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Collateral, Netting and Systemic Risk in the OTC Derivatives Market

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Abstract

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To mitigate systemic risk, some regulators have advocated the greater use of centralized counterparties (CCPs) to clear Over-The-Counter (OTC) derivatives trades. Regulators should be cognizant that large banks active in the OTC derivatives market do not hold collateral against all the positions in their trading book and the paper proves an estimate of this under-collateralization. Whatever collateral is held by banks is allowed to be rehypothecated (or re-used) to others. Since CCPs would require all positions to have collateral against them, off-loading a significant portion of OTC derivatives transactions to central counterparties (CCPs) would require large increases in posted collateral, possibly requiring large banks to raise more capital. These costs suggest that most large banks will be reluctant to offload their positions to CCPs, and the paper proposes an appropriate capital levy on remaining positions to encourage the transition.

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I. INTRODUCTION

The recent financial crisis has provided an impetus to move the lightly regulated over-the-counter (OTC) derivative contracts to central counterparties (CCPs) rather than the bilateral clearing that has taken place to date. The debate about the future of financial regulation has heated up as regulators in both the United States and European Union seek legislative approval to mitigate systemic risk associated with large complex financial institutions (LCFIs).² Regulatory changes will likely require offloading of standardized OTC derivatives to CCPs. In order to mitigate systemic risk that is due to counterparty credit risks and failures, either the users of derivative contracts will have to hold more collateral against the contracts are traded bilaterally, or margin will have to be posted to CCPs to cover potential losses.

There are several initiatives underway. The U.S. House Committee on Financial Services has several pieces of legislation underway. The European Commission announced similar policy actions and is expected to introduce legislation to mandate the clearing of standardized contracts to CCPs in 2010.

There has been very little research that looks at the overall costs to LCFIs of offloading derivative contracts to CCPs. Since the demise of Bear Stearns, much of the discussion and research on risks associated with derivatives had been focused on credit derivatives (or the CDS market), which represent only about 6 percent of the overall notional OTC derivatives market, as reported in Bank for International Settlements (BIS) data.³

There have been some estimates of costs stemming from risks in CDS contracts to the financial system when an LCFI fails. Barclays (2008) show that the default by a major derivative dealer could lead to losses of around \$40 billion but acknowledge that their assumptions do not factor in re-pricing risk at default or the associated losses from other OTC derivatives. Recently, Cont and Minca (2009) used network theory to analyze the systemic impact of credit default swaps; in particular they illustrate that credit default swaps introduce contingent links between institutions that can increase the range of contagion. Duffie and Zhu (2009) were the first to address the risks in the overall OTC derivatives market in a theoretical context. Their simulations show that one global CCP covering all OTC derivatives contracts would provide the most efficient allocation of capital. However, they do not use actual data to determine the overall costs to LCFIs in moving such risks to

² The term LCFI is used to denote major dealers/banks and others that are active in the OTC derivative market.

³ The OTC derivatives market has grown considerably in recent years. According to BIS surveys, notional amounts of all categories of the OTC contracts stood at \$605 trillion at the end of June 2009. These include foreign exchange (FX) contracts, interest rate contracts, equity linked contracts, commodity contracts, and credit default swap (CDS) contracts. A comprehensive breakdown of the OTC derivatives market is available in Table 1 of the Bank for International Settlements' release, "OTC derivatives market activity in the second half of 2009," issued in October 2009.

CCPs nor addresses the concentration risk. The paper also uses independently and identically distributed (i.i.d) assumption across products (e.g., credit default swap positions are unrelated to interest rate swap positions), which is unlikely to be representative in practice.

A couple of recent IMF papers on counterparty risk stemming from OTC derivatives find that a large part of the counterparty risk in OTC derivatives market is under-collateralized—up to \$2 trillion— relative to the risk in the system (Singh and Aitken, 2009b; Segoviano and Singh, 2008). Moving this risk to CCPs will require posting additional collateral.⁴

Furthermore, post Bear Stearns and especially after Lehman’s collapse, the demand for high quality collateral has increased significantly, while the supply of collateral has been reduced due to the hoarding of (unencumbered) collateral by LCFIs as reserves (Singh and Aitken, 2009a).

This paper contributes to the ongoing policy debate and shows that margin and collateral requirements at CCPs are a function of the risks from OTC derivatives. Even though many of the OTC derivatives are standard, the additional costs associated with the move suggest that inducing a critical mass of OTC derivative contracts to move will either require higher charges on counterparties to the bilateral transactions, or sizable collateral to be posted and held at CCPs.⁵ Furthermore, this measure of systemic risk may increase if the large banks only offload standardized contracts that are clearable (or eligible) at CCPs, as partial offloading of only some contracts will adversely impact the net exposure on their books.⁶ The ‘netting’ between standard and nonstandard contracts will not take place if only nonstandard contracts remain on LCFI’s books.

The rest of the paper is organized as follows. Section II discusses collateral and netting in the context of OTC derivative contracts and how they would interact in an international setting across various legal jurisdictions. Section III provides some calculations on the margin and collateral requirements for LCFIs as they move their OTC contracts to the CCPs and a levy to incentivize that a critical mass of contracts move to CCPs. Section IV concludes with some policy suggestions, which focus on the action that regulators will need to take to ensure that a critical mass of OTC derivatives moves to CCPs.

⁴ Neither the notional value of OTC contracts nor the gross market value of these contracts (essentially the total value of all the derivatives that are in-the-money) provides a basis for the measurement of counterparty risk. See section II.

⁵ See Morgan Stanley’s study, Intercontinental Exchange, Dec 15, 2007 that suggests about 60 percent of all OTC derivatives outstanding may be centrally cleared in two-three years. In Section III we assume that two-thirds of all eligible contracts could move to CCPs. If a critical mass of derivative contracts does not offload to CCPs, LCFIs will continue to impose systemic risk from such positions since the multilateral netting benefits of a CCP may not be fully attained.

⁶ For example, an LCFI may have a positive position (so-called “in-the-money”) via a standardized derivative contract with a hedge fund and a negative position (so-called “out-of-the-money”) via a nonstandard derivative with the same hedge fund. Presently these two positions offset each other on the LCFI’s books.

II. COLLATERAL, NETTING AND MOVING TO CCPs

Recent regulatory initiatives, both in the United States and Europe, have called for the establishment of central counterparties for OTC derivatives with an objective to reduce counterparty risk. A central counterparty (CCP) interposes itself between the buyer and the seller and, through legal novation, assumes the rights and obligations of both parties; in doing so, a well functioning CCP reduces systemic risk stemming from LCFIs being trading counterparties with each other. From the systemic risk perspective, counterparty risk is the risk to all others in the global system if an LCFI fails.

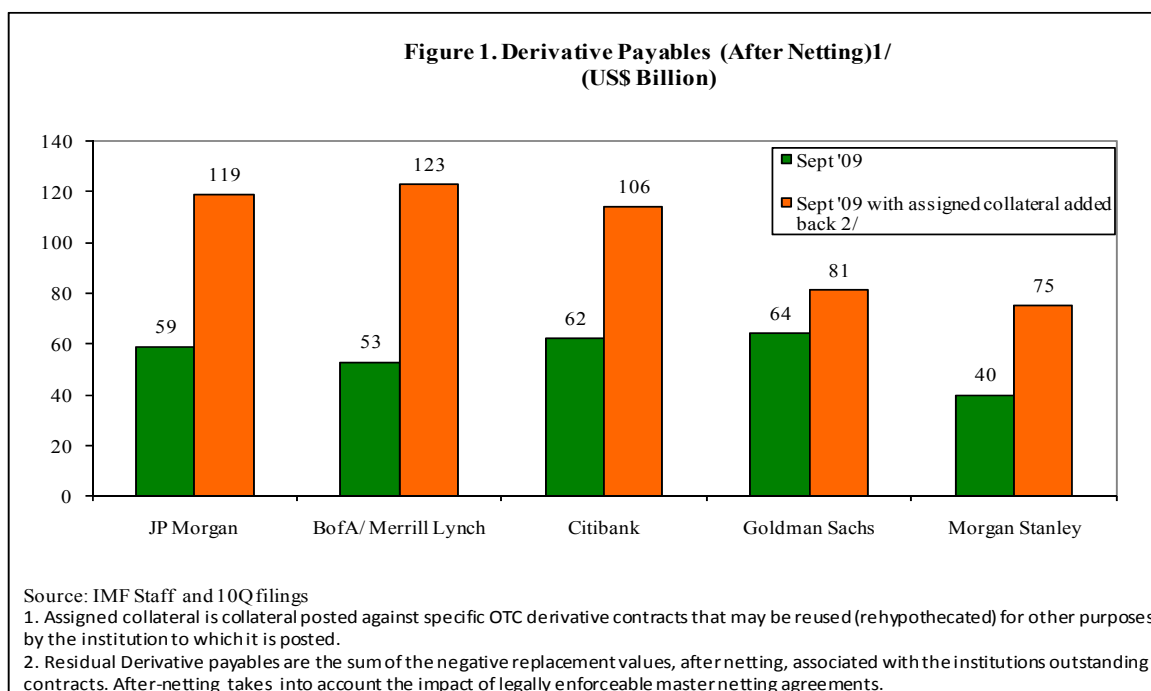
Assuming that legislation does not simply mandate the clearing of all OTC derivatives, a key question in that context is the magnitude of the costs to LCFIs of offloading their derivatives exposure to CCPs. To this end, we first need to measure the exposure of the financial system to the failure of an LCFI active in the OTC derivatives market, and to do so we use the LCFI's total "derivative payables" (and not "derivative receivables"). Derivative payables represent the sum of the counterparty's contracts that are liabilities of the LCFI at any given time, while derivative receivables represent the sum of the counterparty's contracts that are the assets of the LCFI. On the other hand, derivative receivables represent the credit risk of the counterparties to whom the LCFI is exposed and there is already a formal Basel II capital charge related to potential non-receivables. Derivative receivables has, so far, been the focus of the regulators (e.g., U.S. Office of Comptroller of the Currency's Quarterly Derivative Trading Report, or Bank for International Settlements semi-Annual report on OTC Derivative Activity). *By contrast, an LCFI's derivative payables is the risk imposed on the rest of counterparties when it fails.*⁷

In earlier papers, we highlight the importance of derivative payables as a useful metric to measure exposure of the financial system to the failure of an LCFI because: (i) at present the cost to the financial system from an LCFI's derivative payables does not carry an explicit regulatory capital charge; and (ii) using derivative payables as a yardstick, we thus provide an available measure of systemic risk.⁸

Collateral is posted in an OTC derivatives context because it correlates to the requesting side's analysis of that party's likelihood of default, the risk—market, credit, operational and counterparty—of the transaction that is being collateralized, its tenor, and the relationship with the client, liquidity and so forth. Using this notion, residual derivative payables exposure can be used to show the maximal extent of under-collateralization, which is substantial. In fact, based on financial information from 10Q reports, the five key LCFIs that are active in the OTC derivatives market in the United States (Goldman Sachs, Citi, JP Morgan, Bank of America, and Morgan Stanley) are jointly carrying almost \$500 billion in OTC derivative payables exposure as of Q3, 2009 (higher/orange bars in Figure 1).

⁷ When Lehman filed for bankruptcy, its derivative payables (also called negative replacement value in Europe) had an immediate impact on Lehman's counterparties since these payments were not made and the counterparties incurred the costs of replacing the contracts. However, the derivative receivables (also called positive replacement value in Europe) are collected by the bankruptcy court/trustee in due course.

⁸ See IMF Working Paper 08/258 and Working Paper 09/173 for further discussion on using derivatives payable as a metric to proxy for systemic risk in the OTC derivatives market.



In Europe, Deutsche Bank, Barclays, UBS, RBS and Credit Suisse are sizable players. These five largest European banks had about \$600-\$700 billion in under-collateralized risk (measured by residual derivative payables) as of December 2008.⁹

Present market practices result in residual derivatives payables and receivables, after International Swap and Derivatives Association's (ISDA) netting agreements, because:

- sovereigns, AAA insurers/corporates/large banks/multilateral institutions (e.g., EBRD), the "Berkshire Hathway" types of firms do not post adequate collateral since they are viewed by LCFIs as privileged and (apparently) safe clients; and
- dealers have agreed, based on the bilateral-nature of the contracts, not to mandate adequate collateral for dealer to dealer positions. In fact, dealers typically post no collateral to each other for these contracts.

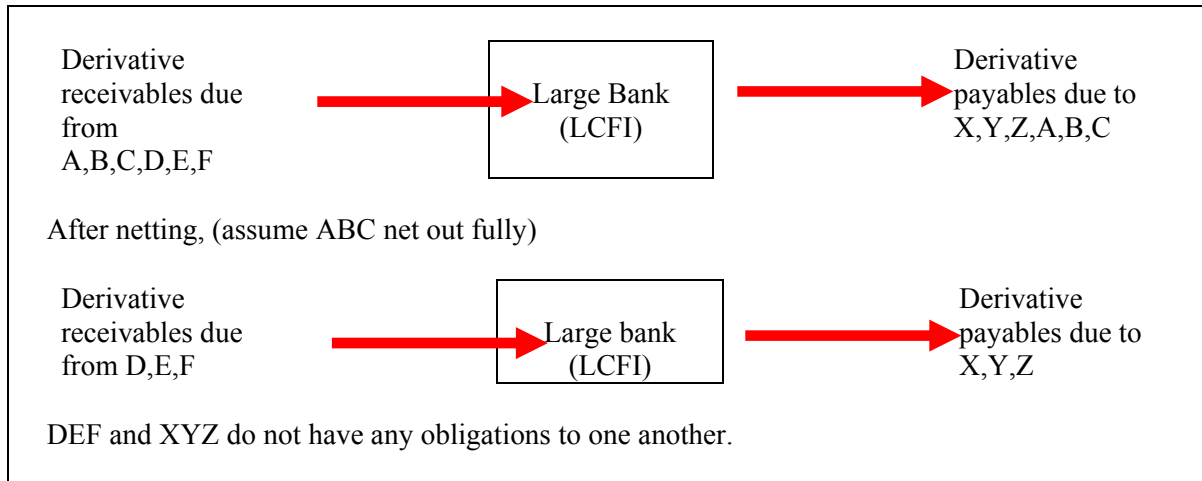
On the contrary, CCPs will require collateral to be posted from all its members. Thus offloading transactions to CCPs would make the under-collateralization gap obvious and require large increases in collateral. The amount of capital needed to be raised will depend on how the collateral requirements are assessed by CCPs and the regulators (e.g., entity type, rating, or riskiness of the compressed portfolio that is offloaded to CCPs) and how firms choose to raise the required collateral.¹⁰

⁹ The U.S. banks also had higher derivative payables as of December 2008 (over \$650 billion), as dislocations due to market volatility were higher relative to Q3, 2009 data.

¹⁰ Many LCFIs presently have sizable unencumbered or cash collateral deposited with their central banks. We assume, given the high ratings the LCFIs active in the OTC derivatives market, that the opportunity cost of posting collateral to CCPs will be the same whether LCFIs use their deposits with central banks or opt for new funding in capital markets.

It is useful to note that the ISDA's master agreements allow the major derivative players to net their derivative receivables and payables exposure across a given counterparty. Thus, the focus of this research is on derivative payables after netting (see Figure 2):

Figure 2. Derivative Receivables and Derivative Payables after Netting



Source: IMF staff.

To get an idea about the actual magnitude of the degree of systemic risk in this market, note that under-collateralized derivative payables may total at least \$1.6 trillion (Segoviano and Singh, 2008; Singh and Aitken 2009b); this research uses a 'bottoms-up' individual firm data as of end-Dec 2007. Another source, the semi-annual BIS report on OTC Derivative Activity using aggregate survey data, suggests derivative payables and receivables, after netting, as of end-June 2009 stood at over \$4 trillion when we include non-US CDS contracts (or roughly \$2.0 trillion of derivative payables assuming the major players run matched-books).¹¹ This figure for derivative payables and receivables, after netting, was about \$5 trillion as of end-Dec 2008, since dislocation in the market (via market volatility) was higher, making the values of derivatives positions higher for both positive and negative positions, relative to June (or about \$2.5 trillion of derivatives payables assuming the major players run matched-books).

Both the IMF research and BIS semi-annual OTC derivatives data are higher than a recent BIS Quarterly Review paper which uses an ISDA survey, and concluded that under-collateralization is about \$1 trillion for both payables and receivables based on the ISDA estimate of 80 percent collateralization (which would imply roughly \$0.5 trillion for derivative payables).¹² This difference between IMF research/BIS data and the BIS Quarterly

¹¹ BIS semi-annual survey only includes gross CDS positions (after netting) for the United States. Thus, European and Asian gross CDS positions are not part of this survey and consequently the gross figures for derivative payables will be higher.

¹² BIS Quarterly Review, September 2009, "Central Counterparties for Over-the-Counter Derivatives."

Review stems largely from the fact that “assigned collateral,” which appears in the LCFIs’ 10Q (or similar) financial statements, is rehypothecated (or re-used) by LCFIs for other purposes and is not dedicated or segregated for the purpose for which such collateral is received (Singh and Aitken, 2009a). This implies that the ISDA estimate of under-collateralization is low because the collateral that is posted is not dedicated to reduce risk in OTC derivatives. A recent ECB/Banking Supervisory Committee study finds that the extent of collateralization is only 44 percent of net exposures, which could indicate that the ISDA survey (on which the BIS Quarterly Review numbers are based) is over-reporting the degree of collateralization.¹³ Hence, a reasonable estimate for the degree of under-collateralization using the earlier studies, after accounting for assigned collateral, and the fact that most dealers run a matched book would be \$2 trillion for derivative payables.

Furthermore, to the extent such ‘assigned collateral’ would now have to be posted at the CCP, this sum (often in the range of \$20 - \$70 billion per large bank) will now be unavailable to be re-used. Dealers may therefore find it costly to move their trades to CCPs and these costs may not be trivial for the following three reasons: (i) the inability to effectively net internal position across products for any given client (ii) the larger upfront cost of posting initial margin and guarantee fund contributions at CCPs, and (iii) loss from the inability to rehypothecate the existing posted collateral which they use (and re-use) to finance other parts of their business.¹⁴

A key incentive in favor of moving OTC derivatives to CCPs is higher multilateral netting and the corresponding reduction in counterparty risk or additional benefits from portfolio margining where exposures across all OTC products would be offset. In this latter case, the intuition is that the margin required to cover the exposure of the portfolio would be smaller under a CCP than margining its individual components, since the prices of the portfolio’s components would be correlated and could be offset in a CCP. However, if there are multiple CCPs that are not linked the benefits of netting are reduced because cross-product netting will not take place. Hence, to maximize netting benefits across multiple CCPs, three elements need to be considered:

- *Interoperability* (or linking of CCPs), which allows a market participant (e.g., LCFI) to concentrate its portfolio at a CCP of its choice, regardless of what CCP its trading counterparty chooses to use. Thus, at the level of each CCP, CCP_i may have access to collateral from another CCP_j that may go bankrupt in the future, so that losses involved in closing out CCP_j ’s obligations to CCP_i can be covered.¹⁵

¹³ ECB’s report references EU Commission’s comment on ISDA: “The dominant source of the nature and extent of bilateral collateral is ISDA’s margin surveys. This section is based on the numbers provided by ISDA. However, the Commission services cannot judge the solidity of these numbers, as no information is available about the methodology for calculating the numbers. They should accordingly be considered as indicative only.”

¹⁴ Initial margin in bilateral contracts for CDS contracts are typically high due to their ‘jump risk’ (or sudden change in the price of the reference entity) and can reach 10–30 percent of notionals; for interest rate swaps (IRS) it is much lower, around 1 percent of notional or even less.

¹⁵ Market sources indicate (and the author shares this view) that it is *unlikely* that CCP_i in a country would be allowed access to collateral posted to CCP_j registered in another country.

- A *multilateral cross-guarantee agreement* provides a mechanism for sharing excess collateral after the closeout/bankruptcy of an LCFI at a different clearing agency. This would allow CCPs to have legal priority over the collateral of an LCFI if it goes under (unlike in the case of Lehman when clients who posted collateral with Lehman were reduced to unsecured creditors).¹⁶
- If a CCP fails and there is insufficient collateral among all CCPs to cover the losses, then one could consider an *unlimited call* on the LCFIs dealing with the CCP to bridge the losses (and thus have ‘skin in the game’ and avoid moral hazard).¹⁷

III. CAPITALIZATION NEEDS FOR MOVING TO CCPs

Current regulatory proposals envision that all standardized derivatives should be cleared by CCPs. In this way, regulators could either mandate that LCFIs use CCPs, or make it costly for them to keep nonstandard contracts on the books. To achieve this, regulators are in favor of imposing some type of charge on contracts that may not move to CCPs.

While such a move may encourage standardization, the overall collateral needs within the financial system may be onerous. The initial margin requirement (including monies toward the guarantee/default fund) to move to CCPs will increase.¹⁸ To attain a critical mass (which we assume to be two-thirds) of all standardized OTC derivatives to move to CCPs, some illustrative arithmetic based on margin requirement trends at the large CCPs suggests that about \$200 billion may be needed in initial margins and guarantee funds (see Box 1).¹⁹ Compared to \$75 billion capital injection to nineteen LCFIs required by the recent SCAP exercise to meet their capital needs, the costs to move to CCPs seem relatively large. Such costs may be necessary to reduce the present under-collateralization within the financial system if a critical mass of OTC derivatives is to be motivated to move to CCPs and reduce the counterparty risk from a failure of an LCFI.

¹⁶ Any excess collateral would have to be returned to the bankrupt estate unless there was some security interest in favour of the second CCP. However, if the bankrupt LCFI is not a member of the second CCP, it is unlikely that it would pledge its collateral to support the second CCP (unless the LCFI is a member of both CCPs). LCFIs are likely to work with one CCP to maximize overall netting and collateral benefits.

¹⁷ According to CPSS-IOSCO Recommendations for CCPs (RCCP 4), a clearing member may not be exposed to significant risks that they themselves cannot control; they control these costs by defining the guarantee/default fund for instance. In other words, a CCP is not allowed, according to CPSS-IOSCO, to expose its members to an unlimited call to bridge losses. Therefore, at least in Europe, a cap is defined on replenishments to the default fund.

¹⁸ Market sources indicate that variation margin is presently paid to mark the portfolio of derivatives to market and is a function of the volatility in the market and covariance within the compressed portfolios. We do not expect movement to CCPs to have a large impact on variation margins, unless the present methods used by LCFIs are more lenient than those of CCPs.

¹⁹ Also see accompanying GFSR, April, 2010, Chapter 3, which makes a similar, but more conservative estimate on foreign exchange, equity, commodities and other unallocated contracts.

Box 1. Some Arithmetic on Collateral Requirements at CCPs

In the absence of information on open-positions in the future, and how the landscape for the OTC derivative market might evolve, we use the present ratio of initial margin and guarantee fund to notional positions already cleared, and estimate costs to LCFIs of offloading their contracts to CCPs.

Extrapolating from ICE, the largest clearer of credit default swap contracts, the margin requirement to offload CDS would be about \$40-\$80 billion. ICE clears 3 trillion index trades (notional amount) and is supported by a \$2 billion guarantee fund and \$3 billion initial margin; this translates into a margin and guarantee fund/notional ratio of 1/600. Thus, in the absence of other data, initial margin and guarantee fund monies from LCFIs to support offloading two-thirds of the \$36 trillion CDS notional market will be roughly \$36 billion (i.e., $1/600 \times \$36 \text{ trillion} \times 2/3$). As more trades clear over time, overall netting via compressed portfolios may be enhanced at the CCPs and margin requirements may be lower. However, since only CDS indices clear at this stage and as single name CDS contracts move to CCPs, it is likely that the overall costs will outweigh the netting enhancement, since single names carry a sizable 'jump risk' relative to indices. Market sources suggest for these contracts at least a ratio of 1/300 ratio for initial margin + guarantee fund/notional cleared which results in a \$80 billion costs to move CDS ($1/300 \times \$36 \text{ trillion} \times 2/3$).¹

Extrapolating from LCHClearnet/Swapclear, the largest clearer for the interest rate swap (IRS) market, margin requirements to offload IRS would be \$40-\$50 billion. Market sources and public information indicate that the initial margin and guarantee fund as a fraction of total notional IRS is now around 1/10,000. This fraction is much lower than for CDS since jump risk is not associated with IRS contracts. If an additional \$100 trillion of the more complex and non-plain vanilla IRS market offloads to CCPs, these will be more costly to clear and the LCFIs will require a total of an additional \$20-30 billion ($1/5000 \times 100 \text{ trillion}$ or $1/3300$ to 100 trillion). This would be on top of about \$20 billion invested today. Thus we envisage that over time, two-thirds of the IRS market will clear at CCPs (i.e. the \$200 trillion cleared at present plus an additional \$100 trillion).

Assuming that two-thirds of the \$130 trillion market in fx/equities/commodities and other unallocated OTC derivative products moves to the CCPs, then the initial margin and guarantee fund cost of offloading fx, equity, commodities and other contracts would be about ($1/1000 \times 2/3 \times 130 \text{ trillion}$), or \$90 billion using a ratio of margin and guarantee fund to nominal cleared contracts, based on various data from market sources for these products.

Overall, if a critical mass of two-thirds of the \$600 trillion market moves to CCPs, around \$200 billion may be needed toward initial margin and guarantee fund from LCFIs (i.e., summing the totals calculated above for CDS, IRS and the remainder of the market). For a rough comparison, the TARP stress test exercise required about \$75 billion capital injection to nineteen LCFIs to buoy their capital needs.

Summary of Costs to Move to CCPs

In the absence of information on open-positions in the future, we use the present ratio of initial margin and guarantee fund to notional cleared, and estimate costs to LCFIs.

	Ratio of (Initial Margin + Guarantee Fund) to Notional	Offloading 2/3 of present Notional Size of Market	Extrapolated Costs
CDS	1/600 to 1/300 ^{1/}	2/3 x 36 trill	\$40 – 80 bill
IRS	1/5000 to 1/3300	Additional 100 trill ^{2/}	\$40 – 50 bill
FX, Equity, Commodities & Unallocated contracts	1/1000	2/3 x 130 trill	\$90 bill
Total Costs		2/3* 600+ trill	\$170– 220 bill

^{1/} From a CCP view, clearing compressed portfolio(s) may shrink the \$30 trillion notional to \$3 trillion, but then they would use a ratio of 3/100 (or 3% for initial margin + guarantee fund/compressed notional cleared).

^{2/} We acknowledge that about \$200 trillion market in plain vanilla IRS is already being cleared. If the remaining \$100 trillion of the more complex IRS clears, this would result in about 2/3 of the \$437 trillion market in IRS moving to CCPs.

Given the costs, and assuming a levy (i.e., a tax to the exchequer or designated fiscal authority) needs to be introduced to induce OTC derivatives to move to CCPs, it should be constructed to mitigate the systemic risk from the failure of an LCFI. Since derivative payables represent systemic risk, there should be a corresponding levy.²⁰ As noted earlier, the cost to the financial system from an LCFI's derivative payables does not currently carry a capital charge because the bulk of payables is subtracted from receivables (via netting) before the Basel charge is assessed. In the context of OTC derivatives, because residual derivative payables (i.e., after netting) represents systemic risk, it may be a relevant metric to focus upon.

As an example of how to incentivize movement to CCP, we assume an ad hoc levy of 10 percent to 20 percent for contracts that stay on LCFIs' books. If about one-third of OTC derivatives remain non-standardized for CCP clearing, this suggests that additional capital needs for the large LCFIs of about \$70 billion to \$140 billion (i.e., 10 percent to 20 percent \times $1/3 \times$ \$2 trillion).²¹ Offloading only standardized contracts to CCPs will adversely impact the present netting benefits to the LCFIs, as the offset or netting between standard and nonstandard contracts on an LCFI's books will not be possible (see footnote 5). Also, the levy assumption could be fine-tuned to encourage standardization and incentivize LCFIs to move to CCPs (see Appendix I which summarizes the objective of a large bank that will choose between either paying the levy and keeping the transactions on its books, or posting collateral and offloading contracts to a CCP).²²

To the extent that CCPs net the offsetting exposures of multiple LCFIs and collect margin only on each LCFI's residual exposure, this can significantly lower the under-collateralization and reduce the estimates for additional margins above. However, this entails that not only a critical mass of derivatives moves to CCPs, but also that there is interoperability across CCPs at least for the same product, in order for an LCFI to concentrate its clearing with one CCP and optimize the netting potential.

Absent the reduction in margin requirements through netting, CCPs could dilute their standards for initial margins. Since the CCPs will be competing, there could be a race for the lowest common denominator (i.e., lower the initial margin requirements). In that case, LCFIs will be more likely to opt to offload their exposure to CCPs than to pay a relatively higher

²⁰ We are suggesting a real tax via the levy on derivative payables and not a Basel-like capital charge on derivative payables.

²¹ It is uncertain if the present \$2.0 trillion for uncollateralized derivative payables will decrease uniformly when 2/3 of OTC derivatives are offloaded to CCPs. So the residual derivative payables may be higher than $1/3 \times$ \$2 trillion, due to some loss in netting.

²² Some LCFIs may be willing to pay the levy, than forego their 'netting' benefits; LCFIs know their books and the embedded correlations across products better than any CCP. The tax rate would need to be calibrated to provide enough incentive to move contracts to CCPs, but not so high as to overly burden LCFIs as they attempt to adjust their balance sheets to meet the proposed stringent regulations. Of course, if all non standardized contracts had appropriate collateral posted, then a levy would be unnecessary. Also, timing of the introduction of such levy would need to be carefully considered.

levy or other charge and keep the contracts on their books (Appendix 1 assumes that CCPs will not lower margins that may lead to regulatory arbitrage).

Without proper risk management and/or adequate default fund at the CCPs, the systemic risk from derivatives may spread from the present 8 to 10 LCFIs that presently dominate the OTC derivative market to about 14 to 15 entities (i.e., LCFIs plus CCPs with sizable business today). The CCPs that are likely to seek new business include ICE Trust and ICE Europe (both specializing in CDS clearing); SwapClear which specializes in interest rate swaps; and Chicago Mercantile Exchange (CME) supported by the buy-side firms, such as Blackrock, Pimco, and Blue Mountain. Several others, including Eurex, LIFFE/NYSE and a few in Japan/Singapore/HK are vying for business (see Table 1). However, it is unlikely that all will succeed.

Table 1. Present Central Counterparties in Business (or Seeking New Business)

Name of Clearing House	Location	Regulated By	Expected Launch Date	Expected Product Available on Launch date
ICE U.S. Trust	United States	NY FED, NY State Banking Dept.	Already launched	N. American indices
NYSE LIFFE/BClear and LCH.Clearnet	United Kingdom	FSA	2009/2010	European indices and Swaps
CME	United States	CFTC and FSA	May-June 2009	N. America indices, European indices and constituent single names
ICE Clear Europe	United Kingdom	FSA	31 July 2009	European indices
Eurex Clearing	Germany	BaFin, Bundesbank and FSA	31 July 2009	European indices and constituent single names
LCH.Clearnet.SA	France	College of European Regulators	2010	European indices

Source: Banking Supervisory Committee, European Central Bank Report, August 2009.

Multiple CCPs reduce the possibility of cross-asset class netting and hence encourage netting of exposures of the LCFI within their balance sheets (i.e. less incentive to offload contracts to CCPs). Both situations move away from the Duffie-Zhu (2009) result that the most efficient capital allocation occurs when all LCFIs offload all OTC derivatives to one CCP. To

maximize the benefits of netting at the CCP level, interoperability that allows for maximum netting across asset classes and in the same asset class needs to be considered in earnest.²³

IV. CONCLUDING REMARKS AND POLICY ISSUES FOR REGULATORS TO CONSIDER

The paper has noted that there is sizable activity at present that is under-collateralized. The margin/collateral requirements at central counterparties (CCPs) should help the OTC derivatives market be better collateralized, lowering the derivative payables at the large banks that dominate this market. However, the overall netting benefits may be less if the several CCPs that are in operation are not linked (i.e., there is no interoperability). The margin requirements from multiple un-linked CCPs will be higher than if only one existed or if they were linked. This implies that the full benefits of CCPs would not be forthcoming. Systemic risk may also increase on the books of the large banks if only standardized contracts are cleared at CCPs, and banks are thus unable to net between standard and nonstandard contracts. Looking forward, regulators will need to tackle (international) jurisdictional issues to avoid asymmetries between CCP requirements, especially for margins.

Policy implications are the following:

- Regulators should be cognizant that LCFIs active in OTC derivatives market under collateralize relative to the risk they assume (there is an estimated shortfall of up to \$2 trillion if measured by the derivative payables carried by the major market participants).
- Whatever collateral already posted is currently allowed to be rehypothecated (so collateral needs will be even more onerous if placed at CCPs). Thus, offloading transactions to CCPs would make this gap obvious and require large increases in collateral.
- Moving only some ‘standard’ or ‘eligible’ contracts to CCPs will not reduce the systemic risk within the large LCFIs. Thus, an appropriate levy (or tax) is advocated that may force LCFIs to offload a critical mass to CCPs (i.e., assumed to be two-thirds of all contracts) and reduce the instability from the failure of an LCFI.
- If CCPs compete with each other and thus lower the threshold for margin, then regulatory oversight will be required to ensure the robustness of a CCP and lower the chances of a default. We endorse adherence to strong globally consistent standard to ensure against regulatory arbitrage.²⁴

²³ See a recent discussion paper by EuroCCP that is reviving some interest in the linking of CCPs. The basic premise of this paper is that when two CCPs agree to interoperate, they should each increase their default fund as a function of the open positions between them. <http://www.euroccp.co.uk/leadership/index.php>

²⁴ For instance, see http://www.ecb.int/paym/cons/html/escb-cesr_otc.en.html, and the work underway by CPSS/IOSCO on these issues.

REFERENCES

- Barclays Quantitative Credit Strategy: “*Counterparty Risk in Credit Markets*,” 2008.
- Bank for International Settlements, OTC Derivative Market Activity, Semi-annual Reports (various issues).
- Bank for International Settlements, Quarterly Review, September 2009, “*Central Counterparties for Over-the-Counter Derivatives*.”
- Cont, Rama and Andrea Minca, “*CDS and Systemic Risk*,” Working Paper, 2009 (Columbia University, 2009).
- Duffie, Darrell and Haoxiang Zhu, “*Does a Central Clearing Counterparty Reduce Counterparty Risk?*” Working Paper, 2009 (Stanford University, Graduate School of Business).
- European Central Bank, 2009, “Banking Supervisory Committee report on CDS and Counterparty Risk,” (August).
- Office of Comptroller of Currency, “Quarterly Reports on Bank Trading and Derivatives Activities,” (various issues).
- Singh, Manmohan, and James Aitken (2009a), “Deleveraging post Lehman—Some Evidence from Reduced Rehypotheication,” IMF Working Paper 09/42.
- Singh, Manmohan, and James Aitken (2009b), “Counterparty Risk, Impact on Collateral Flows and Role for Central Counterparties.” IMF Working Paper 09/173.
- Segoviano, Miguel and Manmohan Singh, (2008) “Counterparty Risk in the Over-The-Counter Derivatives Market.” IMF Working Paper 08/258.

Appendix I: Objective of a Large Bank to Minimize costs of Moving to CCPs

The objective of the appendix is to succinctly summarize the costs that a large bank will face when offloading derivative risk to CCPs and paying *initial margin (and a contribution to guarantee fund)* and a *levy* (or surcharge) for derivative contracts that are not moved to CCPs. It assumes that the regulators will insist that an LCFI either moves their eligible/standard contracts to CCPs, or begin to pay a capital levy on the positions that remain on the books. The basic parameters facing a large bank are the following:

L: Levy in percent on derivative payables (after netting) to reduce systemic risk.

DP_{after netting}: Derivative Payables after netting on the books of an LCFI

M: Initial Margin and associated contribution to the Guarantee Fund (as a ratio to Notional)

N: Notional amount of derivatives offloaded to CCPs

A hypothetical method that a large bank could use to minimize the total costs comprised of margin and levy is shown below.²⁵

$$\text{Minimize: } L \times DP_{\text{after netting}} + M \times N^{26}$$

Although regulatory proposals are being fine-tuned, we assume that CCPs will not lower margins (M) to gain business. We also assume, that a high L (levy) will also impact DP_{after netting}, as banks will be encouraged to “standardize” and offload a higher fraction of their portfolios to CCPs.

We also note that empirically, DP_{after netting} is empirically related to N (approx 0.3 percent to 0.4 percent of N, as per recent BIS semi-annual OTC derivative activity surveys).

²⁵ There may be some additional regulatory capital relief/rebate in offloading more derivatives receivables that are part of N. The present capital charge using (after netting) derivative receivables cannot be compared with what will likely be sizable *new funding* that will be needed to meet margin requirements at CCPs.

²⁶ We assume that the two ($L \times DP_{\text{after netting}}$) and ($M \times N$) are additive since the funding cost for the large banks to raise L (i.e., a capital levy to pay regulators), is roughly the same as the opportunity cost of holding unencumbered assets that will be posted as margin to the CCPs.