CHAPTER 11

Centralized Clearing for Credit Derivatives

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The subprime crisis has highlighted several shortcomings of over-the-counter (OTC) trading in credit derivatives, most notably counterparty and operational risk concerns and the lack of transparency. The primary issue is that collateral and margin requirements are set bilaterally in OTC trading and do not take account of the externality that each trade's counterparty risk imposes on the rest of the system. This allows systemically important exposures to grow without sufficient capital backing. We propose the following comprehensive solution to address this and other shortcomings:

- OTC markets that grow sufficiently large should trade through a centralized clearinghouse that also acts as a counterparty to *all* trades, ensuring minimal, near-zero counterparty risk.
- Well-standardized products such as credit default swaps (CDSs) or credit indexes should ideally move to exchange-based trading where well-capitalized market makers provide liquidity, the exchange clearinghouse acts as the counterparty to *all* trades, and there is significant transparency in terms of aggregate and trade-level price and volume information.
- OTC markets that are not large enough to require a centralized clearinghouse but where deals are deemed to have important counterparty risk should be subject to a centralized registry.
- Given the binary nature of default events, collateral and margining arrangements should be marked to market daily and should be carefully designed to ensure that centralized counterparties in credit derivatives

face minimal counterparty risk, recognizing that higher counterparty risk than that in other products may be unavoidable. Requiring an appropriate level of transparency regarding bilateral exposures can mitigate the adverse consequences arising from residual counterparty risk.

- Regardless of market structure (centralized registry, centralized counterparty, or exchange), regulators should have expedient access to information on bilateral positions in significant OTC markets.
- Finally, since counterparty risks in OTC and registry structures would remain significant, a higher level of disclosure could be required of market participants—for example, disclosure, with a delay, of all net positions of each institution. This would provide an incentive to move away from these structures to centralized counterparty ones. However, where such disclosure is costly (for participants and regulators), there should at least be an effort to require bilateral collateral arrangements already in place in OTC markets to be sufficiently responsive to credit and market risks.

11.1 OTC CREDIT DERIVATIVES—A SNAPSHOT

Credit derivatives, mainly credit default swaps (CDSs) and collateralized debt obligations (CDOs), have been under great stress since the inception of the subprime financial crisis, and in turn, they have contributed to the severity of the market disruption.[1] It has been argued that this is in large part because these relatively new products are traded over the counter in bilateral transactions between banks and other institutions, unlike other financial derivatives such as equity options and futures contracts, which are mainly traded on exchanges.

Although OTC contracts can be more flexible than standardized exchange-traded derivatives, they also suffer from greater *counterparty and operational risks*, as well as less *transparency*. Each party in an OTC contract bears the risk that the counterparty will fail to fulfill its obligation in the future. Operational risk creates uncertainty about whether OTC trades will be cleared and settled in an orderly manner; for example, a market participant that takes a large hedging position in a credit derivative risks that settlement may be delayed if the trading and settlement infrastructure is poor. Counterparty and operational risks may also interact, whereby there is greater uncertainty about clearing and settlement when an important counterparty experiences distress. Finally, since there is no centralized trading platform in OTC markets, information about prices and trading volume is very limited. OTC trading is much less transparent than on an exchange,

which, as we explain later, is detrimental to financial stability in a stressed environment. Even the most basic information desirable to manage risks in such times—the total amount of outstanding credit derivatives—is misleading because of a lack of a centralized database. The Depository Trust and Clearing Corporation (DTCC) recently began publishing some disaggregated information on volumes of one credit derivative, credit default swaps, but it is only a small step toward the level of transparency desirable for market resilience during stress.

Consider first the CDS market. This market has grown by leaps and bounds since its inception in the mid-1990s, with reported total notional amounts outstanding rising from around $180 billion in 1998 to a peak of over $60 *trillion* by mid-2008. Many commentators express concern that this is much more than the total value of the underlying corporate bonds and loans that these contracts are designed to insure. But in this OTC market, the outstanding notional principal is estimated from surveys of dealers. To see how this distorts the picture, consider an investor who owns $100 million in XYZ corporation debt and buys protection by entering into a $100 million credit default swap with Bank A. Since both counterparties are surveyed, this would be reported as two new $100 million CDS contracts. Bank A then hedges its exposure by buying a CDS from Bank B. This raises the increase in outstanding CDSs to $400 million. Bank B buys a CDS from Bank C—another $200 million in CDSs—and finally, to cut the example short, Bank C hedges by buying protection on XYZ from an end investor, that is, an investor that wants to bear XYZ's credit risk rather than hedge it, in return for receiving the swap spread as a premium. Due to the bilateral nature of OTC trading, this chain, which involves one buyer of $100 million of protection, one ultimate protection seller, and three market-making intermediaries, would be reported as an increase of $800 million in outstanding CDS notional principal.

The settlement of CDS contracts written on Lehman Brothers, following its bankruptcy in September 2008, provides a striking example of this phenomenon. About $400 billion of CDSs were presented for settlement, but once all the offsetting trades, like those between Banks A, B, and C in the preceding example, were netted out, the DTCC estimated that only about $6 billion ultimately changed hands. The key issue is that investors do not know how to translate the $400 billion of gross notional amount outstanding to the $6 billion net. The substantial uncertainty about the net figure that would have to change hands in Lehman Brothers' bankruptcy, and whether this would lead to counterparty losses for other banks, contributed to the paralysis in interbank lending markets.

Although both CDSs and CDOs have contributed to the credit crisis, they have done so in quite different ways because the instruments themselves

have quite different risk characteristics. Most CDOs represent claims on an underlying pool of risky debt instruments, such as corporate bonds or mortgage loans. In the securitization process, exposure to the default risk that is inherent in the securities placed in the pool is split up among the different CDO tranches that are created, with buyers of the riskiest equity and mezzanine tranches bearing most of it.[2] These investors may end up losing most or even all of their principal value. But this risk is comparable to the risk on a bond: the investor cannot lose more than was invested initially. By contrast, a credit default swap is like an insurance contract. The protection buyer pays a regular premium, maybe a few hundred basis points a year, while the protection seller is exposed to the risk that the reference entity (the firm or sovereign borrower the CDS is written on) will default. If that happens, the seller is immediately liable for the default loss on the obligor's debt, which can be as much as the entire principal amount of the CDS. In the Lehman case, the protection sellers had to pay out about 92 cents on the dollar, several times the initial cost of the protection.

We therefore feel that the need to bring credit derivatives out of the purely OTC market in which they are currently traded is most pressing for the CDS market. We concentrate on them in this chapter, discussing briefly at the end the relevance of our proposal for other credit derivatives such as CDOs.

Note also that outside of the current crisis, the CDS market has experienced some problems when the number of contracts to be settled is large relative to the physical supply of the underlying reference securities. This raises the question whether these contracts should be settled by physical delivery of the underlying assets or in cash based on the price of the underlying. We relegate discussion of this issue to Box 11.1, focusing here on issues related to counterparty risk in CDSs and its mitigation.

11.2 WEAKNESSES IN THE CDS TRADING INFRASTRUCTURE: SOME EXAMPLES

A firm's CDS spread—the fee a buyer pays for default protection—is widely believed to be one of the best market indicators of credit risk. The spread tends to widen dramatically during a period of general financial stress, such as we are experiencing now. Is this widening entirely due to an increase in the credit risk of the underlying obligors? Higher default risk for obligors is clearly the most important factor, but an increase in perceived counterparty risk—the risk that the writer of the CDS contract will fail to fulfill its obligations or that the buyer of the contract will default, leaving the seller with the risk of replacing the contract at new prices and terms—is also an

BOX 11.1 CASH SETTLEMENT OR PHYSICAL SETTLEMENT?

An important aspect of all derivative contracts is how they are settled upon exercise. Two alternative methods, physical delivery and cash settlement, are prevalent in both exchange-traded and over-the-counter derivatives. For example, physical delivery is used for options on individual stocks. Upon exercise, shares of the stock in question are delivered in exchange for cash. By contrast, settlement of most index options and derivatives based on interest rates, such as Eurodollar futures, is done only in cash. The settlement amount is determined by the observed value of the underlying in the market. Both procedures are in use for settlement of credit default swaps (CDSs).

With physical delivery it is possible that the available supply of the deliverable security may be insufficient to meet the requirements of the net short positions on the maturity or exercise date. The problem is aggravated if the aggregate positions requiring delivery are not visible to the market. The market may experience a classic short squeeze in which participants with short positions suddenly have to scramble to buy the security, thus pushing the price up sharply over a brief period of time.

A prominent example of this phenomenon was the settlement of CDSs on Delphi in 2005, when the net outstanding position in CDS contracts to be settled far outstripped the floating supply of bonds that were deliverable into this contract. A more recent example occurred in the equity market when a short squeeze developed in shares of Volkswagen, in the presence of a large position in call options held long by Porsche and sold by many prominent hedge funds.

Another problem with physical delivery is that there is often a potentially large set of related things that can be delivered, such as multiple securities issued by the reference entity for a CDS, or different grades of a commodity that can all be delivered against a futures contract, and these trade at different prices in the market. This leads to the well-known cheapest-to-deliver issue, which introduces ambiguity into exactly what the long will receive upon delivery and how a hedge of the not-cheapest-to-deliver instrument will perform.

Cash settlement has its own problems, the most important of which is that the settlement price must be determined in the market. Anything that makes the market price differ from the full equilibrium value of

(Continued)

BOX 11.1 *(Continued)*

the underlying, such as a badly designed auction process or, again, an imbalance between the size of short positions and the outstanding amount of the underlying covered by the contract. If the auction becomes lopsided, a variant of the short squeeze can occur even with cash settlement.

What is the solution? If the floating stock of deliverable securities is small in relation to the outstanding position, the problem cannot be avoided by either cash or physical delivery. It may be mitigated by allowing the short position a broader range of settlement options, to include a choice of either physical delivery or settlement in cash. This may also work well in the case of nonstorable agricultural commodities.

In any case, increased transparency about the aggregate net position to be settled would warn market participants when there is an imbalance between the outstanding derivatives positions and the amount of the underlying available to be delivered. This is particularly relevant to the CDS market, where the market currently does not have a good idea of the net outstanding position in individual contracts.

important culprit. In fact, when the underlying obligor is a financial institution, credit correlation can have a substantial effect on the counterparty risk, as the intermediaries in the CDS market are also other financial institutions. In particular, large global financial firms fluctuate in value together due to their interconnectedness in the global markets, so that an increase in the credit risk of one is generally adverse news about the credit risk of others. This effect, along with the fact that such institutions are tied to each other through chains of OTC derivatives contracts as described earlier, means that the failure of one institution can substantially raise CDS spreads on other institutions, making it difficult for investors to separate the credit risk of the obligor from CDS counterparty risk.

Such systemic concerns arising from counterparty risk in CDS contracts have grown dramatically over the past year. For example, Bear Stearns was a leading clearer of the CDS contracts between financial institutions, like Bank B in our example. Its imminent failure in the first half of March 2008 sparked fear among them over the settlement and clearing of many trades—that its failure would have resulted in market disruption and mark-to-market losses for other institutions. The lack of transparency in the exposures of different institutions to each other aggravated such fears immensely, causing

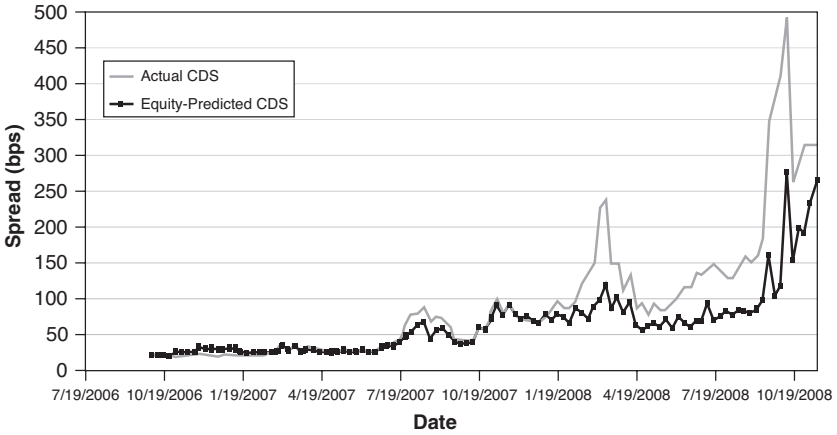

FIGURE 11.1 **The Relative Behavior of CDS Spread and Equity-Implied CDS Spread for Goldman Sachs during the Subprime Crisis**

Source: Leland (2008).

CDS spreads on financials to rise well beyond what would be based *only* on their credit risk. Deciding that Bear Stearns was too interconnected to be allowed to fail, the Federal Reserve and the Treasury orchestrated a bailout. The consequences of allowing a large OTC derivatives intermediary to fail rather than bailing it out became painfully visible when Lehman Brothers filed for bankruptcy shortly thereafter, once again causing CDS spreads to rise sharply and precipitating a freeze in interbank markets as well. Many observers now feel, with the benefit of hindsight, that Lehman was a systemically important counterparty and it was a serious mistake to let it fail.

Empirical evidence that widening of CDS spreads around these bank failures is partly attributable to concerns about counterparty risk can be seen in Figure 11.1, which compares the behavior of the market-quoted CDS spread on Goldman Sachs to its equity-implied CDS spread.[3] The two series grow increasingly out of sync as the Bear Stearns default approaches; the dislocation diminishes after the resolution of Bear, retaining nevertheless a higher level than during the pre-March period; dislocation skyrockets again around the Lehman Brothers and AIG episode of mid-September, again falling to an extent in October 2008 following the announcement of the rescue package for banks. While there may be other liquidity factors delinking the CDS and equity markets, counterparty risk and clearing concerns stand out as primary candidates.

The specific problems experienced by AIG during September 2008 highlight yet another shortcoming of OTC credit default swaps. AIG was in the

position of the ultimate protection seller in our example, taking on the default risk of XYZ and not hedging. AIG regarded default protection as just another kind of insurance, like insuring automobiles. Because of its AAA credit rating, AIG's counterparties did not require it to post collateral when it sold protection, but they did impose the condition that collateral would be required if AIG's credit rating fell. On September 17, 2008, AIG was downgraded to A– by Standard & Poor's and to A2 by Moody's, which touched off an immediate collateral call for over $13 billion. AIG could not raise that amount quickly and had to be saved from insolvency by a hasty bailout by the Federal Reserve and the Treasury.

11.3 THE BENEFITS OF CENTRALIZED CLEARING

The preceding examples show that OTC markets have some undesirable features, especially during a financial crisis. Yet the huge OTC market for interest rate swaps has thrived for the past 25 years. Why can't participants in the CDS market privately achieve outcomes that efficiently address these undesirable features? Put another way, why might a regulatory solution in the form of a centralized clearinghouse or exchange be desirable for credit default swaps?

First, all OTC contracts, including CDSs, feature collateral or margin requirements, wherein counterparties post a deposit whose aim is to minimize counterparty risk. The deposit is marked to market daily, based on fluctuations in the value of the underlying contract and the creditworthiness of the counterparties (as we discussed in the case of AIG). The difficulty, however, is that such collateral arrangements are negotiated on a bilateral basis. Parties in each contract do not take full account of the fact that counterparty risk they are prepared to undertake in a contract also affects other players; indeed, they often *cannot* take account of this counterparty risk externality in an OTC setting, due to inadequate transparency about the counterparty's other positions and its interconnectedness with the rest of the market. While bilateral collateral arrangements do respond to worsening credit risk of a counterparty, such response is often tied to agency ratings, which are sluggish in capturing credit risk information and potentially inaccurate.[4]

Futures and options exchanges frequently set maximum position limits for participants. A position limit is not unlike an infinite margin requirement. In a clearinghouse or exchange setting, even without position limits, it would be natural to impose higher collateral requirements on counterparties with unusually large exposures. Otherwise there will be concerns that severe price pressure may be exerted on markets if these large exposures are unwound under duress, as could well have happened with Lehman or

AIG. Since OTC markets prevent aggregating information about institution-specific positions, they also preclude a ready identification of large exposures. AIG was an extreme case, but it also showed clearly that each of its individual counterparties did not fully internalize the benefit of its margining on other counterparties, resulting in low overall margins, which allowed AIG to underwrite a systemically large amount of CDS protection. Had the counterparties been aware of AIG's total exposure, they might well have insisted on larger margins, which would have restricted AIG's ability to accumulate such large positions.

Finally, the same forces outlined earlier create resistance from large players to move trading from OTC markets to centralized clearing or exchanges. Large players benefit from the lack of transparency in OTC markets since they see more orders and contracts than other players do. They can also unwind or take on large positions in an OTC setting with less market impact (that is, without moving the market much) as they can trade with multiple counterparties, and thereby ensure that their overall trade remains disguised. Not only would large players lose these benefits in a clearinghouse or exchange setting, but they would also be required to post higher collateral. However, we will argue that during a systemic crisis, no player enjoys a significant relative advantage of trading on its own credit. Hence, in a situation such as the one we are in right now, the public goods aspect of reducing systemic risk in the context of a clearinghouse or an exchange likely far outweighs any specific benefits that even the best-rated and largest players may enjoy from bilateral contracting in an OTC market.

11.4 POSSIBLE SOLUTIONS AND THEIR RELATIVE MERITS

In what specific form should OTC trading move to centralized clearing? Let us first distinguish three forms a clearing facility might take (see Table 11.1).

Solution I: Registry. The most basic form would just be a central registry of deals that are set up privately in bilateral negotiations between counterparties. This kind of clearing facility could perform such functions as holding collateral for the counterparties, marking deals and collateral to market daily, and facilitating the associated transfers of funds, with appropriate netting of amounts, among all of the institutions it deals with. Centralizing information about outstanding CDS deals would allow a major improvement in market transparency, and netting of margin flows among the counterparties would increase efficiency. But counterparty credit risk would

TABLE 11.1 Three Possible Solutions to Centralized Clearing and Their Relative Merits

	Market Organization			
Market Characteristic	**OTC**	**Registry (Solution I)**	**Clearinghouse (Solution II)**	**Exchange (Solution III)**
Trading style	Bilateral negotiation	Bilateral negotiation	Bilateral negotiation	Continuous auction
Market participants	Large, well-capitalized firms	Large, well-capitalized firms	Well-capitalized counterparties only	Retail trade possible; largest trades arranged in upstairs market
Flexibility/ standardization of contracts	Maximum flexibility	Maximum flexibility	Flexible terms; standardized credit enhancement	Largely standardized contracts
Counterparty credit risk	Substantial	Substantial	Little to none	Little to none
Collateral/margin requirements	Bilateral negotiation and management	Consistent mark-to-market valuation of positions and collateral; required amounts set bilaterally by counterparties	Consistent mark-to-market valuation of positions and collateral; required amounts standardized and set by clearinghouse	Consistent mark-to-market valuation of positions and collateral; required amounts standardized and set by clearinghouse
Currently enforced levels of price information	Largely opaque; daily quotes available	Currently largely opaque; daily quotes available	More transparent; daily settlement prices publicly available	Transparent to all
Current levels of volume and open interest information	Opaque	Largely opaque	More transparent	Transparent to all
Current level of information on large trader positions	Opaque	Available only to regulators	Available only to regulators	Available only to regulators
Netting of cash flows	Bilateral only	Yes	Yes	Yes
Netting of offsetting positions	Bilateral only	Bilateral only	Yes	Yes
Secondary market	Only by mutual agreement between counterparties	Only by mutual agreement between counterparties	Yes	Yes

remain a problem to be dealt with privately by the participants. At this time, the DTCC performs some of these functions for a large fraction of the OTC-traded CDSs.

An important limitation of this level of centralization is that the risk of counterparty failure prevents two offsetting contracts from being netted out; thus, the gross principal amounts outstanding would be much larger for a registry than for the next two approaches. Another limitation is that even though in principle regulators can access information on positions from the DTCC, strictly speaking there is no requirement on the part of the DTCC to provide that data; such a requirement should be put in place. But, even if regulators could obtain the information, they would still have to mark these positions to market and translate the network of gross positions into net ones, a step that requires additional regulatory infrastructure that would have to be standardized to cover new products as and when they arise. In essence, under a pure registry solution, information on exposures that would be desirable for efficient response in a stressed environment is unlikely to be available to regulators with expediency.

Solution II: Clearinghouse. The next level of centralization would be for the clearing facility to become the counterparty and guarantor to each of the original counterparties in a deal. Each trade would be set up bilaterally, but then the CDS would be broken into two separate contracts with the clearinghouse in the middle, as is done by the clearinghouse of a futures exchange or by the Options Clearing Corporation for exchange-traded options.[5] This kind of clearinghouse would greatly reduce counterparty risk in the market, as long as it was adequately protected against default. An important element of that protection is that the clearinghouse would set uniform margin requirements on all deals. In contrast to a pure registry arrangement (Solution I), a centralized counterparty-cum-clearinghouse would enable netting of identical offsetting contracts, an attractive feature given the problems witnessed in CDS markets during the current crisis. However, by designating a single entity as the centralized counterparty, this arrangement puts the onus of maintaining near-zero counterparty risk *entirely* on that one entity.

Solution III: Exchange. The most centralized form of market organization would be for CDS trading to move to a formal exchange. An exchange eliminates the bilateral nature of OTC trading and opens it up to a much broader range of market participants, at highly visible prices. As with a centralized clearinghouse, two offsetting

> contracts are netted out: in other words, a counterparty can completely exit a position by putting through an offsetting trade on the exchange. In effect, the clearing corporation of the exchange still absorbs the counterparty risk. However, instead of there being just one centralized counterparty, trading on an exchange would be supported by licensed market makers who would be required to meet standard collateral requirements, and who would serve as the first line of defense if a customer defaults. If a market maker defaults, the exchange clearinghouse would use its resources to honor all affected contracts, and if necessary, could draw upon the capital of its member firms. One important benefit of this structure would be that the CDS market-making function—which currently sits under the universal banking structure that is subsidized by government guarantees—would be spun off and separately capitalized, reducing significantly the likelihood of systemic spillovers from the failure of a CDS intermediary to the banking sector.

Exchanges also set margin requirements for individual buyers and sellers. Whenever the amount on deposit becomes too low, the exchange sends a margin call, and failure to restore the margin to the required level leads to immediate liquidation of the position. This system mitigates counterparty risk between a trader and the brokerage firm and between the broker and the clearinghouse, thus effectively eliminating it entirely for contracts traded on the exchange. Futures exchanges proudly point to the fact that no trader of an exchange-traded futures contract has ever lost money due to a default by the clearinghouse.

Finally, exchanges also aggregate trade-level information and provide transparent dissemination of information about prices, volumes, and open interest to market participants and the general public. This information makes it possible for regulators, both at exchanges and at government agencies, to monitor the outstanding positions of a particular institution, and also of a particular contract. Going beyond issues of counterparty risk, exchange-based trading would also facilitate introduction and enforcement of other rules, such as prohibitions on insider trading and market manipulation.

One significant inconvenience of exchange trading of derivatives is that the contracts need to be quite standardized to permit a large number of traders to be trading the same instrument. Standardization would be a challenge for many OTC products, like CDO tranches. However, OTC credit default swaps are already highly standardized with regard to maturities and other terms that are mostly specified by selecting standard options in an International Swaps and Derivatives Association (ISDA) agreement. A bigger issue is resistance from large players to move trading from OTC markets to centralized exchanges, because they benefit from lack of transparency

of OTC markets and would likely be required to post higher collateral to clearinghouses and exchanges.

Of course, such higher collateral requirements would reduce the willingness of some players to take large positions, and standardized contracts would limit customization and innovation. However, in the current context, reining in risk taking by financial institutions and limiting the possibility of trading toxic securities in opaque markets may be seen as desirable objectives. With exchange-based trading, the most creditworthy institutions would not enjoy much comparative advantage, given uniform collateral requirements and anonymous trading. Also, greater transparency would reduce the profits of institutions with large market-making shares. For example, it would be harder to disguise their activities in putting on or unwinding large trades. However, exchanges, such as the New York Stock Exchange, have successfully dealt with such concerns by creating an upstairs market for negotiation and execution of large trades.

In considering the three levels of centralized clearing, we feel that the lowest level—a basic registry of deals—is not enough. While transparency is substantially improved and some efficiency is gained in dealing with cash flows, the critical problem of counterparty risk is not dealt with. However, while we see significant value in moving to a fully public exchange, the need to standardize products sufficiently to allow a liquid market would be a problem for credit derivatives other than the CDS, and of course the overhead cost of setting up and running an exchange could be substantial. The major gains from establishing a centralized clearing facility are obtained once there is a clearinghouse that assumes the role of counterparty and guarantees every trade.

The key issue in ensuring minimal, near-zero counterparty risk is how to set margin requirements such that the creditworthiness of the clearinghouse is never called into question. A trader must have confidence that there is no counterparty risk in a contract with the clearinghouse on the other side. This is where credit default swaps present a different type of risk exposure than other derivatives that are traded on or off exchanges. Established exchanges set the initial and maintenance margin requirements for derivatives contracts based on the estimated size of daily price changes. The amount on deposit should be more than adequate to cover the loss that would occur on a day when the price moves by an unusually large amount. When there is a deficiency, the margin call must be satisfied by the next day. By marking the position to market daily and requiring that at least the maintenance margin amount be on deposit each day, the clearinghouse is almost completely protected against default by a market participant.

Similar to a futures contract, the daily fluctuations in a CDS market spread are quite visible, and the clearinghouse would have no trouble establishing settlement prices for mark-to-market calculations. But, unlike

futures contracts, when there is a credit event, the liability of the protection seller in a CDS immediately jumps to a much higher level, possibly up to the entire amount of the protected principal in case recoveries in default are low (as was the case with the Lehman CDSs). No margin requirement less than 100 percent of the notional principal can provide *full* protection against the counterparty risk borne by the clearinghouse. This presents an important problem. If 100 percent margin were required to sell protection on an obligor whose probability of defaulting may be only a few percent or less, the market would disappear. But if the clearinghouse is exposed to a significant default risk whenever a CDS protection seller has to pay off, its guarantee loses effectiveness.[6] One possibility might be to require that participants (or market makers in case of an exchange) post significant *initial* margins to the clearinghouse. While this would limit entry, it would ensure that CDS market-making activity is always well-capitalized.

A better alternative is to set 100 percent margin for a protection seller's largest position across different reference entities (perhaps even setting limits on maximum exposures, as many futures exchanges do), with substantially lower amounts for additional positions. This would cover the clearinghouse fully in case of a single default, and provide time to issue a margin call for additional collateral on the remaining positions. The assumption that no more than one credit event would occur on the same day is less problematic if intraday margin calls could be made, which would be more important in CDS margining compared to non-credit-related products. Nevertheless, the clearinghouse would have to accept the risk of collateral shortfalls when credit events occur in rapid succession, and manage its liquidity accordingly. The clearinghouse can, for example, prearrange a line of credit to be drawn down in the event of such a contingency.

However it is handled, the issue of how to protect the clearinghouse from counterparty default when a credit event occurs must be dealt with carefully. Some experimentation in setting margin requirements to address this issue will be natural and should help convergence to feasible solutions. In cases where counterparty risk cannot be fully eliminated, then *transparency* levels could play a substitute role, as we explain next.

11.5 DESIRABLE LEVELS OF TRANSPARENCY

As discussed earlier, systemic risk arises naturally from the exposure to counterparty risk that is inherent in OTC markets. We argued so far that a centralized clearing and counterparty system would essentially eliminate counterparty risk. In markets where this solution is not adopted,

counterparty risk should be priced in terms of exchange or bilateral margin and collateral arrangements, and for this case it must be visible and easy to evaluate. This creates an important role for transparency in OTC markets.

In order to determine the appropriate risk premium for an OTC contract with a counterparty, an investor needs to be able to calculate not only the counterparty's probability of default but also its exposure to various other risks. For example, if the investor is buying protection on a particular reference entity, the protection is less valuable if the counterparty also has a big exposure to default of the same entity. In just the state of nature when the protection is most important, the counterparty is more likely to default. A good example of this so-called wrong-way counterparty exposure occurred when the monoline insurers sold a large amount of protection on highly correlated risks. A similar problem arises if the first counterparty is exposed to a second counterparty that in turn is exposed to the reference entity. While it is not possible to know the full risk exposure of any counterparty, it would clearly be useful to know the exposure of every counterparty to major risks. Prices for bilateral OTC contracts should take into account the relevant counterparty exposure, which would provide an incentive for the counterparties to reduce risk.

Of course, in regulations to promote derivatives markets transparency it is essential not to eliminate the incentive to invest in research and information gathering. If transparency requires trading strategies to be made public, so that their price impacts become large, then the survival of the market will be jeopardized. The following proposal on required transparency for credit derivatives is designed to balance these considerations by adjusting the detail and timeliness of public disclosure.

In all three solutions described in Table 11.1, both price and contract information and counterparty positions should be visible to the relevant regulatory authorities. In the registry solution, aggregate exposure of each counterparty to a particular contract should be made public on a delayed basis such as monthly or biweekly. That is, the public should be able to find out the net notional value of CDSs written by one company on a particular reference entity. This means that a bank or hedge fund would periodically report its net exposures to a list of reference names. At this time the DTCC reports on roughly 1,000 underlying names; hence, under our proposal, this report would give the net notional position of each bank to each of these 1,000 names one month ago, for example.

In the clearinghouse and exchange solutions, the counterparty reports would not need to be made public, because counterparty risk is not priced for these contracts. The information would still need to be visible to regulators and to the clearinghouse for use in margin requirements, but the centralized trading arrangement facilitates such information gathering. Importantly,

lack of public disclosure with centralized trading would be an incentive for OTC market players to migrate the market to a clearinghouse or an exchange.

We acknowledge that the level of transparency for the registry solution we propose is not as great as could be desired. It does not reveal counterparties of counterparties nor a counterparty's noncredit derivatives exposures, both of which would be needed to assess overall counterparty risk accurately. A more detailed report would include the entire matrix of net exposure of counterparty A to counterparty B with respect to reference entity C. But, even such bilateral transparency is deficient when similar products are traded simultaneously on exchanges and over the counter. The OTC contracts would be revealed, but the exchange positions would not. Regulators could therefore see these relationships but investors could not. Further, the reports we propose would only be released with a lag, which would make them outdated measures of counterparty exposures in some cases. Finally, if the level of transparency just described is deemed to be too costly, regulators should at least investigate how the current bilateral margining procedures in OTC deals could be improved to reduce counterparty risk further.

Nevertheless, the improvement in risk assessment from even a crude level of transparency would be enormous. An investor would be able to price contracts to take account of a counterparty's exposures much better than in the currently opaque OTC environment. If the counterparty subsequently takes on even more risk, because this is public information, the investor will have a capital loss on his or her position. As a consequence, counterparties would have incentives to manage their risk exposures in order to continue business.

To summarize, transparency and margining or collateral arrangements act as partial substitutes. Where the latter are sufficiently rich to ensure near-zero counterparty risk, public transparency of bilateral exposures is redundant. Absent such collateral arrangements, transparency can provide incentives to market participants to manage their risks prudently.

11.6 RECENT PROPOSALS AND WILL THEY SUCCEED?

In response to concerns regarding the OTC nature of credit derivatives markets, the Federal Reserve is supporting a move toward central clearing of credit default swap contracts. One platform is being developed jointly by the Chicago Mercantile Exchange and the hedge fund Citadel. The Intercontinental Exchange (ICE) has a competing proposal, and others are being developed in Europe.

The DTTC (New York) and LCH.Clearnet Group (London) have announced a merger to create the world's largest derivatives clearinghouse, also providing services for OTC products such as interest rate swaps and credit default swaps. These developments augur well for the credit derivatives market and overall financial stability. The AAA credit rating and risk-management expertise of centralized clearinghouses will help assuage fears over counterparty and operational risks. Centralized clearing will also enable aggregation of trade-level information so that prices, volumes, and open interest can be disseminated to market participants beyond the direct participants. This information will also make it possible for regulators to monitor the outstanding positions of a particular institution and of a particular contract. And prices of credit default swaps would reflect what they are supposed to—the credit risk of the underlying obligor—rather than that of the counterparty providing the insurance.

Will these initiatives succeed? Some institutions, especially large players, will likely resist calls to move away from the OTC markets. Hence, the regulatory resolve must be strong. The resisting players must realize (or be informed) that OTC markets can continue to arise whenever the financial sector needs to innovate and customize new products, but once these markets grow beyond a critical size, the standardized versions of the products should move to a centralized clearing counterparty structure or to exchanges (Solutions II or III).

11.7 IMPLICATIONS FOR OTHER MARKETS

Although we have focused on CDS markets as the proximate example, many other markets that have figured prominently in the current crisis—most notably those trading mortgage-backed securities (MBSs), collateralized debt obligations (CDOs), and asset-backed commercial paper (ABCP)—have also experienced severe stress. Fundamentally, there is no reason why these products cannot be traded and cleared more centrally. The key difference between them and CDSs is in the relatively standardized nature of CDS contracts. But this simply suggests that some of these other derivatives should be provided the centralized counterparty-cum-clearing structure (Solution II), unlike the CDS, which can potentially even trade on an exchange (Solution III). In principle, centralized counterparty and exchange-trading solutions can be applied also to traditional OTC markets such as those in foreign exchange derivatives, commodity derivatives, and equity- and credit-linked structured products.[7] Migration of some of these products away from the OTC markets will help reduce counterparty and operational risk concerns, and also allow for an explicit assignment of jurisdiction

applicable to these products—Federal Reserve, Commodity Futures Trading Commission (CFTC), or Securities and Exchange Commission (SEC)—something that is unclear at best in the status quo trading infrastructure for these products.

In summary, we believe it is high time to lift the veil of opacity of bank balance sheets and interbank linkages, starting with more transparent trading infrastructure for credit derivatives.

NOTES

1. See Chapter 10, "Derivatives: The Ultimate Financial Innovation."
2. See Chapter 1, "Mortgage Origination and Securitization in the Financial Crisis."
3. This graph by Hayne Leland employs a structural model of credit risk to find the asset volatility and asset value level that matches the model equity volatility with the options market's implied volatility, and the model equity value with actual equity value. It assumes a constant (and relatively low 9 basis points) liquidity premium on CDS contracts. The model builds on Leland's 2006 Princeton University lectures, which include jump risk and liquidity premiums on debt (www.princeton.edu/bcf/newsevents/events/links/lectures-in-finance/index.xml). We are grateful to Hayne Leland for sharing the figure with us.
4. See Chapter 3, "The Rating Agencies: Is Regulation the Answer?"
5. This kind of hybrid trading arrangement, which essentially blends private negotiation of specific deal terms with a full clearinghouse guarantee of the final deal and substitution of itself as counterparty to each of the original transactors, resembles the procedure used in the Chicago Board Options Exchange's long-maturity FLexible EXchange (FLEX) options.
6. Note that this issue of margining for the "binary" or "digital" nature of an obligor's default applies also to bilateral contracts in OTC credit derivatives markets. To our knowledge, margining in bilateral contracts does not explicitly deal with the issue, perhaps explaining the significant counterparty risk concerns that arose with regard to the CDS contracts during the subprime crisis.
7. Indeed, over time existing exchanges have innovated their products to compete with OTC markets even on nonstandardized contracts, like FLEX options.

REFERENCE

Leland, Hayne. 2008. Structural models and the credit crisis. Presentation at the Financial Intermediation Research Society, Anchorage, Alaska.