clearing house has a reciprocal incentive and capability to monitor and control risks incurred by its members. The members have some incentive to monitor each other based on mutualisation of losses through loss-sharing rules. Where the financial back-up arrangements include insurance cover the insurance company also has the incentive and capability to monitor clearing house risks. Finally, in seeking to establish a high credit standing in the marketplace, a clearing house may wish to secure a AAA credit rating from one or other of the major rating agencies, as both the BOTCC and the OCC have recently done.<sup>52</sup> In such cases the rating process provides an additional market discipline.

Given the apparent effectiveness of market discipline, what is the rationale for official regulatory oversight of US derivatives clearing houses? Traditionally, the CFTC/SEC have focused on investor protection, with a strong emphasis on capital adequacy requirements for market intermediaries as well as segregation rules governing customer assets. However, the regulatory authorities have not applied detailed prudential rules or uniform minimum standards to clearing houses themselves, rather leaving it to the latter to develop their own financial safeguards, subject to CFTC/SEC approval.

The Barings collapse of 1995, by highlighting for the first time the cross-border systemic dangers associated with derivatives clearing and settlement, raises questions about the most effective approach to regulating derivatives clearing houses.<sup>53</sup> At the same time the Group of Thirty, in a recent study of systemic risk, has called on supervisors to develop minimum prudential standards for exchanges, clearing houses and settlement systems, while proposing that the financial services industry itself should play a more proactive

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<sup>51</sup> Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries, Basle, November 1990, p. 26.

<sup>52</sup> Only four exchanges/clearing houses worldwide are currently rated. One reason is that clearing houses do not issue public debt. In addition, clearing members tend to be sophisticated financial institutions who are in a position to make their own credit assessments. The leading rating agencies have, however, developed criteria for this purpose: see *Rating Exchanges and Clearing Houses*, Standard and Poor's, *op.cit.*, and *Credit Risks of Clearing Houses at Futures and Options Exchanges*, Moody's Investors Services, June 1995.

<sup>53</sup> See Richard Dale, *Derivatives Clearing Houses: the Regulatory Challenge*, *Journal of International Banking Law*, February 1997, pp. 46-55.

role in developing global risk management standards for individual firms.<sup>54</sup> In other words, there is a case for arguing that, in the US as elsewhere, the present balance between official regulation of individual firms and self-regulation of clearing houses, is tilted the wrong way. According to this view regulators should focus their efforts on ensuring that the financial infrastructure - embracing clearing, payments and settlement systems - is sufficiently robust to withstand individual institutional failures, while the industry plays an active part in developing uniform principles of risk management to be adopted by market participants. In this way regulators would be able to concentrate on the truly systemic issues, leaving the markets a greater role in the formulation of industry prudential standards.

At the international level, there are several alternative approaches to ensuring the adequacy of clearing house's prudential safeguards. The Windsor Declaration together with recent initiatives of the Futures Industry Association have favoured what might be described as a 'disclosure regime'.<sup>55</sup> The idea here is that good practice guidelines on operating procedures coupled with disclosure of prudential risks and financial safeguards will encourage market participants to choose the best regulated - or self-regulated - exchanges and clearing houses to conduct their business. In the words of Mary Schapiro<sup>56</sup>, former CFTC Chairman:

“Markets that do not maintain what are perceived to be “best practice” in risk containment may well find that their competitive position is harmed by a “migration” of business to those markets that do have such prudential protections.”

However, this approach is open to the objection that market participants, whether clearing members or customers, may instead seek out exchanges and clearing houses with the lowest margin requirements and transaction costs.<sup>57</sup> This danger could be avoided by adopting a 'minimum standards regime' of the kind, for instance, set out by the Lamfalussy Report in relation to cross-border and multi-currency netting and settlement schemes.<sup>58</sup> The problem then is to formulate a minimum standards framework that could be applied to

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<sup>54</sup> See Global Institutions, National Supervision and Systemic Risk, A Study Group Report, Group of Thirty, Washing DC, 1997.

<sup>55</sup> See generally, Richard Dale, *Derivatives Clearing Houses: The Regulatory Challenge*, op.cit.

<sup>56</sup> Mary Schapiro, *Comments on CFTC Discussion Paper on Default Procedures*, Windsor, UK, May 1995, p. 3.

<sup>57</sup> See Note 55 at 54.

<sup>58</sup> Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries, Bank for International Settlements, November 1990.

derivatives clearing houses.<sup>59</sup> In this context, the US clearing organisations, with their long-established record of successful risk management, might be viewed as an appropriate regulatory model. To an extent the US approach is already being adopted elsewhere, as the more recently established exchanges and clearing houses incorporate features of the US regulatory regime, such as the SPAN/TIMS margining systems. On the other hand, the adequacy of financial back-up arrangements might need to be addressed since in this area US practice is uneven and a uniform minimum solvency standard may be desirable.<sup>60</sup>

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<sup>59</sup> See William Hanley, Karen McCann and James Moser, *Public Benefits and Public Concerns: An Economic Analysis of Regulatory Standards for Clearing Facilities*, Federal Reserve Bank of Chicago Working papers, December 1995. The authors propose what they describe as “necessary” standards for clearing organisations, based on the Lamfalussy Report’s analytical framework.

<sup>60</sup> On the possibility of measuring the adequacy of clearing house resources to resolve member default(s), see Andrea Corcoran, *Developing Financial and Operational Performance Standards for Exchange Markets: A Modest Proposal for an International Dialogue*, in *Symposium on Risk Reduction in Payments, Clearance and Settlement Systems*, Goldman Sachs, January 1996, pp. 123-132.



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