

Under-collateralisation and rehypothecation in the OTC derivatives markets

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At present there is sizable activity in the OTC derivatives market that is under-collateralised. The margin/collateral requirements at central counterparties (CCPs) should help the OTC derivatives market be better collateralised, lowering the derivatives risk 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. Also, large banks make very effective use of collateral they receive that has rehypothecation rights.¹ This implies that overall cost to large banks in moving OTC derivatives to CCPs will be sizable.

NB The views expressed herein are those of the author and should not be attributed to the IMF, its Executive Board, or its management.

1 "Rehypothecation" has nothing to do with the French word "hypothèque" which means the right given to a lender to repossess the underlying asset in case of delinquency.

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). This paper shows that large banks active in the OTC derivatives market do not hold collateral against all the positions in their trading book and provides an estimate of this under-collateralisation. Whatever collateral is held by banks is allowed to be rehypothecated (i.e. the collateral received can be re-used for other purposes). Banks, in general, use collateral very efficiently. Since CCPs would require all positions to have collateral against them, off-loading a significant portion of OTC derivatives transactions to central counterparties would require large increases in posted collateral. These costs suggest that most large banks will be reluctant to offload their positions to CCPs.

We measure the exposure of the financial system to the failure of a large bank (or non-bank) dominant in the OTC derivatives market, according to their total "derivative payables" (and not "derivative receivables").² Derivative payables represent the sum of the counterparty's contracts that are liabilities of the large bank. Similarly, derivative receivables represent the sum of the counterparty's contracts that are the assets of the large bank. At present, the cost to the financial system from a large bank's derivative payables does not carry a regulatory capital charge and are not reflected in risk assessments.³ On the other hand, derivative receivables are imbedded in credit risk and there is already a capital charge/provision for potential non receivables. Regulators usually look at the asset side of the balance sheet for 'risk-weighted assets'. By using derivative payables as a yardstick, we thus provide an available measure of systemic risk that is comparable across all global banks that are active in the OTC derivatives market.

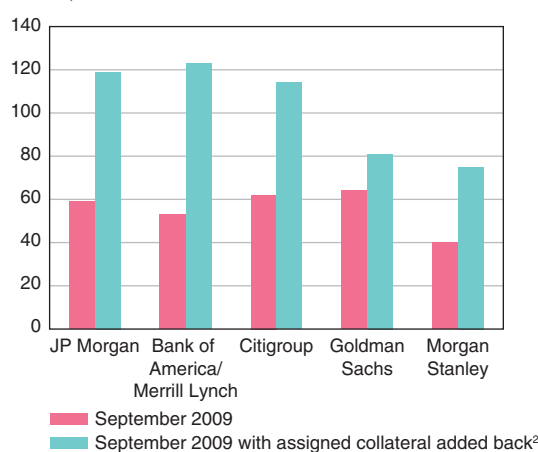
Financial information from recent years suggests that five US banks active in this market are carrying about USD 500 billion in OTC derivative payables exposure. The key institutions active in the OTC derivatives in the United States are Goldman Sachs, Citigroup,

JP Morgan, Bank of America, and Morgan Stanley. In Europe, Deutsche Bank, Barclays, UBS, Royal Bank of Scotland (RBS) and Credit Suisse are sizable players. In Europe, the five largest European banks had about USD 600-USD 700 billion in under-collateralised risk (measured by residual derivative payables) as of December 2008. It is useful to note that the International Swap and Derivatives Association's (ISDA) master agreements allow banks and others active in this market to net (or offset) their derivative receivables and payables exposure on an entity. Thus if Goldman Sachs has a positive position with Citigroup on a interest rate swap and a negative position with Citigroup on a credit derivative, ISDA allows for netting of the two positions. Thus, the focus of this article is on derivative payables, after netting.

Collateral is posted in an OTC derivatives context to cover for the likelihood of default, operational and counterparty risk of the transaction that is being collateralised etc. Residual derivative payables exposure can be used to show the maximal extent of under-collateralisation, which is substantial.

Chart 1
Derivative payables (after netting)¹

(USD billions)



¹ Assigned collateral is collateral posted against specific OTC derivative contracts that may be reused (rehypothecated) for other purposes by the institution to which it is posted.

² Residual derivative payables are the sum of the negative replacement values, after netting, associated with the institutions outstanding contracts. After-netting takes into account the impact of legally enforceable master netting agreements.

Source: IMF Staff and 10-Q filings

² In Europe and under the International Financial Reporting Standards, derivative payables are also called negative replacement values, and derivative receivables are called positive replacement values.

³ Unlike market risk, credit risk and operational risk that attract capital charges in the Basel II framework, systemic risk has not yet been considered by regulators. Also, regulators usually look at the asset side of the balance sheet for 'risk-weighted assets'; thus derivative payables, a liability, is a counterintuitive measure.

1 | COST TO MOVE OTC DERIVATIVES TO CENTRAL COUNTERPARTIES (CCPs)

According to earlier studies, uncollateralised derivative payables total about USD 2.0 trillion (Singh and Aitken, 2009; Segoviano and Singh, 2008). This largely stems from the present market practice where privileged clients of large banks do not post sufficient margin (e.g., sovereigns, central banks, AAA insurers, Fannie Freddie, and corporates etc.); also, banks do not post collateral with each other either. This figure is much higher than findings from a recent BIS study.⁴ This difference stems largely from the fact that "assigned collateral", which appears in the large banks' 10-Q⁵ (or similar) financial statements, is largely rehypothecated (or re-used) by the major players in this market for other purposes and is not dedicated/segregated for the purpose for which such collateral is received. A recent ECB study finds that the extent of collateralisation is only 44 percent, which could indicate that the ISDA survey may be on the high side.⁶ To the extent such 'assigned collateral' would now have to be posted at the CCP, this sum (often in the range of USD 20 – USD 70 billion per large bank) will now be unavailable to be re-used.

A key argument in favor of moving OTC derivatives to CCPs was netting across contracts, and the corresponding reduction in counterparty risk. 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. Current regulatory proposals envision that all standardised

(or eligible) derivatives should be cleared by CCPs. However, CCPs will require collateral to be posted from all its members. Thus offloading transactions to CCPs would make the under-collateralisation 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.⁷

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.⁸

In this way, regulators could either mandate that largest players 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/tax on contracts that may not move to CCPs. While such a move may encourage standardisation, 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. To attain a critical mass (which we assume to be two-thirds) of all standardised OTC derivatives to move to CCPs, some illustrative arithmetic based on margin requirement trends at the large CCPs suggests that about USD 200 billion may be needed in initial margins and guarantee funds (see Table 1).

4 BIS Quarterly, September 2009, paper uses the ISDA survey, and concludes that under-collateralization is about USD 1 trillion for both derivatives and receivables (which would imply roughly 0.5 trillion for derivative payables).

5 Form 10-Q shall be used for quarterly reports under Section 13 or 15(d) of the Securities Exchange Act of 1934.

6 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."

7 Many banks presently have sizable unencumbered or cash collateral deposited with their central banks. We assume, given the high ratings the banks 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.

8 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 notional; for interest rate swaps (IRS) it is much lower, around 1 percent of notional or even less.

Table 1
Summary of costs to move to CCPs

(USD)

	Ratio of (initial margin + guarantee fund) to notional	Offloading 2/3 of present notional size of market	Extrapolated costs
Credit default swaps (CDSs)	1/600 to 1/300 ¹	2/3 x 36 trillion	40–80 billion
Interest rate swaps (IRSs)	1/5,000 to 1/3,300	Additional 100 trillion ²	40–50 billion
Forex, Equity, Commodities & Unallocated contracts	1/1,000	2/3 x 130 trillion	90 billion
Total Costs		2/3 x 600 trillion	170–220 billion

Note: 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.

1 From a CCP view, clearing compressed portfolio(s) may shrink the USD 30 trillion notional to USD 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 USD 200 trillion market in plain vanilla IRS is already being cleared. If the remaining USD 100 trillion of the more complex IRS clears, this would result in about 2/3 of the USD 437 trillion market in IRS moving to CCPs.

2 | REHYPOTHECATION (OR RE-USE) OF COLLATERAL BY LARGE BANKS

Any estimate of the costs of moving to CCPs is not complete unless there is discussion of how banks re-use the collateral pledged with them from various clients. Based on recent 10-Q reports, rehypothecation declined rapidly post-Lehman. After Lehman's bankruptcy, prime brokers have been demanding more cash collateral in place of securities (unless they are highly liquid securities). Post-Lehman, some investors have taken precautionary measures against rehypothecation by opting to hold assets in custody accounts. Data show that the decline between end-2007 through end-2009 for "total collateral received that can be repledged/ rehypothecated" by the largest seven US broker-dealers—Lehman Brothers, Bear Stearns, Morgan Stanley, Goldman Sachs, Merrill Lynch and JPMorgan—declined from about USD 4.5 trillion to USD 2.1 trillion (see Chart 2).

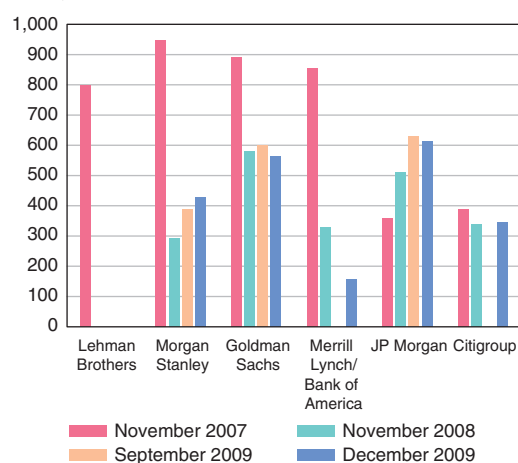
On-balance sheet data do not "churn", where churning means the extent of re-use of an asset. If an item is listed as an asset or liability at one bank, it cannot be listed as an asset or liability of another bank by definition; this is not true for pledged collateral. Since on-balance sheet is the snapshot of a firm's assets and liabilities on a given day, these cannot be the assets or liabilities of another firm on that day. However, off-balance sheet item(s) like 'collateral that is

permitted to be re-used' are shown simultaneously in footnotes by several entities. These firms do not own the collateral but due to rehypothecation rights they are legally allowed to use the collateral in their own name.

Since the US banks rehypothecate "collateral received that can be pledged" with European banks and vice versa, the source of off-balance sheet funding is higher (through the velocity of collateral).

Chart 2
Collateral received that can be pledged at large US banks
 (November 2007–December 2009)

(USD billions)



Note: JPMorgan data post November 2007 includes Bear Stearns and Washington Mutual.

Chart 3
Rehypothecation declined during the recent crisis
for European banks
 (November 2007–December 2009)

(USD billions)



When we include other large banks with significant relations with the hedge fund industry such as Deutsche Bank, UBS, Barclays, RBS and Credit Suisse, the total available pledged collateral was over USD 10 trillion at end-2007 (see Annex 1)

The total assets under management (AUM) of the global hedge fund industry were about USD 2 trillion as of end-2007 (prior to the crisis). Assuming an average leverage of 2, the hedge fund industry held roughly USD 4 trillion of securities on a mark-to-market basis. Based on discussions with collateral teams at large banks (since hedge funds do not provide this information), about USD 1 trillion of the market value of securities of the hedge fund industry was rehypothecated, as of end-2007.⁹

Since hedge funds have typically contributed about 30 percent–40 percent of all pledgeable collateral received by the large banks, the churning of hedge fund collateral could have been between 3 and 4.¹⁰ Thus in the context of this article, if large banks were to post USD 200 billion with central counterparties in

the context of offloading OTC derivative positions to them, the real cost may be USD 200 billion times the relation to the churning factor (forthcoming Singh, 2010).

3| POLICY ISSUES FOR REGULATORS TO CONSIDER

The paper has noted that at present there is sizable activity in the OTC derivatives market that is under-collateralised. The margin/collateral requirements at central counterparties should help the OTC derivatives market be better collateralised, 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).¹¹ The margin requirements from multiple un-linked CCPs will be much higher than if only one existed or if they were linked. This implies that the full benefits of CCPs would not be forthcoming.

- Regulators should be cognisant that LCFIs active in OTC derivatives market under collateralise relative to the risk they assume (there is an estimated shortfall of up to USD 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.
- Large banks make very effective use of pledged collateral they receive that has rehypothecation rights; the churning factor of collateral gives an idea to the real cost of posting collateral.

⁹ Typically, hedge funds specialising in fixed-income and convertible arbitrage seek leverage and in lieu of the associated borrowing, post collateral with the large banks. Market sources indicate that on average, each of the largest 20-25 hedge funds borrowed USD 30-60 billion from their prime brokers (or roughly USD 1 trillion); collateral was posted by the hedge funds in line with their borrowing around end-2007. After Lehman's crisis, and given the regulatory efforts to reduce leverage, re-use of pledged collateral has now come down sizably.

¹⁰ In other words, 30 percent–40 percent x USD 10 trillion total pledged collateral divided by USD 1 trillion collateral that is allowed to be rehypothecated by the hedge fund industry. Note that our sample does not account for other large banks that may also be active in areas associated with pledged collateral (HSBC, Société générale, BNP Paribas, HSBC, Nomura etc.) and thus the churning factor may be higher since this would increase the numerator of this fraction.

¹¹ 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, 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.

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ANNEX

Current rules on rehypothecation in the United States and the United Kingdom

A defined set of customer protection rules for rehypothecated assets exists in the United States, but not in the United Kingdom. This difference meant that when Lehman Brothers International Europe (LBIE, United Kingdom) filed for insolvency there was little statutory protection available to those customers who allowed re-use of their collateral. In the United States, however, the Securities Investor Protection Act (SIPA) of 1970 provides for certain procedures that will apply in the event of the insolvency of a broker-dealer.

In the United Kingdom, an unlimited amount of the customer's assets can be rehypothecated and there are no customer protection rules. By contrast, in the United States, Rule 15c3-3 limits a broker-dealer from using its customer's securities to finance its proprietary activities. Under Reg T, the broker-dealer may use/rehypothecate an amount up to 140 percent of the customer's debit balance.¹ Created by SIPA, the Securities Investor Protection Corporation (SIPC) is an important part of the overall system of investor protection in the United States.² SIPC's focus is very specific: restoring funds to investors with assets in the hands of bankrupt and otherwise financially troubled brokerage firms (e.g., Lehman). Since 1970, SIPC has grossed more than USD 2 billion from its members' assessments that can be used by investors to recover assets in the event of a brokerage firm's insolvency.

A key reason why hedge funds have previously opted for funding in Europe (especially the United Kingdom) is that leverage is not capped as in the United States via the 140 percent rule under Rule 15c3-3. Leverage levels at many UK hedge funds, banks and financial affiliates have been higher, as the United Kingdom does not have a similar cap. Thus, prime brokers and banks would rehypothecate their client's assets along with their own proprietary assets as collateral for funding from the global financial system. Lehman's administrators PriceWaterhouseCoopers (PWC) confirmed in October 2008 that certain assets provided to LBIE were rehypothecated and no longer held for the client on a segregated basis and as a result the client may no longer have a proprietary interest in the assets. As such, LBIE investors (e.g., hedge funds) fell within the general body of unsecured creditors. Consequently, hedge fund assets with LBIE have remained frozen in the United Kingdom, whereas thanks to SIPA, this was not the case in the United States. Disentangling hedge fund assets from the broker-dealer/banks' proprietary assets that have been rehypothecated together, has been an onerous task in the United Kingdom..

Rehypothecation in Continental Europe

Our understanding from legal sources is that the EU law does not establish a quantitative cap on the rehypothecation of collateral pledged to broker-dealers akin to that found in the US's SEC Rule 15c3-3. EU law permits the parties to strike their own bargain as to how much (if any) collateral may be subject to rights of reuse. The regulatory regime for broker-dealers and their customers may lead to some re-thinking due to the litigation involving Dexia in 2009. However, changes are still distant from being finalised and it is impossible to say at this stage what changes (if any) can be expected as regards limiting rehypothecation rights.

¹ Assume a customer has USD 500 in pledged securities and a debit balance of USD 200, resulting in net equity of USD 300. The broker-dealer can rehypothecate up to USD 280 of the customer's assets (140 percent x USD 200).

² Derivatives, repos and futures are not covered by SIPA, so any collateral associated with those products may not be covered (so there is uncapped rehypothecation in the United States, if collateral is associated with these products). To clarify, SIPA's regime does not relate to collateral; rather it relates generally speaking to the return of a customer's equity as calculated through something called the net equity claim.