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Abstract

In the wake of the recent financial crisis, over-the-counter (OTC) derivatives have been blamed for increasing systemic risk. Although OTC derivatives were not a central cause of the crisis, the complexity and limited transparency of the market reinforced the potential for excessive risk-taking, as regulators did not have a clear view into how OTC derivatives were being used. We discuss how the New York Fed and other regulators could improve weaknesses in the OTC derivatives market through stronger oversight and better regulatory incentives for infrastructure improvements to reduce counterparty credit risk and bolster market liquidity, efficiency, and transparency. Used responsibly with these reforms, over-the-counter derivatives can provide important risk management and liquidity benefits to the financial system.

Key words: OTC derivatives, central counterparty, centralized data repository, collateral management, electronic trading platform, exchange, market transparency, regulation, systemic risk

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I. Introduction

In the wake of the recent financial crisis, over-the-counter (OTC) derivatives have been blamed for increasing systemic risk.[1] Over-the-counter derivatives markets are said to be complex, opaque, and prone to abuse by market participants who would take irresponsibly large amounts of risks.

Although OTC derivatives were not a central cause of the crisis, we find that weaknesses in the infrastructure of derivatives markets did exacerbate the crisis. As a result of failures of risk management, corporate governance, and management supervision, some market participants took excessive risks using these instruments. The complexity and limited transparency of the market reinforced the potential for excessive risk-taking, as regulators did not have a clear view into how OTC derivatives were being traded. If used responsibly, however, over-the-counter derivatives provide important risk management and liquidity benefits to the financial system as well as non-financial corporations and other market participants. Here, we will address market design weaknesses in the OTC derivatives market that were identified through the crisis, and discuss how the New York Fed and other regulators could improve the structure of this market.

While new legislation is also needed, regulators have not waited for legislation to demand improvements in the infrastructure of these markets, and have worked in concert with other market participants and policymakers to this end for the past several years. Table 1 summarizes the major accomplishments of this effort. In addition, The New York Fed is advocating:

- greater use of central clearing counterparties (CCPs), by encouraging clearing initiatives by market participants and through harmonization of capital regulations that provide additional incentives for central clearing.
- increased regulatory transparency through mandatory reporting of non-cleared OTC derivatives to trade repositories.
- increased transparency to all market participants through the publication of price and volume information.
- the use of exchanges and electronic trading platforms for sufficiently actively traded products.
- stronger operational and risk-management practices, including collateral management and multilateral trade compression.

II. Over-the-Counter Trading, Exchange Trading, and Clearing[2]

An over-the-counter trade is privately negotiated between the buyer and seller. In contrast, an exchange is a centralized facility, such as an electronic communications network, for matching the bids and offers of many buyers and sellers. Any derivatives trade, whether executed on an exchange or over the counter, can be cleared through a central counterparty, which assumes responsibility for the counterparty performance of both sides of a trade, as we will explain in Section IV. Essentially all derivatives traded on exchanges are centrally cleared. Over-the-counter derivatives are centrally cleared if both parties

[1] Systemic risk means the risk of a significant reduction in the effectiveness of the financial system, caused for example by a chain reaction of failures of major financial institutions.

[2] The term "clearing," when used in this paper, refers to central counterparty clearing services, as opposed to clearing services that are provided by utilities that handle centralized payments and settlements for financial instruments.

decide to assign the trade to a central counterparty, and if the central counterparty accepts the assignment. Regulators have prioritized the increased use of central clearing for OTC derivatives trades in order to reduce systemic risk.

III. Recent Improvements in the OTC Derivatives Market[3]

Regulatory efforts over the past four years have significantly improved a market that had been fraught with inefficient systems and processes — especially in the case of credit derivatives. In 2005, the exceptional growth of the credit derivatives market had outpaced the capabilities of dealers' processing systems, leading to large backlogs of unconfirmed trades. These unconfirmed trades had potentially uncertain legal statuses, often for lengthy periods of time, and limited the ability of dealers to accurately determine their counterparty exposures, a risk management concern that also increased systemic risk. In 2005, for every 100 new trades that a dealer executed, there were about 1,000 aged unconfirmed trades.[4]

Since 2005, the market's trade processing efficiency has improved markedly. Today, for every 100 new credit derivative transactions, there are fewer than 10 aged unconfirmed trades. Without the demands made by regulators for improvements in this market, OTC derivatives might have contributed to even greater systemic risk at the time of Lehman's default. Firms that had derivatives positions with Lehman (its "counterparties") were forced to terminate many of those transactions when Lehman declared bankruptcy. To date, of over 900,000 OTC derivatives trades on Lehman's books, only one transaction has been challenged due to an open confirmation. Of the settlement payments due on credit derivatives with which protection was sold against Lehman's default, the Trade Information Warehouse at the Depository Trust Clearing Corporation (DTCC), which handled the bulk of these settlements, reported no failures to perform.[5] Had typical 2005 unconfirmed trade levels persisted through September 2008, however, Lehman's failure could have been far more chaotic, posing the potential for systemically dangerous defensive behavior by those market participants who were unaware of the extent of their credit derivatives exposures, not only to Lehman but to other important counterparties. In Section VII, we discuss this type of behavior, which can lead to a run on a large, weak counterparty or distortions in market prices.

Table 1 highlights some of the additional achievements that have been made by market participants in response to regulatory demands to reduce risk and increase market efficiency.

[3] For more information and a chronological listing of the New York Fed's efforts in the OTC derivatives space, please visit http://newyorkfed.org/newsevents/otc_derivative.html

[4] This is based on regular monthly metrics collected on new trade volume and unconfirmed trades aged over 30 days for the top 14 credit derivatives dealers in December 2005.

[5] These figures are specific to the bankruptcy declaration of Lehman Brothers Holdings Incorporated within the United States on September 15, 2008.

Table 1. Improvements to the Over-the-Counter Market Spurred by Regulators[6]

A central repository for credit derivatives trades was created[7]. Certain events, such as quarterly payments, occur over the contractual lifetime of a credit derivatives trade. Before 2005, there was no central source of credit derivatives trade information, making it difficult to manage these types of lifecycle events. Regulators insisted that market participants create a central repository to log all credit derivatives trades. In addition to facilitating the processing of various lifecycle events, in late 2008, this central repository, kept at the DTCC, became a key source of credit derivatives data for regulators and the general public. Similar efforts are now underway for derivatives linked to interest rates and equities. Section VII offers a further discussion on the role of trade repositories for improving transparency.

Despite continuing growth in trading volume, backlogs of unconfirmed trades have decreased[8]. In 2005, immature infrastructure and lack of automation had led to long processing lags between the times at which trades are executed and the times at which they become legally matched contracts. These backlogs made it difficult for market participants to adequately measure their risk exposures. Regulators set stringent targets and deadlines for dealers to reduce their backlogs and increase both automation and processing efficiency for OTC derivatives. The processing lags and backlogs of legally uncertain trades have been largely eliminated for credit derivatives and dramatically reduced for other types of OTC derivatives.

Market participants have increased transparency regarding their counterparties.[9] In 2005, a client of a dealer would commonly assign its trades to other dealer counterparties through a process known as novation (as illustrated in Appendix D), without all parties being informed of the assignment. This led to a lack of awareness by dealers of the identities of their ultimate counterparties, resulting in trade-match failures and breaks in payment flows. To address this, regulators required market participants to set up a mandatory protocol by which novating parties would obtain the consent of those parties remaining on the trade. This ensured that all parties would henceforth be aware of the identities of their counterparties at all times.

Improvements to CDS market design enable the market to handle record levels of bankruptcies.[10] In initial market practice, credit-derivative settlement payments called for the delivery of bonds of the defaulting borrower referenced in the credit default swap (CDS). The total of outstanding CDS positions referencing a particular borrower can be large relative to the quantity of bonds of that borrower available in the market. As a result, a default or other market event triggering the settlement of CDS contracts could cause a scramble for sufficient deliverable bonds, artificially driving up the prices of those bonds. In response to regulatory pressure, market participants have committed to use an auction process that allows parties to settle CDS contracts without the need to deliver bonds. The auction determines a settlement price for the bond that leaves most parties indifferent between settling the CDS through physical delivery of bonds in return for cash, and settling in cash only for the net value.[11] In the past 12 months, the market has successfully settled 50 CDS corporate credit events. In the preceding three-year period there was an average of only three such CDS settlement events per year.

[6] The improvements described in this box were prompted by the collective efforts starting in 2005 of the bank supervisors of the largest OTC derivatives dealers.
[7] For more information on the DTCC Trade Information Warehouse and the services that it provides, please visit: http://www.dtcc.com/products/derivserv/suite/ps_index.php
[8] Quarterly metrics on aggregate dealer performance against commitments to regulators are compiled by Markit Partners and are available at: http://www.markit.com/en/products/research-and-reports/metrics/metrics.page?
[9] The market-prescribed process for novations was released by an industry trade association known as the International Swaps and Derivatives Association (ISDA). More information on this and other protocols can be accessed at ISDA's website at www.isda.org.
[10] More information on the history of processing CDS credit events as well as the actual documentation for the auction-based settlement mechanism are available at www.isda.org/credit.
[11] For more information on the credit event auctions, please visit: http://www.creditfixings.com/information/affiliations/fixings/auctions/docs/credit_event_auction_primer.pdf

Aggregate notional amount of CDS trades has been cut in half. Before 2007, active market participants typically held large simultaneous long and short CDS positions referencing the same underlying borrower. These redundant positions posed significant unnecessary counterparty exposure and offered no material economic benefit. In response, regulators demanded that banks increase their use of "portfolio compression" (illustrated in Appendix E) for collapsing these superfluous positions, thus reducing the associated counterparty risk. Since January 2008, nearly $50 trillion in notional CDS positions have been eliminated from the market through portfolio compression, reducing the total notional amount of outstanding CDS positions from a peak of over $60 trillion to a current level of about $26 trillion, after allowing for additional trading in the interim.

Dealers now know the daily value of their collateralized portfolios with each other. Dealers had been inconsistent in their approaches to monitoring and managing the counterparty risks of their OTC derivatives positions, including their frequency of exchange of collateral. Regulators required major market participants to adhere to at least daily monitoring of the values of their OTC derivatives portfolios with each other. This enabled firms to make more timely and accurate collateral exchanges. In addition, a new protocol has been introduced for the safe and timely resolution of disputes over the appropriate amount of collateral to exchange.[12]

As Table 1 highlights, many early regulatory initiatives treated operational problems, particularly trade processing inefficiencies. By mid-2007, however, regulators realized that additional improvements to market infrastructure and practices would be necessary in order to bring OTC derivatives markets to a level of operational reliability and systemic safety similar to that of other systemically important markets (for example, exchange markets for derivatives, such as futures). The focus of regulators has expanded accordingly, as we shall explain later in this paper.

IV. OTC Derivatives Counterparty Risks, and Clearing

A. Counterparty Credit Risk

Even while it performs as intended, an OTC derivatives contract exposes its holders to the risk of loss in two ways: through the performance of the underlying asset and through the potential default of the counterparty. For example, a forward contract for oil causes a loss to the buyer and a gain to the seller when the price of oil declines, and vice versa when oil prices rise. Any loss to one counterparty is the gain of the other. In addition, each counterparty is exposed to the default of the other. For example, suppose the buyer of the oil forward contract has a position worth $100 million, assuming performance by the seller. If the seller declares bankruptcy, the buyer may lose some of this potential $100 million value, and indeed could lose more than $100 million by the time the contract is terminated and settled. The buyer's position is thus, in some respects, like that of a lender to the seller. Counterparty credit risk, that is, the risk of holding a contract with a firm that could potentially fail to fulfill its obligations, is a major consideration of participants in the OTC derivatives market.

Counterparty credit risk rises to the level of systemic risk when the failure of a market participant with an extremely large derivatives portfolio could trigger large unexpected losses on its derivatives trades, which

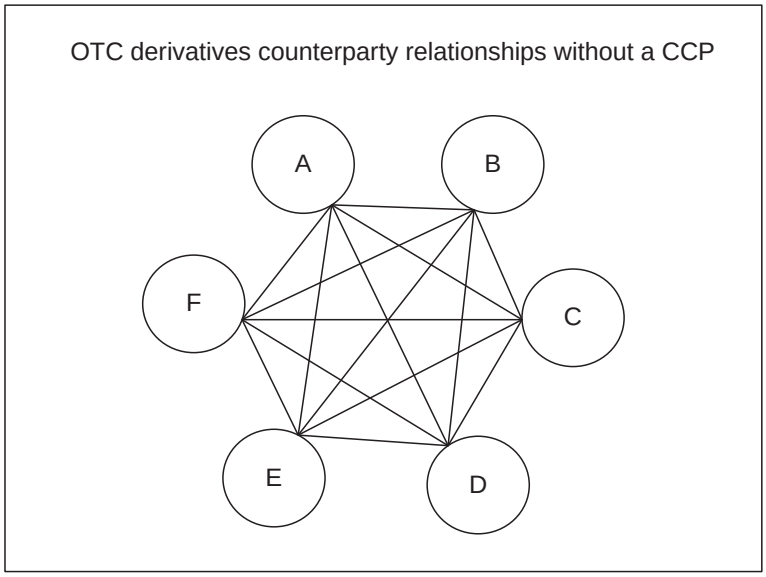
[12] The ISDA collateral dispute resolution procedures can be found on ISDA's website: www.isda.org

could seriously impair the financial condition of one or more of its counterparties. Systemic risk also arises when the fear of such a failure could lead counterparties to attempt to avoid potential losses by reducing their exposures to a large weak market participant, possibly contributing to a "run" that indeed accelerates the failure of that market participant. An additional form of systemic risk that can arise from the actual or anticipated failure of a large OTC derivatives market participant is the potential for an accompanying "fire sale," which can lead to significant price volatility or price distortions (in both derivative markets and underlying asset markets) when counterparties suddenly attempt to replace their positions with the distressed firm, and otherwise attempt to sell risky assets in favor of safer assets, a "flight to quality." Through price impacts, such a fire sale or flight to quality could cause failure-threatening losses to some market participants, even those with no direct counterparty credit risk to the firm in question.

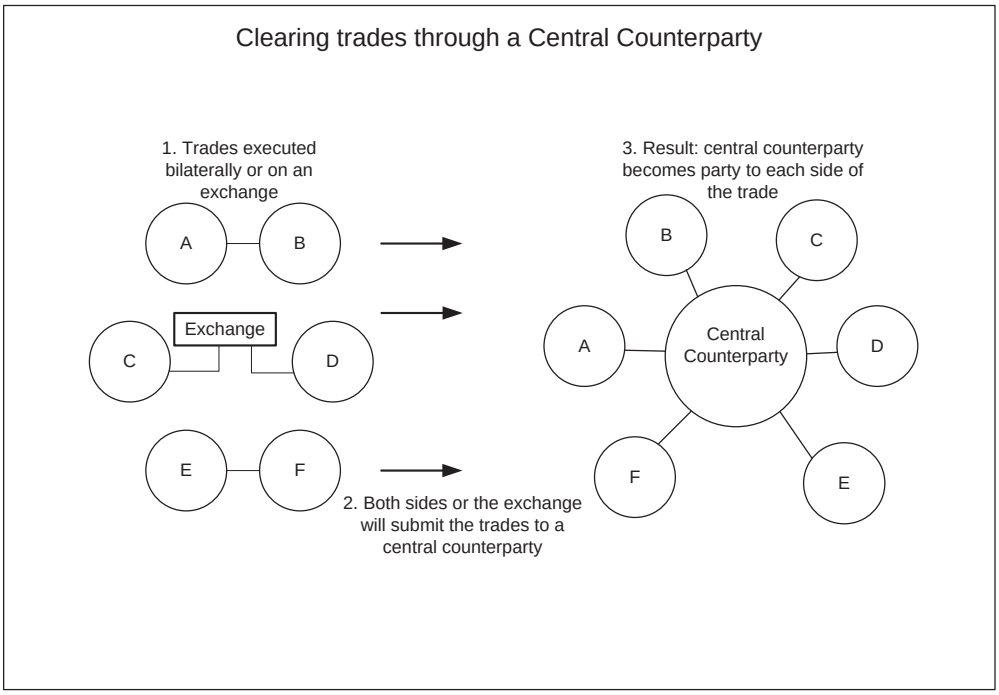
B. Central Counterparty Clearing

Counterparty credit risk can often be reduced by "clearing," which means obtaining the effect of a guarantee by a central counterparty (CCP), sometimes called a clearing house. The CCP stands between the two original counterparties, acting as the seller to the original buyer, and as the buyer to the original seller. Figure 1 illustrates the difference between an OTC market without central clearing, and one with a CCP, which can also handle trades executed on exchanges.

Figure 1. [13]



[13] This is a conceptual illustration comparing the counterparty relationships in a market without a CCP against one where there is a CCP. CCPs typically will have tiered criteria for participation and some market participants will be direct clearing participants while others use the direct participants as clearing agents. Any clearing arrangement with an indirect participant should have a robust legal framework to protect an indirect clearing participant from the default of its clearing agent.



In order to be financially resilient, a CCP relies on a range of controls and methods, including stringent membership access, a robust margining regime, clear default management procedures, and significant financial resources that back its performance.

Because its long and short positions are automatically offsetting, a CCP has no losses or gains on a derivatives contract so long as the original counterparties to the trade continue to perform. The CCP is, however, exposed to counterparty credit risk from each of its participants. Because of this risk, and because of the systemic importance of CCPs, regulators and CCPs should demand strict acceptance criteria to market participants that wish to obtain the right to clear their trades with CCPs by becoming clearing members. Clearing members must also provide margin[14] that can be used to offset losses to the CCP in the event that the member fails to perform on its cleared derivatives positions. A CCP collects two types of margin from each member: initial margin, provided when a trade is cleared, and variation margin, which is exchanged between the CCP and the clearing member on a daily basis. On any day, the variation margin payment is the estimated change in the market value of the derivatives position from the previous day. The determination of initial and variation margins is discussed in more detail later in this section and in Appendix C.

[14] In order to distinguish between the collateral posted to a central counterparty or exchange from the collateral used to secure a non-cleared OTC derivatives transactions, we refer here to the former as "margin." Margin within the centrally-cleared environment is the economic equivalent of collateral for non-cleared OTC trades.

C. CCP's Financial Resources

Beyond demonstrating its financial strength and providing margin, each CCP member must also contribute capital to a pooled CCP guarantee fund. The guarantee fund is an additional layer of defense, after initial margin, to cover losses stemming from the failure of a member to perform on a cleared derivative. For example, suppose that Counterparty X fails, and as a result "owes" the CCP $100 million, reflecting the cost to the CCP of unwinding its derivatives positions with X. Suppose that X had posted $80 million in margin with the CCP. The CCP would first apply this margin toward the unwinding costs. The remaining $20 million necessary to unwind the failed derivatives positions with X would be taken from the other resources of the CCP, which include the pooled guarantee fund. The procedures followed and the forms of financial backing available to the CCP depend on the particular rules of the CCP. Appendices A and B provide examples.

The amount of initial margin posted with a CCP is based on an analysis, sometimes complex, of the risks posed to the CCP by the type of the derivative in question, as well as the size of the position. The initial margin for each type of derivatives contract is based in part on the volatility of changes in the market value of that type of derivative, bearing in mind that there is a delay between the times at which a variation margin payment is determined and the time by which the derivatives contract could be liquidated in an orderly manner by the CCP, should the clearing member fail to provide the variation margin. The initial margin should exceed, in most extreme scenarios, the change in market value of the derivatives position over this time window. For example, the initial margin for a credit default swap is generally greater than that for an interest rate swap of the same notional size because of the potential of sudden changes in the credit quality of the borrowers referenced in most credit default swaps. The determination of initial margins should also consider the potential for adverse changes in the liquidity of the financial instrument during the unwind period. For example, the difference between the bid and offer prices for some types of derivatives could suddenly increase during a period of financial stress.

The process of daily variation margin determination requires daily estimates of the fair-market prices of each of the types of derivative cleared by the CCP. Because of the costs of analyzing risks and of setting up pricing methods for each type of derivative cleared, as well as other fixed setup costs, it is not cost effective to clear types of derivatives that are thinly traded or complex. In addition to the high cost of handling thinly traded or complex derivatives, a CCP may face a sudden need to unwind positions held with a failed clearing member. If forced to liquidate positions on thinly traded derivatives on short notice, the CCP could have difficulty avoiding the losses caused by fire-sale discounts.

For a moderately sized position in an actively traded derivative, it may take only a day or two for the CCP to unwind its position without incurring a severe additional fire-sale loss. For a large position in a less actively traded type of derivative, the CCP could take much longer to unwind its position in order to avoid causing itself a large additional fire-sale loss. Thus, the appropriate amount of initial margin for each type of derivative reflects both the daily volatility of the market value of the derivative as well as the number of days that is likely to be needed for an orderly unwind of the position.

The initial margin required on a derivatives position could naturally be set equal to an estimate of the daily volatility of the market value of the position, multiplied by two days plus the number of days required to unwind the position in an orderly manner, and further multiplied by a safety factor.[15] The addition of two days is appropriate because the variation margin payment requested on a given day would

[15] If price changes over successive days are uncorrelated, then the total volatility of the change in market value over N days is less than the daily volatility multiplied by N. It is not sufficiently conservative, however, to rely on this absence of correlation in a stressed-market scenario.

typically be determined based on the closing price of the previous day and might be received (or found to be missing) on the following day.[16] If the first sign of trouble is the failure of a counterparty to make a margin payment, it could therefore take up to two days from the last price determination for it to become apparent to a CCP that it must begin to unwind the counterparty's position. A hypothetical calculation of the initial margin on a derivatives position is provided in the box below.

Sample Calculation of Initial Margin

We give a hypothetical example of the determination of initial margin for a given derivatives position. A CCP and its regulator should conduct their own quantitative analyses to determine the sufficiency of initial margin calculations based on the risk that the product type and position size pose.

Suppose a CCP has historically cleared an average daily notional amount of $100 million of a particular type of derivative. An orderly unwind for this type of derivative is estimated to require the liquidation on each day of no more than 20% of the daily average clearing volume, which is $20 million in this case. A counterparty wishes to clear a trade with a notional position size of $60 million. The counterparty is assumed to have no prior positions in this type of derivative. At an orderly unwind rate of $20 million per day, the $60 million notional position would require a 3-day safe-unwind period. Allowing for 2 initial days to begin an unwind, the initial margin should therefore cover the change in market value that could occur in an extreme but plausible scenario over a total period of 5 days.

The daily volatility of each $1 million notional of this type of derivative is estimated to be $2,000. Thus, a position of $60 million represents an estimated daily volatility of $120,000. Because the daily volatility represents a typical daily price change, and because the margin should cover a stress scenario, we suppose that the CCP or its regulator has mandated a safety factor[17] for this type of derivative of 3.5.

The initial margin for a position size of $60 million would then be 5 days worth of volatility multiplied by $120,000 of position volatility per day, and further multiplied by a stress factor of 3.5, which is $2.1 million in total.

If a CCP is successful in clearing a large quantity of derivatives trades, the CCP is itself a systemically important financial institution. The failure of a CCP could suddenly expose many major market participants to losses. Any such failure, moreover, is likely to have been triggered by the failure of one or more large clearing members, and therefore to occur during a period of extreme market fragility. Thus, while robust operational and financial controls are paramount in reducing the likelihood of a CCP failure, a CCP must also have methods in place for quickly recapitalizing, or for quickly unwinding its derivatives positions with minimal impact on counterparty risks and on the underlying markets. Regulators should ensure that a CCP's risk management design and financial resources are robust enough to allow the CCP to withstand extreme but plausible loss scenarios. Our recent experience has shown that current international standards which call only for protection against the failure of the single largest participant in "extreme but plausible" market conditions are insufficient. Regulatory standards should ensure that CCPs remain resilient to a broader set of risks, including multiple participant failures, sudden fire sales of financial resources and rapid reductions in market liquidity. "Extreme but plausible" loss scenarios should encompass, at a minimum, the largest historical observed price movements in that market. The corresponding sizing of the guarantee fund and other resources should be reassessed by the CCP and its

[16] In some cases, margin payments are intended to be received on the same day that they are assessed.
[17] The stress factor for a particular product should not be considered a fixed standard or ratio. Rather, a stress factor should be determined through an analysis of the specific risks posed by the product, including the potential for sudden large changes in market value.

regulators on a regular basis. Appendices A and B provide an example of the "waterfall" of various financial resources available to a CCP in the event of the failures of multiple clearing members. Section VII expands on the importance of regulatory oversight and of the increased use of CCPs.

V. Why Allow Any OTC Derivatives Trading?

From a naïve viewpoint, it would be possible to cure the risks posed by OTC derivatives by simply mandating that all derivatives trading be conducted on organized exchanges. Exchanges offer price transparency and effective competition. Since an exchange employs the use of a CCP, it also offers a high standard for controlling counterparty credit risk. The elimination of the OTC market, however, would cause more harm than good. In order to understand some of the benefits of OTC derivatives, let's imagine what their absence would imply.

A. OTC Derivatives as Risk Management Tools

Without OTC trading, derivatives that are not actively traded would cease to exist. Exchange trading relies on a relatively high order flow, due in part to the cost of setting up exchange trading for each new type of derivative. Without enough trading, these setup costs cannot be recovered from exchange and brokerage fees. Further, the effective matching of supply and demand on an exchange depends on relatively active order submission by buyers and sellers. Thus, with only exchange-traded derivatives, investors and operating companies would have a more restricted menu of derivatives. Although many risk-management solutions are available through exchange-traded derivatives, end users would have limited ability to obtain derivatives that are customized to their specific needs. As a result, corporations and other investors would be unable to offset certain types of business risks caused by fluctuations in currency prices, interest rates, default risk, and energy prices, among many other sources of financial risk that they may wish to control. Indeed, while most large corporations hedge some risks using exchange-traded derivatives such as futures contracts, they often rely on OTC derivatives to hedge those risks for which there is no close match available on organized exchanges, and to satisfy hedge accounting standards.

Remaining unhedged can be costly. For example, if unable to hedge effectively, managers may choose to avoid some projects whose uncertain cash flows have a high net present value for their shareholders out of fear that losses resulting from unhedged risks could be misperceived by their shareholders or superiors as a reflection of poor project selection or management. A failure to hedge can also increase the probability of bankruptcy, or at least financial distress, which brings additional costs, such as legal fees or high frictional costs for raising new capital when distressed.

B. OTC Markets Foster Innovation

Without the opportunity to use the OTC derivatives market as an incubator for new financial products, the development of many new types of derivatives would be stifled, limiting the potential for financial innovation to spur economic growth. We now take for granted the benefits associated with access to many types of widely used derivatives, such as interest-rate swaps and a rich menu of exchange-traded options. These financial products originated as relatively inactively traded over-the-counter derivatives. They later achieved a significant level of trading activity among a broad spectrum of investors. If mid-twentieth century regulation had precluded the over-the-counter trading of derivatives, many important financial products would not have been developed.

Financial innovation can also be misused. For example, products are sometimes designed with complexities that seem to have the primary purpose of exploiting the lack of sophistication of some end users. Legislation and regulation should clearly aim to discourage the mis-use of financial products. Additionally, innovation should not be used as a means of avoiding the thrust of proposed regulatory changes, including the increased use of central counterparties. As new product types grow in use, legislation and regulation should require a clear path for their movement to central clearing.

VI. Dealer Incentives and Role as Market Makers/ Intermediaries

Dealers innovate and customize in the OTC derivatives market. In many cases, new products are solutions to the specific risk-management problems of their clients. Some of these new products eventually become actively traded. The development of new derivatives can involve substantial costs, including those for product design, pricing and risk-management technology, legal expertise, and, if necessary, integration into systems for trade processing, settlement, and clearing. Dealers hope to earn a return on their investments in product development through client fees and, if a product becomes relatively widely traded, through rents associated with intermediation between ultimate buyers and sellers. By allowing counterparties to trade at a dealer's quoted bid and ask prices, the dealer provides liquidity to the market, with an intent to profit on average over many trades, by buying low and selling high.

Even after an OTC derivatives product has achieved relatively active trading, and would be suitable for exchange trading, dealers have an incentive to maintain the wider bid-ask spreads that they can obtain in the OTC market relative to the spreads that might apply to the same product on an exchange, where buyers and sellers can more directly compete for the same trade. Further, exchanges are more likely to match ultimate buyers directly to ultimate sellers, reducing the fraction of trades intermediated by dealers. Thus, from the viewpoint of their profits, dealers may prefer to reduce the migration of derivatives trading from the OTC market to central exchanges. Once over-the-counter liquidity is established for a financial product, market participants may prefer to continue to trade in the OTC market because that may allow better execution (lower effective bid-ask spreads) than available on an exchange that has yet to establish active trading. It may be difficult for an exchange to successfully increase market share or introduce a competing product under these circumstances. "Liquidity tends to stay where it is."

In summary, some derivatives trading can be inefficiently "trapped" in the OTC market because of a lack of incentives for individual market participants to migrate from the OTC market to exchanges. The economic benefits of innovation and customization offered by the OTC market are thus to be weighed against losses of market efficiency for products that, although sufficiently actively traded to justify exchange trading, have yet to make that migration. The answer to this tradeoff is not "exchange trading or nothing at all." There is a societal benefit associated with some customized OTC products, even with their relatively expensive effective fees. For products that achieve a measure of liquidity and standardization in the OTC market, migration to more centralized trading venues should be encouraged by regulators. Later in this paper, we consider the role played by electronic derivatives trading platforms, which expose bids and offers to multiple participants in the over-the-counter market, thus offering a useful middle ground between exchange trading and traditional bilateral OTC trade negotiation. If, however, market participants are forced to migrate to exchanges and electronic trading platforms too aggressively, then dealers may find that their original costs of innovation are unlikely to be recovered from future intermediation fees. Some useful new or customized financial products may be stifled. This

could imply lost opportunities for risk management and, potentially, less market liquidity. Effective opportunities for risk management are important ingredients to economic growth in the broader economy.

VII. Further Needed Improvements

Despite the significant recent improvements in market infrastructure outlined above, the infrastructure for OTC derivatives still poses systemic risks that should be addressed with further improvements.

A. Reducing counterparty exposure and systemic risk through market design and regulatory oversight

i. Reducing the Possibility of Counterparty Runs by Expanding Central Clearing

Rather than terminating a contract before its final maturity, which is operationally cumbersome and costly, novation, as described previously and in Appendix D, is a typical and efficient way to exit a derivatives position. Novation effectively passes the position to another party willing to take the trade. In the days leading up to the failures of Bear Stearns and Lehman Brothers, some of the counterparties of these dealers novated their trades to other dealers, based on an unusual motive. Rather than maintaining their exposures to either Bear or Lehman, they rationally preferred to novate their derivatives to dealers that were perceived to be more creditworthy. They reacted out of fear that their payments from these weakened dealers, or the performance collateral[18] they had posted with these dealers, would be lost, or at least held up during bankruptcy proceedings. Unfortunately, these novations took cash collateral and valuable business opportunities away from the already weakened dealers, adding to their strains in a way that may have contributed to their failures.

The risks posed by "counterparty runs" through novation and by other means[19] can be addressed in part by the increased use of clearing. Properly designed CCPs maintain high collateral standards that mitigate the exposure risks to their participating members. Further, even in the face of heightened fears of counterparty defaults, a CCP 's contractual obligations to its clearing participants prevent it from novating or terminating positions in an attempt to "run" from a deteriorating counterparty. Thus, more extensive use of clearing will lower the systemic risk associated with runs by derivatives counterparties. Because, moreover, well regulated CCPs are held to high standards for margin and guarantee funds, their counterparties should have no need to run from them. This also reinforces the importance of maintaining strict standards for the safety and soundness of CCPs, given their intended role of absorbing systemic risk.

Only some types of OTC derivatives are now cleared. These include, for example, certain actively traded credit derivatives, some common forms of interest-rate swaps, and some energy derivatives. Of these "eligible" types of OTC derivatives, those for which clearing has been set up, not all positions are actually cleared; the decision of which positions to clear has to this point been left to the discretion of market participants. For example, near the end of 2009, the major OTC derivatives dealers reported that

[18] We are referring specifically here to the "independent amount" of collateral that a counterparty posts to a dealer to secure its performance on a non-cleared derivatives contract. The independent amount of collateral serves the same role as the initial margin in the context of central clearing. Please see Section VII for more details.

[19] For other defensive actions by which OTC derivatives counterparties may seek to reduce their exposures to weak derivatives dealers, see D. Duffie (2010) "The Failure Mechanics of Dealer Banks," Journal of Economic Perspectives, forthcoming issue.

approximately 35%% or $202 trillion of the gross notional outstanding in the OTC interest-rate derivatives market is currently cleared. Of the population that is uncleared, 43% can ultimately be cleared either by expanded product eligibility on a CCP or from increased submission of market participants to clear already eligible trades. [20]

On September 8, 2009, fifteen major OTC derivatives dealers wrote to their bank supervisors, including the Federal Reserve, detailing the targets shown in Table 2 for the fractions of their clearing-eligible credit default swaps and interest-rate swaps that would be centrally cleared by October 2009 and by December 2009, respectively. Dealers should further increase the fractions of their derivatives trades that are cleared. In 2010, regulators should demand an increase in the suite of clearing-eligible products.

Table 2. Dealers' Commitments to Increase Central Clearing

On September 8, 2009, a collection of major derivatives dealers made individual commitments to submit specified proportions of their own population of eligible trades to a central clearinghouse, and also made a collective industry commitment to reduce the proportion of uncleared eligible derivatives trades. "Eligible" trades are supported for clearing by a recognized central counterparty where both counterparties to the trade have a clearing relationship in place with that CCP.

Credit Derivatives
Beginning October 2009: • Each dealer individually committed to submitting at least 95% of new eligible trades for clearing (calculated on a notional basis). • Collectively, all dealers committed to clearing at least 80% (on a weighted average notional basis) of all new eligible trades. (Not all trades that are submitted are necessarily cleared; the counterparty to the original trade must also submit, and the two submissions must be successfully processed by the central clearing counterparty.) For the month of November 2009, the 15 dealers on average, submitted 92% of their new eligible trades for clearing (with the median at 99%), and collectively cleared 94%.
Interest Rate Derivatives
Beginning December 2009: • Each dealer individually commits to submitting 90% of new eligible trades (calculated on a notional basis). • Collectively, all dealers commit to centrally clearing 70% of new eligible trades (calculated on a weighted average notional basis). • Collectively, of the population of products that have historically been eligible, all dealers commit to clearing 60% (calculated on a weighted average notional basis).

ii. Capital Treatment of OTC Derivatives and of CCPs

Because clearing has not, to this point, been mandated or received sufficiently favorable regulatory capital treatment, dealers have chosen what to clear and what not to clear based largely on the costs of clearing

[20] On December 22, 2009, the 15 major OTC derivatives dealers provided this data as part of an interim report to regulators providing breakdowns and clearing landscape for the aggregate outstanding notional amounts in interest rate derivatives.

and on their own risk management benefits from clearing. Naturally, each individual dealer does not have the incentive to consider as well the systemic risk associated with uncleared derivatives. Analogous to air pollution, the systemic risk associated with uncleared derivatives represents a "negative externality" that may be appropriately treated with regulatory pressure or incentives. For example, for a given type and size of derivatives position, the regulatory minimum capital requirement of a financial institution should be materially lowered by clearing the position. These capital requirements for cleared positions should only be applied to trades cleared through CCPs that meet robust international risk management and design standards.

In addition to requiring that a financial institution holds enough capital to protect itself, regulators should require banks to hold capital in light of the risks that it imposes on others. Currently, the minimum capital that a regulated financial institution, say a bank, must hold against the risk posed by an over-the-counter derivatives position is based on the credit quality of its counterparty and the loss that it could suffer if its counterparty fails to perform. The intent is to mitigate the risk that the regulated financial institution in question could fail from a loss of "receivables" on its derivatives. This capital requirement does not, however, provide a direct incentive to the bank to lower the exposure of its counterparties to the failure of the bank itself, that is, the potential losses of others that are based on the bank's payables. The regulatory treatment of the bank should encourage the bank to lower the exposure of its counterparties to its own failure. Most importantly, regulations should favor the provision of collateral to counterparties and the clearing of derivatives positions.

iii. Risk Management Design and Oversight of CCP

Whenever different types of derivatives are cleared with the same CCP, rather than at distinct CCPs, counterparty exposures are further reduced, on average, through the netting of positive position values in some derivative types against negative position values in others. Market participants may therefore prefer a single CCP, at least within a particular asset class, in order to have more efficient risk reduction and collateral allocation. For example, suppose that an investor has derivatives positions with CCP A that have a *positive* market value of $100 million (that is, in favor the investor), and positions with CCP B that have a *negative* market value of the same amount, $100 million. If there were only one CCP, these exposures would net to zero. [21] Although margin can be used to reduce exposure risk, the ability to manage counterparty risks safely is much enhanced by having a single CCP in this case, rather than two or more. A single CCP, in this example, would imply that neither the investor nor the CCP are currently exposed to each other's default, and would reduce the expected amount of exposure at a future default, even after applying margin. Furthermore, because posting margin is a material cost of participating in a CCP, market participants have an additional incentive to clear more if they can reduce the amount of margin to post against their exposures. Regulators should therefore encourage methods for reducing the use of margin whenever this can be done without increasing systemic risk. In particular, the joint clearing of different derivative products in the same CCP improves the opportunity to net positive against negative counterparty exposures, and increases the incentives for market participants to clear their derivatives trades, without increasing systemic risk. It is crucial, however, that a CCP should not increase the range of products that it clears without also obtaining the expertise necessary to safely handle all of the products that it clears. This expertise is especially important to the design of safe margin schemes and for default management; regulators will surely wish to monitor for its presence.

[21] The precise netting benefits within a CCP will depend upon the correlation of positions and the level of offset provided through its risk management design.

While the cost of pledging margin is an important consideration, market participants should also evaluate such CCP design elements as the size of the guarantee fund, the regime for information reporting, and procedures for default management, including margin sales and position unwinds. A CCP should hold margin and guarantee funds only in highly liquid low-volatility assets, such as cash or short-term government securities, which can be used for the immediate or almost-immediate settlement of claims. Regulators should ensure that a CCP satisfies strict liquidity criteria, both for the forms of margin that it collects from market participants and also for its own investments.

Regulators, for their part, should strive to ensure that the risk-management design of a CCP is robust, but should otherwise refrain from determining which CCPs should prevail by imposing geographical criteria, or by policies that would inhibit market forces from consolidating CCPs. (Consolidation may allow market participants to benefit from netting and other economies.) In order to combat the tendency of a CCP toward monopolistic behavior, regulators should impose additional restrictions or regulatory requirements, such as requiring fair and open access and setting good governance standards. Similarly, regulators should monitor any potential tendencies for CCPs handling similar products to compete for market share by offering weak requirements for margin or participation in guarantee funds.

Regulators should also consider the implications of classifications of derivatives for purposes of regulatory oversight that could artificially divide the market operationally. For example, regulations should not impede the ability of market participants to consolidate the clearing of different products within the same CCP whenever that is economically efficient and safe. Regulations should not promote inefficient methods of clearing or unnecessarily costly margin and participation arrangements for market participants.

One proposal to address the challenges created by a market with multiple CCPs is a requirement that CCPs allow participants to move open positions from one CCP to another. In principle, this "interoperability" could bring benefits to the market. For example, in the event that one CCP does not achieve sufficient clearing volume for certain products, market participants could transfer their open positions to another without the need to unwind and replace their positions. Interoperability would also allow market participants the option to consolidate their trades into one CCP in order to take advantage of the netting of positions for margining purposes. In practice, however, operational, legal, and risk-management issues make interoperability difficult and costly for the foreseeable future. Interoperability should be a design element for CCPs for future consideration.

Globally, regulators and other financial market authorities are already coordinating on a regular basis to formulate a consistent approach to the oversight and minimum standards of CCPs. The New York Fed has led the formation of the OTC Derivatives Regulators Forum, a group of over 40 regulators meeting regularly to coordinate oversight and address issues pertinent to CCPs and trade repositories.

iv. Regulatory Oversight of Market Participants

In the near term, regulators should work with market participants on common targets for the fractions of their derivatives exposures that are either eliminated through compression trades, as described in Table 1 above, or cleared. This calls for increasing the range of derivatives that are eligible for clearing (among those that are sufficiently actively traded to justify clearing), as well as increasing the fractions of eligible positions that are cleared. Although market participants might not individually choose to incur the cost of clearing more of their derivatives exposures, they collectively benefit from the market-wide use of clearing, and would be more inclined to agree to the increased use of clearing if all market participants are held to common high standards in this respect. As soon as international harmonization of capital

regulations allow, better incentives for the increased use of clearing should also be built into those capital regulations. Meanwhile, periodic public reporting of the degree to which major market participants use clearing will provide useful risk management information to creditors and other counterparties, and may also serve the purpose of stimulating the efforts of any lagging market participants.

Some non-financial corporate end-users of derivatives have expressed anxiety over the costs they may incur for clearing, in the event that regulations mandate their participation in central clearing counterparties. In particular, clearing margin would place additional demands on the end-user's cash position. Until now, corporate end-users have typically traded OTC derivatives without collateral. (Assuming, however, that dealers have incorporated the costs of their credit exposures to end-users into the prices they charge for uncollateralized derivatives positions, end-users have not actually avoided the costs associated with the collateralization of their positions.) Clearing would also add to end-users' cash-flow volatility through the need to make variation-margin payments. The additional cash-flow volatility could pose new liquidity-risk challenges for some corporate end-users.

Considering the costs and benefits, there remains an issue of whether regulations should indeed exempt end-users from a requirement to clear their derivatives trades. End-users are not typically systemically important players in financial markets. On the other hand, large uncleared end-user derivatives positions are sources of risk to dealers, which are themselves systemically important financial institutions. Further, exemptions of corporate end-users from clearing requirements may introduce an incentive for some end-users to conduct derivatives trading businesses. Clearing regulations should have conservative exemption criteria for corporate end-users. These criteria should consider the amount of derivatives trading conducted by an end-user, the gross sizes of its positions, and the degree to which the derivatives trading has non-financial business objectives. Using data housed in CCPs and trade repositories, regulators will be able to make reasonable determinations of whether a particular class of end-users should participate in clearing.

B. Improving market and price transparency with global trade repositories and with pre-trade and post-trade price reporting

As mentioned above, there have been significant improvements in the transparency of the market for credit derivatives on corporate and sovereign debt, made possible by the credit derivatives trade information collected by the DTCC. Further improvements in this direction are coming online, given the commitments by market participants to develop comprehensive trade repositories for other types of derivatives.[22]

i. Mandatory Reporting of Non-Cleared Trades to Centralized Data Repositories

By having unfettered access to detailed data through global trade repositories, regulators are in a better position to monitor risk taking by individual market participants as well as concentrations of exposures to individual market participants or to specific asset classes. This would better enable regulators to detect a firm that creates large market positions with OTC derivatives, as AIG did. Regulators can also explore the sizes and depths of the markets, as well as the nature of the products being traded. With this information, regulators are better able to identify and control risky market practices, and are better

[22] In a June 2, 2009 letter to regulators, market participants promised to create central data repositories for interest rate derivatives by December 31, 2009 and equity derivatives by July 31, 2010. For more information, see the following link: http://newyorkfed.org/newsevents/news/markets/2009/060209letter.pdf

positioned to anticipate large market movements. Certain legal and operational barriers, including data privacy laws and information security standards, will need to be addressed. As a result, regulators in jurisdictions where OTC derivatives are traded should continue their efforts to ensure that the global trade repositories provide unfettered data access to the appropriate systemic, prudential and market regulators, including trade-level data. The repositories will be useful for supervisory analysis if they are provided on a standard data platform, allowing regulators to more easily detect concentrations of exposure or emerging trading patterns of potential concern.

ii. Increase Market Transparency with Publicly Available Aggregate Price and Volume Information

Price and volume data enhance the ability of counterparties and other potential creditors to manage their exposure risks and to set to aside the amounts of capital appropriate to cushion potential losses. Pricing data can also limit disputes between parties over collateral amounts due.

Public investors at large, without more comprehensive information on the OTC derivatives market, could react rashly in the face of uncertainty over exposure levels in the derivatives market. Transparency can have a calming influence on trading patterns at the onset of a potential financial crisis, and thus act as a source of market stability to a wider range of markets, including those for equities and bonds. Public information on OTC derivatives should be made available by both CCPs and trade repositories. Disclosure by these utilities should provide insight into counterparty credit risks by including aggregate measures of exposure and margin.[23] Position data should be released to the public only after some delay and aggregation, along the lines of the aggregate CDS position data released by the DTCC. The publication of detailed, real-time positions for each investor would limit the ability of investors to build or reduce positions at prices near those that had recently been available in the market. Privacy, in this respect, improves the incentives of investors to invest in the collection of fundamental information. Increased market transparency to the public enhances the price-discovery function of derivatives markets, improves the provision of liquidity to hedgers and those anxious to exit their positions and offers greater protections to unsophisticated or uninformed market participants.

iii. Improve Trade Level Price Reporting

Improving the price transparency of the OTC derivatives markets could also increase the competitiveness and the efficiency of risk sharing, by making it easier for investors to determine "going prices." For example, TRACE, a system for disseminating essentially all transactions prices in the over-the-counter markets for corporate and municipal bonds, was established in 2002.[24] TRACE reports transactions prices after a brief delay, providing investors some insight into the range of prices at which they are likely to be able to execute their next trades. This can improve the ability of investors, particularly those who are not dealers, to "shop around," that is, to determine more easily whether to accept the bids and offers quoted to them, and also allows them to better monitor the quality of price execution that they have received on their past trades.

[23] Different jurisdictions have laws on confidentiality, data protection, and privacy or bank secrecy acts that prevent firms operating within those jurisdictions from fully disclosing trade-level information. ISDA is currently conducting an analysis of laws or data-protection acts that may pose problems for full disclosure to trade repositories.

[24] For research on the implications of a lack of price transparency in over-the-counter markets for corporate and municipal bonds, and of the implications of TRACE, see Bessembinder, H., and W. Maxwell, "Markets: Transparency and the Corporate Bond Market," *Journal of Economic Perspectives* 22, 2008, pp. 217-234; Edwards, A. K., L. E. Harris, and M. S. Piwowar, "Corporate Bond Market Transaction Costs and Transparency," *Journal of Finance* 62, June 2007, pp. 1421-1451; Goldstein, M., E. Hotchkiss, and E. Sirri, "Transparency and Liquidity: A Controlled Experiment on Corporate Bonds," *Review of Financial Studies* 20, 2007, pp. 235-273; and Green, R., B. Hollifield, and N. Schuerhoff, "Financial Intermediation and the Costs of Trading in an Opaque Market," *Review of Financial Studies* 20, 2007, pp. 275-314.

Post-trade price transparency nevertheless falls short of the price transparency available in typical exchange-traded markets, where the best available bid and offer are provided to all market participants nearly instantly. In some OTC derivatives markets, a TRACE-like post-trade price transparency system could act as a partial substitute for the price transparency offered by derivatives exchanges. For highly customized derivative products, price reporting would be less valuable, because the terms of such contracts would be of limited use to other market participants for comparison shopping, and would be more costly to disseminate intelligibly. There is a wide range of actively traded derivatives, however, for which TRACE-like price reporting could offer substantial improvements in market efficiency.

iv. Exchanges and Electronic Trading Platforms

Another potential approach to improving OTC transparency and market efficiency is offered by electronic trading platforms (ETPs). An ETP has some of the attributes of an exchange, in that ETP market participants can post quotes on a screen that is visible to other ETP market participants. Unlike an exchange, however, many ETPs do not automatically match bids and offers in order to execute trades. Typically, once a buyer and seller express interest in a trade at the price posted on an ETP, an inter-dealer broker would assist them in negotiating a final trade. ETPs typically serve only a narrow range of major market participants, including dealers. Many other market participants in over-the-counter derivatives do not have access to ETPs, as they would to an exchange-based market. ETPs are already used somewhat extensively in certain over-the-counter markets, for example those for certain standard interest-rate swaps, credit default swaps, and equity options. ETPs are only effective for relatively actively traded derivatives whose terms are simple and standardized. OTC derivatives that are naturally suited to ETP trading are also likely to be amenable to central clearing. Further, ETP trade data are easily captured, stored, and disseminated electronically. For sufficiently actively traded derivatives, ETPs allow more price transparency and competition than available through completely private bilateral negotiation in the OTC market. They lower search costs by improving the ability of market participants to more quickly determine the range of prices at which they could potentially execute a trade, and to more quickly and easily identify a counterparty offering attractive terms. Policies should support the growth and breadth of participation in ETPs for any sufficiently simple and actively traded derivatives. Unless a broad range of non-dealer market participants are given access to electronic trading platforms, however, the use of ETPs will not alleviate concerns over the lack of transparency and competition of over-the-counter markets.

Legislators are proposing to mandate trade execution of standard OTC derivatives on exchanges or regulated entities known as alternative swap execution facilities (ASEFs). Execution on an ASEF is intended to reduce the likelihood of market manipulation through established standards for trading procedures and record keeping. Policies should clearly outline the minimum expectations for trade execution through ASEFs, including breadth of participation among market participants as well as price transparency in order to ensure that the intended benefits of ASEFs are fully achieved.

C. Counterparty risk management through robust collateral management practices and aggressive trade compression

Because, as we have explained, it is ineffective to clear thinly traded or customized derivatives, the careful management of bilateral counterparty risk for uncleared derivatives will remain important.

Collateral is exchanged between parties in order to secure the value of a transaction against counterparty failure. Of any two parties that hold derivatives contracts with each other, the present value of future cash

is positive for one of them, who is said to be "in the money." The in-the-money party is thus exposed to the default of the out-of-the-money party, and often receives collateral from the out-of-the-money party, which can be used to defray the costs of unwinding the position should the out-of-the-money party default. The amount of collateral held can reflect the net value of the derivatives positions, their volatility, and the quality of the collateral, as well as the creditworthiness of the counterparty.

The precise collateral arrangements between the two parties are negotiated in a separate contract. In addition to the daily collateral exchanges, dealers often request additional up-front collateral (known as "the independent amount") from their clients, that is held for the life of a derivatives position as a security against the credit risk of that client. This is analogous to the initial margin collected by central clearing counterparties. Following the Lehman bankruptcy, many end-users found themselves in the position of unsecured creditors to Lehman, forced to make claims on the independent amount of collateral that they had posted to Lehman. This has highlighted the importance of having the collateral of end users segregated from a dealer's own assets. Market participants are currently considering methods to ensure that their independent-amount collateral remains remote from the bankruptcies of their counterparties.

Market participants should maintain high collateral standards with each other. The option to compete for market share or for better price terms by lowering collateral requirements opportunistically must be avoided. In this context, industry-wide minimum collateral standards, supervision, and, if necessary, regulation, can all play useful roles. Likewise, high operational standards for collateral management are needed. Prudent collateral management means that firms react in a timely manner to market information by revaluing their portfolios, and by making collateral calls or posting additional collateral soon afterward. This is especially critical during stressed market situations, when volatile price swings can quickly lead to large changes in a firm's exposure to its counterparties, and when collateral might need to be liquidated if a counterparty fails. Frequent and timely reactions to market moves also decrease the likelihood that disagreements between parties will arise over the amount of collateral they are contractually required to exchange.

In order to decrease collateral disputes, firms should engage in a regular reconciliation process, in which they ensure, with each counterparty, that their respective records match on all of the key economic details of their derivatives and collateral positions. Among major dealers, an independent third party could perform the reconciliations, identifying those trades for which there is a failure to match.

For disputes that do arise over the valuation of trades, parties should resolve them immediately. In practice, if counterparties disagree over the amount of collateral to be exchanged, and if neither side relents, the result may be a failure to exchange appropriate collateral. Recently, market participants announced a new procedure for resolving collateral disputes, using strict timelines and ensuring the exchange of collateral while the dispute is ongoing. During the dispute period, the higher of the collateral amounts proposed by the two parties is required, as a matter of conservatism. The dispute is resolved by valuation according to a specified market-polling procedure. Regulators should require market participants to resolve collateral disputes using this new method.

In some types of derivatives that are not cleared, major market participants tend to build offsetting positions with different counterparties, long with one set of counterparties, and short with the others. In many cases, these offsetting positions are redundant. They serve no useful business purpose and create counterparty risk. Market participants should continue to engage in regular market-wide portfolio compression exercises, explained in Appendix E, in order to eliminate these redundant positions.

VIII. Conclusion: Addressing the Problems Identified

The New York Fed plans to address the problems that we have identified in the OTC derivatives market by advocating for improvements in counterparty risk management, especially central clearing and robust collateralization, while preserving the market's incentives for product innovation and customization, so that market makers continue to contribute to economic growth by developing financial products that improve the allocation of risk and enhance market liquidity. The New York Fed encourages the use of exchanges and electronic trading platforms, as well as post-trade price transparency, in order to promote market efficiency. There will remain a population of customized derivatives that are more suitably negotiated or risk-managed bilaterally. Whether or not derivatives contracts are traded or cleared centrally, there must be high standards for collateral arrangements, operational infrastructure, and transparency.

Regulation and other improvements in the market should not overemphasize one risk-reducing element of the market design without giving consideration to how that individual component fits together with the rest of the market infrastructure. The various components must function robustly on their own and synchronously. Regulation must encourage improvements that are holistic and employ a long-term vision of how the OTC derivatives market infrastructure affects the entire financial system. The New York Fed will encourage market participants to set and meet corresponding targets, and will contribute to the design of supporting regulations.

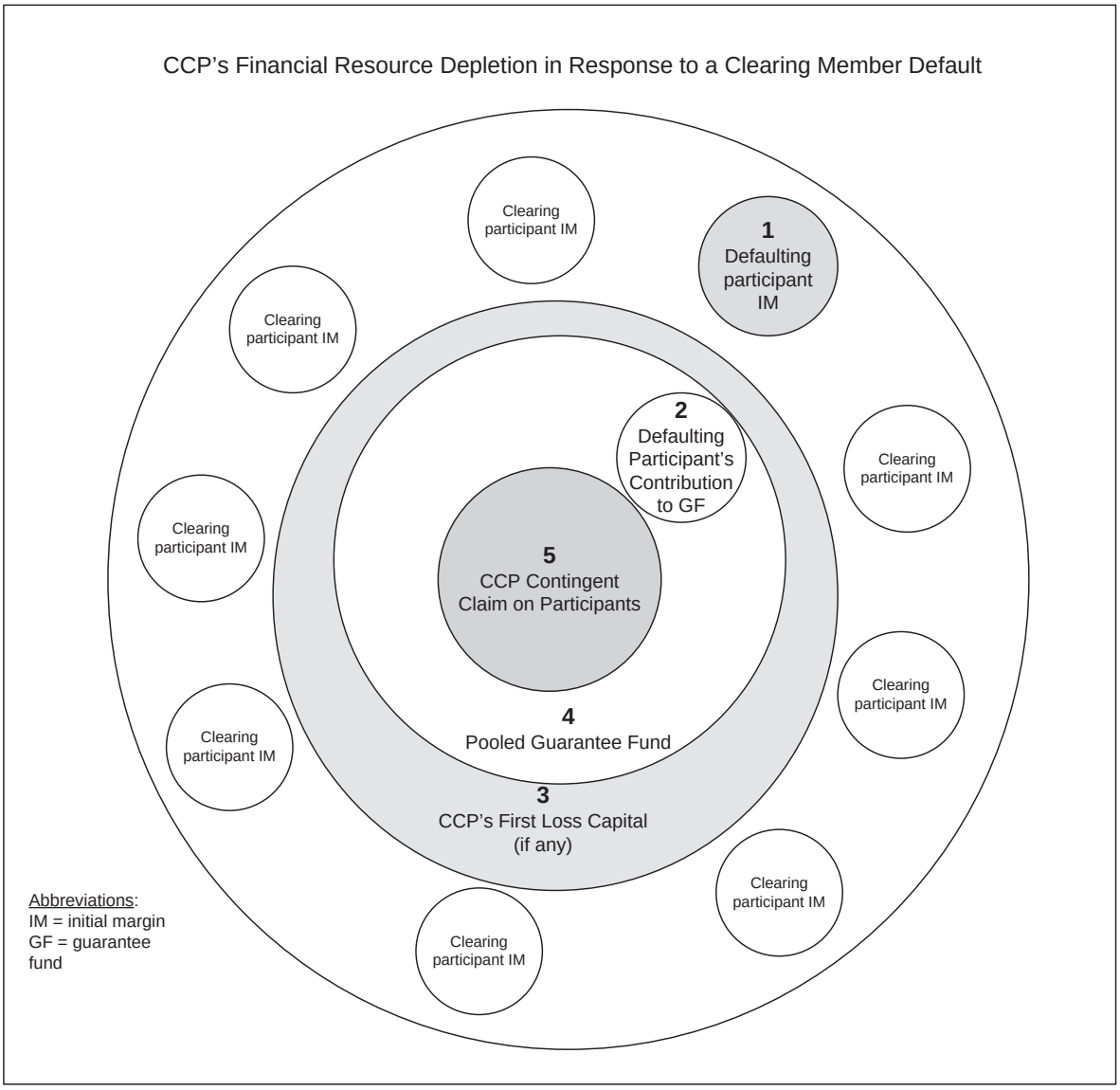
Appendices: Technical and Institutional Details

Appendix A: CCP's Financial Resources in Response to Clearing Participant Default

In the event that a clearing participant is unable to meet its contractual obligations, its CCP typically has several layers of financial resources on which to draw. The primary objective of the CCP in such a scenario is to be able to continue to meet its contractual obligations as a counterparty to each of its non-defaulting participants. In so doing, it prevents the propagation of systemic risk. Figure 2 below provides a conceptual overview of the sequence of resources that a CCP could use. This hypothetical CCP has several layers of protection against the cost of unwinding the derivatives positions of any defaulting member. In the order in which they are drawn upon, these are: (1) the initial margin posted by the failing participant, (2) the contribution of that participant to the CCP guarantee fund, (3) a "first-loss" pool of capital of the CCP, (4) the portion of the pooled guarantee fund provided by the non-defaulting members, and (5) a contractual claim to additional contributions by CCP participants, contingent on losses to the guarantee fund. In practice, the designs of CCPs vary, and may include these and additional financial resources for handling default management.

Appendix B provides an example of how the resources of the CCP illustrated in Figure 2 are engaged in a scenario with multiple clearing-member failures.

Figure 2.
A conceptual representation of CCP resources available to respond to the default of one or more clearing participants.



Appendix B. CCP Financial Resources and Resilience to Multiple Participant Failures

Consider the scenario depicted in Figure 3, below. Here, perhaps in the course of a severe and sudden financial crisis, several members of a CCP fail in sequence.

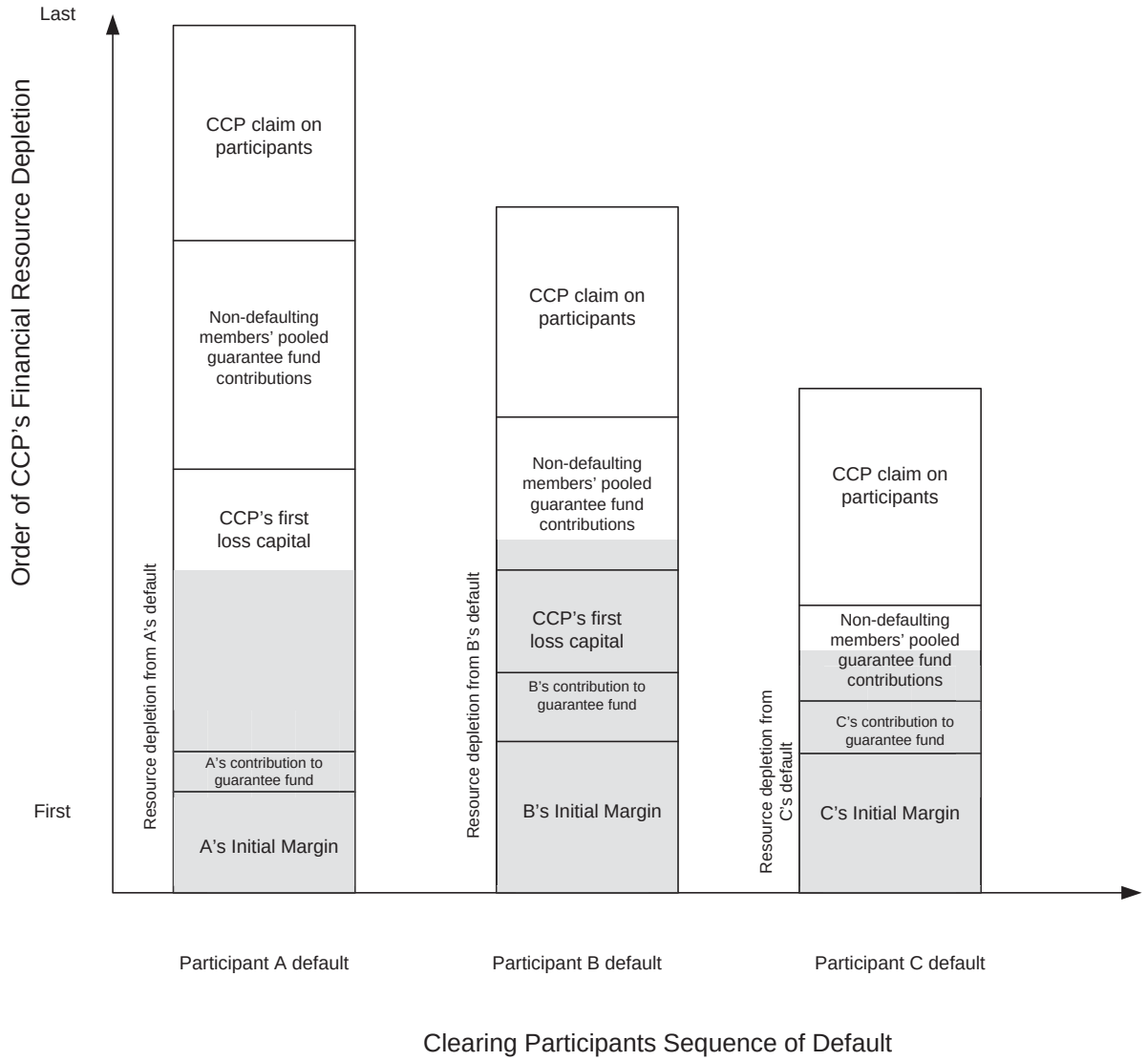
In the scenario shown in Figure 3, Participant A is the first to default. For example, on a given day, A has failed to make its required variation margin payment. Under the rules of this particular CCP, the derivatives positions of the failed participant are auctioned to the surviving participants. Each derivatives position of A is auctioned separately. For each position, that member offering to assume A's position at the lowest cost to the CCP wins. The total of the winning bids across all of A's positions is the cost to the CCP of unwinding A's positions (before considering administrative costs). This total cost is shown in Figure 3 as the height of the shaded portion of the Participant-A column. As shown, this unwind cost exceeds the initial margin that A had provided to the CCP, despite the intention that the initial margin should cover the unwind cost in most extreme scenarios. Indeed, this illustrated scenario is so extreme that the unwind cost exceeds the sum of the initial margin and the contribution of A to the guarantee fund. The remainder of the unwind cost is funded out of the "first-loss" capital held by the CCP for this eventuality.

After A defaults, in this example, Participant B defaults. The unwind cost for B is covered by the initial margin that had been posted by B, then the contribution by B to the guarantee fund, and then the remainder of the first-loss capital of the CCP, which had already been partly depleted by the default of A. Participant B's default took place before the CCP has replenished its first-loss capital. The cost of unwinding B's derivatives positions is so large in this scenario, that even some of the guarantee fund was required to cover it. Finally, Participant C fails. By this point, the first-loss capital of the CCP had been fully exhausted by the failures of A and B. There has been insufficient time for the CCP to replenish its first-loss capital and guarantee fund. As shown in Figure 3, the cost of unwinding C's positions also requires some use of the now-reduced pooled guarantee fund. Ultimately, the CCP has sufficient resources to unwind its derivatives positions with A, B, and C, while continuing to perform on its derivatives positions with non-defaulting participants. The CCP then restores its guarantee fund and first-loss capital.

Figure 3.

CCP's Financial Resources: Waterfall of Losses in Multiple Participant Defaults Scenario

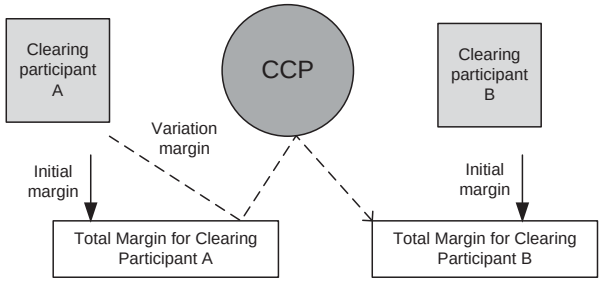
This is a conceptual representation of how a CCP utilizes the resources it has available to respond to the default of one or more clearing participants. A CCP may have additional sources of funding or design and prioritize the sequencing of its financial resources differently for default management.



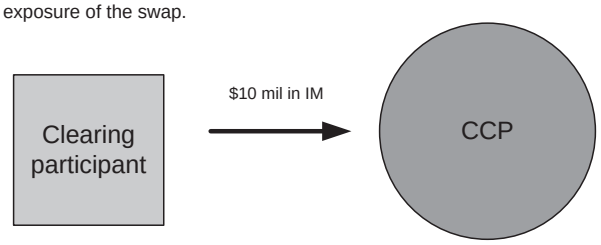
Appendix C: How Clearing Participants Post Initial and Variation Margin

Posting Initial and Variation Margin to a CCP

The CCP collects initial margin from its clearing participants based on the potential future exposure of the products that are cleared through the CCP. Variation margin is also collected on a daily basis if the market value of the product changes. In essence, the variation margin is passed on from one participant to another using the CCP as its transfer mechanism. CCPs will debit or credit a clearing participant's total margin account based on how much variation margin must be transferred on a given day. Below is a hypothetical example illustrating the margining relationship between a clearing participant and the CCP.

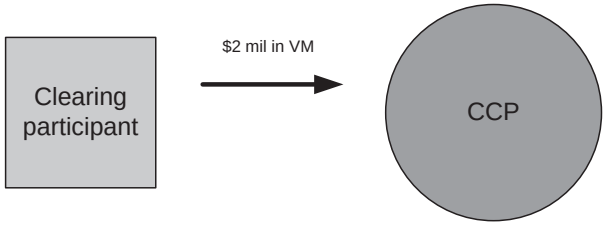


1. A swap is cleared through the CCP and clearing participant posts $10 million in initial margin to CCP to cover potential future exposure of the swap.



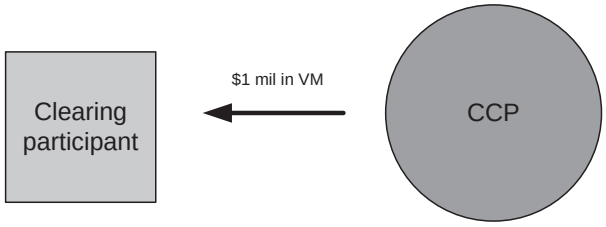
Total margin held at CCP: $10 mil

2. Suppose at some point that the market value of the instrument increases from zero at time of clearing to $2 million. clearing participant must post $2 million in variation margin to CCP. Total margin held at the CCP is $12 million.



Total margin held at CCP: $12 mil

3. Now suppose the next day, the market value of the instrument has decreased by $1 million. The CCP must return $1 million in variation margin to its clearing participant.

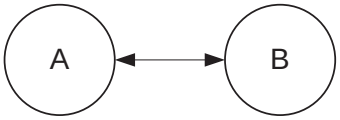


Total margin held at CCP: $11 mil

Appendix D: Novation

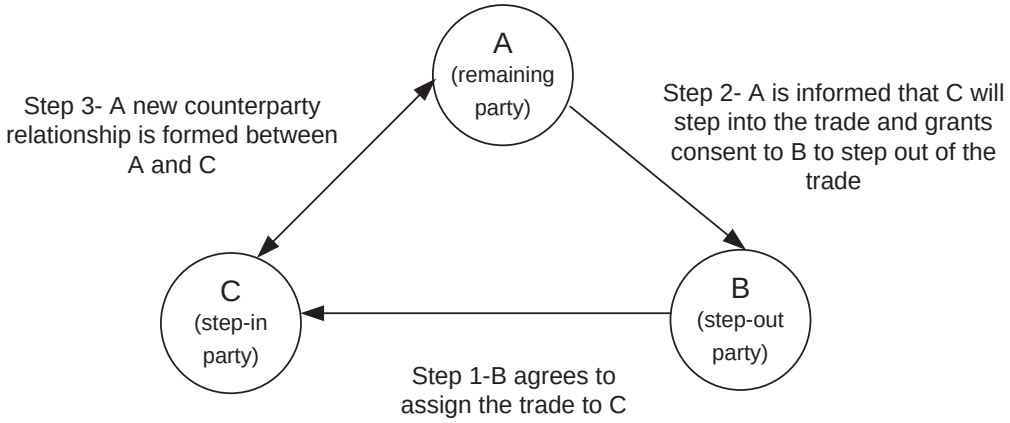
How a Novation Works

Original trade between A and B

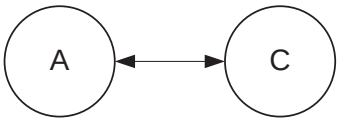


The Novation Process

1. Original trade is between party A and party B; Party B wants to exit its trade position with party A and agrees to pass on the position to party C. Party B (step-out party) assigns the trade to party C (step-in party)
2. Party A is informed that party C will step into the trade and grants consent to B to pass it on.
3. There is a new counterparty relationship between party A and party C.



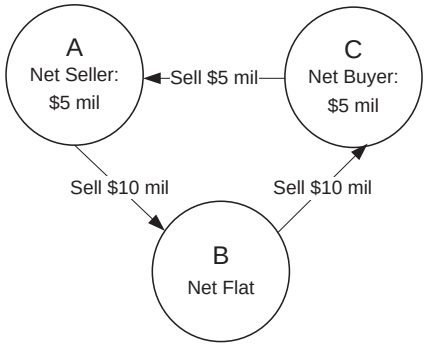
Result: new trade between A and C



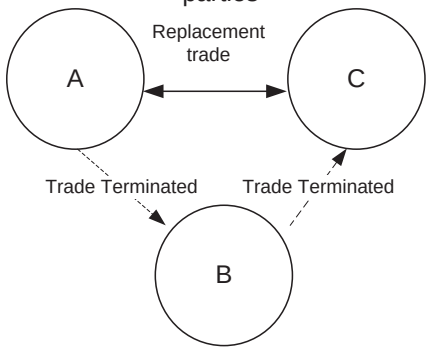
Appendix E: Portfolio Compression

How Portfolio Compression Works

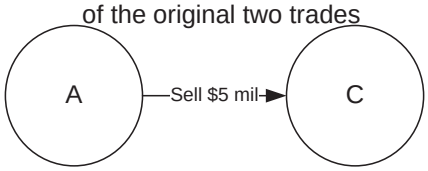
1. Three parties all trading with each other



2. Portfolio compression across multiple parties



3. Result: One trade between the parties that reflects economics of the original two trades



1. In product X:

-Party A buys $5 million of protection from C, but sells $10 million protection to B; Party A is a net seller of $5 million in product X.

-Party B has two credit derivatives positions in product X. It buys $10 million of protection from party A and sells the exact same amount of protection to party C, so its net position in product X is zero.

-Party C sells $5 million of protection to A but buys $10 million from B; C is a net buyer of $5 million in product X.

2. "Portfolio compression" eliminates the two trades that B has with A and C, and creates a replacement trade between A and C taking into account their original trade.

3. The result: There is now one trade across all three parties without affecting the economics of the original two trades.