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Public Benefits and Public Concerns: An Economic Analysis of Regulatory Standards for Clearing Facilities

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An Economic Analysis of Regulatory Standards for
Clearing Facilities**

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ABSTRACT

Significant innovations are being proposed for clearinghouse operations. The concentration of payments and transfers which occur in a clearinghouse operation creates an important reliance on the operations of these facilities. This paper contends that the structure of these facilities affects their performance. Fragilities not addressed by internal structural approaches may require regulatory oversight. Following this analysis, the paper proposes regulatory standards. These standards are organized around five risk areas: legal risk, credit risk, liquidity risk and operational risk.

**Public Benefits and Public Concerns:
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I. INTRODUCTION

Clearing facilities have propagated due to the economic benefits they offer. By centralizing information, recordkeeping, payments and/or risks associated with credit and liquidity, they provide scale economies and improve the flow of information. Clearing facilities concentrate activities which would otherwise be performed by many institutions, creating increased reliance on the performance of a few institutions. This reliance can increase the fragility of the financial system. This fragility is sometimes referred to as "systemic risk." This paper is a response to the regulatory concerns posed by clearing facilities. Our goal is to provide an economic foundation for regulatory standards for clearinghouses and, consistent with this underlying basis, to provide standards which can be applied to clearing facilities in a wide range of applications.

The "Lamfalussy Report"¹ is widely regarded as defining the regulatory standard for clearing facilities. Written by a committee composed of representatives from the Bank for International Settlements and from the central banks of the G10 nations, the Lamfalussy Report established minimum operating standards for facilities clearing foreign exchange contracts. Since its publication in 1990, the six standards of the document have come to be regarded as the regulatory basis for *all* clearing facilities. Such an extension is beyond the stated intent of the original document.

Innovations Have Increased the Role of Clearing Facilities

Though the Lamfalussy Report provides a thorough review of how the public interest is affected by the presence of a clearing facility, several developments have accelerated clearing facility innovations beyond the areas covered by the Lamfalussy Report. First,

¹"Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries," Bank for International Settlements, November 1990.

regulatory policy has influenced innovation. In 1976 the Commodity Futures Trading Commission (CFTC) stated its requirement that futures contracts clear through multilateral facilities. The extension of futures contracting into new areas has elevated awareness of the value added by futures exchange-style clearing systems. Naturally, innovators are making efforts to extend these advantages into other derivative markets, in particular the over-the-counter (OTC) markets. Furthermore, the rapid growth of the OTC derivatives market may have made significant scale economies available for clearing these contracts.

Public policy plays a less direct role in the choice of clearing mechanism. Present Bank for International Settlements (BIS) capital requirements increase incentives to clear through multilateral facilities. Such arrangements obtain zero-risk weights for capital required against the credit exposures from derivatives positions. In addition, tax treatments dependent on timing of cash flows create incentives to select clearing and settlement procedures which obtain preferential tax treatments.

Second, policymakers have signaled an interest in multilateral facilities as a means of controlling systemic risk. This regulatory view of multilateral clearing is enunciated in the Federal Deposit Insurance Corporation Improvement Act (FDICIA); the provisions of FDICIA strengthen the enforceability of netting arrangements. In addition, the Federal Reserve's Policy on Large Dollar Net Settlements incorporates the minimum standards recommended by the Lamfalussy Committee.

Finally, innovation has significantly broadened the scope of services provided by clearing organizations. Clearing organizations of today offer selections from a service menu which includes: trade acknowledgment, third-party contract valuations, third-party collateral management, netting arrangements, guarantees of contractual performance and surveillance of counterparties. Significantly, recent proposals suggest that this menu of services will be made available for a much broader array of financial contracts. The performance of these services can have implications for the operation of the financial system.

Broader Standards are Needed in the Current Environment

The pace of recent innovations raises the concern that clearing operations may increase the fragility of the financial system. Specifically, five categories of risk to the financial

system exist which may be magnified due to the presence of multilateral clearing facilities. These categories are: (1) legal risk; (2) credit risk; (3) liquidity risk; (4) operational risk; and (5) cross-system risk. The analysis of the Lamfalussy Report initiated consideration of these risks and proposed minimum regulatory standards in those areas which posed concern for markets for foreign exchange contracts. Recent innovations and the need for standards applicable to other markets, especially markets for derivative contracts, suggest the need for more comprehensive standards in the first four areas and standards relevant to cross-system risk.

Underlying our analysis is an understanding that central banks will remain lenders of last resort. It is well understood that this lending role weakens the incentives of individual institutions to adequately manage risk. These weakened incentives result in a need for regulation in order to prevent disruptions to the financial system; that is, through regulatory oversight, to curtail "systemic risk." Hence the standards offered in this paper are intended to thwart the systemic risks which can arise from the operations of a clearing facility.

We also revisit areas covered by the Lamfalussy committee. Our standards for legal, credit, liquidity and operational risks are intended to increase the focus on conclusions expressed in the Lamfalussy committee's analysis. It is not our sense that the present employment of the Lamfalussy Standards poses an immediate concern. Much to the contrary, the umbrella of safety afforded by those standards offers the industry, regulators and academics an opportunity to discuss the appropriate regulatory role in setting comprehensive standards for clearing facilities. We intend for this paper to provoke such a discussion.

II. FOUNDATIONS FOR REGULATORY STANDARDS

Functional and Conceptual Definitions

As a starting point in our analysis, we assume that contract counterparties share incentives to select clearing procedures which are cost effective. Costs which will be considered by these firms include any direct costs entailed in clearing their contracts plus any deadweight losses incurred when contract counterparties fail to perform. Firms will seek out procedures which lessen these combined costs. It is further reasonable to assume that as the

number of contracts increases, economies of scale and scope in clearing are likely to arise. The presence of these economies will accelerate investment in the development of improved clearing facilities. This characterization leads to the proposition that free entry and exit into clearing associations dictates that firms will affiliate with clearing systems which minimize their clearing and settlement costs.

Netting

The engine driving creation of these scale economies is netting. Netting is the process of consolidating the obligations of registered transactions between counterparties. Netting simplifies the gross obligations existing between counterparties, thereby lowering the cost of managing outstanding obligations. This subsection explains this simplifying process, the subsection following then covers how novation accomplishes further simplification.

Netting can take various forms and the extent of its scope is dependent on the allowable netting arrangement. Applicable only to like transactions, new obligations are incorporated into the running total (either reducing or increasing it) leaving participants with a “net” obligation to each other. Absent a default by either party to the contract, netting allows for the total obligations arising from those contracts to be met via a single payment.

When such a payment occurs with regularity over the life of the contracts it is referred to as a periodic settlement. On futures exchanges, this settlement occurs daily and is known as “marking to market.” Participants in the OTC derivatives market may choose to mark to market on a weekly or monthly basis, or not at all. This process mitigates exposure to accumulations of losses by one party to the contract which may result in their default. In contrast, a final settlement occurs when delivery or payment is made on a futures contract, or delivery of foreign exchange is received from an FX swap contract. This construction emphasizes that there are two sets of relevant cash flow obligations: those which are due immediately, and those which are due in future periods.

Classification of payment obligations as immediate or deferred defines two netting possibilities: *payment netting*, in which payments immediately due are net; and *contract netting*, in which contracts requiring future payments are net.

Payment netting arrangements have certain implications for the payments system.

Aggregate loss is the sum of the differences between required payments due to each participant in the system and the payment amounts which are actually made. The distribution of these losses among the participants may have significant secondary effects. These secondary effects, failures to pay on contracts resulting from failures to receive on other contracts, are referred to as loss propagations. Because payments made to and received from clearinghouses are concentrated in short intervals of time losses can propagate rapidly, protections should be immediately applicable.

Contract netting systems have different implications for the payment system. Losses will be determined by the amount immediately due (as above) plus the present value of the sum of differences between values of anticipated cash flows and cash flows realized on contract default. The deferred portion of payments on contracts is referred to as the contract's "replacement value." In addition, failure of contracts established as offsets to other contracts implies re-exposure to original risks. These offsets can be presumed valuable as costs are incurred to obtain these offsets. The replacement value of these offset contracts will incorporate the cost of obtaining replacement contracts.

Both forms of netting offer economies. If A owes B \$5 and B owes A \$2, their obligations can be completed by making the respective payments. If payment transactions are costly, a cost reduction is obtained by netting the two due amounts. This "payments net" allows A and B to complete their respective obligations on payment of \$3 from A to B. Additionally, if A has *five* contracts to buy 100 bushels of corn from B in one year and B has *three* contracts to buy 100 bushels of corn from A in one year, their respective contracts can be netted so that A is obligated for *two* contracts to buy 100 bushels of corn from B in one year.

The distinction between these nets is more than one of semantics. Failure of a net payment exposes counterparties to *liquidity risk*, the risk that a solvent counterparty is temporarily unable to make a required payment. Alternatively, the possibility that either A or B may be unable to complete obligations due in one year poses a *credit risk*, the possibility of loss resulting from a counterparty's failure to meet its financial obligations. Each of these risks have unique systemic implications and their management should thus be considered

separately.

Distinctions between types of netting also extend to the number of counterparties involved in a net. *Bilateral netting* simplifies the payment or contractual obligations existing between pairs of counterparties. The principal economies resulting from bilateral netting are reductions in the cost of making payments and reductions in the opportunity costs associated with maintaining collateral deposits. *Multilateral netting* extends these economies by simplifying existing payment or contractual obligations across more than two counterparties. Pursuit of these economies plays an important role in motivating private investment in clearing facilities. Public interests become involved when pursuit of lower costs results in exposure to loss by parties which are not affiliated with the clearing facility. The central bank's lender-of-last-resort role is an attempt to socialize costs imposed by these externalities. The need for regulation arises from the weakening of incentives which can stem from below market pricing for central bank lines of last-resort credit.

With these concepts established, further insight to netting operations on exchanges and OTC can be developed. OTC derivative contracts can be distinguished from futures exchange contracts, in part, by their degrees of standardization. The standardized contracts traded on futures exchanges are relatively simple to net and mark to market. Customized OTC contracts are difficult to net and to mark to market. Their more opaque nature, in conjunction with the rapid growth of this market, elevates concern about the systemic implications emanating from extension of clearing facilities to include these contracts.

Novation

Novation is a legal device used to facilitate a higher order of netting. The term, when applied to clearing systems, describes a *legal* substitution of gross obligations by the net of these obligations, subject to a netting agreement. When contracts are simply *netted*, the contracts themselves continue to exist. Even though the counterparties may regard their obligations as being offset, a payment obligation may be restored on default of a counterparty to a contract offset. Alternatively, when contracts are *novated*, the original contracts are extinguished by subsequent transactions creating new, consolidated contract(s). Consider two

contracts in a multilateral netting scheme. The first contract requires A to sell 5 widgets to B, and the second requires A to buy 5 widgets from C. By multilaterally netting, the resulting obligation would require B to buy five widgets from C, and A to do nothing.

Without novation, if B does not perform on the settlement date, A is still obligated to buy 5 widgets from C. This would be true even though A's *net* obligation was zero going into the settlement period.

Alternatively, had novation occurred, A's holding of a contract to sell 5 widgets to B would have been *anceled* by the purchase of a contract to buy 5 widgets from C, resulting in a replacement contract requiring B to buy from C, representative of the total obligations. A's net obligation would be equivalent to A's gross obligation, and the same would be true for B and C.

The above example illustrates that the significance of novation increases when credit risk implications are considered. For example, suppose A and B are strong credits while C is a weak credit. Contract novation creates a direct exposure for B from the new contract with C. Where previously B had an indirect exposure to C (C's failure in the contract with A could affect A's performance in its contract with B) B is now directly affected by C's failure; this exposure is involuntary in the sense that B did not choose to trade with C.

The resultant credit exposures arising from novation have important effects on the incentives to enter into a multilateral netting agreement. Creation of involuntary direct credit exposures reduces incentives to enter into a multilateral netting agreement. A direct credit exposure is the risk of loss owing to the operations of the counterparty. The possibility that contract novation may assign an unsuitable counterparty will deter involvement with a clearing facility.

Introducing an intermediary (or central counterparty) may lessen credit exposure problems. Suppose a counterparty exists whose credit quality is equal to (or exceeds) the strongest of the three counterparties (A, B, or C). None of the three will object if all contracts between the three are replaced by contracts with the central counterparty. Contracts requiring A to sell to B become contracts requiring A to sell to the central counterparty and B to buy from the central counterparty. Contracts requiring A to buy from C become contracts requiring C to sell to the central counterparty and A to buy from the central counterparty.

There is no objection to this arrangement because each original counterparty buys or sells as originally intended, but does so with a counterparty whose credit quality equals or exceeds the credit quality it had under the original set of contracts. Such centralization improves financial system transparency by routing all transactions through the central counterparty. Centralizing the credit decision-making process can potentially mitigate the threat of *systemic risk* – the possibility that failures may cascade owing to an implicit mutual reliance on the credit decisions of others. The risk-reducing benefits offered by the presence of a central counterparty are contingent upon the credit quality of the central counterparty being at least equal to that of the most creditworthy participant.

Implications Stemming from Clearing Facilities' Services

Summarizing to this point, the netting activities of clearing facilities are: (a) clearing and settlement of *payments* bilaterally or multilaterally and (b) clearing and settlement of *contracts* bilaterally or multilaterally. These netting services are supported by the other activities of the clearing facility; i.e., trade acknowledgment, contract valuations, handling of collateral, guarantees of contract performance, and surveillance. Each of these services has value to the counterparties involved.

Performance of these services does entail some ancillary considerations. First, there must be a means for rapidly resolving disputes between parties. Slow resolution procedures will imply payment delays which reduce the value of participation in the clearing facility. Second, contract valuations must be objectively obtained. When valuations favor certain participants, losses are shifted to others. The risk of this loss shifting reduces the value of participating in the clearing facility. Third, the financial strength of the clearing facility must be consistent with its financial duties. The clearing facility must be capable of determining, on a timely basis, the due-to and due-from amounts for all participants of the facility. In addition, the clearing facility must be capable of managing its exposures to risk.

Clearing facilities can also be thought of as nodal entities in two ways. First, the routing of payments and deliveries through a clearing facility creates a choke point. Failure at these nodes has then, by definition, systemic implications. Because operators of the clearing facility can foresee that these implications can be significant, they may form

expectations of central bank intervention. This prospect encourages them to rely more on the lender of last resort and less on careful management of risk exposures. Thus, moral hazard problems exist which have systemic implications. As Parkinson (1992) points out, this moral hazard problem implies that a poorly structured clearing facility can elevate systemic risk.

The clearing facility is also nodal in an informational sense. Regarding payments and deliveries as data, the clearing facility becomes a repository of credit information. The record of timeliness on delivery and payment obligations is indicative of the financial strength of a contract counterparty. Significant economies are achieved by centralizing the collection and storage of these data. These economies stem from the elimination of redundant collection and storage facilities operated by counterparties in a bilateral system. In the absence of a central clearing facility, this information is diffused across counterparties. A weak counterparty may be able to stave off failure by renegotiating with its individual counterparties. Were these counterparties aware of its vulnerability, none would agree to new terms. Centralization results in more efficient utilization of this information. Thus, as pointed out by Gorton (1985), clearing facilities are a Coasian solution to an information problem.

This nodal perspective highlights the usefulness of a tradeoff between the social benefit of improved use of information and the social cost of heightened systemic risk owing to the moral hazard problem. Regulators manage moral hazard problems by influencing the organization structure. This regulatory approach is intended to improve the terms of the tradeoff.

Legal Environment for Clearing Facilities

The legal environment governing contracts affects the performance of a clearing facility. The legal environment determines how contracts can be created and terminated. Legal requirements for creating contracts are governed by a legal hierarchy. This hierarchy reflects various refinements of rules. Exchange rules or standardized contract agreements are the highest level of this hierarchy. Below this are regulations governing the activities of counterparties. Finally, there is contract law. The priority of these rules must be strict. Priority is important because the presence of a hierarchy stems from the need for rules which address the specialized needs of a particular market structure. Should rules of a lower level

override those of the higher level, these specialized needs may not be met.

As already discussed, the simplification obtained through novation reduces the cost of managing contract positions. For novation to be effective, contracts created through novation must have the same standing as contracts created directly between counterparties. Absent equivalent standing, contracts with the higher standing dominate. Thus, unequal legal standing of contracts would impede the simplification of contracts obtained from netting.

Legal requirements for terminating contracts are also important. Since contracts are terminated via either completion of their terms, novation, or default, the legal standing in each case must be addressed. In a default situation, legal recognition of *close-out* netting greatly facilitates the termination procedure. Close-out netting provides that upon the default of a counterparty, all outstanding obligations are net with their respective counterparties and those net obligations become binding. This procedure prevents cherrypicking.²

The hierarchy of rules stipulates remedies for contracts terminated through default. These rules must address several key areas of concern. First, provisions are needed for the disposition of the collateral deposits placed by the defaulting counterparty. Second, authority is needed to liquidate the outstanding contracts of a defaulting counterparty to meet its payment deficiencies. The goal is to make resources available from termination of contracts available to cover counterparty losses. The next subsection covers the impact of clearing facility structure on performance.

Organization and Performance of Clearing Facilities

The structure of a clearing facility affects its performance. These structural items are a first line of defense against failure. The two primary structural items are (1) the contracts themselves and (2) the definition of the loss-sharing arrangement.

Contracts posing high levels of risk increase the importance of risk-management facilities. Thus, clearing facility risk exposures can be managed through contract design. For example, contract design affects the liquidity of markets for these contracts. Defining

² In futures exchange markets, on default, all the outstanding contracts of the defaulting party can be immediately closed out and proceeds applied to cover any losses incurred. As an exception to usual bankruptcy law, exchanges have priority claims on the proceeds of a contract liquidation.

liquidity as the ability to transact at low cost during adverse market conditions, liquidity affects the cost the clearing facility incurs when it closes out the positions of defaulting members. When these costs are high, recovery of loss amounts is impaired resulting in further weakening of the financial ability of the surviving participants to the clearing system.

Clearing facilities define loss-sharing arrangements in order to allocate losses. Organization of loss-sharing arrangements (centralized versus decentralized) alters the incentives of participants. Centralized loss-sharing mutualizes risk. Thus, clearing facility participants have incentives to restrict the risk-increasing activities of other participants. Decentralized loss-sharing diffuses exposure; loss exposures are limited to those realized between immediate counterparties; i.e., they remain bilateral.

Centralized loss-sharing

Under centralized loss-sharing arrangements, participants can suffer losses regardless of their contract counterparties. Since any losses sustained are distributed across the participants, individual members have weak incentives to bear the cost of determining the financial strength of their counterparties. However, because participants have exposure to the decisions of any other participant, all have incentives to cooperate in managing their mutual exposure to risk. Cooperation comes in the form of association-imposed standards aimed at reducing risk. This cooperation, in conjunction with arrangements which centralize credit information, results in effective risk management.

These association-imposed financial standards employ four primary instruments to manage clearing facility risk exposure when loss-sharing is centralized: (1) capital standards; (2) collateral standards; (3) mark-to-market procedures; and (4) limitations on positions. The choice of which instruments are used is dictated by the type of netting (contract or payment) done by the facility.

Participants in centralized loss-sharing arrangements place capital resources in the clearing facility so that these funds can be used to cover losses. The loss exposure of any participant is proportional to their contribution to the pool of capital. Capital standards define what positions must be capitalized, the amount of required capital, and where and in what form it must be held. Capital standards define a required buffer against loss. The strength of

this buffer is directly related to the amount of capital required. In addition, capital standards augment the alignment of interests between each participant and the joint interests of all participants. Monitoring participants for their compliance with required capital levels provides the clearing facility with a measure of each participant's financial ability and ensures the continuation of their alignment of interests.

Collateral standards ensure that a provision exists for surety against loss on the outstanding positions of participants. Collateral standards should include consideration of the required amounts of collateral, ownership rights, definition of acceptable collateral, methods by which collateral requirements may be fulfilled, and the location of these deposits.

Facilities that net deferred contracts manage their exposures by marking contracts to market. As previously described, marking contracts to market decreases the potential for loss accumulation. The frequency of these marks balances two concerns. The first is the potential for credit risk accumulation. Since the extent of this accumulation increases with the time between marks, risk avoidance dictates a frequent marking of contracts to market. The second incorporates the cost of making these payments. These costs are the direct costs of transferring funds through the payment mechanism and the indirect cost incurred when brokers lose opportunities to offset outstanding contracts with newly arriving orders. Recognition of these costs leads to less frequent marking of contracts. The clearing facility can reduce its participants' costs by increasing the time between marks, but doing so elevates the risk of large loss accumulations. To manage this tradeoff, the clearing facility may choose to increase its monitoring activities.

Finally, position limits control the exposure of the clearing facility to each participant. These position limits serve to keep the risks implied by a participants' outstanding positions in accordance with their capital levels.

A primary strength of a centralized loss-sharing structure is that information flows are centralized via a clearing facility. This centralization of information lowers the cost of monitoring for risk buildups, that may result in systemic problems. However, the criticality of the continued operations of a clearing house may lead to moral hazard problems. The clearing institution may become "too important to fail." The threat of failure creates reliance on any explicit or implicit safety net arrangements. The ability to rely on the safety net

weakens incentives to adopt adequate measures to control loss exposure, creating a moral hazard. Moral hazard problems establish the need for regulation.

Decentralized loss-sharing

Decentralized loss sharing diffuses exposure. Hence, counterparties manage these exposures by monitoring each counterparty. To keep the cost of this monitoring activity low, firms can limit the number of potential counterparties. Clearing facility participants have weak incentives to restrict the activities of participants with whom they do not transact. This can be problematic if the facility centrally manages liquidity exposure. In a default situation, all members may be called upon to provide liquidity. However, the presence of the safety net induces participants to place increased reliance on that vehicle for resolving systemic problems, reducing incentives to adopt adequate safety measures. This implies moral hazard problems at the participant level. Inability of regulatory authorities to measure, and therefore to manage, this dispersed exposure heightens the significance of this threat.

Decentralized loss sharing arrangements can also impact market liquidity. Participants have incentives to trade only with highest quality counterparties. This incentive fragments markets, making each fragment less liquid. These market fragments are more likely to propagate shocks, thus rendering decentralized facilities of concern to regulators.

Clearing Facility Structure Dictates Standards

The preceding analysis provided justifications for the existence of regulatory standards relating to clearing facilities. The following section addresses the difficulties inherent in attempting to expand the Lamfalussy standards significantly beyond their original intended purpose.

As discussed, the presence of a central bank willing to assume the role of lender of last resort creates potentially significant moral hazard problems. Minimizing reliance on the safety net is a goal of regulation which can be attained only through ensuring that the structure of clearing facilities is sound and well-suited to the activity envisioned. Thus, the design and control mechanisms of a clearing facility for multilateral netting have significant risk implications. Mismanagement and inadequate identification of these risks may give rise

to an adverse situation with systemic implications.

Consequently, regulatory standards for clearing facilities should concentrate on the structural attributes of these organizations. First, the regulatory authority should recognize the economic contribution made by the clearing facility. Standards imposed should lead to structures capable of withstanding economic shocks. Second, costs imposed by regulatory standards should be commensurate with the public loss incurred should they fail. Excessive costs will limit access to the public benefits these facilities can provide. Finally, effective standards should result in appropriate risk allocation, aligning the interests of the participants and the facility. When structured properly, this will result in firms internalizing those costs which may have otherwise been shifted to the public; mitigating the moral hazard problem.

Section IV of the paper proposes standards for clearing facilities which address these issues. Not every standard is applicable to every facility; applicability is determined by the facility's structure. Five areas of risk exposure are identified and standards addressing these are presented. These standards define criteria which, when properly implemented, will dramatically curtail the potential systemic threats posed by a clearing facility for multilateral netting systems. These standards are designed to ensure that the risks are borne by those with the incentive to contain them.

III. Lamfalussy Standards & Applications

The Lamfalussy committee identified six operating standards for the operation of “cross-border and multi-currency netting and settlement schemes.” These standards were developed with the financial integrity of a foreign exchange clearing house in mind.

The six standards address safeguards necessary to protect against legal, operational, credit, and liquidity risks. It is stressed in the report that they represent *minimum* standards and should not be taken as a statement of best practices for safety and soundness. Developed with a focus on interbank payment orders and foreign exchange transactions, the Committee suggested that the standards may provide a “useful starting point for the consideration of risk-management procedures for funds settlements associated with clearing arrangements for other financial instruments.”

Our analysis was greatly facilitated by being able to use the Committee's work as a

starting point for developing a framework for creating standards which can be applied more broadly than the original six, and which incorporate consideration of many of the innovations and systemic threats which have arisen since the Lamfalussy standards were published in 1990. In extending the Committee's work to a more specific set of standards, we have reexamined the analysis provided in the Lamfalussy Report. The most striking feature of the Committee's analysis is the depth to which both deferred contract netting facilities and payment netting facilities were examined. In addition, the analysis reviews schemes with centralized risk management and loss sharing as well as those with decentralized risk management and loss sharing. Unfortunately, the distillation of the analysis into six brief standards has meant that many of their more specific observations have been overlooked. Our intention has been to build upon the analysis and formulate a framework for assessing the viability of clearing facilities in general, expanding beyond foreign exchange netting.

It is worth noting that the Lamfalussy standards tend to reflect payment system issues. The chief concern of the committee appears to have been the systemic implications of a payments failure of the clearing house. This is manifest in the oft-cited Standard IV, commonly referred to simply as the "largest net debit" standard. The nature of payments netting suggests that the failure of one counterparty to pay immediately results in an immediate loss to the recipient counterparty.

Alternatively, in a deferred contract netting system, this translation is not necessarily the case. OTC derivatives dealers often use collateral and marking to market procedures to reduce counterparty credit exposure. Failure to meet a collateral call for an OTC contract, however, is not necessarily equivalent to default. In fact, the decision to terminate OTC derivative contracts in the event of failure to post margin is only acted upon in the extreme. Trade association master agreements aside, there is no set time limit in place for posting collateral to OTC derivative contracts; it is usually left to the counterparties themselves to determine. The decision often incorporates business marketing factors along with credit concerns.

Therefore, in a deferred contract netting scheme, the "largest net debit" standard is not a loss sharing standard. Failures to meet margin calls are not immediately translatable into liquidity threats for other counterparties. Though failure to meet a call for collateral may

represent a liquidity problem for an individual counterparty, it does not follow that this liquidity problem is system wide. Despite this, certain applications of the standards interpret Standard IV as having implications for loss sharing. In fact, the six standards do not directly address the issue of loss sharing; their primary focus is on liquidity issues.

The Lamfalussy framework has been applied in several studies of clearing house facilities. These studies use a common approach in adopting the six standards as a proxy for the Lamfalussy framework. As discussed above, this approach is not always warranted as the six standards were adopted with a foreign exchange netting and settlement facility in mind. When the authors of these applications reach difficulties in applying the six standards to situations for which they were not intended, the result is often to omit the awkward standard and to focus instead on those standards that appear more appropriate to the clearing facility under review.

This approach does not always have a satisfactory result. Each application becomes not just a review of the soundness of the clearing facility, but also a study of the usefulness of the six standards. We were unable to locate an application wherein the Lamfalussy framework was applied beyond the wording contained in the original six standards.

Our goal is to develop a generalized approach which can be comprehensively applied across clearing facilities. We have avoided the arbitrary choice of a handful of standards and instead have focused on the Lamfalussy framework as the basis for our work. We believe that the awkwardness attendant to applying the Lamfalussy standards to non-foreign exchange clearing facilities has provided regulators with a temptation to develop new criteria for the evaluation of netting facilities that are not based on the Lamfalussy framework and are not consistent among regulatory authorities. Such new criteria may attempt to achieve sufficiency standards beyond the Lamfalussy minimums, but without a consistent framework these standards might result in an uneven playing field, or worse, systemic implications for the cross-border payment system.

IV. PROPOSED STANDARDS FOR CLEARING FACILITIES

The analysis of the control mechanisms employed by clearing facilities and their incentives to utilize these mechanism is the basis of the standards proposed in this section.

The section, in many instances re-states insights developed by the Lamfalussy Committee. These instances are identified. In other instances we restate the standards developed by the Committee in order to highlight different aspects. Our approach differs from that of the Committee in that we are not proposing minimum standards, but necessary standards. The proposed standards are organized around five risks having systemic implications. Thus, we believe our standards will more closely match the requirements likely to be imposed on a proposed clearing organization. However, our standards should not be regarded as sufficient in that specific applications will quite likely introduce considerations too detailed for the level of generalization adopted here.

The standards proposed here are organized around the five risk categories identified in the previous analysis. Standards applying to all facilities are listed first, followed by standards whose applicability depends on the type and extent of a facility's centralization. Thus, requirements for a clearing facility will depend on its centralization.

LEGAL RISK

Legal risk stems from conflicts between the duties and rights of participants and the duties and rights of the clearing facility. Clearing facilities should minimize exposures to legal risks. Because liabilities are determined by the loss-sharing arrangement adopted by the facility, acceptable standards for controlling legal risk will depend on the form of the loss-sharing arrangement.

All Loss-sharing Arrangements:

The clearing facility and its prospective participants must each provide assurances that they both can and will be bound by the rules and procedures established by the facility and the laws of the jurisdiction in which the facility is domiciled.

The Lamfalussy Standards require a "clear understanding" of the netting arrangements. This standard imposes a higher burden by requiring *ex ante* demonstrations by the parties to the arrangement that their legal rights and responsibilities under the agreement are understood. Only by obtaining such assurances can the management of a clearing facility be confident that the actions required of them in a default situation can be carried out swiftly, minimizing risk to other participants caused by a delay tied to legal disputes.

This standard is necessitated because legal systems differ across countries.

Regardless of the respective legal systems, participants to a netting facility should be assured of equivalent standing in contracts cleared through the facility. Failure to adhere to this standard (1) increases the costs of participants by weakening the ability of counterparties or the clearing facility to recover losses incurred in certain jurisdictions, and (2) gives rise to a situation of uncertainty which, if not resolved in a timely fashion, could subject uninvolved participants to losses.

Decentralized Loss-sharing Arrangements:

Clearing facility transactions should never weaken the legal standing of a counterparty relative to its standing in a bilateral contract relationship.

This standard adopts the legal standing for bilateral contract relationships as a norm. Because decentralized loss-sharing arrangements may provide insufficient incentives to adequately monitor levels of indirect credit risk, participants may have increased exposures to these risks. Indirect credit exposure is exacerbated when legal protections afforded to surviving counterparties are weakened. The adoption of this norm argues that acceptable clearing facilities should never decrease the level of legal protection afforded to the surviving counterparties of bilateral contracts.

Centralized Loss-sharing Arrangements:

Clearing facilities must have clearly defined rights to reject trades, close-out positions, control membership and issue legally binding calls for collateral.

Clearing facilities must have the ability to control their exposures. Controls over these exposures are obtained by limiting clearing facility exposure to weak counterparties. These controls are principally obtained by rejecting trades when those trades exceed a prudential limit, restricting participation in the clearing facility to strong counterparties and collateralizing participants' exposures. The facilities' rights to engage in the activities required by these risk-reducing controls must be legally established and accepted by all participants.

Clearing facilities must have clear title to collateral deposits and prior claims to proceeds obtained from contract close outs.

Collateral deposits provide centralized clearing facilities with resources to meet their liquidity needs and serve as protection against credit risk. As one of the primary mechanisms employed to control risk exposures, the rights of a clearing facility to utilize collateral deposits can never be in question. Without this certainty, the ability of the clearing facility to minimize the losses incurred

by surviving counterparties is severely compromised.

The clearing facility must have provisions to settle disputes over its rules. These settlements must have legal standing. These provisions must enable resolution of disputes without jeopardizing settlement of amounts currently due.

Disputes between participants will occur. These disputes cannot be permitted to jeopardize the operations of the clearing facility by delaying payments. Thus, provisions must be in place for ensuring the continuation of payment obligations during the period of dispute resolution. By allowing the dispute resolution to slow payments, the clearing facility would risk weakening its financial viability and that of its participants.

Continuous involvement in the contract markets creates expertise in the norms of the trade. Disputes taken outside of the clearing facility will require that this expertise be communicated to others. Thus, disputes can be more readily handled within the clearing facility. In cases where disputes must be resolved outside the clearing facility, steps must be identified to prevent the dispute resolution procedure from weakening the clearing facility.

Contract valuations rendered by clearing facilities must be impartial.

Valuations ultimately determine gains and losses. Thus, participants have significant incentives to steer the valuation process to their benefit. The valuation process must not provide opportunities to shift losses between participants. Such loss shifting reduces the value of the clearing facility thereby limiting its usefulness. Thus, any ability of individual participants to influence the valuation of contracts must be limited, particularly in less liquid markets.

CREDIT RISK

Credit risk is the exposure to the possibility of loss resulting from a counterparty's failure to meet its financial obligations. The structure of a loss sharing arrangement determines the incentives for the extent of effort applied toward risk management.

All Loss-sharing Arrangements:

Acceptable credit risk levels for clearing facilities should never exceed the prevailing default probabilities for short-term corporate debt implied by the highest quality commercial paper.

This standard adopts a norm for levels of credit risk. The norm is justified by two considerations. First, it will generally be too costly for clearing facilities to obtain *absolute* assurances that all future obligations will be paid. Thus, an acceptable level of credit exposure must be defined. Secondly, this standard bases the cost of obtaining this level of protection at the level obtained by managers of high quality firms. Hence, the standard specifies a high level of protection as well as one that is obtainable as demonstrated in markets for short-term high-quality corporate debt.

Implementation of this standard does not require that clearing facilities be rated by qualified agencies. Compliance can also be accomplished through a demonstration that the probability of failure for a proposed clearing facility is no greater than that for the stipulated class of securities. Benchmarks can be established in several ways. The historical default rate of debt in this risk category provides a benchmark. Alternatively, models can be employed which interpret the spread between short-term, high-quality corporate debt and default-free government debt as compensation for default. These rates of compensation can be used to back out implicit default probabilities.

Procedures must be established for limiting the exposure posed by any one participant. In the event that a window of time exists between transaction consummation and implementation of the loss-sharing arrangement, this window must be clearly defined and understood by participants as part of the risk-sharing agreement.

The Lamfalussy Standards require that participants in a clearing facility have a "clear understanding" of their exposure. This standard focuses attention on the procedures which result in lags between contract inception and completion of contract processing by the clearing facility. Such lags raise questions about the respective liabilities of the clearing facility and the counterparties to the contract. The standard requires a clear specification of the liabilities of each party to the transaction.

For example, in cases where contract processing reveals that a position limit vis-à-vis the clearing facility has been exceeded, the facilities' rules must clearly prescribe which party is exposed to losses at every step of the contracts' processing.

Decentralized Loss-sharing Arrangements:

When the management of decentralized loss-sharing facilities chooses to centralize credit risk management, increased regulatory scrutiny is merited.

This standard affects clearing facilities adopting centralized risk-management systems while retaining decentralized loss-sharing arrangements. The absence

of a mutualization of risk creates a non-alignment of the interests of the clearing facilities' management and the participants. In particular, the adequacy of the facilities' fulfillment of the adopted credit risk management roles are questionable since they lack the incentives to fulfill them. Consequently, such arrangements can impair the effectiveness of the risk monitoring, increasing the potential for systemic risk.

In particular, systemic exposures can result when control mechanisms such as position limits, membership standards, or collateralization procedures are not rigorously administered. To overcome this possibility, regulators considering proposals for these facilities should require that the proposed facilities' managers demonstrate that their risk-management systems will not result in increased levels of systemic risk.

Centralized credit-risk management must never obscure the gross credit obligations of the participants.

The "clear understanding" stipulated by the Lamfalussy Standards and reiterated by the report of the Group of Thirty³ requires that risk exposures of counterparties be transparent. This stipulation is necessary to ensure that counterparties have access to all the information required to properly manage their exposures, irrespective of the clearing arrangement. Particularly when credit risk management is centralized and loss sharing is decentralized, net exposures will potentially grossly understate participants' exposures arising from the default of a counterparty. To ensure that participants are at all times aware of both their net and their gross exposures, procedures for facilitating this transparency are needed. The regularity of this reporting must be commensurate with the prospective criticality of their payment obligations.

Centralized Loss-sharing Arrangements:

Management of credit risks must be centralized. This centralization must include monitoring of participants' compliance with the clearing facility's financial requirements.

Centralization of the loss-sharing arrangements generally implies greater reliance on the facility. Since participants are potentially exposed to the failure of any one participant, regardless of whether or not they transacted with that participant, the credit monitoring requirements are substantial. To obtain the required level of reliability, and reduce duplicate efforts on the part of all

³"*Derivatives: Practices and Principles*," Global Derivatives Study Group, The Group of Thirty, Washington DC, March 1994.

members, the monitoring of participants' creditworthiness should be centrally managed. This requires that the facility be able to regularly monitor the financial viability of each participant in order to minimize the potential threat to its members.

Never shall any participant's claims against the clearing facility exceed its proportion of contracts outstanding which are not in default as of the completion of the most recent settlement cycle.

The occurrence of heavy losses can have important consequences for the continued viability of the clearing facility. The distribution of proceeds from the liquidation of loss positions can aggravate these situations. This standard ensures that long-run considerations are properly regarded. Distribution of proceeds from liquidated positions should not favor a survivor in excess of that survivor's currently outstanding positions. Thus, the standard lessens incentives for loss-sharing arrangements which favor short-run considerations.

Prospective collateralization procedures are required for the credit exposures which arise from the deferred payment obligations of any contracts.

When the clearing facility has an exposure to credit risk, it must require prospective collateral against this risk. Reliance on retrospective collateral compromises the integrity of the risk management tool. Collecting prospective collateral ensures that members "pre-pay for default" minimizing the burden to be assumed by surviving participants.

Collateralization procedures must be sound. Collateral requirements must reflect the default risk of the obligations placed with the clearing facility. Collateral must be periodically marked to market. The frequency of these marks must be commensurate with the price volatility and liquidity of markets in which the posted collateral trades. Permissible collateral must be transferable within the settlement cycle in which it is called.

Collateral is the primary tool of risk managers for managing the risk of deferred obligations. Determination of the appropriate amount of collateral must incorporate consideration of credit risk. To insure the sufficiency of collateral placed on deposit, collateral must be periodically marked to market. When collateral instruments are subject to large price changes due to market volatility or from liquidity problems, these marks should be computed more frequently. Failure to fulfill a call for collateral should be construed as a contract default. Finally, the clearing and settlement system of any collateral instrument should not prevent ready access to those resources when they are required.

Funds and/or collateral placed with a participant to a clearing facility can result in systemic problems when not segregated from the participant's proprietary accounts. The risk control mechanisms of clearing facilities must ensure against these problems.

Clearing facility participants can accept the positions of customers as well as placing their own positions. Commingling of client and proprietary funds makes liquidation of the positions of a clearing facility participant more difficult. Difficulty arises from delays in payments to the clients and from transfer of account clients to the surviving participants of the clearing facility. In certain countries these problems are addressed by account segregation. In other jurisdictions, this approach is not favored. In such instances, sufficient safeguards must be in place to obtain a high level of confidence that value transfers can be rapidly obtained.

LIQUIDITY RISK

Liquidity risk, in the context of a clearing facility, is the risk that a failure to pay by one participant may lead to a temporary deadlock in the payments system as other participants are rendered unable to meet their obligations when due. Management of this risk entails the ability to provide short-term liquidity to the system as needed. Invocation of a facility's liquidity provision is distinct from invocation of the loss-sharing arrangement.

Centralized Liquidity Management:

Clearing facilities should have clearly defined procedures for managing liquidity risk which specify the responsibilities of both the clearing facility and the participants, as well as the timeframe in which those responsibilities must be met.

The Lamfalussy Standards addressed the need for counterparties to have a clear understanding of their responsibilities. The Group of Thirty Report re-emphasized this requirement. Systemic implications can result from inadequate centralized liquidity management. Clearing facilities which centralize this function must have liquidity provisions sufficient to ensure that the settlement process is not impaired. This standard obligates the clearing facility to establish binding procedures for dealing with payments.

Clearing facilities must not obscure the liquidity exposures of any participant. Payment obligations must be frequently updated and made available to all participants.

Increased concentrations of payments volume raises liquidity concerns. Clearing facilities should improve the information flows required to manage the liquidity needs of their participants. This standard requires clearing facilities to

take steps to ensure the transparency of every participants' current and projected needs for liquidity vis-à-vis the facility.

Liquidity resources of the clearing facility should be sufficient to meet settlement requirements with a high level of probability.

The Lamfalussy Standards require that liquidity resources be sufficient to meet the payment obligations of the participant with "largest net debit" position. This coverage may be adequate if the liquidity problems of the participants are uncorrelated. However, it is a fluid designation making compliance with the standard difficult to assess. In addition, when access to liquid resources *are* correlated across participants, there is increased likelihood that multiple participants may face significant liquidity constraints. This standard is intended to retain the probability level implied by Lamfalussy's largest net debit standard while incorporating consideration of system-wide liquidity problems.

The standard proposed here requires the developers of proposed clearing facilities to demonstrate that their liquidity-management systems achieve a high level of reliability. In general, this level should increase with increases in the magnitude of liquidity problems which might stem from failure of the proposed liquidity management system. When significant liquidity problems might result, the required probability level will exceed the probability standard for credit risk. When liquidity problems are less likely to result in systemic problems, reliability of the liquidity management system is less critical.

These demonstrations of adequate liquidity provisions can be accomplished in several ways. Facilities can propose probability distributions for payments and specify the level of liquid resources required to obtain the necessary probability that these resources will enable it to meet its obligations. Alternatively, facilities can adopt simulation techniques which enable reliable forecasts of liquidity resources.⁴

Payments and transfers made to or from a clearing facility should be in final funds or securities (i.e., delivery versus payment or payment versus payment). This finality can be either direct or obtained through an agent(s). Payments failing to meet this requirement must be deemed in default.

Due to the critical nature of payments to and from a clearing facility, these funds should not be subject to the possibility of overdraft. To prevent these problems, transfers of value must be completely reliable. Payments must be in

⁴ For an example, see the April 22, 1994 presentation by Garrett Glass to the Payment System Conference sponsored by the Federal Reserve Board, Washington D.C.

final funds and delivery of securities must be irrevocable.

OPERATIONAL RISK

Operational risk stems from the threat of processing-system failures or managerial problems. Weaknesses in those areas can have ramifications which give rise to systemic implications.

All clearing facilities should ensure the operational reliability of technical systems and the availability of back-up facilities capable of completing timely processing requirements including settlement and valuation when relevant.

The Lamfalussy Standards speak to the need for reliable processing capability of netting schemes. This standard emphasizes that facilities must be capable of completing obligations in a timely manner. The timeliness standard is a relative one. When systemic implications stemming from this processing are great, the level of assured system performance should rise.

Clearing facility directors and employees serving in a managerial capacity must be in compliance with bank employment standards stipulated by their national banking codes.

Banking regulators generally have standards for employees holding key positions within banks. The rationale for these standards is due in part to the potential for systemic implications that criminal actions can have. There is a corresponding problem in clearing facilities. Criminal actions taken by clearing facility employees can have systemic implications. The criteria for employees of clearing facilities should not be less than those for banks.

CROSS-SYSTEM RISKS

Netting between clearing facilities raises issues of risk propagation. Netting across clearing organizations approaches a universal clearing facility in operational aspects, but falls short of this in its organizational structure. Thus risks posed by cross-clearing facility netting schemes will be difficult to internalize and are, therefore, likely to be left undermanaged. Regulatory standards are needed to reduce the need for reliance on the lender of last resort. The standards of this subsection are intended to control propagation of risk across clearing systems.

Only systems which have centralized credit and liquidity risk management should be allowed to net across systems; i.e., with other netting facilities.

Participants in cross-clearing facility netting arrangements should be limited to those able to demonstrate a high level of risk management. This high level of

risk management is necessary in order to assure that information, deliveries and payments are provided on a timely basis. Absent evidence that a facility is capable of achieving a high level of accuracy on a timely basis, the facility's participation in a cross-system netting arrangement could exacerbate systemic risk.

All cross-system payments must be in final funds. The design of such an agreement should require simultaneous delivery versus payment (DVP) for all settlements.

To ensure that transfers of value between clearing facilities are sound, all such transfers must be irrevocable. To prevent loss propagation owing to reliance on intraday overdrafts, final funds must be used for all transfers of funds between clearing facilities. Similarly, deliveries of securities and payments for those securities must coincide. Such measures will insulate clearing facilities from possible weaknesses at other facilities with whom they net.

If clearing facilities choose to share information about members' positions with other clearing facilities for purposes of risk management, the firm reporting a position must be fully liable for the accuracy of the reported position as of the stated time.

Due to the importance of the information conveyed, it is crucial that position reports made between clearing facilities are reliable. The risk-management decisions made on the basis of these reports can affect the viability of a clearing facility. To emphasize the relevance of this reporting issue, this standard stipulates that liability for reporting errors belongs to the originating clearing facility.

Provisions must be made to prevent systemic problems arising from unmatched settlement cycles.

The Lamfalussy Report emphasizes the seriousness of "Herstatt" risk. Herstatt risk describes the specific instance which arises in exchanges of value when delivery and payment cycles are unmatched. The lack of matched settlements also creates problems when positions are credited for collateral deposits when those transfers have not settled. Coincident failure of the firm and the collateral transfer can result in an uncovered exposure. In normal market situations, such simultaneous failures are unlikely. They become much more likely when markets come under stress. The significance of this risk is elevated when failures of this nature occur across clearing organizations. As markets become increasingly international, the frequency of these mismatches is likely to increase. Reliable measures must be taken to prevent these specific problems.

IV. Conclusion

The paper analyzes clearing facility approaches to managing their loss exposures and the incentives which determine their performance. The report of the Lamfalussy Committee is then reviewed to obtain further insight. From these analyses, standards are proposed for clearing facilities.

The standards developed in this paper differ from earlier efforts in several areas. First, credit risk is distinguished from liquidity risk and separate standards proposed for each of these areas. Second, standards are proposed for exposures resulting from cross-system transfers. Third, rather than proposing minimum standards that achieve universal applicability, we propose necessary standards.

The issue of standards for multicurrency clearing facilities is not fully taken up in this paper. The inability to make final-fund transfers in multiple currencies means that clearing facilities accepting multiple currencies may have Herstatt-like risk exposures. Resolution of this problem will require coordination in the funds transfer operations of central banks. This topic is left for future research.

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