

# IMF Working Paper

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## The Nonbank-Bank Nexus and the Shadow Banking System

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**IMF Working Paper**

Research Department

**The Non-Bank-Bank Nexus and the Shadow Banking System<sup>1</sup>**

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**Abstract**

The present way of thinking about financial intermediation does not fully incorporate the rise of asset managers as a major source of funding for banks through the shadow banking system. Asset managers are dominant sources of demand for non-M2 types of money and serve as source collateral ‘mines’ for the shadow banking system. Banks receive funding through the re-use of pledged collateral ‘mined’ from asset managers. Accounting for this, the size of the shadow banking system in the U.S. may be up to \$25 trillion at year-end 2007 and \$18 trillion at year-end 2010, higher than earlier estimates. In terms of policy, regulators will need to consider the re-use of pledged collateral when defining bank leverage ratios. Also, given asset managers’ demand for non-M2 types of money, monitoring the shadow banking system will warrant closer attention well beyond the regulatory perimeter.

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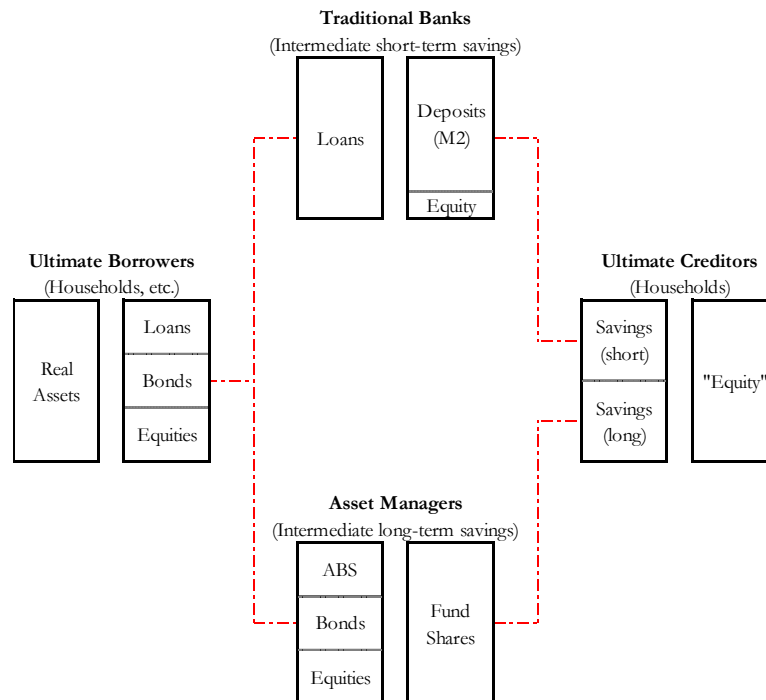
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## I. INTRODUCTION

Financial intermediation can happen through the banking system, non-bank financial institutions, and capital markets. Short-term savings are generally considered to be intermediated by banks, which engage in maturity transformation as they make long-term loans. The intermediation of long-term savings outside the banking system is usually thought of within the following framework. Ultimate creditors—primarily households—save for the long-term, and place their funds either directly in the capital markets or with asset managers such as mutual funds, pension funds, insurance companies and the like. These asset managers invest these funds in long-term instruments, such as equities, bonds and asset-backed securities. Since ultimate borrowers—households, corporations and governments—prefer to borrow for the long-term, it follows that creditors and borrowers' interface, directly or indirectly, should mainly involve long-term securities.

This simple framework, depicted in a stylized way in Figure 1, sees little need for maturity transformation outside the traditional banking system. It is also at a loss explaining the rationale behind the (reverse) maturity transformation conducted by the shadow banking system. Given the large increase in the size of the shadow banking system, this simple framework has become a poor representation of the real world.

**Figure 1:** A Simple Financial Intermediation Framework



The purpose of this paper is to update this simple framework for important developments over the last decade by describing important supply and demand side aspects of the modern asset management complex. On the supply side, asset managers are now important suppliers of collateral. On the demand side, asset managers are significant demanders of safe, short-

term, liquid instruments, or non-deposit money-claims. These supply and demand aspects of the asset management complex together determine the shadow banking system. To date, this interaction is not adequately captured, however, by models that aim to explain how modern financial intermediation works nor by data collection efforts, such as the flow of funds accounts.

The paper clarifies these issues by first describing the investment management practice of the modern asset management complex, and how it notably results in reverse maturity transformation. It describes how this involves various sources and uses of collateral in the shadow banking system and what processes are involved to re-use collateral in “chains.” It shows how these developments require policy adjustments at the individual financial institution level, notably how leverage is measured, and at the system level, notably on measuring the size of the shadow banking system. We expand on these issues.

First, the asset management complex is typically thought of as a collection of staid pension funds, mutual funds and similar funds, which manage the long-term savings of ultimate creditors (primarily households) by investing in long-term bonds and holding them until maturity. This image of asset managers is overly simplified and inaccurate, however.

Asset managers do not just invest long-term, but also have a large demand for money (or more precisely, money-market instruments). This money demand reflects in part the liquidity management of funds. Other demand derives from derivatives-based investment strategies (Mehrling, 2011). These are not their most important demands for money, however. Primarily money demand is the result of securities borrowers posting cash as collateral to asset managers for securities lent.

The money demand aspect of the asset management complex is an often overlooked feature of modern finance. It involves massive volumes of reverse maturity transformation, whereby significant portions of long-term savings are transformed into short-term savings. It is due to portfolio allocation decisions, the peculiarities of modern portfolio management and the routine lending of securities for use as collateral. This reverse maturity transformation occurs in spite of the long-term investment horizon of the households whose funds are being managed. This reverse maturity transformation is the dominant source of marginal demand for money-type instruments in the financial system.

Second, the flipside of the demand for money instruments is that the asset managers are acting as ultimate sources of collateral—or collateral mines—for the shadow banking system. The securities that asset managers invest in on behalf of households are seldom left lying around passively in portfolios. In order to capture their value as collateral, securities are routinely lent out for use in the shadow banking system, a fact households, whose securities are ultimately being lent, are oblivious to.

The shadow banking system is collateral-intense. Banks (especially dealers) intermediate the collateral world to provide funding, settle trades, enhance returns for clients, and hedge

counterparty risks on OTC derivatives.<sup>2</sup> Obtaining collateral is similar to mining. It involves both exploration (looking for deposits of collateral) and extraction (the “unearthing” of passive securities so they can be re-used as collateral for various purposes in the shadow banking system).

The richest deposits of collateral reside with asset managers, which include hedge funds, exchange traded funds, sovereign wealth funds, central banks, pension funds, insurance companies and mutual funds. The means through which collateral is “mined” from these deposits include the borrowing of securities from asset managers, reverse repos, customer margin loans, and margins stemming from in-the-money OTC derivatives contracts.

Collateral comes in different forms. The most “valuable” form is source collateral—as used in this paper, which is collateral that can be re-used or in other words re-pledged (see [Singh and Aitken](#), 2010). The repeated use of source collateral facilitates system-lubrication but also the build-up of leverage-like collateral chains between banks and asset managers (see Singh, 2011b).

In this context, asset managers serve as a lot more than just an agglomeration of passive investment vehicles that intermediate households’ long-term savings into long-term investments. Just as households are the ultimate creditors in the economy, asset managers should be thought of as ultimate sources of collateral—or source collateral mines—for the shadow banking system.

Third, the reverse transformation and re-use of collateral has implications for the analysis of financial institutions’ balance sheets and for the measurement of financial and monetary aggregates. At the end of 2010, we estimate about \$5.8 trillion in off-balance sheet items of banks related to the mining and re-use of source collateral. While down from about \$10 trillion at year end-2007, this remains very large, with micro-prudential and macro-prudential implications.

At the individual financial institution level, these items are importantly not covered by traditional accounting concepts and financial analyses nor directly addressed by Basel III. It also requires a more integrated analysis of those large complex financial conglomerates that have both banking and shadow banking roles in the financial ecosystem.

At the aggregate level, to arrive at a more complete measure, adding these numbers to previous estimates of the U.S. shadow banking system of \$20 trillion and \$15 trillion (see [Pozsar, et al](#) (2010)), yield totals of up to \$25 trillion and \$18 trillion at year-end 2007 and 2010, respectively.<sup>3</sup> The corrections are large, but the meaning of this aggregate and its interactions with other banking sector and monetary metrics remains poorly understood.

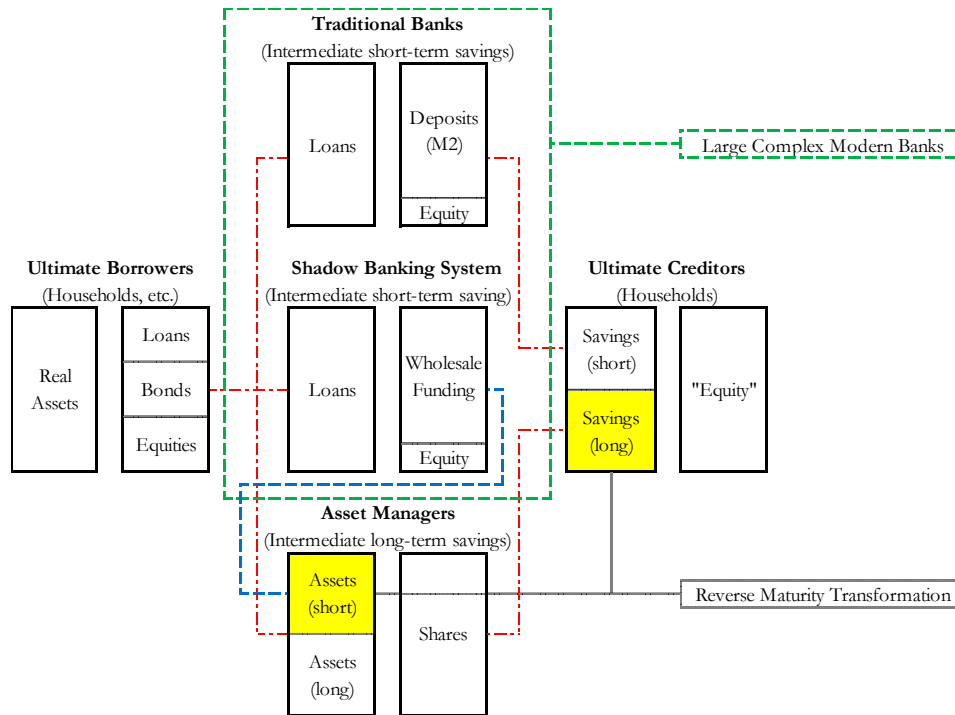
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<sup>2</sup> By dealers we mean the 10-15 banks active in collateral management and *not* traditional commercial banks.

<sup>3</sup> U.S. banks typically rehypothecate “collateral received that can be pledged” with European banks and vice versa. The U.S. and European markets are roughly equal in size; hence we add about 50% of the \$10 trillion pledged collateral figure for the U.S. The traditional U.S. banking system was estimated at \$13 trillion prior to Lehman’s demise; thus the shadow banking system was sizably larger than the traditional banking system.

These insights yield the more comprehensive financial intermediation framework depicted in Figure 2.

**Figure 2: A (more) Comprehensive Financial Intermediation Framework**



The rest of the paper has four remaining sections. Section II describes how the investment management practices of the modern asset management complex result in reverse maturity transformation in the shadow banking system and how this relates to the secular rise of wholesale funding markets and shadow banking in general. Section III describes the sources and uses of collateral in the shadow banking system, and the volume of banks' off-balance sheet leverage through the re-use of pledged collateral. In light of asset managers' role in funding (shadow) banks, Section IV reviews shortcomings of the current accounting framework for banks and weaknesses in financial and monetary aggregates. Section V concludes with some policy suggestions, including the limitation of the Flow of Funds accounts to monitor the shadow banking system.

These include that: (i) there is a lot more to banks' funding than deposits and interbank loans, and hence a need to look at large financial conglomerates' activities in the traditional and shadow banking systems in an integrated way; and (ii) regulatory reform efforts and the frameworks that describe the basic accounting identity of the banking system need to adequately account for the role of asset managers as non-bank providers of funding to banks.

## II. REVERSE MATURITY TRANSFORMATION

Institutional demand for safe, short-term, liquid instruments (or money) mainly arises from the day-to-day management of long-term savings in the modern asset management complex. Even though asset managers invest households' long-term savings into long-term instruments, their day-to-day management and return mandates—absolute or benchmark—effectively requires them to transform a portion of these long-term savings into short-term savings. This in turn drives the money demand of asset managers. This reverse maturity transformation occurs in spite of the long-term horizon of households (see further Box 1).<sup>4</sup>

Reverse maturity transformation gives rise to large, centrally managed cash pools within the asset management complex. In the aggregate, these cash pools account for over three-quarters of the \$3.5 trillion in institutional cash pools at end 2010 (see [Pozsar](#), 2011). The traditional, deposit-funded banking system is not well fit to intermediate these large cash pools for at least two reasons.

First, since these cash pools are handled in an asset management context, they cannot earn zero interest; this precludes fully insured, but noninterest-bearing transaction account as an option in normal interest rate environments. Second, since these cash balances are generated as a result of lending “other peoples’ securities, managers—as fiduciaries—prioritize principal safety, subject to earning some reasonable rate of return. This precludes interest-bearing deposits as an option, as at \$250,000 (in the US, and similarly elsewhere) these instruments are insured for only a small fraction of cash pools, beyond which point they represent unsecured exposures to banks. No risk manager would sign off on significant unsecured bank exposures via uninsured deposits. More generally, all M2-types of money – currency in circulation, checking accounts, certificates of deposit, savings accounts, time deposits and retail class money market funds—ill-fit institutional cash pools’ money demand.

Instead of M2-types of money, asset managers prefer alternatives such as short-term publicly guaranteed debt (such as Treasury bills and agency discount notes) and privately guaranteed wholesale funding instruments (such as repurchase agreements, asset-backed commercial paper and other asset-backed paper) issued by the shadow banking system. One may refer to these as public and private non-M2 types of money ([Acharya and Schnabl](#) (2010), [Gorton](#) (2010) and [Ricks](#) (2011)), respectively.

U.S. Treasury bills and other sovereign claims are the ultimate money instrument in an institutional context as they are fully insured, extremely liquid and short-term products with a yield and without duration risks. For more on the money properties of bills see [Greenwood, Hanson and Stein](#) (2010) and [Krishnamurthy and Vissing-Jorgensen](#) (2010). As such, they are superior alternatives to fully insured, but non-interest-bearing transaction (or checking) accounts as well as interest-bearing, but only partially insured deposits.

There can be an insufficient volume of short-term, government guaranteed instruments relative to the money demand of the asset management complex (and institutional cash pools

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<sup>4</sup> Importantly, this implies that in many instances what seems to be institutional cash is ultimately retail cash.



in general). In such circumstances, and given the limits on institutional cash investors' appetite for too much direct unsecured exposure to banks via uninsured deposits, the shadow banking system will likely fill the void via privately guaranteed money-type market instruments.

In their activities, modern banks (financial conglomerates) straddle both the traditional and shadow banking systems and use both traditional (M2, for households and some corporations) and market-based (non-M2) liabilities for their funding. Since asset managers prefer non-M2 types of money, it follows that banks' funding through non-M2 instruments are asset manager-to-bank claims and not bank-to-bank claims as it is widely assumed.

### **Box 1. What Is Reverse Maturity Transformation?**

Maturity transformation, typically done by banks, refers to the transformation of short-term deposits into long-term loans. Reverse maturity transformation refers to the transformation of long-term savings into short-term savings. Much of this occurs in the shadow banking system, arising from at least three activities.

First, asset managers always hold a certain portion of their funds in short-term instruments. These holdings reflect both technical and tactical considerations. On the technical side, fund managers have to manage constant inflows and outflows of funds. Inflows are not always immediately invested in risky assets, but first in short-term instruments. Similarly, short-term instruments may be held in reserve to cope with withdrawals. On the tactical side, allocations to short-term instruments may serve as a source of return for fund managers that are active in market timing, for example. According to the Investment Company Institute, demand for money from these types of activities in the U.S. was \$400 billion and \$500 billion at year-end 2007 and 2010, respectively. These numbers combine a relatively large and stable technical component and a relatively small and more cyclical tactical component.

Second, funds with synthetic (or derivatives-based) investment strategies typically invest their client's funds in short-term instruments and overlay derivatives (such as futures and swaps) onto them to gain their desired exposure to duration, foreign exchange or credit risk. For example, instead of investing in Brazilian bills outright (perhaps out of fears of foreign exchange controls or retroactive taxes) a global bond fund manager may invest in them synthetically through a combination of Treasury bills and non-deliverable *reais* forwards. Although envisaged to be significant in volume according to market participants, there is no available data on the aggregate demand for money from these types of strategies (also see Mehrling, 2011).

Third, as noted in the next section, collateral mining via securities lending (especially) in the U.S. occurs primarily against cash collateral. Securities borrowers wire cash to securities lenders as collateral, which securities lenders transfer into a cash collateral reinvestment account and invest in short-term instruments. According to the Risk Management Association, demand for money from this corner of asset management was in the U.S. \$1.2 trillion and \$800 billion at end-2007 and 2010, respectively.<sup>1</sup>

<sup>1</sup> These figures are lower than the total volume of source collateral mined from securities lenders as shown in Figure 3. The discrepancy is because not all securities lending transactions are conducted against cash collateral in the U.S.; some are conducted against securities collateral. The figures above reflect the volume of securities lending against cash collateral.

### III. COLLATERAL MINING

The provision of non-M2 type of moneys requires collateral, since users will not accept general claims. This, among other activities, makes the shadow banking system collateral-intensive. This intensity of the shadow banking system is typically examined from the vantage point of the users of collateral—that is, the dealers. Little attention is paid to the questions from whom and through what means the dealers obtain collateral for use.

The ultimate sources of collateral in the shadow banking system are asset managers. Asset managers can be subdivided into two main groups: levered accounts and unlevered (or real money) accounts. Broadly speaking, levered accounts refer to hedge funds, and real money or unlevered accounts refer to exchange traded funds, sovereign wealth funds, central banks, pension funds, insurance companies and mutual funds.<sup>5</sup>

Dealers obtain (or “mine”) collateral from asset managers through various means. From the levered (or hedge fund) accounts they mine collateral through the provision of funding via repo against collateral, and the prime-brokerage related borrowings via margin loans against collateral. From the unlevered (or real money) accounts, dealers mine collateral directly from their custodians; in these transactions, unlevered accounts and custodians act as principal and agent securities lenders, respectively.<sup>6</sup> However, the distinction between levered and unlevered accounts is increasingly blurred as the latter seek higher risk to cover their underfunded status (e.g., defined benefit pension funds).

We estimate the total volume of collateral mined from ultimate sources (that is, from asset managers) at \$3.3 trillion and \$2.4 trillion at year-end 2007 and 2010 respectively (see further Singh, 2011b). These totals reflect \$1.6 and \$1.3 trillion in hedge fund assets, and \$1.7 and \$ 1.1 trillion in real money assets at end-2007 and 2010, respectively (Figure 3). Since they were mined from ultimate sources, we refer to them as source collateral.

Source collateral accumulates on dealers’ central collateral desks where their re-use can also be determined. Source collateral can be re-used to meet demand for collateral from the “street”. This demand comes from the need to settle trades with other dealers, to post collateral for out-of-the-money OTC derivatives to other dealers, as well as to raise cash from institutional cash investors directly or indirectly through money funds.

Source collateral is collateral that can be re-pledged, creating dynamic collateral chains (see further Box 2). The term re-pledged is a legal term and means that the dealer receiving the collateral has the right to re-use it in its own name (rehypothecation is a term used in the

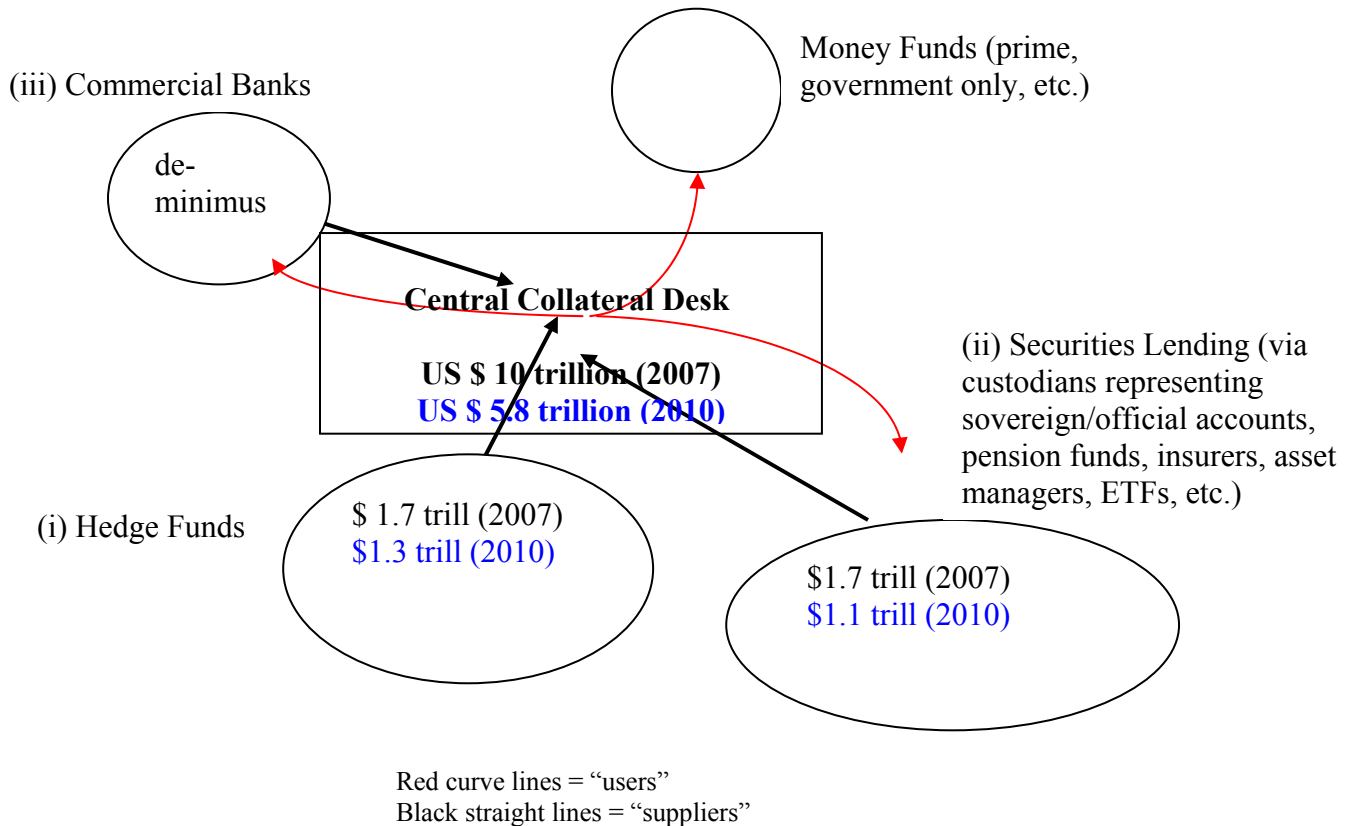
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<sup>5</sup> In practice, the demarcation between levered and real money accounts is not clear, as many real money accounts today incur leverage, deal in derivatives and have the ability to go short. Thus, dealers may mine collateral from real money accounts through the same way they use to mine collateral from levered accounts.

<sup>6</sup> The means through which collateral is mined may be “active” or “passive” in that it is either a dealer or an account that initiates the transaction. From dealers’ perspectives, collateral mining can be considered active if dealers call up hedge funds or real money accounts looking for collateral, and passive if the accounts that call up dealers to for example raise cash or borrow (or short) certain securities in exchange for posting collateral.

context of re-use of hedge funds' collateral).<sup>7</sup> Since a single piece of source collateral can be re-used several times by several different dealers, the aggregate volume of re-pledged collateral reflects both the volume of source collateral (that is collateral “mined” from ultimate source asset managers) as well as the velocity (or re-use rate) of source collateral (Singh, 2011b).

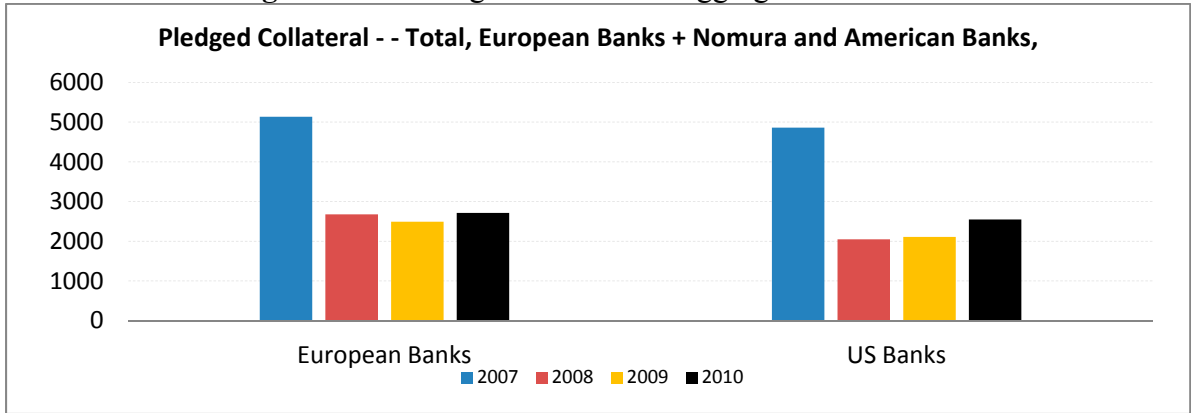
**Figure 3: The Sources and Uses of Collateral—Central Collateral Desks (2007 and 2010)**



Aggregating across the largest U.S. and European banks (plus Nomura, Japan) the volume of source collateral that was re-pledged (or re-used) gives a total of about \$5.8 trillion in off-balance sheet items at year-end 2010. While down from \$10 trillion at end-2007, they are still sizable (see Figure 4). This means that there are large volumes of source collateral accruing to global banks which they can “freely” recycle in financial markets. These operations lead to cross-border interconnections that straddle multiple jurisdictions.

<sup>7</sup> The typical description in financial statements of collateral that can be re-pledged is: “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 re-pledge was \$561 billion and \$578 billion, respectively, of which the firm delivered or re-pledged \$392 billion and \$445 billion, respectively.” **Source:** Goldman Sachs 2010 Annual Report.

**Figure 4: Re-Pledged Collateral –Aggregate Market Size**



**Sources:** 10K reports and equivalent financial statements of the banks listed (as well as discussions with the banks’ treasury departments, if needed). Also see Singh and Aitken (2010).

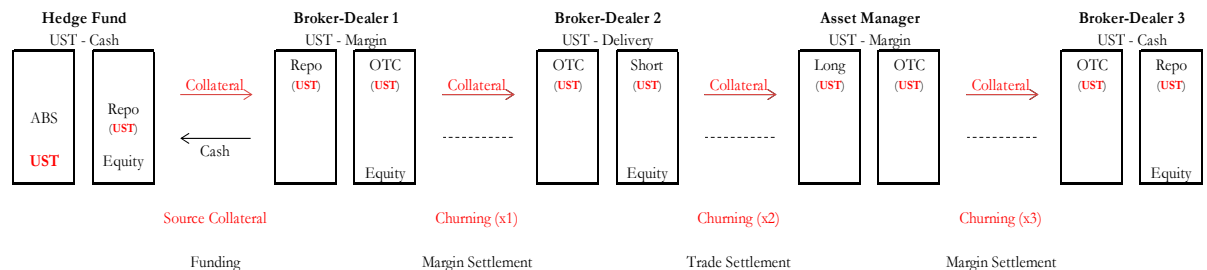
**Box 2: Repeated Use of Collateral and Dynamic Chains**

To visualize the concept of the repeated use of source collateral consider the following example (see also Figure 5). A hedge fund may invest in an asset-backed security backed by student loans on a levered basis by obtaining funding from its prime broker—a dealer (let’s call it dealer<sub>1</sub>). The funding (or financing) for this position is provided via repo against Treasury collateral. This means that the hedge fund posts Treasuries to dealer<sub>1</sub> which provides cash in return.

In this example, Treasury collateral is source collateral, meaning that it comes with rights for the dealer to re-pledge it for its own purposes. One purpose may be the requirement of dealer<sub>1</sub> to post collateral to another dealer (dealer<sub>2</sub>) on an out-of-the-money interest rate swap. Dealer<sub>2</sub> receiving the Treasury collateral may in turn also re-pledge it. It may deliver it to an asset manager. Finally, the asset manager may re-use the Treasury security to post it as collateral to another dealer (dealer<sub>3</sub>) who has an in-the-money FX swap position with the asset manager.

This example demonstrates how a single piece of source collateral (which in this case was a hedge fund’s Treasury security) can underpin various financial transactions: the provision of funding to consumers, the management of interest-rate and foreign exchange risks, the settlement of trades, and the provision of security for uninsured cash investors. Since these transactions are underpinned by a single piece of collateral, such daisy-chains may be referred to as *dynamic chains*.

**Figure 5: An Example of Repeated Use of Collateral Creating a Dynamic Chain**



#### IV. AN ANALYTICAL FRAMEWORK ENCOMPASSING BANKS AND NON-BANKS

The description of asset managers as the main source of marginal demand for safe, liquid and short-term financial assets (and hence maturity transformation) and as collateral mines has many implications for data collection and measurement as well as policy. This can best be seen by reinterpretation of the analytical framework of a banking system.

Bank credit to ultimate borrowers is either funded by the equity of the banking system or by the debt that non-banks (i.e., households, pension funds and insurers) provide to the banking system. This can be depicted as in the equation below (see [Shin, 2009](#)). The equation is as follows. The term on the left side of the equation denotes the total lending to ultimate borrowers. The first term on the right hand side (in the red balloon) denotes the total debt funding to the banking sector provided by non-banks (or, outside claimholders). And the second term on the right hand side denotes the total equity of the banking system.

$$\sum_{i=1}^n y_i = \sum_{i=1}^n e_i z_i (\lambda_i - 1) + \sum_{i=1}^n e_i$$

Total lending to  
ultimate borrowers
Total debt  
liabilities to non-  
banks
Total equity of  
intermediaries

$y_i$  is the total claims on ultimate borrower by bank<sub>*i*</sub>

$e_i$  is the equity of bank<sub>*i*</sub>

$\lambda_i$  is the leverage of bank<sub>*i*</sub><sup>8</sup>

$z_i$  is the fraction of non-bank funding bank<sub>*i*</sub> receives

The traditional view of a banking system is that total debt funding from nonbanks (the first term on right hand side, the red balloon) is relatively “sticky.” In other words, it is often assumed that, since non-bank funding to banks predominantly reflects households’ deposits (or M2) and the stock of household deposits is steady (in line with relatively slow-moving household wealth), the debt funding to banks does not vary much.<sup>9</sup>

<sup>8</sup> This notation does not fully accord with current accounting and regulatory conventions. For example, from a regulatory point of view, until Basel III is implemented, leverage refers mostly to on balance sheet leverage. According the definition of Basel III, several off-balance sheet items will come on the balance sheets by 2017. These include commitments (including liquidity facilities), unconditionally cancellable commitments, direct credit substitutes, acceptances, standby letters of credit, trade letters of credit, failed transactions and unsettled securities (in the [Basel III “handbook”](#) see pp. 82–83 (§ 83(i)); pp. 84 (§ 84(i)–(iii)); pp. 85–86; and pp. 88–89).

<sup>9</sup> Household deposits grow in line with household wealth and income, i.e., steadily.

As such, rapid increases in the aggregate volume of credit supplied through the banking system must come via increased leverage ( $\lambda_i$ ) which—due to the “stickiness” of the red balloon and the stable nature of M2—are assumed to come from increases in interbank claims. Thus, in Shin’s interpretation, shadow banking is largely an interbank phenomenon.<sup>10</sup>

This view, however, ignores the significant funding that banks receive from the asset management complex through source collateral and the non-M2 money demands of institutional cash pools. Even when household deposits are sticky, when we introduce non-bank firms and intermediation through the shadow banking system, both individual banks and the banking system as a whole can (quickly) lever up.<sup>11</sup> In the U.S., as noted, the gross volume of funding from non-banks that was intermediated by banks may have been as high as \$25 trillion and \$18 trillion at year-end 2007 and 2010, respectively. In other words, non-banks’ funding to banks involves much more than just household and their deposits.

Most importantly, even with M2 being stable, the banking system can leverage up, not necessarily by increased interbank lending, but because of the portfolio choices of the asset management complex. Unlike short-term household funds—which are primarily in M2 liabilities—short-term institutional funds are primarily in the form of non-M2 liabilities. In turn the supply of privately guaranteed non-M2 liquid assets is by and large a function of the aggregate volume of institutional demand for short term claims (see our interpretation of “z” below).

$$\sum_{i=1}^n y_i = \sum_{i=1}^n e_i z_i (\lambda_i - 1) + \sum_{i=1}^n e_i$$

$Z_i$  can be expressed as  $Z_h + Z_k$ ,

Where,  $Z_h$  is the fraction of M2 funding that bank<sub>*i*</sub> receives from households, and  $Z_k$  is the fraction of non-M2 funding that bank<sub>*i*</sub> receives from other nonbanks.

<sup>10</sup> Shin and Adrian (2010) note that “M2 [...] is a good proxy for the total stock of liquid claims held by ultimate creditors against the financial intermediary sector as a whole” and later demonstrate that M2 has been slow moving or stable over time, expanding “by a factor of 2.4 since 1994”. Shin (2009) notes that “the total liabilities of the banking sector to the household creditors can be expected to be sticky, and would be related to total household assets. [...] For the purposes of short-term comparative statics, we could treat it as a constant.”

<sup>11</sup> Leverage is typically measured on a gross basis and interbank lending on a net basis. As an example, if bank A wants to buy a million dollars of securities from a person and gets financing from Bank B (on the basis of the collateral of the securities) which refinances from Bank C, which in turn refinances with Bank D which receives the cash as a deposit from a nonbank source ( i.e., household or mutual fund). We have assets of Banks A, B, C and D go up by \$1 million each, for a total of 4 million; gross interbank lending/borrowing of \$3 million and financing from nonbanks of 1 million. Since capital has not changed, leverage goes up (assets of the banks go up by 4) and the proportion of financing from nonbanks goes down. Assume “z” is the proportion of nonbank funding to the banks; thus the total bank financing goes up by 4 million of which only 25% is from nonbanks.

Also, as the financial system levers up, the associated collateral chains generally get longer, as evidence from pre-Lehman data shows (end-2007) relative to the post Lehman era (Singh 2011b). Also, if asset managers (for both secular and cyclical reasons) demand more short term claims, the extent to which they turn to the shadow banking system to fill that demand depends on the available supply of safe assets ( see [Pozsar](#), 2011).<sup>12</sup>

This allows for an alternative interpretation of the equation we started our discussion with. The red balloon is not “sticky” and does not have to decrease to adjust for higher banking system-leverage; both leverage and nonbank-to-bank funding can increase or decrease together.<sup>13</sup> The key is that short-term savings in a financial system are not limited to household deposits and that increases of the banking system are not necessarily funded all by interbank claims, but to a significant degree by asset manager-to-bank claims. In our interpretation, shadow banking is primarily an asset manager to bank phenomenon.<sup>14</sup>

## V. CONCLUSION

The present framework of financial intermediation and data collection does not fully incorporate the rise of asset managers as sources of funding for banks through the shadow banking system. In conclusion, we offer some policy suggestions to consider:

- To date, regulatory efforts have focused on fortifying the equity base of the banking system and limiting the banking system’s leverage through leverage caps and capital adequacy requirements. Non-bank funding to banks was assumed to be sticky and mainly in the form of household deposits. As such, regulatory efforts need to focus on the sizable volumes of bank funding coming from non-bank asset managers via source collateral and institutional cash pools.
- Regulators may need to reconsider and fine-tune the leverage definitions of banks to incorporate collateral chains due to the sizable volumes of pledged collateral that churn between banks and nonbanks. For example Lehman, at the eve of its bankruptcy (end-2007), had \$800 billion in pledged collateral that could be repledged in Lehman’s name, while its balance sheet size was only about \$700 billion.

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<sup>12</sup> Aside from U.S. Treasury Bills that is often cited, we do not exclude Bunds or other AAA government securities; or gold; or currency (e.g., recently, the Swiss Franc).

<sup>13</sup> Nonbank financing is not “sticky” and the proportion of nonbank financing does not have to shrink to compensate for an increase in leverage.

<sup>14</sup> Since the money holdings of asset managers are ultimately the claims of households, it follows that households ultimately fund banks through both M2 and non-M2 instruments. It is important to note, however, that while households’ *direct* holdings of M2 instruments reflect their own investment decisions, their *indirect* holdings of non-M2 instruments are *not* a reflection of their direct investment choices, but the portfolio choice and investment management techniques of their fiduciary asset managers.

- With dealers' ability to borrow and re-pledge collateral having become more restricted post-Lehman, new collateral mines and mining techniques are being explored—see the increasing prominence of corporations as securities lenders in the U.S. and elsewhere, and the recent innovation of collateral upgrade swaps with pension funds and insurers in the U.K., respectively. These are examples of off-balance sheet related cross-border interconnectedness and collateral chains that regulators need to attend to.
- Regulatory efforts aimed of altering funding structures may need to be complemented. Current approaches are actively pushing banks away from short-term, secured, wholesale funding markets and incentivizing them to issue more deposits and term funding. Unless the supply of preferred assets is addressed by more safe assets (including sovereign bonds), shadow banking will likely fill in the void.
- Regulatory proposals, such as the Dodd-Frank Act and Basel III, that are pushing riskier activities outside the banking system (proprietary desks, hedge funds and OTC derivatives to name a few), will likely increase the shadow banking world; thus its linkages to the traditional banking world warrants closer attention. More generally, the approach towards shadow banking system may need some adaptation in key dimensions. Dynamic chains, for example, are quite different from the credit intermediation chains.
- The flow of funds accounts, as currently designed, are insufficient to adequately understand the shadow banking system and we offer some suggestions in Box 3. Otherwise significant volumes of financial transactions will remain untabulated in the shadows.



### **Box 3. Flow of Funds Data and Limitations**

Banking sector and other financial data are captured in Flow of Funds (FoF) statistics, such as those produced by the U.S. Federal Reserve System. Yet aspects that straddle the banking sector (and its nexus with the non-banks) are not covered or addressed by the FoF statistics. This box attempts to highlight some of the salient aspects of the FoF statistics to show that even in mature markets like the United States, there are ‘data gaps’ in financial statistics that need to be complemented by a rigorous analysis of off-balance sheet statistics, and linkages with other sectors that are outside the regulatory perimeter.

First, SIVs (special investment vehicles), off balance sheet entities, were sizable in the run up to the 2007/08 financial crisis. Although they are picked up in the FoF data, data is aggregated. Presently, there is no way of tracing back to the banking sector off balance sheet liabilities such as ABCP (asset backed commercial paper), and money funds, via Flow of Funds. Hedge funds holdings of financial assets are buried in FoF’s “household” sector. By aggregating and netting across all banks, the FoF loses relevant information. For example, security lending on L130 of the FoF page 83 is shown “net” in line 20, and thus would not highlight large positive build up in say bank X and a negative build up with say another bank Y. Thus FoF has limitations for early warning signals of the banking sector.

Second, derivatives data is also difficult to discern in the FoF. Financial statements do not provide the under-collateralization (or margin shortfall) of derivative positions. For some of the recent members of the ‘banking community’ Goldman Sachs, has most of its plain vanilla derivatives books in the bank, e.g., while its equity and commodities derivatives are conducted out of the brokerage subsidiary. Most of the (notional) derivatives for Morgan Stanley were still being conducted outside the commercial bank. The FoF accounts presently only reflect the flow of savings and investment of an economy. Derivatives unbundle risks associated with the securities that transmit the flow of savings and investments. To adequately track the workings of modern financial systems, FoF will ultimately have to include "satellite" accounts that track the flow of risks and collateral.

Third, more granularity is needed in the breakdown in the type of short-term money market instruments FoF data uses the term “open market paper” to capture money market instruments such as financial, nonfinancial and ABCP, Treasury bills, agency discount notes, etc. Not only is the breakdown of short-term instruments not granular enough, but it is impossible to track the detail holdings of short-term instruments (i.e., money funds’, securities lenders’ or corporate Treasurer’s holdings of short-term investments). In summary, instrument of maturity transformation and the holders of risks related to maturity transformation are close to impossible to track through the FoF accounts.

Fourth, bank holding companies such as Citibank, JP Morgan, Deutsche Bank, Goldman Sachs and Morgan Stanley are not fully reflected in banking statistics. For example, the holding company has 10 times the assets of the bank. FoF shows all elements of the holding company (bank, dealer, asset manger etc) but “tears” the holding company X’s balance sheet and then aggregates all banks in one sheet; all dealers in another sheet etc. This aggregation is loss of the overall picture of the holding company; hence the need to go back to the 10Q/10K to see the build-up of all business positions of the bank holding company from its various components under one roof.

Overall, nonbank linkages with the banks are not fully captured in FoF statistics. Thus FoF data needs to be augmented by other information that is usually buried in the footnotes to financial statements. For example, pledged collateral that is received by banks with rights to re-use is not fully reflected in the balance sheet or the FoF statistics; however it does shed light on the systemic risk via collateral chains that connect nonbanks to banks.

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