

IMF Working Paper

The (sizable) Role of Rehypotheccation in the Shadow Banking System

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Monetary and Capital Markets Department

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Abstract

This Working Paper should not be reported as representing the views of the IMF.

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This paper examines the sizable role of rehypothecation in the shadow banking system. Rehypothecation is the practice that allows collateral posted by, say, a hedge fund to its prime broker to be used again as collateral by that prime broker for its own funding. In the United Kingdom, such use of a customer's assets by a prime broker can be for an unlimited amount of the customer's assets while in the United States rehypothecation is capped. Incorporating estimates for rehypothecation (and the associated re-use of collateral) in the recent crisis indicates that the collapse in non-bank funding to banks was sizable. We show that the shadow banking system was at least 50 percent bigger than documented so far. We also provide estimates from the hedge fund industry for the "churning" factor or re-use of collateral. From a policy angle, supervisors of large banks that report on a global consolidated basis may need to enhance their understanding of the off-balance sheet funding that these banks receive via rehypothecation from other jurisdictions.

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I. INTRODUCTION

The United Kingdom provides a platform for higher leveraging stemming from the use (and re-use) of customer collateral. Furthermore, there are no policy initiatives to remove or reduce the asymmetry between United Kingdom and the United States on the use of customer collateral. We show that such U.K. funding to large U.S. banks is sizable and augments the measure of the shadow banking system. Supervisors of U.S. banks that report on a global consolidated basis need to enhance their understanding of the collateral funding that the U.S. banks receive in the United Kingdom.

Rehypothecation occurs when the collateral posted by a prime brokerage client (e.g., hedge fund) to its prime broker is used as collateral also by the prime broker for its own purposes. Every Customer Account Agreement or Prime Brokerage Agreement with a prime brokerage client will include blanket consent to this practice unless stated otherwise. In general, hedge funds pay less for the services of the prime broker if their collateral is allowed to be rehypothecated.

There has been very little research in this area. One of the first papers on this topic showed how the collapse in rehypothecation levels was contributing to global deleveraging after Lehman's demise (Singh and Aitken, 2009a). Adrian and Shin (2009) provide an analytical model where collateral assets can be recycled by pledging and re-pledging; the model shows that during a crisis, the cumulative haircuts (or 'margin spiral') on pledged collateral can be sizable. Gorton (2009) shows that during a crisis, haircuts on collateral can result in a run on the shadow banking system. Singh and Aitken (2009b) show that counterparty risk during and in the aftermath of the recent crisis resulted in a decrease of up to \$5 trillion in high-grade collateral due to reduced rehypothecation, decreased securities lending activities and the hoarding of unencumbered collateral.

This paper contributes to the ongoing policy debate on the size of the shadow banking system and how it impacted the funding for large banks. We show that in addition to the previously documented research (Adrian and Shin, etc.), that the shadow banking system was at least 50 percent larger than previously estimated. We also provide estimates from the hedge fund industry and their prime brokerage relationships with large banks for the "churning" or the extent of re-use of collateral. The rest of the paper is organized as follows. Section II discusses rehypothecation in the United Kingdom and the United States and the associated regulatory regimes; the United Kingdom provides a platform for higher leveraging (and deleveraging) not available in the United States. Section III highlights the collapse in rehypothecation levels in the United States, especially after the demise of Lehman. Section IV shows that the shadow banking system in the United States was much larger than envisaged, if we adjust for rehypothecation. Section V calculates the 'churning' factor for pledged collateral via hedge fund's relationships with their prime brokers. Section VI

concludes with some suggestions for regulators to enhance their understanding of the funding sources for large banks.

II. 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. 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 Regulation T, the broker-dealer may use/rehypothecate an amount up to 140 percent of the customer's debit balance.² Created by the Securities Investor Protection Act (SIPA) of 1970, the Securities Investor Protection Corporation (SIPC) is an important part of the overall system of investor protection in the United States.³ 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 \$2 billion from its members' assessments that can be used by investors to recover assets in the event of a brokerage firm's insolvency. This difference between the United States and the United Kingdom meant that when Lehman Brothers International Europe (LBIE, U.K.) filed for insolvency there was little statutory protection available to those customers who allowed re-use of their collateral. In the United States, however, SIPA provides for certain procedures that will apply in the event of the insolvency of a broker-dealer.⁴

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 15c3-3.⁵ Leverage levels at many U.K. hedge funds, banks and financial

² Assume a customer has \$500 in pledged securities and a debit balance of \$200, resulting in net equity of \$300. The broker-dealer can rehypothecate up to \$280 of the customer's assets (140 percent x \$200).

³ 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.

⁴ U.K.'s bankruptcy law neither makes a distinction between banks and broker-dealers, nor provides the associated protection from broker-dealers (like SIPA in the United States). In the United States, the customer protection rule, created by SIPA, is designed to work in conjunction with the Federal bankruptcy scheme for broker-dealers.

⁵ Mathematically, the cumulative 'collateral creation' can be infinite in the United Kingdom but will be finite in the United States (since the 140 percent cap on the debit balance reduces each successive round of rehypothecation).

affiliates have been higher, as the United Kingdom does not have a similar cap. Thus, prime brokers and banks would rehypothecate their customers' 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 customer 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.⁶

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 U.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 2009.⁷ However, changes are still distant from being finalized and it is impossible to say at this stage what changes (if any) can be expected as regards limiting rehypothecation rights.

III. REHYPOTHECATION AFTER LEHMAN'S BANKRUPTCY

After Lehman's bankruptcy, prime brokers have been demanding more cash collateral in place of securities (unless they are highly liquid and unencumbered securities). Hedge funds often use their securities as collateral for their own repo trades and financing of their own positions. In the aftermath of Lehman, larger hedge funds are increasingly seeking to ensure that assets that have not been pledged as collateral are kept in segregated client accounts, so that prime brokers have absolutely no claim over those assets. Segregated accounts, broadly speaking, includes sweeping non-collateral assets into custody accounts, restricting

⁶ LBIE had about 900 prime brokerage clients at the time of its collapse, mostly hedge funds. The joint administrators of LBIE, in charge of managing the estate of the London-based European hub of the bank, said that a claim resolution agreement (CRA) had been put into effect after 90 percent of clients by value gave their support by a deadline on December 29, 2009. The CRA is a contract on an individual basis between LBIE and its clients setting out the basis on which assets can be returned. The breakthrough came as a relief to many hedge funds that found their assets trapped in the bank when it imploded and have been pressing the administrators to return them quickly so that they can minimize losses.

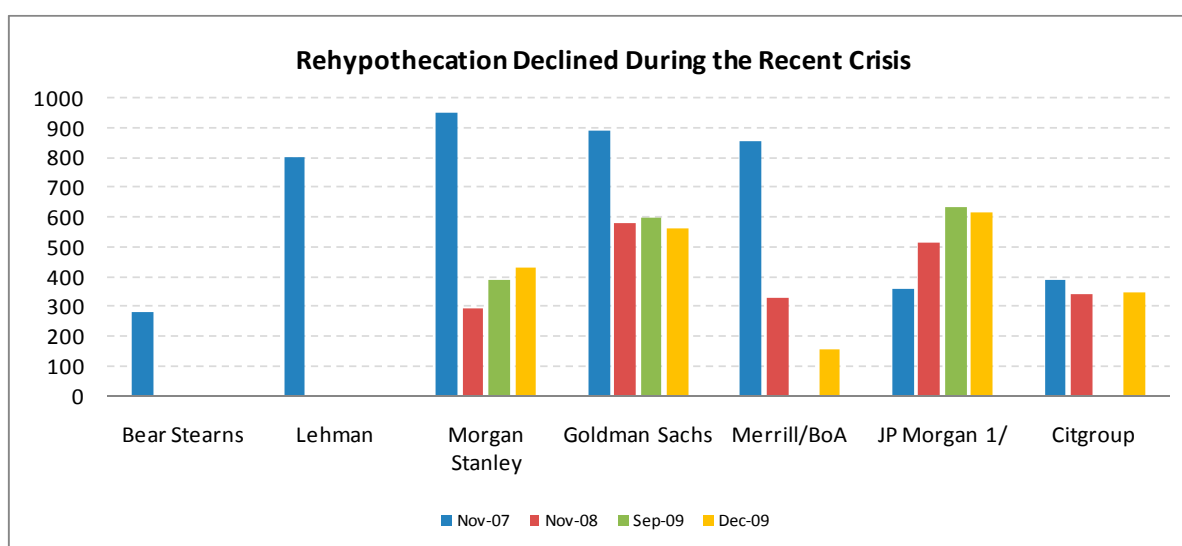
⁷ Also see the French Supreme Court decision dated 4 May, 2010, "Restitution Obligation Owed by the Depository of a Fund."

rehypothecation rights, using multiple prime-brokers, and applying for client money protection as under the U.K. FSA’s Client Money Rules (Sidley Austin LLP, 2008). Post-Lehman, some investors have taken precautionary measures against rehypothecation by opting to hold assets in custody accounts.

Based on recent 10Q reports, rehypothecation declined rapidly post-Lehman. Data show that the decline between end-2007 through end-2009 for “total collateral received that is permitted to be pledged/rehypothecated” by the largest seven U.S. broker-dealers—Lehman, Bear Stearns, Morgan Stanley, Goldman, Merrill and JPMorgan—declined from about \$4.5 trillion to \$2.1 trillion (see Figure 1).

Figure 1. Collateral Received that is Permitted to be Pledged at Large U.S. Banks

(November 2007–December 2009; in billions of U.S. dollars)



Source: Company Reports, IMF Staff calculations.

Note: JPMorgan data post Nov’07 includes Bear Stearns and WAMU; market sources indicate that JPMorgan may have benefited from being close to Fed; end-June’09 data shown in lieu of end-Nov. ‘08 data as latter was not easy to disentangle.

IV. COLLAPSE IN THE SHADOW BANKING SYSTEM (ADJUSTING FOR REHYPOTHECATION)

The shadow banking system is non-banking institutions that include (among others) hedge funds, money market funds, pension funds, insurance companies and to some extent the large custodians such as BoNY and State Street. The funding is typically associated with the non-banks’ securities lending transactions, use (and re-use) of the collateral they post with banks, etc. However this non-bank/bank nexus is difficult to track. For example, the Flow of Funds

(FoF) data of the U.S. Federal Reserve captures only on-balance sheet funding (King, 2008).⁸ The FoF data do not capture pledged collateral that is used (and re-used) by large banks for funding. The FoF database uses only on-balance sheet data and does not include data in the notes and memo items to the balance sheet. When we include—via balance sheet notes—pledged collateral data that large banks are allowed to use (and re-use), the collapse in overall funding to banks was sizable. Pledged collateral are off-balance sheet items that show collateral received by banks from non-banks (e.g., hedge funds’ collateral) and other banks (see Box 1). Figure 2 illustrates that the off-balance sheet funding from rehypothecation was relatively large for U.S. banks. We build upon the work on shadow banking of Adrian and Shin (2009). Their measure of the shadow banking system is the sum of prime dealer repos, financial sector commercial paper and asset-backed commercial paper; this is the red (or lower) line in Figure 3. We augment their shadow banking measure by including collateral received that can be repledged by large banks; this is shown in Figure 3’s green (or higher) curve.⁹

Box 1. Methodology of Using Collateral Received that Can be Repledged

This box explains our methodology for using data on pledged collateral from financial statements. Pledged collateral are off-balance sheet items that show collateral received by banks from non-banks (primarily hedge funds’ collateral) and other banks. This collateral is generally obtained under customer margin loans, securities borrowing, reverse repos, and derivative and other transactions. As described above in the section on rehypothecation, this collateral is unsecured funding for the large banks as this is the ‘excess’ collateral received against the loan made to client. Much of the excess collateral accrues from non-U.S. jurisdictions such as U.K where there is no cap on the right to use (and re-use) such excess collateral. The typical description in a financial statement for excess collateral that can be rehypothecated is as follows:

As of December 2009 and November 2008, the fair value of financial instruments received as collateral by the firm that it was permitted to deliver or repledge was \$561 billion and \$578 billion, respectively, of which the firm delivered or repledged \$392 billion and \$445 billion, respectively.

This description is remarkably similar in financial statements for both U.S. and European banks; thus data on pledgable collateral is at least to some extent comparable across these institutions.

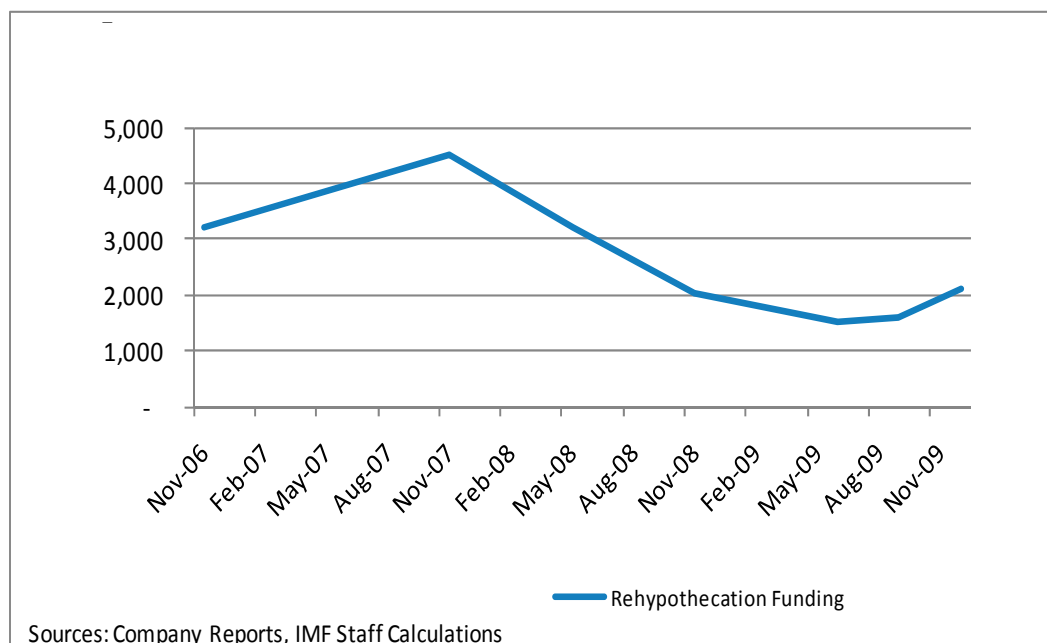
⁸ Securities lending transactions perform the same economic function as repos but are not reported as repos in the financing data.

⁹ To the extent such collateral is ‘cashed’ by transacting with another party (e.g., a custodian such as BoNY), the transaction then moves from off-balance sheet to on-balance sheet. Initially rehypothecation contributes to the shadow banking. Subsequently, cash-for-security repo transactions will go on-balance sheet, but much of the security-for-security repo (borrowed versus pledged) may remain off balance sheet (King, 2008).

Figures 2 and Figure 3 illustrate that this off- balance sheet funding from rehypothecation was relatively large when compared to the on-balance sheet dealer funding. Note that Figure 2 isolates the difference between the two lines in Figure 3. We add our pledged collateral data to Adrian and Shin's (2009) measure for the shadow banking system (that now includes Asset-Backed Commercial Paper data, estimated to have averaged from \$0.5–\$1 trillion in 2007–2009).¹⁰

Figure 2. Non-Bank Funding to U.S. Banks via Rehypothecation

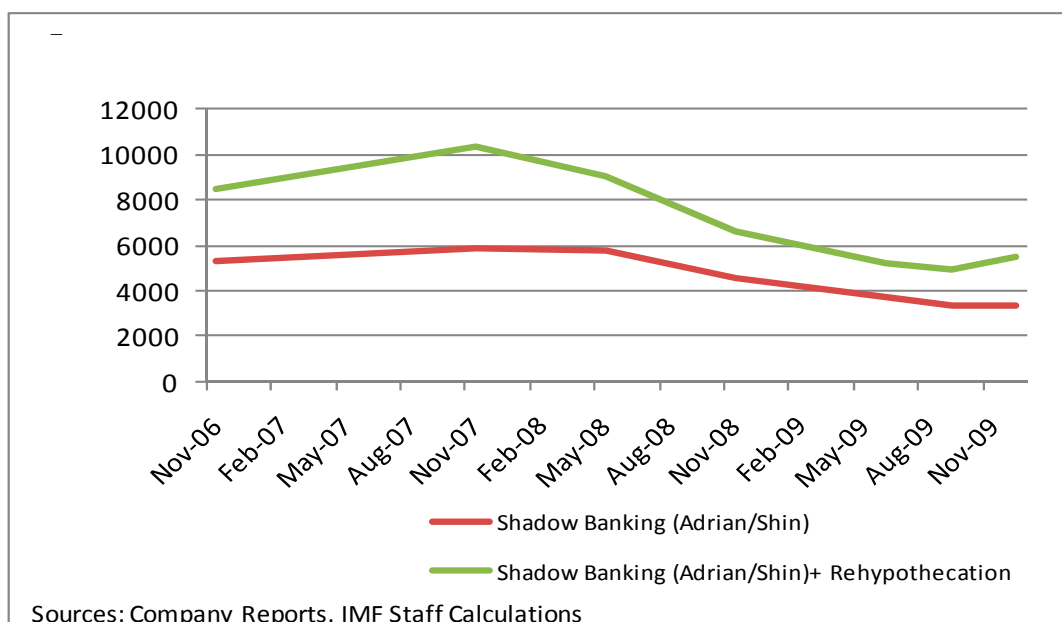
(In billions of U.S. dollars)



¹⁰ Asset-Backed Commercial Paper, for example, represents the liabilities of a conduit that holds various types of consumer and business debt. These debts in a prior era might have been held by commercial banks on balance sheet and funding through deposits. Thus monitoring total ABCP balances is a useful way to observe any transfer of ABCP assets out of the shadow banking system and on to the balance sheet (Sweeney, 2009).

Figure 3. Shadow Banking System in the U.S.—Larger than Documented

(In billions of U.S. dollars)

**V. CHURNING (OR VELOCITY) OF COLLATERAL—EVIDENCE FROM U.S. BANKS**

On-balance sheet data do not “churn,” where churning means the re-use of an asset. If an item is listed as an asset or liability at one bank, then 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 items are 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 ‘pledged-collateral that is permitted to be re-used’, are shown in footnotes simultaneously by several entities, i.e., *the pledged collateral is not owned by these firms, but due to rehypothecation rights, these firms are legally allowed to use the collateral in their own name.*

Since Figure 1 shows that total pledgeable collateral within the U.S. banking system was sizable and the associated source(s) for such collateral were not as large, it is likely that this collateral was re-used due to the rehypothecation rights.¹¹ The re-use or churning factor can be calculated by dividing the total pledgeable collateral received in the numerator by the

¹¹ Although this paragraph discusses pledged collateral via U.S. banks global financial statements, it is not possible to break down what fraction of such collateral was received via subsidiaries of U.S. banks that are domiciled in foreign jurisdictions like U.K.

associated source of collateral in the denominator. Since we have estimates from the hedge fund industry, we calculate the churning factor via hedge fund's data and extrapolate the results.

The total assets under management (AUM) of the global hedge fund industry were about \$2 trillion as of end-2007 (prior to the crisis). Assuming an average leverage of 2, the hedge fund industry held roughly \$4 trillion of securities on a mark-to-market basis.¹²

Typically, large hedge funds specializing in fixed-income and convertible arbitrage seek leverage and in lieu of the associated borrowing, post collateral with the large banks (FSA, 2010). Market sources indicate that on average, each of the largest 25 hedge funds borrowed about \$30–60 billion from their prime brokers (or roughly \$1 trillion); collateral was posted by the hedge funds in line with their borrowing around end-2007. After Lehman's crisis, with limited opportunities to use leverage and given the regulatory efforts to reduce leverage, re-use of pledged collateral has now come down, as noted previously.

Analytically, we can illustrate the churning factor for the hedge fund industry from the prime brokerage agreements with the largest ten banks active in collateral re-use as follows:

Where α_i is total pledgeable collateral with bank_{*i*} from *all* sources, and
 β_j is hedge fund_{*j*}'s pledgeable collateral to banks
 γ is the share of the hedge fund industry's collateral

$$\text{Churning factor of collateral} = \frac{\gamma \sum_{i=1}^{10} \alpha_i}{\sum_{j=1}^{25} \beta_j}$$

Discussions with collateral teams at large banks suggest that about \$1 trillion of the market value of securities of the global hedge fund industry was rehypothecated, as of end-2007. Of the total pledgeable collateral of \$10 trillion received by the large ten global banks that

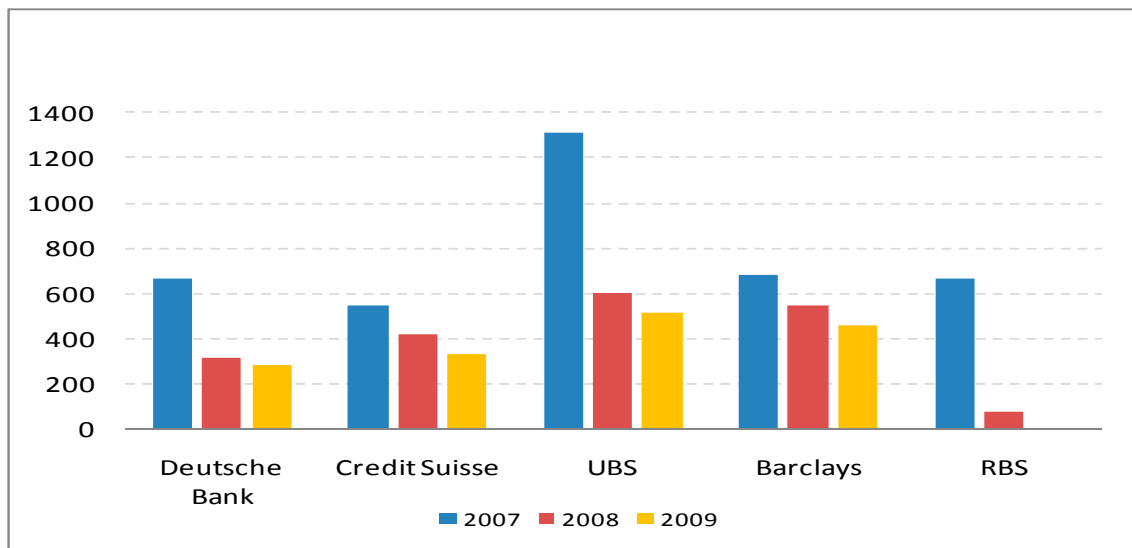
¹² As FSA notes, leverage is difficult to define in a consistent way across hedge funds, due to the range of trading strategies and products. In their view, the term 'leverage' is often incorrectly used for hedge funds as a synonym for risk (FSA, 2010). The FSA paper defines hedge fund's gross 'footprint' to be equal to the total value of all long and short securities positions held, regardless of how they are held (physically or via derivatives). Also see ECB's occasional paper on hedge funds and leverage issues via www.ecb.int/pub/pdf/scpops/ecbocp34.pdf

appears in their financials (via securities lending, repo and prime brokerage), about 40 percent came from hedge funds prior to the crisis; the rest of the collateral was largely posted by banks to each other to take advantage of their respective funding specialization. Thus,

$$\text{Churning factor of collateral} = \frac{40\% (\$10 \text{ trillion})}{\$1 \text{ trillion}} = 4$$

Figure 4. Collateral Received that is Permitted to be Pledged at Large European Banks

(November 2007–December 2009; in billions of U.S. dollars)



Source: Company Reports and IMF Staff Calculations.

Box 2 summarizes the global churning factor from the lens of the hedge fund industry and their prime brokerage agreements with large global banks, since U.S. banks rehypothecate collateral with European and other banks.¹³

¹³ Large banks do an excellent job with the collateral they receive that has rehypothecation rights; the churning factor gives an idea to the real cost of giving up collateral. For an example, if large banks were to post \$ x with central counterparties (CCPs) in the context of offloading OTC derivative positions to them, the real cost may be \$ x times the opportunity cost of the churning factor (Singh, 2010).

Box 2. Velocity (or Churning) of Collateral at a Global Level

Since the U.S. 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).¹⁴ When we add U.S. banks data together with large European banks with significant relations with the hedge fund industry, such as Deutsche Bank, UBS, Barclays, Royal Bank of Scotland and Credit Suisse, the total available pledged collateral was over \$10 trillion at end-2007.¹ Roughly \$1 trillion AUM of all hedge funds were rehypothecated and hedge funds contributed about 40 percent of all pledgeable collateral received by the large banks; thus the churning of collateral could have been around a factor of 4 as of end-2007. More recently, as of end-2009, the churning factor has also declined in line with the total available pledged collateral.

We understand from large European banks who handle collateral under English Law that the largest hedge funds are ‘not leaving money on the table’ relative to the era before Lehman. In other words, unlike smaller and/or equity focused hedge funds, the larger hedge funds will not sign off on unlimited rehypothecation and not borrow. Furthermore, although U.K. does not have the 140 percent cap on rehypothecation, many large hedge funds are presently using this figure as a benchmark when negotiating/revising their prime brokerage agreements with large banks.

1/ However this sample does not account for other banks that are likely to have large prime brokerage business (HSBC, Societe General, BNPParibas, Nomura etc.) and thus the churning factor may be higher (as the denominator, i.e., pledgeable collateral of all hedge funds globally, will remain at \$1 trillion).

VI. POLICY IMPLICATIONS

Following the collapse of Lehman, hedge funds have become more cognizant of the way the client money and asset regime operates in the United Kingdom. For some, the United Kingdom provides a platform for higher leveraging (and deleveraging) that is not available in the United States. In general, post Lehman, one would expect an increasing tendency for those providing collateral to counterparties to ask for their collateral to be segregated from the counterparty’s assets and to place limits on its further use.

Our understanding is that the U.K. FSA has not yet made any changes on the use (and re-use) of collateral since their LBIE experience that would remove or reduce the asymmetry in the U.K. and the U.S. However, the FSA’s Consultation Paper 10/9 proposes (a) daily reporting

¹⁴ The most recent end-2009 financial reports of large European banks (i.e., Deutsche Bank, Credit Suisse, UBS and Barclays) show lower levels of rehypothecation relative to end-2007 (see figure 4).

on client money and assets holdings to all prime brokerage clients, and (b) creating a requirement that all prime brokerage agreements will contain a disclosure annex which will highlight relevant definitions and the contractual limit on rehypothecation.¹⁵ Market sources from the sell side suggest that many large hedge funds are presently using the 140 percent cap as a benchmark when negotiating/revising their prime brokerage agreements with large banks.¹⁶

Some suggestions from our research follow:

- Supervisors of large banks that report on a global consolidated basis may need to enhance their understanding of the off-balance sheet funding that these banks receive via rehypothecation from other jurisdictions.
- The asymmetry between U.K. and the U.S. on the use of client's collateral is an example that highlights the recent policy recommendations to limit leverage and jurisdictional arbitrage (Tucker, 2010).
- The reduction in pledgable collateral received by the large banks (and the associated churning factor) has a direct impact on global liquidity. Rehypothecation data and the associated churning factor might be considered by major central banks to augment their tools for understanding the shadow banking system and associated liquidity within the global financial system.

¹⁵ Enhancing the Client Asset Sourcebook, FSA Consultation Paper 10/9, March 2009.

¹⁶ However, discussions with a diverse group of U.K.'s buy side (including small and medium sized hedge funds, institutional investors etc) indicate that the majority are not yet converging to the 140 percent rule.

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