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Derivatives and Systemic Risk: Netting, Collateral, and Closeout

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Abstract

In the U.S., as in most countries with well-developed securities markets, derivative securities enjoy special protections under insolvency resolution laws. Most creditors are "stayed" from enforcing their rights while a firm is in bankruptcy. However, many derivatives contracts are exempt from these stays. Furthermore, derivatives enjoy netting and close-out, or termination, privileges which are not always available to most other creditors. The primary argument used to motivate passage of legislation granting these extraordinary protections is that derivatives markets are a major source of systemic risk in financial markets and that netting and close-out reduce this risk. To date, these assertions have not been subjected to rigorous economic scrutiny. This paper critically re-examines this hypothesis. These relationships are more complex than often perceived. We conclude that it is not clear whether netting, collateral, and/or close-out lead to reduced systemic risk, once the impact of these protections on the size and structure of the derivatives market has been taken into account.

Derivatives and Systemic Risk: Netting, Collateral, and Closeout

1. Introduction

In recent years, derivatives and some related financial instruments have been accorded different legal treatment in insolvency resolution in many countries from other creditor claims on firms in bankruptcy.[1] The special treatments which include the ability of these contracts to net or setoff offsetting positions between counterparties, to access collateral promptly, and to close-out or terminate positions quickly without being subject to prolonged legal stays, effectively places these contracts outside the normal bankruptcy process applied to other creditors. These exceptions to the usual resolution process are important because derivative contracts have expanded significantly in recent years to where defaults in these markets are perceived by many to be likely to produce serious systemic damage to financial markets and macroeconomies. This systemic risk argument has been the major rationale used to justify the enactment of legislation and regulations providing these securities with special protections. Indeed, recently enacted bankruptcy reform in the U.S. expanded the special provisions to a broader range of instruments and contracts, and attempts to do the same are ongoing in other countries. Yet, surprisingly, there has been very little rigorous analysis of the economic implications of these provisions for netting, collateral, and closeout. Such an analysis is the primary contribution of this paper. We conclude that it is not clear whether the netting and collateral provisions when combined with closeout, as is typically the case in derivative contracts, decreases the potential for economic damage, as is generally claimed in previous work, or indeed increases the risk.

Both netting (or more generally, set-off) and collateral are legal concepts with long histories in commercial and private property law. Legislative and common-law developments have perfected these activities with respect to derivative markets and

[1] These developments have occurred more or less in parallel in the markets for exchange-traded derivatives, (most) OTC derivatives, associated margining and collateral practices, repos, payments systems, and securities settlement systems, to name a few. For reasons of expository convenience we shall focus on OTC derivatives markets. However, the economic issues involved apply in differing degrees and ways to all of these important markets.

payments systems. This process has been international. While cross-jurisdictional disparities remain in the treatment of netting and collateral for most contracts, there is widespread consistency in the treatment of netting and collateral associated with derivative contracts in many jurisdictions. Close-out, which permits the immediate termination of contracts under certain conditions, is a more recent concept. Except for some minor exceptions (e.g., wages, suppliers) to permit the continued operation of the insolvent business, non-bank insolvency resolution procedures are universally based on staying claims while the insolvency is being adjudicated.[2] Close-out of covered derivative contracts is directly antithetical to the spirit of staying claims and is aimed at protecting not the firm in insolvency, but the counterparties to the contracts.

These legal protections, which place covered contracts outside of the normal bankruptcy (or insolvency) resolution process, have been justified by the argument that financial derivatives markets are critical to the efficient functioning of financial markets, and that close-out netting and collateral protection are necessary to prevent the failure of any one or more large firms from being propagated to other firms and markets resulting in a systemic breakdown of those institutions. This argument has been made by regulators and industry groups and has been cited by legislatures when enabling legislation has been discussed. The result has been a regulatory and legislative consensus that strongly supports these existing special protections and attempts to expand them further. Indeed, the adoption of these protections in many industrialized countries is a notable example of successful progress towards international legal harmonization.

With rare exceptions, the debate on protecting derivative contracts even at the expense of placing them outside the normal insolvency processes has been remarkably one sided.[3] It is almost universally argued that the inclusion of all three provisions in derivatives contracts is necessary to reduce the potential for

[2] Stays are handled differently in U.S. bank insolvency procedures. For a discussion of stays and other differences between bank and non-bank insolvency regimes see Bliss and Kaufman (2005).
[3] Two important early studies, the "Angell Report" (BIS, 1989) and the "Lamfalussy Report" (BIS, 1990), did look at the pros and cons of netting in the context of payments systems, and raised a number of concerns, primarily associated with loss shifting and effects of legal uncertainty.

systemic risk and severe economic disruptions in financial markets.[4] For example, in a summary of the relevant sections of the recently enacted Bankruptcy Act of 2005, a member of the President's Working Group on Financial Markets concluded that:

> "Title IX of the Bankruptcy Act of 2005 is designed to further the longstanding goal of the U.S. insolvency laws: reduction of systemic risk. The principal method of reducing systemic risk under the Bankruptcy Code and the FDI Act is through assuring the availability of close-out netting for derivatives." (Krimminger, 2005)

However, a number of recent studies have begun to examine the costs associated with the protection of derivatives contracts and the validity of the underlying systemic-risk-reduction argument.[5]

Notwithstanding the frequent use of the combined term "close-out netting," close-out and netting perform different economic functions, and both are in practice tied to collateral. These mechanisms have evolved for purposes other than reducing systemic risk reduction. Market participants tend to be more concerned with their own welfare in normal day-to-day business environments than with possibilities of adverse externalities in the form of systemic failures of markets. Netting, close-out, and collateral serve the needs of market participants even when there is no systemic threat: They facilitate market risk and counterparty credit risk management; and they permit expansion of dealer activities, enhancing the depth and liquidity of the derivatives markets.

This paper examines netting, close-out, and collateral and the economic functions that they perform. While they work together, the three provisions have different though frequently overlapping economic effects. The effect of these mechanisms are generally analyzed in a static framework; that is by considering, for a given set of contracts, the winners and losers vis-à-vis what would obtain if the protections were not in effect.

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[4] An industry letter to Congress, dated 3 March 2005, supporting expansion of protections was signed by the American Bankers Association, the ABA Securities Association, the Bond Market Association, Edison Electric Institute, Emerging Markets Traders Association, the Foreign Exchange Committee, the Futures Industry Association, the Financial Services Roundtable, the International Swaps and Derivatives Association, the Investment Company Institute, the Managed Funds Association, and the Securities Industry Association. Another letter, dated 31 October 2001, asserting that "…failure to enact financial contract netting provisions would unnecessarily place the financial system at greater risk." was signed by the heads of the Federal Reserve Board, the Department of the Treasury, the Security and Exchange Commission, the Federal Deposit Insurance Corporation, the Commodity Futures Trading Commission, the Office of the Comptroller of the Currency, and the Office of Thrift Supervision.

[5] See Bergman et al (2003), Bliss (2003), Emmons (2003), Edwards and Morrison (2005).

However, as pointed out in Bergman et al (2003), a complete and full economic analysis of market mechanisms, such as netting, requires a dynamic analysis that considers how market structures and the contracts that firms undertake are affected by the mechanisms.

Section 2 will provide a brief overview of netting, close-out and collateral as it applies to derivatives contracts.[6] Section 3 will analyze the functions these mechanisms play in risk management from the perspective of a dealer or active end-user and the effect they have had on market structure. Section 4 will re-examine the systemic risk reduction argument, and Section 5 will conclude.

2. Legal Background[7]

In most business relations, netting and set-off are not significant issues. Generally, firms either buy from or sell to other firms, but rarely do both simultaneously. So, in the event of bankruptcy, few if any contracts could be netted or set-off. However, financial markets often generate large numbers of bi-directional transactions between counterparties.

Close-out and netting consist of two separate but related rights, often combined into a single contract: 1) the right of a counterparty to unilaterally terminate contracts under certain specified conditions (close-out), and 2) the right to offset amounts due at termination of individual contracts between the same counterparties when determining the final obligation. In the U.S. and some other jurisdictions, the governing contracts typically contain terms stipulating the actions to be taken in the event of default. In other jurisdictions, such as the UK, a common law netting right exists.

The wide-spread adoption of laws protecting close-out netting and collateral agreements has been shepherded mainly by the International Swap and Derivatives Association (ISDA), a trade group that coordinates industry documentation practices, drafts model contracts, and lobbies for legislative changes to support the enforceability of those contracts. Central to the ISDA approach to netting is the concept of a master agreement that governs transactions between counterparties. The Master Agreement is designed to eliminate legal uncertainties as to terms of the contract and to provide

[6] A fuller description may be found in Bliss (2003), Bergman et al (2003), or Johnson (2000).
[7] Portions of this section previously appeared in Bliss (2003).

mechanisms for mitigating counterparty credit risk. It specifies the general terms of the agreement between counterparties with respect to general questions such as credit support arrangements, netting, collateral, definition of default and other termination events, calculation of damages (on default), documentation, and so forth. Multiple individual transactions are then subsumed under this general Master Agreement forming a single legal contract of indefinite term under which the counterparties conduct their mutual business. Individual transactions are handled by confirmations that are incorporated by reference into the Master Agreement. Placing individual transactions under a single master agreement that provides for netting of covered transactions has the effect of avoiding any problems netting agreements may encounter under various bankruptcy codes. Having only a single contract between each pair of counterparties to a Master Agreement eliminates the problem of netting multiple contracts.[8] Netting legislation covering derivatives has been adopted in most countries with major financial markets (the UK being a notable exception, where netting has long been provided for in the bankruptcy code), and ISDA has obtained legal opinions supporting their Master Agreements in most relevant jurisdictions.

2.1 Close-out netting

Close-out netting affects the treatment of outstanding contracts between counterparties upon insolvency or other contractually specified adverse credit event. In general, close-out netting involves the termination of all contracts between the insolvent and a solvent counterparty. Broadly speaking, there are two relevant classes of contracts: 1) executory contracts are promises to transact in the future (but where no transaction has yet occurred), such as a forward agreement to purchase foreign currency; and 2) other contracts, such as a loan, where a payment by one party has already occurred. We refer to these as "non-executory contracts," since no single legal description applies. These two types of contracts are treated differently under close-out netting.

[8]In some cases, there may be several Master Agreements covering different classes of contracts and with different divisions of the same holding company. Thus, counterparty netting protection may be less than complete. This has led to the development of Cross-Product Master Agreements, in effect Master Master Agreements. ISDA has lobbied for legislative recognition of these innovations to reflect industry risk management practices. Many of these proposed changes have been incorporated into the recently passed changes in U.S. bankruptcy laws.

Non-executory contracts may contain clauses that permit the creditor to accelerate future payments—for instance, repayment of loan principal—in the event of default or the occurrence of a stipulated credit event, for example a downgrade by a rating agency. Acceleration precedes any netting and determines in part the amounts due. The handling of non-executory contracts where payments are due to the insolvent counterparty depends on the contract terms and legal jurisdiction. Whereas non-executory contracts may be accelerated in insolvency, executory contracts are terminated. Termination cancels the contract and creates a claim for compensation, usually the cost of reestablishing the contract on identical terms with another solvent counterparty.

Upon default or a contractually agreed "credit event,"[9] where close-out netting is permitted, the value due under the master agreement is determined by marking to market the executory contracts and determining the amounts due under accelerated non-executory contracts. These amounts are then netted and a single net payment is made. If the solvent counterparty is a net creditor—is in-the-money—the solvent counterparty becomes a general creditor for the net amount. If the solvent counterparty is a net debtor—the solvent counterparty is out of the money—the full payment is made to the insolvent counterparty or their trustee. Usually, the solvent counterparty determines the values of the contracts being terminated and payments owed. These computations may subsequently be litigated. However, disputes over the exact valuation do not affect the ability of the solvent counterparty to immediately terminate and replace the contracts with a different counterparty.

Acceleration and termination both change the amounts immediately due to and from the solvent counterparties vis-à-vis what would have been currently due had the credit event (default, downgrade) not occurred. Terminations of contracts with the resulting demands for immediate payments may precipitate financial difficulties and even insolvency of a firm and make it difficult to resolve the firm in an orderly manner or to arrange refinancing.[10] For this reason, many jurisdictions limit the rights of counterparties

[9]Termination events may include cross defaults (defaulting on other contracts), mergers, changes in legal or regulatory status, changes in financial condition, and changes in credit rating (Johnson, 2000).

[10]A recent example is the acceleration of some $4 billion of Enron's debt following its downgrade by rating agencies. The firm could not meet the resulting demand for immediate payment of principal and was forced to file for bankruptcy. Until that time, Enron had not actually failed to make a payment on any obligation, though it was almost surely already insolvent.

to enforce the termination clauses in their contracts. The court can impose a stay, which does not invalidate termination clauses in contracts but rather overrides them, perhaps temporarily, at the discretion of the court. Staying contracts establishes a "time out" while keeping the contracts in force; normal payments are still due. This differs from cherry picking, which involves the insolvent counterparty disavowing unfavorable contracts and forcing the associated solvent counterparties to become general creditors of the insolvent firm.

2.2 Collateral

Secured or collateralized transactions are common in business—mortgage loans and liens are common examples. The use of collateral is however even more pervasive in derivatives markets.[11] In insolvency, most collateral remains under the control of the bankruptcy trustee, at least initially. While secured creditors may have a claim on particular assets, their ability to immediately realize the value of the assets is subject to the procedural delays inherent in the bankruptcy process.[12]

In contrast, in most cases collateral posted against derivatives positions is under the control of the counterparty and may be liquidated immediately upon a covered "event of default". This arises both due to operation of laws governing derivatives contracts that recognize the right to liquidate collateral, and due to the nature of the collateral used—cash or securities delivered to the counterparty at the time the collateral is posted, and therefore under their immediate control.

Derivatives collateral is therefore fundamentally different in both type and nature from the use of physical assets as security, pledged against other specific debts, but under the control of the debtor. Part of the difference in legal treatment is justified by the fact that physical assets may be essential to the continued operation of the firm, while cash or securities that have already been delivered to a counterparty could not then be simultaneously used for other purposes.

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[11] The use of repurchase agreements for short term lending and margin accounts for exchange-traded derivatives are related examples of financial market adaptations designed to reduce credit risk through secured transactions.

[12] Procedures exist for secured creditors to petition the bankruptcy court to release their security. The rules governing such release are complicated and necessarily involve some delay (see, for example, Baird, 2001).

3. Risk Management and Market Structure

A major function of derivatives is to transfer risk from those wishing to lay off a particular type of risk to those willing to assume that risk, usually for a price. Netting and collateral permit derivatives market participants to reduce the counterparty credit risks they are exposed when they enter into a derivatives transaction and thereby expand the market. Close-out makes netting and collateral more effective, and thus leads to further expansion of the market.

3.1 Netting

Of the three risk reduction mechanisms—netting, collateral, and close-out—netting has had the greatest impact on the structure of the derivatives markets. Without netting the current large size, liquidity and concentration we see in the derivatives markets would be unlikely to exist.

Netting under master agreements of all the covered contracts to determine the counterparty risk exposure has a multitude of complex economic implications. Netting permits existing risk exposure positions to be adjusted by taking on offsetting contracts with the same counterparty. Since new contracts are usually initiated at zero value, this means that positions can be adjusted without either party incurring immediate cash flows. It also eliminates the need to negotiate the termination value of existing contracts. OTC derivatives are generally not tradable. In the absence of netting, a firm that wishes to discontinue a derivatives contract would be in a disadvantageous position vis-à-vis its original counterparty.[13] If it wished to buy out (or sell) its position, it would be in a relatively weak bargaining position. If it obtained an offsetting position from another market participant, it may have to post collateral with both counterparties, and its own credit risk exposure to those counterparties would have increased. With netting and the offsetting position being undertaken with the original counterparty, both the (no longer desired) market risk and the counterparty credit risk would have been eliminated, and associated collateral would have been freed up.

[13] For example, consider a firm that had issued a long term floating rate loan and entered into a long term swap to swap out the floating rate for a fixed rate. If for some reason (e.g. to lock in subsequent lower long term fixed rates) the original variable rate loan is retired, the original swap becomes an unhedged source of interest rate risk.

By combining two offsetting contracts under the same master agreement, the firm's counterparty would have to manage only the net position. Since the new position is usually established at zero value and since subsequent changes in value of the original and the offsetting positions would tend to cancel out, the adjustment in positions could be undertaken with little or no impact on the credit risk exposures between the parties. Of course, the offsetting position could be initiated with another counterparty to achieve the same adjustment in market risk exposures. However, in that case each of the counterparties with which the firm had positions would have to take measures to control the credit risk exposure it had to the firm, resulting in an increase in credit risk exposure (no change at original counterparty, but the new counterparty has new credit risk) with concomitant increases in costs (collateral or spreads).

The advantages of dealing with the same counterparty, rather than new counterparties, when unwinding hedges extends to establishing multiple positions with different risk exposures. Suppose an end-user firm wants both interest rate and foreign exchange hedges and that these are imperfectly correlated. By obtaining the hedges from the same counterparty, the future credit risks that will be generated as the hedge position values fluctuate will be reduced through the diversification of market risk exposures. The end user might then obtain more favorable terms (spreads) and/or reduced collateral requirements, reducing its costs of hedging.

These benefits of dealing with a single counterparty to reduce the cost of (effectively) unwinding hedges through offsetting positions and for hedging multiple exposures leads to economies of scale. End users also have incentives to deal with one counterparty rather than many and thus tend to use dealers. Given these benefits, and reduced search costs and reduction in information asymmetries that established relationships produce, OTC derivatives have evolved into a market dominated by financial intermediaries, referred to as dealers,[14] who function as common counterparties to large numbers of end users. These derivatives dealers also actively trade with each other to manage their positions.

[14] These are not dealers in the sense of buying and selling contracts (since most OTC derivatives are not traded), nor are they brokers who facilitate trades between counterparties without taking possession of the contract being traded. Rather they are derivatives portfolio managers who dynamically manage large books, deriving income from bid-offer spreads, while seeking to remain "market neutral" by appropriately controlling their exposures. Nonetheless, the term "dealer" is generally applied to these intermediaries.

However, the scope of the dealer market model is constrained by capital. Market and credit risk exposures must either be hedged or collateral must be posted against potential losses. In addition, financial firms must hold capital against their credit exposures. The amount of needed capital may be determined by internal prudential judgment, external market forces (market discipline), and/or regulation. A dealer can manage market risk exposures by ensuring a balanced book (taking offsetting positions with different counterparties). This is more easily done if the dealer operates on a large scale. However, operating on a larger scale means greater credit risk, and it is here that position netting under master agreements becomes critically important. If it was not possible to net exposures to each counterparty, then total credit risk exposures would grow proportionally with the gross size of the dealer's book. Aggregated across dealers (and other market participants), the credit risk exposures would grow proportionally with the size of the market as a whole. Credit risk exposures need to be managed either through capital set asides or through collateral arrangements. Since equity capital is widely perceived to be expensive and collateral is scarce, the effect would be to constrain both the size of the market and the size of dealer firms in the market.

An additional implication of position netting is the effect it has on incentives of parties to react to perceptions of increasing credit risk of their counterparties. Were credit exposures related to gross positions, all counterparties of a troubled firm would have strong incentives to terminate their existing positions (if possible), cease initiating new additional positions, and decline to roll over maturing positions. Since derivatives are an important tool of risk management, this exclusion of troubled firms from the market could further exacerbate their financial problems. With position netting, however, the out-of-the-money counterparties of a troubled firm have little immediate incentive to terminate their relationship,[15] and in-the-money counterparties have reduced incentives to terminate their relationship, particularly if the troubled firm could post collateral to cover the net position. Thus, netting reduces the incentives for derivatives counterparties to "run" and hence makes workouts of temporarily troubled firms more likely.

[15] One reason that an out-of-the-money counterparty might be concerned arises from the possibly that if the markets prices underlying their positions move in the future their positions could become in-the-money, with concomitant credit risk as to the net exposure.

Position netting permits the size of the credit risk exposures to grow at less than the growth rate of the market as a whole. By holding capital against net rather than gross credit risk exposures, dealers can build a bigger book on a given capital base. They can also expand the (gross) positions they undertake vis-à-vis a given counterparty who has a given capital base or a given quantity of good collateral. As derivative markets have expanded and become more concentrated, the reduction of credit risk exposures through netting has risen. Figure 1 shows the increasing degree of netting of credit exposures by U.S. banks.[16] Bilateral netting have risen from 45 percent in 1996-Q1 to 83 percent in 2004-Q4.

Thus, the benefits to end-users of dealing with fewer counterparties, the apparent economies of scale and scope provided by running a large dealer book, and the ability to expand gross positions has made position netting a prime factor in the rapid expansion of derivatives markets.[17] But it has also led to the concentration of that market in a relatively few large international dealers. Figure 2 show the percentage of the bank derivatives market accounted for by the largest dealers over time.[18] In parallel to the increasing reliance on netting to reduce credit exposures, a handful of the very largest dealers have accounted for an increasing portion of the derivatives market.[19] Both the size and concentration of markets are sources of liquidity.

3.2 Collateral

Managing net credit exposures to individual counterparties depends either on limiting (gross) exposures or on the business needs of the counterparty generating a demand for offsetting positions. Both of these have limitations. Early in the development of the derivatives markets, there was a tendency to deal only with the most credit worthy

[16] Quarterly survey of US banks (OCC, 2004).These numbers are dominated by the largest US derivatives dealer banks: the top 3(10) banks account for 88.8(98.1) percent of all US bank derivatives positions. Comparable numbers for other (non-US commercial bank) derivatives dealers are not available, but these numbers are likely to be representative.

[17] In the absence of obvious barriers to entry, the dominance of the dealer market by a few very large firms suggests that economies of scale and scope are present.

[18] This data is derived from current and past OCC Bank Derivatives Reports (e.g. OCC, 2004) and thus is limited to U.S. bank derivatives positions. Again it is likely to be representative of derivatives dealers n general, though comprehensive non-bank data is not available.

[19] This may be due to mergers of derivatives dealers, resulting in consolidation of both derivatives books and their associated capital backing, or due to expansion of derivatives dealing through increased on a fixed capital base, or a combination of these two factors.

counterparties. Less credit-worthy counterparties were either excluded entirely or paid substantial premia. Financial institutions set up AAA-rated bankruptcy-remote subsidiaries to handle their derivatives dealing operations.

The use of collateral has enabled the further mitigation of credit risk and the expansion of the market to include less credit-worthy counterparties. At the same time, use of collateral as a credit risk mitigation mechanism has expanded along with the aforementioned expansion of netting. ISDA (2004a) reports that at the beginning of 2004, 50 percent of master agreements[20] were covered by collateral arrangements, up from 30 percent in 2003. Total collateral pledged against derivatives master agreements in 2004 was just over $1 trillion,[21] up 40 percent from the previous year. ISDA reports that this growth reflects a continuing growth in the use of derivatives together with the increasing use of collateral agreements. Thus, counterparty credit exposures are first reduced through netting and the remaining net exposures are further by the pledging of collateral. This reduces the total exposures by near 93 percent.

The large majority of the collateral is cash (79 percent; 51 percent in USD, 23 percent in EUR).[22] Government securities account for 16 percent of collateral used. The large usage of cash means that collateral is both liquid and not subject to large fluctuations in value.

The major reason cited by ISDA for the use of collateral agreements is the reduction of economic capital and credit risk. Freeing up lines of credit, permitting further trading with individual counterparties, was also a major motivation. All contribute to growth of the derivatives market.

3.3 Close-Out

Close-out permits derivatives market participants to freeze their exposures in the event of the failure of a counterparty or other event of default stipulated in their master agreement. Without the ability to close-out their positions at the time a counterparty becomes insolvent, market participants would find themselves locked into contracts that

[20] The numbers are similar for both number of trades and market value exposure basis.
[21] Collateral frequently is re-hypothecated, that is collateral received from one counterparty is then used to satisfy demands for collateral by another counterparty. The ISDA estimates of collateral usage (gross values) account for this effect.
[22] ISDA (2004b).

fluctuate in value. This may be true of many other contracts with the bankrupt firm. However, in the case of derivatives, unlike for instance a bond, the derivatives position is likely to require constant rebalancing to maintain hedged positions.

Netted positions are inherently more volatile than their underlying gross positions, and require continuous monitoring and management. For example, a one percent change in the value of gross in-the-money contracts, assuming the value of the offsetting out-of-the-money contracts remains unchanged, would result in a tenfold change in the value of the net position if the gross exposures were ten times as large as the net. Collateral posted against current net positions must therefore be adjusted more frequently than if netting was not permitted and gross exposures were collateralized.[23] When a counterparty becomes insolvent, and positions are frozen, the solvent counterparty's net position can deteriorate more rapidly than the underlying gross positions and prompt close-out is critical.

This is particularly true if the ratio of gross exposures to net gross exposures is large. Fluctuations in the underlying risks of the derivatives contracts, for instance changes in market interest rates, can rapidly change the values of the component gross positions and thus the net exposure of the solvent counterparty. Bankruptcy proceedings usually take a long and unpredictable time.[24] During the insolvency resolution proceeding, the ability of counterparties to manage their exposures to the bankrupt firm by entering into new off-setting contracts or by having the firm post additional collateral is severely restricted. Thus, if derivatives counterparties were subject to stays in the event of insolvency their own risk exposures would be subject to fluctuations that would likely be greater than they would experience if neither party was insolvent and both parties could dynamically manage their exposures. Furthermore, collateral which had been posted against net positions that existed at the time of insolvency would effectively become useless if it were frozen, the existing contracts stayed, and the net exposure that the collateral was intended to protect allowed to fluctuate beyond the control of the solvent counterparty. On the other hand, a creditor who holds an insolvent firm's debt has

[23] The same issue applies to capital, regulatory or economic, being allocated to cover unexpected losses to these exposures. Where capital is held against exposures after both netting and collateral (in the case of partial collateralization of exposures) the effect is a further increase in sensitivity of the exposure vis-à-vis the underlying gross risks.

[24] See Franks and Torous (1988) and Bris et al. (2004).

a known exposure, and while the eventual recovery is uncertain, it can be estimated and is capped.

It follows that, while netting and collateral both contribute to the problem of position volatility and the need to actively manage positions to ensure that collateral remains adequate to cover credit losses in the event of counterparty default. without the means of locking in the values of positions at the time of insolvency (i.e., close-out), netting and collateral alone would be impotent mechanisms for credit risk mitigation.[25]

Close-out serves another purpose. It reduces the uncertainty that the counterparties face with respect to their own hedges. If a fully hedged solvent counterparty were stayed from closing out and instead was locked into a derivatives contract with an insolvent counterparty, the solvent counterparty would not know whether it was hedged or not. Even if the insolvent counterparty eventually makes good on its contracts, the solvent counterparty would still face problems of matching on-going cash flows during the bankruptcy process (unless the bankruptcy administrator permitted payment on existing contracts). If markets move against the solvent counterparty, they would face losses if the insolvent counterparty eventually defaulted on its contracts. If, on the other hand, the solvent counterparty sought to rehedge with another solvent counterparty, the existing contracts with the insolvent counterparty would remain in force creating an unhedged risk in the event (and to the extent) that the prior contract did in fact pay off. The heart of this dilemma is that, in the absence of close-out, the bankruptcy process delays resolution of these issues, and the solvent counterparty cannot know ex ante what course of action to take.

A number of alternatives to close-out could conceivably eliminate the problems facing the solvent counterparties of an insolvent firm. The insolvency administrators could simply sell the derivatives book of the insolvent firm to a new solvent counterparty. But this may involve having to sell the book at below (normal) market value, incurring fire-sale losses which would be transfer to other creditors. If the intent of the insolvency proceeding is to accomplish a workout rather than a liquidation, selling the book would

[25] This is of course true for any secured claim in bankruptcy, the difference is that in most situations the volatility is related to only the gross value of positions (say the value of a mortgage).

leave the distressed firm unhedged and therefore at greater financial risk—but so would close-out.

An alternative that would permit the insolvent firm to remain hedged is simply for the insolvency administrator to guarantee the contracts. However, guaranteeing the existing contracts is only a partial solution as both the solvent and insolvent counterparties would need to manage their positions on an ongoing basis. Thus, the insolvency administrator would need to permit and guarantee new contracts entered into for purposes of managing the pre-existing exposure and to provide additional collateral when needed. This is similar in principal to the continuing payment of wages and suppliers during a Chapter 11 proceeding or to debtor in possession financing. However, no legal basis exists for such a reprioritization of claims or the transfer of good assets (new collateral) to the benefit of derivatives counterparties and to the disadvantage of other creditors. The guaranteeing of derivatives contracts may also fail due to the lack of availability of good collateral, which an insolvent firm is not likely to have in abundance. However, expectations on the part of market participants that contracts will be guaranteed may lead to morale hazard, excessive risk taking, and reduced market monitoring (Bergman et al, 2004).

In an effort to ameliorate the moral hazard attendant to guaranteeing derivatives contracts, Kaufman (2003a) has proposed that close-out be stayed and that derivatives books be transferred to new, solvent counterparties. To eliminate the moral hazard, he proposes that original counterparties (of the insolvent firm) with net in-the-money positions be required to pay an amount equal to their net exposure multiplied by an estimate of the loss rate that would eventually accrued to general creditors.[26]

4. The Systemic Risk Reduction Argument

While netting and collateral have benefited derivatives market in general and close-out is integral to making netting and collateral effective, these are not the arguments that have been advanced to justify legislation to grant these rights. As noted

[26] Such involuntary transfers are permitted under U.S. bank insolvency law, but not under the Bankruptcy code. The assessment for expected losses is not possible under current law for non-banks, though it may be possible through regulatory action to impose such as stipulation in the contracts entered into by insured depository institutions.

earlier, what has primarily motivated the widespread adoption of close-out netting and collateral protection of derivatives contracts is the argument that doing so reduces systemic risk.

No single generally-agreed definition of what constitutes systemic risk exists.[27] One common scenario is the failure of one firm triggering the failure of another firm which triggers other failures and so on—a chain reaction or domino effect of sequential failures. An alternative scenario involves a large macroeconomic shock—say a currency devaluation—increasing the perceived or real probability of failure of a number of firms leading to a liquidity crunch as informational asymmetries and concerns about asset values and counterparty solvency cause participants to sharply reduce trading. A third scenario has widespread credit risk exposures to a common large institution that fails with losses to many of the exposed counterparties.

While much of the discussion of systemic risk envisions failures of financial firms (propagating or simultaneous), losses or threats of losses short of failure can also cause adverse market reactions. Widespread losses to banks may cause them to contract credit with adverse macro-economic consequences. Heightened perceptions of risk and concomitant flight to quality may also disrupt securities markets and lead to a contraction of liquidity. Defensive measures such as increasing collateral requirements and attendant liquidation of assets and contraction of positions can lead to further losses.[28] In analyzing the systemic risk argument, we will consider each of the three potential types of market disruption: cascading failures, large macro-economic shocks, and common-shock market disruption/liquidity contraction.

While there is little evidence of chain reaction failures, there is nonetheless considerable public and regulatory concern that these might occur in the future. Liquidity and credit crunches are, however, rather more common—the Asian and Russian debt

[27] See Kaufman and Scott (2003b) for a discussion.
[28] A distinction may be made between systemic events propagating through the credit channels as banks contract credit (whether due to realized losses or due to perceived risks) and propagation through the financial (securities) markets with disruption of the ability of (particularly financial) firms to manage their risk exposures producing attendant losses (which may have wider economic implications). Borio (2004) presents a detailed analysis of several recent episodes financial market distress, the endogenous nature of liquidity risk, the role of market structure, and a framework for thinking about policy responses.

crises is examples, and concerns about market liquidity motivated the New York Fed's facilitation of the LTCM workout.[29]

Proponents of legal protection of close-out netting for derivative master agreements and related collateral protection argue that 1) derivatives markets are especially critical to the smooth functioning of the financial system, so that their operation deserves special protection, 2) derivatives markets are particularly susceptible to systemic failures due to the volatile nature of the value of derivatives contracts, and 3) close-out netting and collateral protection ameliorate these risks and so are justified on public policy grounds, regardless of the costs (which are rarely mentioned) to other market participants and creditors of a failed institution.[30] While this line of reasoning has been made so often and with so little contradiction that it has nearly become a truism, it does not appear quite so clear cut upon deeper scrutiny.

Edwards and Morrison (2005) have pointed out one flaw: that because the failure of a small derivatives market participant is unlikely to have any systemic consequences whether through knock-on failures of its counterparties or by leading to a liquidity crunch, the systemic risk argument cannot be used to justify a blanket protection of all market participants however small. That said, it may be difficult, as a practical matter, to base laws on the size of the effected firms. So the systemic risk argument basically relies on both the explicit proposition that the potential failure of the largest derivatives market participants poses a systemic risk, and the implicit position that a blanket protection of all contracts is the most effective means of reducing the risk posed to/by the few systemically important market participants.

Attempts to find evidence of chain-reaction systemic risks have suggested that this risk is remote (see Kaufman, 1994, and Furfine, 2002 & 2003). However, a case can be made that the derivatives markets are exceptionally vulnerable to systemic failures. The dealer market is highly concentrated (*vide supra*). Furthermore, a large fraction of

[29] President's Working Group (1999) noted concerns that failure of LTCM would likely have resulted in severe market disruptions and significant losses to direct counterparties and other market participants. However, the estimated losses to direct counterparties would not have threatened their individual solvency.
[30] Bergman et al (2004) explore the possible downsides to other market participants, that is those whose contracts are not protected by netting agreements (i.e. unsecured creditors), and possible detrimental effects on incentives. These possibilities include loss shifting, risk shifting, reduction in market discipline, and lack of transparency.

derivatives positions are in the inter-dealer market; non-financial end-users account for only a small fractions of positions.[31] Removal of any one dealer may seriously disrupt the derivatives markets. Even if no knock-on failures occurred, a very large number of contracts would need to be replaced and new working relationships would need to be established for end users. Liquidation of non-cash collateral and the liquidation of assets to post cash collateral could also depress asset values potentially impacting the solvency of other institutions.

Before considering whether close-out netting and collateral protection ameliorate these risks, it is worth pointing out that these risks largely exist because close-out netting and collateral are protected. Without these protections, the concentrations we see in the dealer market which give rise to systemic concerns simply would likely not exist. The capital available to support gross credit risk exposures would far exceed to capital currently needed to support net exposures. Increasing the capital required to engage in derivatives dealing by a factor of 10 or more would materially alter the economics of derivatives markets.

Because dealer concentration appears to be in part an artifact of close-out netting and collateral protection, a relevant question is whether close-out netting and collateral protection also ameliorate the risks posed by this concentration. An ISDA study (ISDA, 2004b) of major derivatives dealers found that their net exposures to their five largest dealer counterparties averaged 14.5 percent of their total bilateral netted exposures to all counterparties.[32] After adjusting for collateral, this fell to 1.15 percent. Based on this evidence it is unlikely that the failure of any one dealer would directly result in the failure of any other dealer. This risk reduction is due to netting and collateral, rather than directly from close-out. The effects of close-out cannot be addressed by the ISDA study.

[31] The Bank for International Settlements in its survey of OTC derivatives market activity (BIS, 2003) estimated total market value of gross OTC interest rate derivatives positions at 4,328 billion USD in 2003-H2 (interest rate derivatives account for 62 percent of all derivatives by market value). Of these, 1,872 billion (43 percent) were inter-dealer positions and only 687 billion USD (16 percent) were with non-financial customers.

[32] While inter-dealer exposures account for a small fraction of total credit exposures, these exposures are with the relatively small number of other dealers and hence may be expected to be large in absolute terms. The remaining exposures, those with end-users are in most instances individually small and diversified, though a sufficiently large common shock event may still be problematical. A few end users, Fannie Mae and Freddie Mac, may be sufficiently large to pose undiversified risks to dealers. The ISDA report does not detail the degree of end-user credit risk reduction through the use of collateral.

Questions as to the disruption and the concomitant costs that the failure of a major dealer would cause to the market as a whole also remain open. It is likely that such effects would be proportional to the gross numbers of positions or counterparty relations that would need to be replaced, and the total collateral pledged by the failing institution that would need to be liquidated, rather than to the netted value of the positions at each of the counterparties.

The effect of close-out on systemic risk is complicated. Edwards and Morrison (2005) point out that it depends in part on who is failing. If the failing counterparty is not a systemically important firm in its own right and failure is idiosyncratic, the ability of counterparties to close-out and reestablish their positions is likely to quickly remove latent uncertainties as to the solvency of other counterparties and to more quickly return the market to normal operation. When a small firm fails, close-out clears the air.

However, when a large firm becomes distressed, collateral calls related to its deteriorating financial position can potentially push the firm further into distress as the firm liquidates assets to meet collateral calls, suffering fire-sale losses in the process.[33] Eventually the troubled firm will not be able to meet collateral calls and the close-out process will be triggered. Cross-default provisions in master agreements virtually ensure that when one counterparty's demand for collateral is not met, all counterparties will close out.[34] Close-out leaves a firm unhedged and if the positions are collateralized, strips the firm of good assets. Even if the firm is technically solvent (or not yet declared insolvent by the appropriate authority), the close-out process can nonetheless harm the economic viability of the firm. This process could effectively pre-empt efforts by bankruptcy courts or regulators to manage the insolvency, avoid fire-sale of assets, and perhaps restore the distressed firm to viability, preserving its going-concern value, and, in the case of a large firm, spilling over to other firms and markets. Thus, close-out and collateral protection (though not netting) could prove a source of systemic risk by making it more difficult to avoid the failure of a distressed by still viable major dealer.

[33] See Bliss (2003) and Edwards and Morrison (2005).
[34] Cross-default provisions stipulate that default on any contract, even with a different counterparty is an event of default under the contract containing the cross-default provision.

5. Summary and Conclusions

Netting and collateral enhance the management of counterparty risk in derivatives markets and lead to increased liquidity and depth of these markets. The benefits are transferred to the end users in the form of lower costs and greater liquidity for hedge instruments, which facilitate their ability to manage market risks.

However, close-out which is integral to the functioning of netting and collateral protections, introduces potential instability in these markets. Although reduction in systemic risk is often used as an argument for netting, collateral protection, and close-out, the relation between these special protections and systemic risk is complex. Netting and collateral may both increase or decrease systemic risk. They may increase it by permitting the concentration of dealers. They may reduce it by providing dealers with a means of managing their counterparty risks, thus reducing the chances of knock-on failures. Close-out, however, is potentially a source of systemic risk by making it more difficult to manage the distress or insolvency of a major dealer more. Furthermore, while netting and collateral currently ensure that the failure of one dealer is unlikely to directly cause the failure of other dealers, these protections do little to ameliorate the disruptions to markets that would ensue from abrupt termination of a large number of contracts with attendant fire-sale losses from liquidating collateral and the need to reestablish hedges with new counterparties. Whether or not these disruptions indirectly lead to other failures, they are likely to be costly.

Unfortunately, it may be difficult, under current law and regulatory norms, to gain the benefits that netting and collateral provide, without also having the potential disadvantages that close-out may entail. No easy alternative to close-out is available, except for the moral hazard-laden transferring of books to solvent counterparties (which may not be feasible for insolvencies handled by slow acting courts).

One alternative proposed by Bliss (2004) and implemented in the case of LTCM is for regulators to intervene to facilitate a workout before close-out is triggered. This unfortunately requires a degree of monitoring that is not always present to ensure the intervention precedes insolvency, and the voluntary co-operation of the relevant counterparties. Such interventions on a regular and predictable basis may also create

expectations that undermine market discipline and, if unsuccessful, may raise claims against the regulator for bail outs.

We conclude that the systemic risk reduction claims often made for close-out netting and collateral protection appear at a minimum to have been over stated. Systemic risk is in part made more likely as a result of these protections, but then so also are the benefits obtained from a more efficient market that is based on these same protections. The combined use of these three provisions represent a two-edged sword that cuts both ways.

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Figure 1: Netting of Derivatives Counterparty Credit-Risk Exposures by U.S. Bnanks

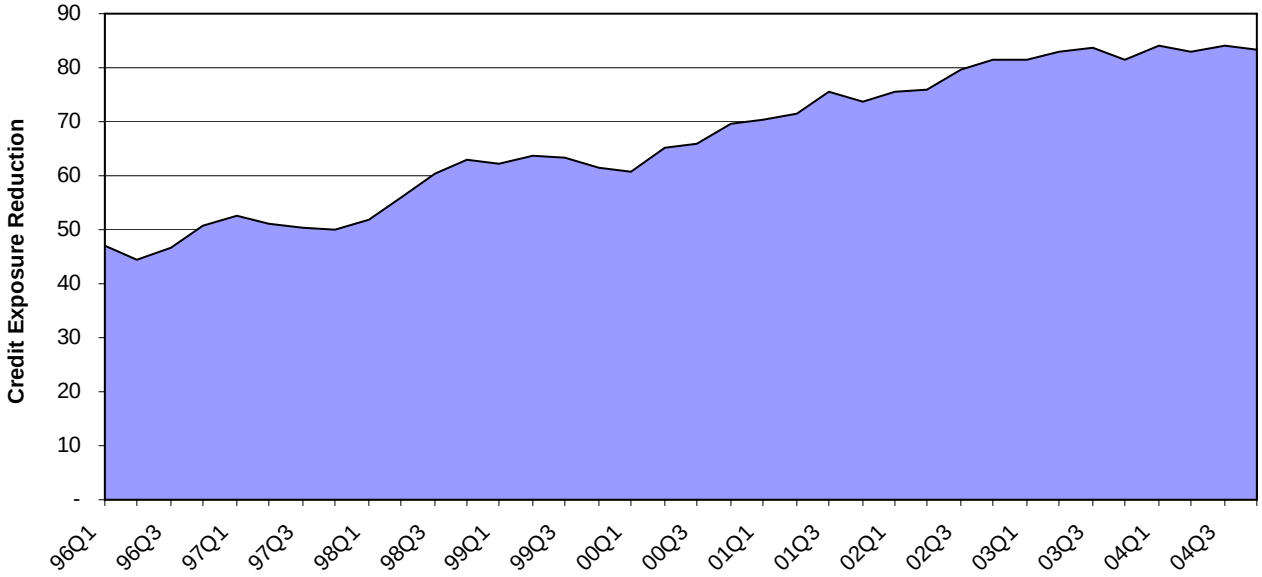
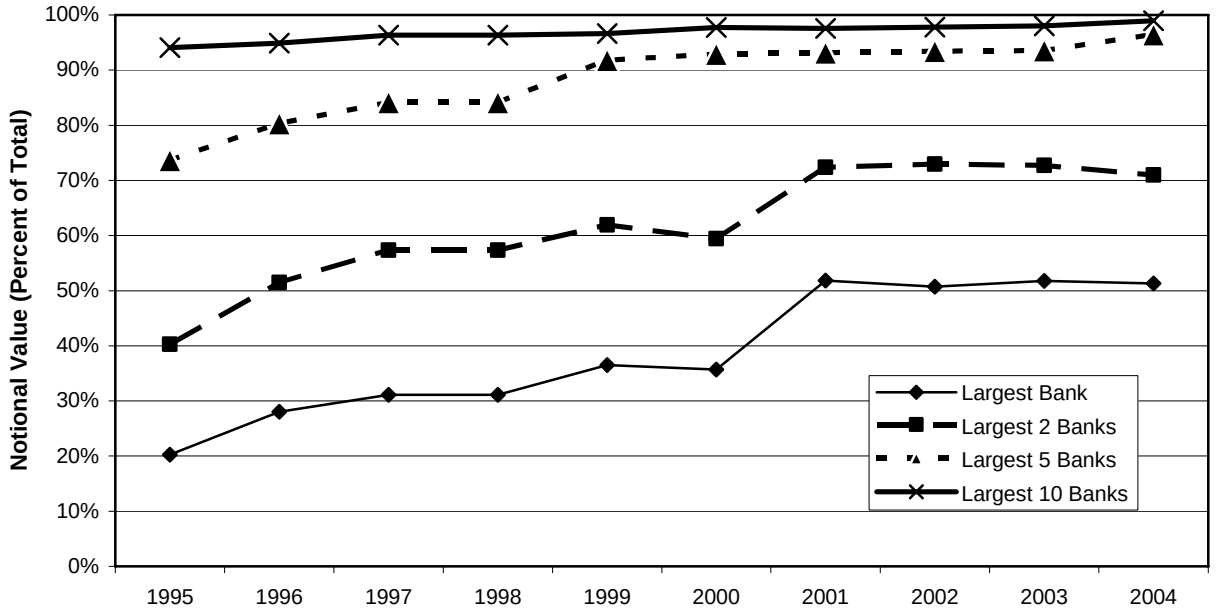


Figure 2: Bank Derivatives Market Concentration



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