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Abstract

Derivatives and certain other off-balance sheet contracts enjoy special legal protection on insolvent counterparties through a process referred to as "close-out netting." This paper explores the legal status and economic implications of this protection. While this protection benefits major derivatives dealers and derivatives markets, it is less clear that other market participants or markets in general are better or worse off. While we are not able to conclude whether or not these protections are socially optimal, we outline the wide range of issues that a general consideration of the pros and cons of netting protection should take into cognizance, and analyze some of these issues critically. Ultimately the question becomes one of quantifying complex trade-offs.

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Netting, Financial Contracts, and Banks: The Economic Implications

Bergman, Bliss, Johnson, and Kaufman

1 Introduction

The protection of creditors' and equity holders' legal rights has long been understood to be a crucial element of the success of modern capitalist economies. The historical and technical legal analysis of bankruptcy is both old and voluminous (we shall refer to some of the relevant papers shortly). Economic analysis has shown that creditor protection, both prior to and under insolvency, has an important impact on economic development.[1] However, many of these analyses tend to treat creditors (including investors) as an undifferentiated homogenous group. In fact they are not.

In resolving insolvencies in the United States, as in most developed countries, all creditors are not treated equally. Most bankruptcy codes provide priority in payment to specific stakeholders of the insolvent firm.[2] For example, outstanding tax and payroll liabilities and administrative expenses of the bankruptcy process itself generally have priority over liabilities to other creditors.[3] Secured (collateralized) bondholders have preference over unsecured creditors.[4] Moreover, even among the remaining general creditors there is a legal pecking order; for instance, senior bondholders over junior bondholders. Thus, all financial stakeholders are not equally at risk.

Many types of "derivatives" a*lso enjoy special protections during insolvency resolution.[5] This has led to increased liquidity in the financial markets for these

[1] The recent study of economic function of bankruptcy processes goes back at least to Jackson (1982), who analyzed bankruptcy processes as a coordination mechanism. Knight (1992), a political scientist, examined the importance of bankruptcy as a social mechanism for resolving conflict. La Porta et al. (1997, 1998) have analyzed the differences across countries in enforceability of investors' rights and demonstrated their positive effects on their capital markets.

[2] In practice, legal priorities are not always observed faithfully in U.S. bankruptcy resolutions for nonbanks. The differences in priorities also cause conflict in the valuation of the insolvent firm's assets. The lower the priority of a claimant, the greater is the incentive to encourage a higher valuation and vice versa (Bebchuk, 1988). Also see Hart (2000).

[3] 11 USC §507(a).

[4] 11 USC §725.

[5] A wide variety of contract types are covered by these special protections, and the list continues to grow as markets innovate and the legal system responds. Such contracts include interest rate options and futures, commodity contracts, forward rate agreements, swaps, and so forth. We shall use the generic term "derivatives" for such contracts, as is usual in the finance literature. The terms "swaps" (used generically, rather than to describe a particular contract type) and "qualified financial contract" (used to designate enumerated contracts under various legal statues) are used elsewhere in a similar sense.

instruments and has encouraged the use of derivatives by banks (and other firms) to hedge their positions and reduce their overall risk exposures.[6] However, these protections for one class of contracts may also have the effect of shifting part of the remaining risk exposures to other claimants. Although the legal priorities of some derivative contracts have been modified in recent years and legislative proposals for further modifications are pending, there has been relatively little analysis of the economic implications of the existing protections and proposed changes, particularly of the potential costs. This paper begins to develop such an analysis. In the process, the paper summarizes the history of these procedures, reviews the current legal treatment of derivatives under insolvency, and analyses the economic arguments for (benefits of) and against (cost of) these procedures. These questions are particularly important today, as the use of derivatives by large banks has increased dramatically in recent years; some of these banks have grown to such a size that their potential failures are increasingly perceived to threaten serious disturbance of the financial system; and the issue of how to resolve insolvencies of large banks remains unsettled.[7]

Derivative contracts may appear to be especially vulnerable to liquidity problems in bank failure resolutions and worthy of particular policy concern for a number of reasons. The aggregate volume of derivative contracts has increased greatly in recent years, as has the participation of banks in this market. Banks and other participants make major use of derivative contracts both as dealer/traders and to hedge their open risk positions as end-users. Hedges by one party shift risk to the counterparty, which may then hedge its open position with yet another counterparty. A chain of hedges connecting participating banks and other large firms and institutions may result. Disturbances that undo the hedge at one link through insolvency and default by a counterparty can be rapidly transmitted to other links and counterparties, causing a need to restructure some other hedges at potentially less favorable terms. This is particularly important as the derivatives dealer market is highly concentrated—96 percent of the U.S. bank-held

[6]Derivatives can also be used to take on (unhedged) risks. In proprietary trading portfolios they may provide a cost-efficient means of deliberately and rationally doing so. In other instances, they may provide a means of obscuring ill-advised risk taking.

[7] See Bliss (2003).

derivatives are held by seven banks (OCC, 2002)—exacerbating the potential disruptions should one of these major dealers fail.

While both banks and non-banks are major derivative market participants, in the U.S., an added degree of complexity arises because banks and non-banks have distinct insolvency procedures, with banks being resolved by a Federal bank regulatory agency (the Federal Deposit Insurance Corporation [FDIC]) and most non-banks by Federal bankruptcy courts.[8] Thus, how a particular contract is treated in an insolvency depends not only on the type of contract, but also on the type of firm that becomes insolvent.

Monitoring by at-risk creditors and the influence of informed market participants on the risk-taking behavior of firms, which together constitute "market discipline" (Bliss and Flannery, 2002), are considered to be important elements in the oversight of managerial decision making and the avoidance of excessive risk taking.

Given differing legal priorities in the ex post distribution of the assets of a bankrupt firm to its creditors, at-risk creditors will not all have the same incentives to monitor firms and discipline debtor firms ex-ante. The expected recoveries, conditional on the firm becoming insolvent, will vary with the creditors' priorities, and so, for a given dollar exposure, will their benefits of engaging in costly monitoring. Similar logic results in different creditors charging different interest rates to the same firm according to the expected losses they are likely to bear in the event of default. For example, unsecured and more junior creditors may be expected to be more sensitive to the financial health of debtor firms than secured and more senior creditors, to charge a higher interest rate, and to monitor and seek to influence more intensely.

The relationship between capital structure and intensity of monitoring/influencing is of particular importance for banking. The government and, therefore, the taxpayers are important at-risk creditors through the provision of deposit insurance (by the FDIC in the U.S.) and the provision of payment clearing services by the central bank. Furthermore, losses to private creditors (depositors) are often a public policy concern as the effects may spill over to other sectors of the economy and adversely affect macroeconomic activity, so called "systemic risk." In the event of a bank failure, the uninsured

[8]Other types of firms with special insolvency regimes include insurance companies, security broker/ dealers, and government-sponsored entities, e.g., Fannie Mae.

depositors' accounts may also be temporarily frozen and access denied during the resolution process, as records are verified and/or assets liquidated and the proceeds collected by the receiver. This may be a particular burden on creditors of insolvent banks, many of which may be expected to value the short-term, highly liquid nature of many of their deposit and other claims. Any prolonged, general freezing of these accounts may have significant adverse spillover effects on financial markets and the macro economy.[9]

This paper explores the legal status of different claimants on commercial banks' asset under insolvency, and how the choice of contracts creditors enter into determines the protections they enjoy. In particular, the paper examines how participants in derivative and certain other off-balance-sheet contracts may effectively enjoy enhanced security status of their in-the-money claims on insolvent counterparties through a process referred to as "close-out netting." We then analyze the possible implications of these protections for other creditors and for the behavior of the derivative market participants themselves. While it is clear that these protections benefit major derivative dealers in particular, and arguably derivative markets in general, it is less clear that other market participants or markets in general are better or worse off. In the end, while we are not able to conclude whether these protections are socially optimal, we outline the wide range of issues that a general consideration of the pros and cons of netting protection must take into cognizance, and we analyze some of these issues critically. Ultimately, the question becomes one of quantifying complex trade-offs, which is beyond the scope of this paper.

Defining netting-related terms

Close-out netting involves two concepts: close-out and netting or set-off. Close-out permits a solvent counterparty to terminate a contract under certain conditions and demand immediate payment under the terms of the contract, either for the replacement or market value of the contract or, in the case of a loan, repayment of principal. Close-out is not usual in insolvencies since the execution of most contracts (including execution of close-out agreements) is stayed when a firm files for bankruptcy or is placed under administration. However, as we shall see, close-out is permitted for some important classes of derivatives contracts.

[9]See Kaufman and Seelig (2002).

Netting, set-off, or offset arises when multiple contracts between the same two parties are being settled simultaneously. The amounts due from the several contracts, which may involve obligations to pay under one contract and a right to receive under another, are summed together and the several obligations to pay or be paid are combined into a single obligation for the net amount. This process of combining multiple off-setting claims into a single claim is generically called "netting." Set-off, netting, and offset are conceptually equivalent, but their legal treatments are distinct. Close-out netting to refers to the determination and settlement of (net) amounts for transactions entered into under a single master contract that also provides for close out. If the solvent counterparty owes on net, they pay immediately; if they are owed, they become a general creditor for that amount. Set-off refers to netting individual contracts, but in this case payment comes in due course along with settlement of other claims in the insolvency, which may occur years after a firm fails; in the meanwhile, the contracts remain in force. We reserve "off-set" for the handling of particular classes of contracts (referred to as qualified financial contracts in the statute), which individually provide for netting and close-out and which are then netted against each other to determine the final amounts due. Whether multiple obligations can be combined to produce a single obligation for the net amount and whether in the process the contracts can be immediately closed out are matters of law that we will discuss in this paper.

Trading of derivatives, repurchase agreements, and some other financial instruments takes place under master agreements between counterparties. These master agreements cover individual transactions under the scope of the contract and usually provide for both close-out and netting rights of transactions under the master agreement.

2 A Historical Background to Netting[10]

Netting issues as a matter of insolvency date to the beginning of commercial relations and the development of property rights. The early history of insolvency law provides some fundamental perspective for understanding the efficiency implications that netting and setoff can hold in today's financial markets. As individuals and groups engaged in commercial relations, bargaining, and exchanging of resources, societies

[10]Portions of this section have been taken from Bliss (2003).

adopted norms, jurisprudence, and enforcement mechanisms to allocate scarce resources among competing claims. Those engaged in commerce accumulated rights and obligations; assets and liabilities; things owed and things owing. At times, naturally, debtors' obligations exceeded their available resources, and various means arose to deal with debtor relations with various creditors.

2.1 *Pro-creditor versus pro-debtor bankruptcy systems*

Broadly speaking, legal approaches to bankruptcy resolution may be classified as either pro-creditor or pro-debtor. Most of the countries that derive their laws from the English common law tradition, including the UK, most Commonwealth countries, and UK-affiliated off-shore financial centers, have pro-creditor laws, which we term "English" approaches or frameworks. Germany, Italy, China and Japan have similar approaches, though they do not share the same legal heritage. Countries whose legal frameworks have their origins in the Napoleonic Code are generally pro-debtor in their approach to bankruptcy, called the "Franco-Latin" approach.[11] These countries include France, Spain, most of Latin America, as well as much of the Middle East and Africa. Thought the antecedents of U.S. law lay in the English common law tradition (excepting Louisiana law, which derives from French traditions), the U.S. has evolved a hybrid system of common and legislated laws that is broadly pro-debtor with significant pro-creditor exceptions.

Pro-creditor bankruptcy laws recognize the right of creditors to protect themselves against default through ex ante contractual agreements that permit the solvent counterparty to close out contracts and set off obligations. The Franco-Latin approach, on the other hand, seeks to maximize the value of the bankrupt firm by affirming claims due to the bankrupt firm and disavowing claims made on the firm. Such selective repudiation of contracts is known as "cherry picking." The Franco-Latin approach often ignores privately negotiated ex ante contractual arrangements that would favor one creditor over another.

[11]The English and Franco-Latin legal taxonomy presented herein is a simplified version of the more nuanced analysis in Wood (1997).

The English (pro-creditor) and Franco-Latin (pro-debtor) approaches have at their roots two fundamentally irreconcilable concepts of fairness. The English perspective is that it is unfair for a bankruptcy administrator to claim monies due from a solvent counterparty under one contract, while simultaneously refusing to make payments to the same counterparty under another contract. Under English law the right to "set off" or net multiple contracts between a solvent and an insolvent counterparty is a matter of common law, which does not require prior agreement. Thus, cherry picking is anathema to the English bankruptcy tradition. Furthermore, the English tradition recognizes the right of freely contracting parties to protect themselves against the possibility of default by various mutually agreed contractual arrangements, such as netting agreements and collateral.

In contrast, the Franco-Latin approach sees ex ante private contracting of creditor protection agreements as creating a privileged class of claimants to the detriment of the remaining creditors. Such protections permit one creditor to receive greater than pro rata value by virtue of being able to net amounts owed from the bankrupt firm against amounts due to the bankrupt firm, while another creditor with no offsetting position may suffer more substantial losses. The Franco-Latin approach views set-off agreements as creating an "unpublicized security"; this means that certain assets of a firm may not be available to satisfy the general creditors' claims because another creditor has an undisclosed superior claim.[12] Set-off arrangements that derive from reciprocal contracts cannot reasonably be made known to other creditors; therefore, the Franco-Latin tradition views such "hidden" preferences as fundamentally unfair. To avoid this perceived inequity, the bankruptcy administrator in pro-debtor jurisdictions is given powers designed to maximize the value of assets available for pro rata distribution to all creditors.[13] These include the ability to separate multiple contracts between the bankrupt firm and individual solvent counterparties. The administrator may also require solvent

[12]The concept of an unpublicized security carries over to collateral arrangements. In the U.S., the claim on the collateral must be "perfected" by registering it in a manner that provides other creditors with an opportunity to learn of the claim; still, courts are likely to disregard the agreement and retain the collateral in the estate of the insolvent firm, thus reducing the improperly collateralized creditor to general creditor status.

[13]The principal of equality of distribution, as discussed in this section, should thus be thought of as applying within a particular creditor class defined by the bankruptcy code. The Franco-Latin concern is that collateral and netting arrangements result in privately negotiated alteration of these priorities.

counterparties to pay amounts due to the bankrupt firm and then stand in line for *pari passu* distribution of any amounts due to them as creditors.

While these two legal philosophies appear fundamentally irreconcilable, in practice pro-creditor and pro-debtor laws frequently co-exist, though perhaps not naturally. This happens when a fundamentally pro-debtor jurisdiction, such as the U.S., enacts laws granting pro-creditor protection to specific types of contracts. These laws are termed "carve outs" and provide exceptions to the general bankruptcy code. Internationally, carve-outs have been enacted in most relevant jurisdictions for payment systems transactions, some derivative instruments, and certain collateralized transactions such as repurchase agreements. In the U.S. and some other jurisdictions, banks and some other types of financial institutions are also subject to carve outs from the bankruptcy code that is applicable to most firms.

2.3 *Netting and Offsets*

The distinctions between pro-creditor and pro-debtor philosophies are particularly important in the cases of payment systems and derivative markets. 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. In the event of bankruptcy, few if any contracts could be netted or set-off. However, financial markets can generate huge numbers of simultaneous transactions between pairs of counterparties. Interbank payment systems involve banks sending each other funds to clear thousands of transactions throughout the day, and the direction and amount of individual transfers are unpredictable. The gross amounts of such transactions are very large, but at the end of the day the net transfers are relatively modest.[14] Similarly, many large commercial and investment banks make markets in special financial instruments and hedge their positions

[14]Interbank payment systems are either "net" or "real time gross settlement" (RTGS). Netting systems accumulate payment orders and then clear them on a net basis at fixed intervals (daily or more frequently). RTGS systems clear individual transactions as they arrive. Two important early studies that looked at the pros and cons of payment netting were the "Angell Report" (BIS, 1989) and the "Lamfalussy Report" (BIS, 1990). These studies touched on many of the issues raised in this paper, although in the context of payment systems rather than derivatives.

with each other. Again the gross positions are very large, but the net positions are modest.[15]

The problem of offsets arose early in the evolution of bankruptcy law, and their development reflected issues we still deal with today. Under Roman law the right to *compensatio* (the canceling of cross demands) was permitted only for claims arising out of the same transaction, only in certain actions, and at the discretion of the *judex* (for reasons of equity).[16] The Justinian Constitution expanded the classes of transactions for which *compensatio* was permitted, but left unresolved whether the cancellation of cross claims was automatic (by mere operation of law) or required agreement or adjudication.[17] The distinction remains today. In most cases, the right of setoff requires adjudication. But for derivatives covered by master agreements and some other financial contracts, close-out netting operates automatically. Under French Civil Code (circa 1900), "two debts are reciprocally extinguished from the moment they exist."[18] This means that in bankruptcy any legal claims are for the net amounts. In the eyes of the law, the component debts do not exist separately. An enforceable master agreement achieves the same effect.

One of the earliest references to setoff authority in English law arose in a case decided in 1676.[19] In the *Anonymous* decision, the court found that upon bankruptcy, a solvent merchant owing and simultaneously in debt to a bankrupt merchant was not required to pay the gross amount owed, but "to pay only that which appears due to the bankrupt on the foot of the account," that is the net amount.[20] The court's opinion did not include any reasoning for the decision. Nor did a soon-to-follow similar case *Chapman v.*

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[15]In 2002 U.S. banks had total derivative credit exposures of $525 billion, 96 percent of which (measured by notional value) was concentrated in seven banks. Netting reduced banking system-wide gross exposures by 75.8 percent, a figure that had increased from 44.3 percent in the second quarter of 1996. Still, a number of major banks have (net) derivative credit exposures exceeding their risk-based capital, in the case of J. P. Morgan Chase by a factor of 589 percent. (Preceding data are from OCC, 2002).

[16]Loyd (1916). The ISDA Master Agreement (*vide infra*) is a method of defining what constitutes "the same transaction."

[17]Ibid.

[18]Ibid. That France is both pro-debtor and permits netting is not necessarily inconsistent. The reciprocal extinguishing of multiple bilateral debts and their replacement by a single legal obligation takes place at the time the debts are incurred and therefore prior to insolvency. Upon insolvency, French law takes a pro-debtor approach in its treatment of the remaining net claim (for instance, in its treatment of collateral arrangements).

[19]*Anonymous*, 1 Mod. 215, 86 Eng. Rep. 837. (C.P. 1676), discussed in Loyd (1916).

[20]Some financial statements therefore included information about net amounts of money due or owing, along with gross amounts, at least for those amounts owed and owing between the merchants themselves.

Darby[21] finding *against* a right of setoff; albeit in this case neither merchant had yet formally entered bankruptcy. However, the *Chapman* decision noted that had a merchant in fact been bankrupt, the non-bankrupt party "should only answer to the bankrupt's estate the balance of the account," thus supporting the right to setoff under bankruptcy. Since banks as a legally distinct business entity did not exist at the time, the question of setoff under bankruptcy did not turn on either party being a bank. Soon after these cases, the English common law roots to setoff were supplemented (and qualified) in 1705 and 1732 legislation as part of more general bankruptcy reform with significant improvements in the status of debtors, including the limited introduction of discharge and entitlements.[22]

In the 1716 case, *Lord Lanesborough v. Jones*; Coggs, a bankrupt goldsmith[23] owed Jones on notes, while Jones was simultaneously one of Coggs' mortgage borrowers. Coggs' trustees failed in their attempt to press for a judgment for full payment from Jones, coupled with only a pro rata repayment of the notes. Instead, Jones was allowed to set off in full the amount owed Coggs on the notes against the mortgage obligation. This decision cited the 1705 legislation and respected netting/setoff, with the result insulating the non-bank counterparty from the failure of the goldsmith. The decision articulated an oft-later-repeated (and occasionally questioned) "natural justice and equity" reasoning. This rationale was later used in the U.S. in the seminal cases *Scammon v. Kimball* (1875),[24] *Scott v. Armstrong* (1892),[25] and *Studley v. Boylston* (1913),[26] respecting a bankers' right of setoff in the United States. In *Scott v. Armstrong* (1892), by way of contrast, the Supreme Court found in favor of a bank *creditor's* right to setoff a receivable *from* an insolvent bank in full against its obligation *to* the bank. However, the surviving creditor was itself a bank, in this instance; though the principal has since been extended to non-bank creditors of banks.

In *Studley v. Boylston* (1913), the U.S. Supreme Court found in favor of a bank's ability to set off a failed tour company's deposit in full against the tour company's

[21] *Chapman vs. Darby*; 2 Vern. 117, 23 Eng. Rep. 684, 685 (Ch. 1689); discussed in McCoid (1989).
[22] See McCoid (1989), particularly footnotes 22 and 23, and discussion in Pomykala (1997).
[23] At the time goldsmiths acted as bankers—taking deposits and making loans.
[24] *Scammon v. Kimball*; 92 U.S. 362 (1875)
[25] *Scott v. Armstrong*; 146 U.S. 499, 510 (1892)
[26] *Studley v. Boylston National Bank*, 229 U.S. 523, 528 (1913); see discussion in Kalevitch (1993).

obligation to the bank on notes. While it may have been "absurd"[27] in the eyes of the court to "make A pay B when B owes A," and that the bank might have to pay what it owed on the deposit at the same time the bank was owed on notes from the same party, it may not have been so absurd to customers of the failed tour company, who had purchased places in the tour with advance payments to the tour company and wanted some money back. In effect, *Studley v. Boylston* found in favor of a bank's right to set off a note receivable from a failed borrower in full against its deposit liability to that borrower.

The *Studley v. Boylston* decision moved beyond simply citing the federal statutory language of protection as it applied in this case, and opined in the last paragraph that with respect to the right of setoff:

> The Bankruptcy Act recognizes this right, and it cannot be taken away by construction because of the possibility that it may be abused. The remedy against that evil is found in the fact that the trustee is authorized to sue and recover if it is shown that, after insolvency, the money was deposited for the purpose of enabling a bank or other creditor to secure a preference. But to deny the right of setoff in cases like this would in many cases make banks hesitate to honor checks given to third persons, would precipitate bankruptcy, and so interfere with the course of business as to produce evils of serious and far-reaching consequences.[28]

Here arises one of the earliest versions of the 'systemic risk' justifications for the right of setoff, an oft-repeated argument offered for protecting setoff and close-out netting rights in over-the-counter (OTC) derivative markets today. The 1892 *Scott v. Armstrong* decision contained no such rationale, however. Perhaps, by 1913, the periodic banking crises leading up to the creation of the Federal Reserve System provided a more pressing and/or available economic justification.

As complex as modern derivatives contracts can appear, they share a fundamental and simple characteristic of depositor-borrower relations, in that parties may simultaneously owe and be owed 'money.' In turn, as the derivatives market grew in the 1980s, so did the demand of interested participants to extend setoff and close-out netting rights to the new marketplace.

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[27]"[Setoff] is grounded on the absurdity of making A pay B when B owes A." *Studley v. Boylston National Bank*, 229 U.S. 523, 528 (1913); see discussion in Kalevitch (1993).
[28]*Studley v. Boylston National Bank*, 229 U.S. 523, 528 (1913)

The recent adoption of the pro-creditor approach for payment systems and derivative markets is an implicit recognition that the equity arguments of the Franco-Latin framework are incompatible with the contractual and legal certainty needs of these financial markets. The widespread adoption of carve-outs, providing pro-creditor protection for payment systems and derivative instruments, particularly in the form of collateral arrangements and netting agreements, represents one of the few successes in international legal harmonization. This process has been shepherded 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. Having only a single contract between each pair of counterparties to a Master Agreement eliminates the problem of netting multiple contracts.[29] Netting legislation covering special financial instruments 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.

3 Current Legal Status of Close-out Netting, Offset and Set-off

To understand the economic implications of netting, offset and set-off, it is necessary to understand the legal rules that provide these important rights. It is tempting (and easier) to assume that the legal application of netting, offset and set-off will be applied uniformly, automatically, and promptly upon the insolvency of an insured financial institution. The actual application, however, of these legal rules is not necessarily so tidy. In addition, what may be possible with respect to these rights upon the insolvency of a debtor subject to the bankruptcy code, may not necessarily be possible with a debtor that is an insured financial institution. Before one can make

[29]In some cases, there may be several Master Agreements covering different classes of contracts and with different divisions of a 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 is lobbying for legislative recognition of these innovations to reflect industry risk management practices. Recent proposed changes to the U.S. bankruptcy code have supported this idea.

statements about the economic effect of these rights, the actual reach of these legal rights must be fully understood.

There are two types of netting rules: those that apply in the course of ordinary business among solvent counterparties—payment netting, also called settlement netting or delivery netting—and those that apply in resolutions of insolvent firms—close-out netting, also called default netting, open-contract netting, or replacement contract netting. As noted in Section 1, close-out netting agreements consist of two related rights: the right of a counterparty to unilaterally terminate contracts under certain specified conditions, and the right to net amounts due at termination of individual contracts in determining the resulting obligation between (now former) counterparties. Wood (1994) points out that payment netting is meaningless unless it is legally supported by close-out netting rights in the event of default by one of the counterparties. 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 Federal Bankruptcy Code (generally referred to as simply "the Code") governing most corporations is generally pro-debtor, with some exceptions. The Code will stay or preempt rights under state laws that are inconsistent with its provisions. However, in the absence of such preemption, the Code will generally enforce a party's contractual rights under state law. There is no general right of set-offs, or netting, of obligations provided for under the Code, although federal bankruptcy law recognizes the right of set-off as (but only if) provided for by the state law governing the contracts involved.[30]

Unlike the resolution of most other firms, the resolution of the insolvency of an insured financial institution, such as a U.S. chartered bank that has FDIC-insured deposits, is governed by the Federal Deposit Insurance Act (FDIA), as amended by the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA), and subsequent acts.[31] FDIA was expressly amended in 1989 by FIRREA to provide special treatment for certain derivative contracts upon the insolvency of an insured financial

[30] *In re Patterson*, 967 F.2d 505, 508-09 (11th Cir. 1992).
[31] 12 USC §1811 *et seq.* (1989).

institution. In addition, the Federal Deposit Insurance Corporation Improvement Act of 1991 ("FDICIA") also affects the treatment of certain derivative contracts upon such an insolvency. Finally, FDIA is supplemented by the National Bank Act in the case of national banks, and by a state's banking laws for a state-chartered bank.

The legal authority to close banks lies with the appropriate regulator, depending on the bank's charter. Creditors cannot force a bank into bankruptcy since banks are specifically exempted from the Code. The FDIC will almost always be appointed either as a receiver (if the bank is to be immediately liquidated) or a conservator (if the bank is to continue operating as a going concern) of the insolvent bank. The appointment of the FDIC to administer the insolvency is mandated for federally chartered, federally insured institutions and is usual for state chartered, federally insured institutions. The decision whether to form a receivership or a conservatorship lies with the FDIC and has a tremendous impact upon a solvent counterparty's close-out netting rights.

FDIA generally provides a number of favorable treatments to creditors of an insolvent bank that have entered into over-the-counter derivative transactions (a "derivative transaction") with the bank. First, except for situations in which the FDIC is acting as a conservator (which happens less frequently today as a practical matter) or for a one-day period when acting as a receiver, the FDIA provides that close-out netting generally cannot be stayed or prohibited. This permits a party to close out the derivative transactions and net out the termination values of the derivative transactions entered into between the parties. It also provides that any rights to liquidate collateral that relate to the terminated derivative transactions cannot be stayed or prohibited.

Second, the FDIA provides that the right to "offset" (i.e., set-off) any net amount owing under derivative transactions and any "qualified financial contracts" (such as obligations under forward or repurchase transactions) that the insolvent bank has entered into with the other party cannot be stayed or prohibited. Finally, FDIA does not restrict a party's right to set off any net amounts owing under the derivative transactions with any other amount (subject to the depositor preference rules) that the other party owes to it,

provided that such a set-off right is enforceable under state law. This section will discuss the underlying contractual and legal basis for these benefits.[32]

There are two levels of legal analysis that must be done when determining the close-out netting, offset, and set-off rights of a solvent counterparty of an insolvent insured financial institution. First, what legal rights have the parties given to each other with respect to these issues in the contracts that have been entered into between the parties. Although parties generally try to expand these rights contractually as much as possible, there are situations when parties contractually limit them. Second, assuming that the parties have agreed to these contractual rights, can the solvent counterparty enforce those rights against the FDIC, which has been appointed as a receiver or conservator of the now insolvent insured financial institution?

Contractual Close-out Netting and Set-Off Rights. The contractual agreements documenting and governing derivative transactions have been standardized to a great extent by the industry and the industry's trade group, the International Swaps and Derivatives Association (ISDA). In fact, almost without exception, the industry has adopted the terminology, definitions and forms of agreements developed by ISDA. Thus, currently, one cannot discuss the rights, obligations, and mechanics of derivative transactions without discussing them within the context of the documentation developed by ISDA.

The payment terms of a derivative transaction entered into between two parties are documented by what is referred to in the industry as a "Confirmation." The Confirmation "confirms" the payment terms. It does not, however, contain the many important contractual terms and other elements found in a typical finance contract. Instead, these terms and provisions are documented in a separate companion document (now basically standardized) called an ISDA Master Agreement (the "ISDA Agreement") that the bank individually negotiates with each of its counterparties. The ISDA Agreement was developed by the eponymous industry trade group. The terms found in an ISDA Agreement include, among others, the governing law, events of default, how an

[32]Although this paper focuses on close-out netting and set-off for insolvent banks, close-out netting and set-off are also sometimes allowed under other insolvency regimes for other types of firms. This presents many of the same concerns and issues discussed in this paper. For example, similar rights exist for creditors of debtors that are subject to the U.S. Bankruptcy Code (i.e., 11 USC §560), such as most corporations and individuals.

ISDA Agreement can be terminated, and how damages are calculated. Each Confirmation is incorporated directly into an ISDA Agreement itself, as opposed to being treated as an individual and distinct contract.

An ISDA Agreement provides for numerous events of default. Events of default under an ISDA Agreement include, for example, failure to pay amounts due under a derivative transaction, a cross-default, and most importantly, insolvency (i.e., bankruptcy). A party is considered to be insolvent if, among other things, it is unable to pay its debts, makes a general assignment for the benefit of creditors,[33] and seeks or becomes subject to the appointment of a conservator or a receiver. The appointment of a receiver or a conservator under FDIA would constitute an event of default under an ISDA Agreement. Upon the occurrence of an event of default, the non-defaulting party has several contractual and legal rights under an ISDA Agreement, including the right to terminate and close out an ISDA Agreement and the underlying derivative transactions.

As part of the termination and close-out of an ISDA Agreement, each included transaction is closed-out (i.e., terminated) at its mark-to-market value. To obtain the mark-to-market value of the relevant derivative transaction, the non-defaulting party will typically obtain three or four quotations for the contract from derivative dealers. If three quotations are obtained, the high and low quotations are thrown out and the middle quotation is used. If four quotations are obtained, the high and low quotations are thrown out and the middle quotations are averaged.

The mark-to-market amount is usually equal to the cost of replacing the individual terminated transaction and is calculated without taking into account that the bank is insolvent. After the amounts are determined, each close-out amount will then be netted against the mark-to-market value of the other terminated transactions entered into under an ISDA Agreement. A net payment is then made at this time. The party that is out-of-the-money is obligated under an ISDA Agreement to pay the net amount to the in-the-money party, regardless of who is the defaulting party. If the insolvent bank is in-the-money with respect to the net termination payment, such amount would be an asset of the insolvent bank and would be collected in full by the FDIC. The FDIC would then use

[33]An assignment for the general benefit of creditors is a relatively uncommon process of voluntarily liquidating a firm outside of the jurisdiction of a bankruptcy court or a bank receiver or conservator.

these proceeds to pay off the different creditors in accordance with the depositor preference provision of FDIA.[34] If the insolvent bank is out-of-the-money, then the solvent counterparty would be a general creditor of the insolvent bank (unless such amount was secured with collateral).

In addition to close-out netting, the solvent counterparty typically has negotiated with the bank a contractual right under an ISDA Agreement of offset or set off. Offset or set-off provides that the solvent counterparty may offset (or set off) the net mark-to-market amount (if any) that it owes to the insolvent bank under an ISDA Agreement against amounts that the insolvent bank owes it under other agreements or contracts. For example, the solvent counterparty would have a contractual right to offset or set off any net close-out amounts that it owes to the insolvent bank under an ISDA Agreement against any deposits that the counterparty has with the insolvent bank. Although the parties have a contractual right of set-off, such rights may be restricted by federal or state law as will be discussed below.

Effect of FDIA. Although there are several provisions under FDIA that potentially could preclude, or slow down, a party's exercise of its contractual rights of close-out netting, offset and set-off, important exceptions to protect close-out netting are provided for derivative transactions that are defined as a "swap agreements." The definition of swap agreement under FDIA is drafted broadly enough to include the majority of over-the-counter derivative transactions involving interest rates, currencies, commodities, and equities (among others) that are structured as swaps, caps, floors, and similar transactions. It is important in understanding these legal rights to appreciate that if a particular derivative is not included in the definition of "swap agreement," it will not be eligible for the protection under FDIA. For example, if a transaction falls outside the definition, it would be excluded from the close-out netting treatment provided to transactions that are covered. As participants in the derivative market develop more sophisticated transactions, it is possible that such transactions may not fit into the definition of a swap agreement formulated by Congress under FIRREA over a decade

[34] 12 USC §1821(d)(11).

ago. This has become a critical issue as the equity derivative and credit derivative markets have exploded.[35]

The ISDA Agreement was prepared by the industry and ISDA and designed to meet the definition of "swap agreement" in FDIA. Each of the individual transactions entered into under the ISDA Agreement also needs to meet the definition of "swap agreement" subject to the caveats described in the two preceding paragraphs. For the purposes of this paper, it is assumed that the term "swap agreement" will encompass the ISDA Agreement.

Termination. As a general rule, FDIA provides that the FDIC as a conservator or receiver may enforce a contract (i.e., prevent a termination) with a solvent counterparty if the sole reason for the solvent party's right to terminate is based upon the appointment of the receiver or conservator for the insolvent bank.[36] However, if the FDIC is appointed as a receiver (i.e., it intends to liquidate the insolvent bank), it has the right to transfer a swap agreement to another FDIC-insured bank (see below). But, if the FDIC does not transfer a swap agreement by close of business on the day following its appointment as a receiver, the solvent counterparty may terminate a swap agreement.[37]

In contrast to the limited stay attendant to the appointment of the FDIC as a receiver, a solvent counterparty is indefinitely prevented from terminating an ISDA Agreement based solely upon the appointment of the FDIC as a conservator. The FDIC as a conservator essentially steps into the shoes of the insolvent bank and assumes the rights and obligations of the insolvent bank under the various transactions. To terminate a swap agreement after the appointment of the FDIC as a conservator, an event of default (other than an insolvency or insolvency related event) or a termination event (as defined in the swap agreement) would have to occur or the conservatorship would be replaced by a receivership; otherwise the solvent counterparty must continue to perform under the swap agreement.[38]

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[35] 12 USC §1821(e)(8)(D)(vi). Currently, Congress is considering broadening this definition considerably to include many of the newer credit and equity derivative transactions, among others, that may not literally fit the definition of a swap agreement.
[36] 12 USC §1821(e)(12)(A).
[37] 12 USC §1821(e)(8)(A)(i); and FDIC Statement of Policy on Qualified Financial Contracts, December 12, 1989.
[38] 12 USC §1821(e)(8)(E).

Although FDIA appears to prohibit the solvent counterparty from terminating a swap agreement upon the appointment of the FDIC as a conservator, many believe that such a right could still be enforced under the FDICIA. FDICIA provides that "notwithstanding any other provision of law," a party may enforce the close-out netting terms of a netting contract (such as the ISDA Master Agreement) entered into between "financial institutions."[39] Indeed, ISDA's legal counsel has taken the position that, upon the insolvency of a bank, a solvent counterparty that qualified as a financial institution[40] under FDICIA should be able to terminate or close out a swap agreement and exercise its close-out netting rights in spite of the FDIC's appointment as a conservator.[41] The FDIC, however, has taken the official position that FDICIA only enforces a party's netting rights[42] and not the right to terminate a swap agreement.[43]

The opposing opinions of the FDIC and ISDA point out a legal uncertainty that can have important consequences. For example, in the event that the solvent counterparty closes-out a swap agreement upon the appointment of a conservator in contravention of the stay provided by FDIA and the courts support the FDIC's position rather than ISDA's, the solvent counterparty may find itself in an even worse situation than if it had not closed out its positions. First, the FDIC could attempt to require the solvent party to reinstate the terminated swap agreement and underlying transactions, putting both parties back into the same situation that they were in before the attempted termination. Second, the solvent party may have already replaced the transactions with a new party that it had in place with the insolvent bank. The solvent party would now have two sets of derivative transactions to deal with.

Close-out Netting. Upon the termination of a swap agreement or other qualified financial contract, either through repudiation by the conservator or through the election of

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[39]12 USC §4403.

[40]The definition of a financial institution includes an FDIC-insured bank. The solvent counterparty would qualify as a financial institution if it met certain quantitative and qualitative tests. These tests are designed to identify large firms that are essentially acting as derivative dealers in the market place. 12 CFR Part 231.

[41]Cravath, Swaine & Moore, Memorandum of Law on the Enforceability of the Termination, Close-out and Multibranch Netting Provisions to the 1987 and 1992 ISDA Master Agreements, March 12, 1998, at 39–40.

[42]A pending amendment to FDICIA that is before Congress clarifies that FDICIA does not override the FDIC's powers to enforce the Agreement when acting as either a receiver or a conservator. In addition, the restrictions against terminating the Agreement with respect to the appointment of a conservator in the amended provisions have become more stringent.

[43]Risk-Based Capital Standards; Bilateral Netting Requirements. 59 Fed. Reg.37726, at 37730, July 25, 1994.

the solvent counterparty, the FDIA prohibits any stay or restriction of a solvent party's netting rights under such an agreement in determination of final payments.[44]

Security Arrangements. Upon the termination of a swap agreement or other qualified financial contract, either through repudiation by the conservator or through the election of the solvent counterparty, FDIA also prohibits any stay or restriction on a party exercising its rights under any security arrangement (i.e., collateral) securing a party's obligations under such an agreement.[45] Thus, upon termination of a swap agreement, the solvent party should be able to liquidate any collateral securing the insolvent bank's obligations under that agreement. Even though there are no such restrictions on exercising a party's rights under a security arrangement, the terms of such arrangements generally require that an agreement be terminated prior to such exercise.

Treatment of "Master" Swap Agreements and Confirmations as One Agreement. FDIA defines a swap agreement as including both a master agreement (such as an ISDA Agreement) and each of the underlying Confirmations.[46] Consistent with this definition, if the FDIC elects to transfer a "master" swap agreement, it must also transfer all of the derivative transactions in the same swap agreement to the same transferee.[47] In other words, the FDIC may not pick and choose which derivative transactions it wants to transfer and which ones it wants to hold with respect to each swap agreement that is has with the solvent counterparty.

In a similar manner, if the FDIC elects to repudiate a derivative transaction or a "master" swap agreement, it must repudiate all of the derivative transactions entered into with respect to that "master" swap agreement.[48] The FDIC may not "cherry pick" by picking and choosing which derivative transactions it wants to repudiate and which ones it wants to enforce.

Offset of a Qualified Financial Contract. In addition to the prohibition against stays and restrictions on close-out netting, FDIA prohibits any stay or restriction against an offset or set-off of an amount owing under a terminated swap agreement against any

[44] 12 USC §1821(e)(8)(A)(iii) (FDIC as receiver); 12 USC §1821(e)(8)(E)(iii) (FDIC as conservator).
[45] 12 USC §1821(e)(8)(A)(iii) (FDIC as receiver); 12 USC §1821(e)(8)(E)(iii).
[46] 12 USC §1821(e)(8)(D)(vi).
[47] 12 USC §1821(e)(9)(A).
[48] 12 USC §1821(e)(8)(D)(vii).

other amount owing under a qualified financial contract.[49,] A party entering into a swap agreement with a bank may also have entered into other qualified financial contracts with that same bank that were not documented under the same "master" swap agreement. The contractual set-off provision found in a swap agreement (such as the ISDA Agreement) should be sufficient to permit a party to offset the amount owing under a swap agreement with amounts owing under any other qualified financial contracts entered into with the same party. A party may also have such right of offset under common or state law, such as New York's set-off statute.

The offset is very similar in effect to the netting under a swap agreement (such as the ISDA Agreement). The primary difference is that a default under a swap agreement does not necessarily result in a default under a relevant qualified financial contract. The offset would only be available if both the swap agreement and the qualified financial contract were terminated at the same time. Also, the methodology to calculate the amount owing under the qualified financial contract is computed (pursuant to the terms of such contract) differently than under a swap agreement.[50] This right of offset with respect to qualified financial contracts is also important because such offset does not appear to have to meet the set-off requirements of state law. A contractual right of such offset or set-off would appear to be sufficient for it to be protected by FDIA.

Set-off Against Other Amounts. Upon the termination of a swap agreement and the determination of the net close-out amount, if the solvent counterparty is out-of-the-money under a swap agreement, it will want to set-off any amount that it owes under a swap agreement (that have not already been offset against obligations under a qualified financial contract) against any amount that the insolvent bank owes to it under any other agreement (e.g., a deposit agreement) pursuant to its contractual set-off provision in the swap agreement. In addition to the contractual set-off, a solvent party also enjoys a

[49]12 USC §1821(e)(8)(A)(iii) (FDIC as receiver); and 12 USC §1821(e)(8)(E)(iii) (FDIC as conservator). In addition to a swap agreement, a qualified financial contract includes a securities contract, commodity contract, a forward contract or a repurchase agreement (12 USC §1821(e)(8)(D)(i)).

[50]For example, the amount owing under an under-collateralized repurchase agreement would represent the difference between the value of the security transferred in the repo and the amount paid for the transferred security.

common law right of set-off under case law.[51] More importantly, New York law has expressly codified a right to set-off.[52]

Depositor Preference. The FDIC recognizes and may attempt to enforce a creditor's right of set-off of master agreements and/or qualified financial contracts and other claims such as deposits against an insolvent bank, subject to state law set-off rights.[53] However, doing so may be inconsistent with the far-reaching effect of the depositor preference provisions of FDIA.

Prior to the Depositor Preference Act, which was embedded in the Omnibus Budget Reconciliation Act of 1993, depositors were general creditors. Under depositor preference, the FDIC as a receiver or conservator is required to distribute amounts collected from the liquidation or resolution of the insolvent bank and pay off any claims against the bank in the following priority: (1) administrative expenses of the FDIC; (2) any domestic deposit liability of the insolvent bank; (3) any other general or senior liability of the insolvent bank; (4) any obligation subordinated to depositors or general creditors; and (5) any obligation to shareholders representing their ownership interest.[54]

If, for example, a solvent bank counterparty was out-of-the-money with respect to an insolvent bank under a swap agreement and simultaneously was owed money under a different contract which did not qualify as swap agreement,[55] depositor preference could be interpreted to require that the solvent party immediately pay any amounts owed under an out-of-the-money swap agreement and then be a general creditor for any amounts owing to it by the insolvent institution under the other non-qualifying contract. Permitting the solvent counterparty to instead set off the two amounts would appear to violate the depositor preference provision by potentially giving the solvent counterparty a greater recovery than might be obtained by uninsured depositors, thus effectively increasing their priority beyond that provided for in the law.

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[51] *Studley v. Boylston National Bank*, 229 U.S. 523 (1913) as discussed above.
[52] New York Debtor & Creditor Law, § 151.
[53] FDIC Interpretive Letter 91-11 (Feb. 5, 1991); 1 FDIC-DAS, Claims Procedures manual 4-142 (1994).
[54] 12 USC §1821(d). See Kaufman (1997) for a discussion of the background and other implications of the Act.
[55] A number of potentially quantitatively substantial and systemically important contracts fall outside the ambit of swap agreement or qualified financial contract. These include deposits, bank issued bonds, and credit support agreements tied to off-balance-sheet entities (e.g., securitizations). In addition, a number of derivatives types, such as weather, energy, and credit derivatives, do not fall under the list of enumerated types mentioned in past legislation. These may or may not be protected.

A more interesting scenario, however, involves a solvent party that is out-of-the-money under the swap agreement and has uninsured deposits with the insolvent bank that would not be paid off by the FDIC in full, because there were insufficient assets to satisfy all of the uninsured depositors claims. Permitting such a set-off would appear to give the solvent party an advantage over other uninsured depositors, since the party would be collecting in full its uninsured deposits through the set-off. This would appear to be against the policies underlying the depositor preference provision, which tries to treat all of the uninsured depositors the same. It is unclear what would be the FDIC's or the courts' position on such a requested set-off.

Effectively, the only opportunity to exercise a set-off right would appear to be a situation in which the solvent party that is out-of-the-money under the swap agreement had insured deposits with the insolvent bank that would be paid off by the FDIC anyway. The FDIC has suggested informally that such a set-off would probably be permitted.

4 The Economic Costs and Benefits of Netting Agreements

The review of the historical development of the legal treatment of netting of contracts has shown that issues of equity are perceived differently in different legal traditions. However, the economic consequences of netting arrangements, particularly if we limit our examination to the narrow field of financial instruments and large complex banks, can be analyzed more objectively. To date, the consensus of market participants and their regulators has been that the special characteristics of derivative markets justify legal protection of close-out netting of derivative contracts. This judgment appears to have been arrived at with little or no consideration of the costs of this decision, only the benefits. In this section, we discuss both the potential benefits to derivative counterparties and markets and the potential costs that close-out netting imposes on parties other than the immediately-protected, solvent derivative counterparties.

Consideration of costs and benefits necessarily involves consideration of counter-factual alternatives—for example, what would change if these particular financial contracts were not protected by netting agreements, and what would be the costs and benefits of removing the current protections? Derivative-active banks do not act in isolation. They are active participants in financial markets and their counterparties are as

often as not non-bank financial institutions. Banks are willing participants in these financial markets both for their own profit as traders and end-users and to compete with non-banks in the provision of credit and non-credit financial products that the market demands.

It will be useful to divide the analysis as follows:

- Prior to failure of any market participant—the ex ante issues
  - Benefits to financial markets and the economy of derivative markets
  - Benefits to banks from participating in derivative markets.
  - Incentives of market to discipline banks arising from netting protections.
- Upon financial distress or failure of a market participant—the ex post issues
  - Benefits to solvent market participants when a counterparty (bank or non-bank) fails.
  - Costs to bank of close-out netting when they become financially distressed.
  - Benefits of close-out netting to bank when bank's counterparty fails.
  - Costs to "other" bank creditors of close-out netting agreements when the bank becomes insolvent.

4.1 *Ex Ante Analysis*

4.1.1 *Benefits of a Liquid Derivative Market—Role of Netting*

The widespread adoption and continued expansion of the master agreement concept, of which close-out netting is an integral component, has coincided with a very rapid growth in derivative markets. It seems reasonable to take as given that these two developments are not unrelated, and that the current structure of derivative markets is critically dependent on the nature of the contracts employed and their legal enforceability. Thus, enforceable netting (and collateral) provisions are a major contributor to the large size and substantial liquidity of derivative markets. Since firms hold capital against their risk exposures for regulatory, prudential, and/or market disciplinary reasons, the need to hold capital against net rather than gross exposures

means that firms can take larger positions on a given capital base. This makes the derivative market more liquid.

With the exception of credit derivatives, the purpose of derivatives is to isolate and transfer specific market risks—interest rate, foreign exchange, equity price, weather, energy, etc. The netting provided under the master agreement mechanism allows counterparties the ability to transfer and manage specific market risk more efficiently, while minimizing their exposures to counterparty credit risk. The ability to focus on specific risks is an important consideration for both end-users (who need be less concerned about their counterparty's credit exposures) and dealer intermediaries (who can specialize in the pricing and management of those risks).

Banks benefit from the existence of liquid derivative markets in two ways. For a few large banks, derivative dealing and proprietary trading based on derivatives are important profit centers. For a larger group of banks, derivatives are essential to risk management. Less obviously, the ability of non-bank financial institutions, such as Fannie Mae and Freddie Mac, to manage (or mismanage) their interest rate, prepayment, and credit risks through derivative markets (often with bank counterparties) increases the ability of banks to sell or securitize assets. The resulting widespread securitization of assets has fundamentally changed the nature of banking, allowing banks to diversify their asset holdings beyond their local borrower base and to engage in origination and servicing of loans in quantities beyond their own funding and capital constraints.

Restricting close-out netting would have adverse consequences for derivative markets. It is likely that liquidity in these markets would contract significantly. Related collateral rights would likely also be affected (the arguments for and against both protections are similar). The ability of less credit-worthy firms to participate in the market would be restricted and the price (spreads) of derivatives would increase as dealers absorb and pass on the costs of the greater credit risks they would then be exposed to.

Nonetheless, several proposals for changing close-out netting protections for counterparties of insolvent banks have been advanced. Draft changes in the U.S. bankruptcy code currently before Congress, and repeatedly approved in the past, though not enacted for unrelated reasons, would generally strengthen the enforceability of netting

under master agreements. These proposed changes would also broaden the definitions of covered contracts to include more contract types (e.g., credit derivatives). However, at the same time the proposed changes would restrict close-out netting by giving the FDIC wide powers to stay close-out rights under master agreements for banks placed into conservatorship. Since, within limits, the FDIC chooses the form of administration—receivership or conservatorship—and can place a bank into conservatorship and later into receivership, this provision would give the FDIC powers to indefinitely stay close-out for distressed banks beyond one day. More forcefully, Kane (2001) has proposed that netting simply be prohibited for counterparties of banks and that cherry picking be permitted. Kaufman (2002) has proposed special treatment of master agreements when the insolvent counterparty is a bank to avoid both FDIC bailouts and disruption of financial markets from abrupt termination of contracts. His proposal is that solvent counterparties with net in-the-money positions (that is, the insolvent bank owes them money) be required to pay the FDIC a fee based on the estimated pro rata loss; in return the FDIC would guarantee the derivative position, and passing it on to a new counterparty would obviate the need for close-out. However, none of these proposals addresses whether banks should continue to enjoy close-out netting protections against insolvent non-bank counterparties.

While these three proposals are very different, each would carve out special treatment of close-out netting agreements in the case of banks, thus potentially changing the current equilibrium of market contracts. If the insolvency of a bank is seen as a remote possibility, the effect of restricting close-out may be minimal. This can come about either because the derivative-active banks are seen as being of unimpeachable creditworthiness or because the counterparties anticipate that in the event of a bank failure, the FDIC would have no choice but to immediately pass the derivatives book to a bridge bank. This latter belief may arise from the observation that the vast majority of bank-held derivatives are concentrated in a very few, very large banks, which may be perceived by the markets to be too-big-to-fail, thus effectively insulating counterparties of these banks from credit risk. On the other hand, if the market abandons these presumptions, different treatment of close-out netting rights for banks and non-banks could restrict the ability of banks to participate in derivative markets. For multi-line financial companies, this might result in the derivatives book being moved into non-bank

subsidiaries of the holding company where enforcement of close-out netting would be more straightforward. For stand-alone banks, this might result in the exclusion of the institution from derivative markets or disadvantageous pricing. In either case, to the extent that bank participation in derivative markets has overall social and economic value, treating bank and non-bank master agreements differently could have adverse consequences.

4.1.2 *Adverse Incentive Effects of Netting Agreements*

As discussed earlier, netting and collateral provides a means for market participants to manage their credit risk exposures. Netting and related collateral agreements have the effect of reducing the credit risk exposures of derivative market participants, relative to what the exposures would be were the same parties liable for their gross exposures on the same set of underlying contracts. This has raised concerns that enforceable netting and collateral agreements might reduce the incentives of derivative market participants to monitor counterparty risk taking and to influence counterparties to limit their risk taking appropriately. This concern is heightened because derivative market participants are seen as especially knowledgeable and sophisticated and therefore particularly able at monitoring.

The validity of this argument depends on two factors. The first concerns the "…same set of underlying contracts" caveat, that is, the *ceteris paribus* assumption. We have argued above that netting results in market participants taking larger gross positions vis-à-vis their counterparties. If netting were not permitted, the gross exposures would likely adjust to the levels of the net exposures under nettings. For instance, suppose a particular counterparty was thought to be an acceptable risk up to a given exposure, say $10 million, perhaps due to available collateral. If netting were enforceable, the net exposure would be limited to at most $10 million, but the gross exposures could be much larger. However, if netting were not enforceable, the gross in-the-money position vis-à-vis the same counterparty would be limited to a $10 million.[56]

[56] The gross out-of-the-money exposure would be determined by the counterparty's view of their own creditworthiness.

Secondly, the argument presumes that a derivative dealer can eliminate counterparty credit risk simply by managing its net exposures. As a practical matter, achieving a net zero or out-of-the-money position vis-à-vis a given counterparty may not always be possible. Given an in-the-money exposure, the options are: to enter into additional (out-of-the-money) contracts, which depends on the business needs of the counterparty and may therefore be impractical; to demand more collateral, which may not be available; or to close out in-the-money positions, reducing gross exposures. Netting currently reduces bilateral credit exposures of the major (bank) market participants by 70 percent on a market value basis. The remaining 30 percent, however, still represents a significant credit risk exposure. For instance, J. P. Morgan's aggregate bilateral credit risk exposure exceeds its Tier 1 capital by more than five times.

How net positions vary across counterparties may be more relevant than the average exposures imply. If derivative market participants manage their portfolios to minimize their exposures to weak counterparties, their monitoring incentives may be altered where they most count. Note, however, that this presumes that market participants are monitoring their counterparties to determine which is weak and which is not, since on average significant credit exposures are being borne. Once a counterparty is identified as weak, the process of maintaining a flat or out-of-the-money position may itself impose discipline on the weak counterparty. Any negative changes in the net position, either from new contracts or changes in value of existing contracts, must be "approved" by the stronger counterparty, for instance by posting additional collateral. This reduces the freedom of contracting that a weak market participant might enjoy.

On the other hand, a net out-of-the-money counterparty might be willing to increase its exposure (reducing its net out-of-money position) to a weak counterparty. This may permit a weak counterparty to obtain credit and continue to hedge. Absent netting protections, a weak counterparty might find it difficult to remain active in financial markets, causing further erosion of its financial position. The tendency for weak banks to shift from unsecured borrowing in the federal funds market to secured borrowing in the repo market illustrates this phenomenon. This limited ability to raise funds and continue operation under adverse conditions may enable marginal firms to

recover from temporary shocks. However, it may also enable insolvent firms to survive beyond the point where they should be liquidated.

A second consideration that might mitigate the disincentives to monitor is that the values of derivative positions are apt to change rapidly. After all, netting only protects against credit risk and not against market risk. In dealing with weak counterparties, a firm needs to consider not only its current net exposure, but also the ability of its counterparty to make good when the value of the net position opens up due to fluctuations in the underlying market risk factors. It is not sufficient that the net position vis-à-vis a weak counterparty be out-of-the-money or fully collateralized today. Each firm needs to consider whether their weaker counterparties will have the capacity to provide additional collateral against the possible adverse changes in value of their position tomorrow. This implies a degree of monitoring even for net flat or out-of-the-money positions.[57]

Arguments for reduced incentives to monitor and counter arguments boil down to how behavior changes in the presence of netting and collateral. There is little direct evidence on the resources that derivative counterparties expend on monitoring. The growing use of collateral—ISDA estimates that 51 percent of net credit exposures are now collateralized—suggests that derivative markets are paying increasing attention to credit risk management. However, since the supply of good collateral at any given firm is finite, this trend may limit the ability of weaker firms to expand risk taking through their derivative positions, though not through other means (e.g., loans).

4.2 *Ex Post Analysis*

Netting impacts on the rights and enforceable claims of market participants in the event of default of a counterparty. The preceding analysis examined the ex ante effects of these issues on the behavior of market participants before any one of them has become distressed or has failed. However, the effects of close-out netting in the event of a failure also generate important issues. Foremost amongst these issues is the concern about systemic risk.

[57]Hendricks (1994) notes that both market participants and supervisory authorities recognize the importance of potential credit exposure and assess the possible increases in credit exposures over a fixed horizon. Under the 1988 Basel Accord, computation of regulatory capital requirements is based on a combination of both current and potential credit exposure.

4.2.1 *Systemic Risk*

The primary argument used to advance the case for legally enforceable close-out netting legislation has been that it reduces systemic risk. The underlying and explicit assumption is that financial markets are special and that their disruption can have adverse consequences for market participants and the broader economy. The concern is that the failure of one firm can lead to knock-on failures of other firms, or contagion. These adverse effects can take place either as a result of direct exposures, so-called rational contagion, or through changes in risk perceptions unrelated to actual exposures, so-called irrational contagion. Evidence of rational contagion is ambiguous at best and attempts to measure possible knock on effects from actual networks of multilateral exposures have concluded that such fears may be overblown (see Furfine, 2003). However, financial panics do happen, and the resulting contractions in liquidity can adversely affect credit markets. Such panics are increasingly rare and the adverse effects of severe market disruptions appear to be less severe than in a previous age. Some would argue that therefore fears of systemic risk are unwarranted. Others might argue that market mechanisms and legal treatments, including close-out netting, have evolved to mitigate otherwise severe risks.

Derivative markets are seen as particularly vulnerable to systemic shocks. The value of derivative positions can change rapidly. The huge volume of derivative trading and the enormous open positions misrepresent the true liquidity of the derivative markets when they are under stress. Derivative markets are dominated by a few large firms. Thus the failure of one firm and the response of others can lead to endogenous adverse changes in asset values and to rapid changes in market liquidity. Derivative dealing and the use of derivatives for hedging and risk management have given rise to far larger numbers of bidirectional contracts than are generated in traditional business relations. Net exposures can and frequently do differ substantially from gross exposures. In most business dealing, netting is not a major issue as one is either buying or selling, a debtor or a creditor, but rarely both simultaneously. With derivatives, it is commonplace to both owe and be owed simultaneously. Indeed, the most common way of adjusting a derivative position is not to adjust a specific contract but to enter into an additional offsetting contract.

The argument that closeout netting is a means of reducing systemic risks has been successfully advanced worldwide. While harmonization of bankruptcy laws has languished, harmonization of the treatment (and protection) of close-out netting now encompasses virtually all major derivative markets. In the U.S., derivative market participants, their trade associations, and most banking and securities market regulators have long supported the special treatment of derivative contracts under insolvency. Proposed revision of the bankruptcy code to clarify existing laws and further expand derivative close-out netting protection is widely supported by U.S. legislators and current and past administrations and has repeatedly passed both houses of Congress only to fall victim to unrelated political issues.

The systemic risk argument is made as follows: Derivative markets cannot function if stays are imposed on counterparties of insolvent firms. Stays would effectively lock counterparties into long-term positions of rapidly changing value, thus making it difficult for solvent counterparties to manage their own exposures. Uncertainty about future recoveries would prevent solvent firms from effectively managing their risks and inability to close out would make it difficult to replace contracts with solvent counterparties, thus perpetuating the uncertainties in the market. It is therefore argued that it is better to quickly resolve derivatives positions outside the normal slow bankruptcy process, allowing solvent firms to go about their business—that is, minimizing contagion.

Together with close-out, netting may further reduce systemic risk by reducing the size of at-risk positions from gross amounts to the much smaller net values. This reduces the probability that a solvent firm will find itself unable to meet these obligations. If close-out netting were not permitted, solvent counterparties would be immediately liable for amounts due to the insolvent firm, but would likely be required to wait until resolution was completed, potentially months if not years later, for any payment on amounts due from the insolvent firm. In the absence of a secondary market for liquidating (selling) pending claims, the resulting timing difference in gross cash flows could

seriously restrict the liquidity of a solvent firm, even if in the end its (post-resolution) net payoff was positive.[58]

These arguments beg the question of how serious would be the consequences of permitting those losses to happen. One could argue that any knock-on effects on most counterparties could and should be absorbed by the market as long as "too many" counterparties were not too badly affected. It is a matter of conjecture whether the failure of a large derivative market participant would be too costly to bear.

4.2.2 *Risk Shifting*

It has been argued that the benefits that accrue to one class of creditors of an insolvent firm through netting come at the expense of the other creditors. Emmons (2003) has rigorously demonstrated this potential impact in the context of payment system netting, but similar logic applies to derivative netting. The ex post transfer of losses from one creditor group to another affects the ex ante behavior of firms and creditors. If credit risks are shifted to creditors that cannot (due to information asymmetries or ignorance) price their true risks or to creditors that will not price their risks for political or other reasons (for example, deposit insurers), risk shifting could exacerbate moral hazard and cause misallocation of resources in the economy.

However, the risk-shifting argument, at least in its basic form, is based on a static analysis. The benefits and costs of netting cannot be analyzed in the context of a fixed set of contracts. In equilibrium, the set of contracts that firms and their counterparties will enter into are determined by whether netting (and close-out) are permitted. Thus, whether total risk (market and credit) increases for one set of creditors (say the FDIC) under netting cannot be answered without examining how netting affects the totality of contracts that another set of creditors (say derivatives counterparties) will enter into. This issue also presumes that the non-netting parties are passive in their contracting decisions. This is certainly reasonable for less-informed market participants (for example, small depositors) and captive participants (for example, deposit insurers, GSEs, and the central bank). However, the market includes presumably informed participants that make their

[58]A similar problem obtains with uninsured deposits. In the U.S., the FDIC has in the past paid out an estimated recovery value as an advanced dividend to provide claimants with some liquidity to continue their businesses (see Kaufman and Seelig, 2002).

own rational contracting decisions with knowledge of the netting and collateral rules that apply to derivative contracts. While these informed participants may have limited information about the precise nature of the protected claims, they are aware of this uncertainty and will price it. To date there is little empirical evidence on whether or not the net risks those "other" creditors assume, willing or otherwise, under close-out netting offset the advantages they and others derive under close-out netting.

It is important to note that the question has a certain symmetry. If indeed netting shifts credit risk from a bank's derivatives counterparties to other creditors when the bank fails, the same mechanisms would protect the bank and thus indirectly the bank's non-bank creditors from losses incurred when the bank's derivatives counterparty fails. This too is indeterminate, but it seems reasonable to assume for the time being that whatever risk shifting is going on benefits all creditors of the solvent party, while perhaps harming some creditors of the insolvent party.

5 Summary and Conclusion

This paper has examined the pros and cons of close-out netting as they currently apply to large commercial banks and complex financial institutions. The first part of the paper summarizes the historical debates over setoff and netting and the current treatment of derivative netting agreements. The international adoption of close-out netting protections (together with associated collateral protection) and the continued evolution of these protections has been concomitant with the rapid expansion of derivative markets themselves. These protections have undoubtedly contributed to the size, liquidity, pricing, and risk management characteristics of the market.

The economic analysis of the economic pros and cons of close-out netting involves several issues. The "pro" arguments concern the larger and more general matters of systemic risk and the importance of derivative markets; the "con" arguments concern the incentive effects of market participants in general and the more narrow question of risk shifting among creditors.

The systemic risk arguments hinge on two judgments: that derivatives are a potential source of systemic risk and that netting ameliorates this risk. Whether systemic risk exists at all is open to question; the question depends in large part on how much

disruption one believes the markets can reasonably absorb before government intervention is desirable. The view, reflected in regulatory policy and legislation, is that systemic risks are real and sufficiently important to warrant periodic intervention. The role of derivatives in systemic risk is rather less broadly accepted. Derivatives have long been a source of concern, but none of the derivative debacles of recent years have resulted in significant disruptions of financial markets. Nonetheless, concern remains. The economic arguments that close-out netting reduces the risk that the failure of a major market participant will produce knock-on effects appears on net plausible, though they do nothing to answer the criticism that the knock-on effects may be tolerable, given the other costs that close-out netting may impose.

The con argument that close-out netting reduces incentives to monitor and, thus, market discipline is more complicated. The degree of monitoring required even with a (today) net flat or out-of-the-money position depends on the volatility of that net exposure through time, which is likely to be related to gross position sizes. Enforceable netting provides some protection from counterparty credit risk but does not eliminate entirely the need for risk management and monitoring.

The risk-shifting con argument was also shown to be complicated. Past arguments have looked at the question assuming a fixed set of contracts and comparing the "with netting" and "without netting" outcomes. Such analysis concludes that netting shifts risk to "other creditors" (those that do not net). However, such analysis does not take into account that the set of contracts that counterparties (derivatives netters and non-netting other creditors) enter into is determined by their expectations regarding the enforceability of close-out netting (and collateral) agreements. Thus, the presence of enforceable netting is likely to increase the use of derivatives and the number and type of crediors. In addition, while netting may shift credit risk, credit risk is not the only source of risk. Close-out netting makes possible the use of derivatives to shift market risk to the benefit of "other creditors." On net, the determination of whether close-out netting results in a greater burden of credit risk being borne by one set of creditors than would be the case under an equilibrium characterized by the set of contracts that market participants would choose were netting protections not available is unclear. Unclear too are the full implications of the trade-off of credit risk shifting versus market risk shifting, which will

depend on to what purpose and how well derivatives are employed by a particular firm to manage its market risks. These issues require further analysis along the lines suggested in this paper.

Bibliography

Bank of International Settlements (BIS), 1989, "Report on Netting Schemes" (February).

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

Bebchuk, Lucien A., 1988, "A New Approach to Corporate Reorganizations," *Harvard Law Review* 101, February, 775–804. (101 harv. l. rev. 775)

Bliss, Robert R. and Mark J. Flannery, 2002, "Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring vs. Influence," *European Finance Review* 6(3), 361–395.

Bliss, Robert R., 2003, "Bankruptcy Law and Large Complex Financial Organizations: A Primer," Federal Reserve Bank of Chicago *Economic Perspectives*, First Quarter, 48–54.

Emmons, William R., 2003, "Interbank Netting Agreements and the Distribution of Bank Default Risk," working paper, Federal Reserve Bank of St. Louis.

Furfine, Craig H**,** 2003, "Interbank exposures: Quantifying the risk of contagion," *Journal of Money, Credit, and Banking*, forthcoming.

Herring, Richard, 2003, "International Financial Conglomerates and Bank Insolvency Regimes," working paper, University of Pennsylvania.

Kane, Edward J., 2001, "Market Discipline and Derivatives: Recognizing the FDIC as an Implicit Counterparty," comments at the Federal Reserve Bank of Chicago Workshop on Resolving *Large Complex Banking Organizations: The Nuts and Bolts* (November).

Hart, Oliver, 2000, "Different Approaches to Bankruptcy," NBER Working Paper 7921.

Hendricks, Darryl, 1994, "Netting Agreements and the Credit Exposures of OTC Derivatives Portfolios," Federal Reserve Bank of New York *Quarterly Review*, Spring, 7–18.

Kalevitch, Lawrence, 1993, "Setoff and Bankruptcy;" *Cleveland State Law Review* 41, 599–684.

Kaufman, George G., 1997, "the new Depositor Preference Act: Time Inconsistency in Action," *Managerial Finance* 23(11), 56–63.

Kaufman, George G., 2002, "Too Big to Fail in Banking: What Remains?" *Quarterly Review of Economics and Finance* 42(3), (Summer), 423–438.

Kaufman, George G. and Steven A. Seelig, 2002, "Post-resolution treatment of depositors at failed banks: Implications for the severity of banking crises, systemic risk, and too big to fail," Federal Reserve Bank of Chicago, *Economic Perspectives*, Second Quarter, 27–41.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny, 1997, "Legal Determinants of External Finance," *Journal of Finance* 52(3), 1131–1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny, 1998, "Law and Finance," *Journal of Political Economy* 106(6), 1113–1155.

Loyd, William H., 1916, "The development of set-off," *University of Pennsylvania Law Review* 64(6), 541–569.

McCoid, John C., II, 1989, "Setoff: Bankruptcy Priority?" *Virginia Law Review* 75, February, 15–43.

Office of the Comptroller of the Currency (OCC), 2002, "Bank Derivatives Report, Second Quarter 2002."

Pomykala, Joseph, 1997, "Bankruptcy Reform: Principles and Guidelines;" *Regulation*, Cato Institute, Fall, 41–48.

Wood, Philip R., 1994, *Principals of Netting: A Comparative Law Study*, Nederlands Instituut voor het Bank- en Effectenbedrijf, Amsterdam.

Wood, Philip R., 1997, *Allen & Overy Global Law Maps: World Financial Law* 3e, Allen & Overy, London.

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