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Shadow Banking: The Money View

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Shadow Banking:

The Money View

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Abstract

This paper presents an accounting framework for measuring the sources and uses of short-term funding in the global financial ecosystem. We introduce a dynamic map of global funding flows to show how dealer banks emerged as intermediaries between two types of asset managers: cash pools searching for safety via collateralized cash investments and levered portfolio managers searching for yield via funded securities portfolios and derivatives. We argue that the monetary aggregates (M0, M1, M2, etc.) and the Financial Accounts of the United States (formerly the Flow of Funds) do not adequately reflect the institutional realities of the modern financial ecosystem, and should be updated to allow policymakers to better analyze and monitor the shadow banking system and its potential contributions to financial instability. The monetary aggregates, used mainly to inform the aggregate demand management aspects of monetary policy, do not include the instruments that asset managers use as money, particularly repos. Asset managers' money demand is not driven by transaction needs in the real economy but in the financial economy: in this sense, repo-based money dealing activities in the shadow banking system are about the provision of working capital for asset managers, much like real bills provided working capital for merchants and manufacturers in Bagehot's world over 150 years ago. These developments should be systematically captured in a new set of Flow of Collateral, Flow of Risk and Flow of Eurodollar satellite accounts to supplement the Financial Accounts. The accounting framework presented with this paper also explains how the Federal Reserve's reverse repo facility helps reduce interconnections within the financial system and how they could evolve into minimum liquidity requirements for shadow banks and a tool to control market-based credit cycles. The global macro drivers behind the secular rise of cash pools and leveraged portfolio managers in the asset management complex are identical with the real economy drivers behind the idea of secular stagnation. As such, one way to interpret shadow banking is as the financial economy reflection of real economy imbalances caused by excess global savings, slowing potential growth, and the rising share of corporate profits relative to wages in national income.

INTRODUCTION

The aim of this paper is to develop an accounting framework to track the sources and uses of short-term funding in the modern financial ecosystem. Given the inherent difficulty of presenting and discussing the workings of an entire system, the paper is accompanied by a map that tracks short-term funding flows from their ultimate sources to their ultimate uses, and across the hierarchy of short-term instruments issued by the sovereign, banks, and shadow banks globally.

Unlike earlier exercises in mapping the shadow banking system (see Pozsar, 2008 and Pozsar et al, 2010), the map accompanying this paper is dynamic, walking the reader through the ecosystem one balance sheet at a time. As such, the map is long rather than poster-size and is meant to be read either as a stand-alone document or a page-by-page reference guide to this paper.[2]

The paper has three conclusions. First, there is a strong case for the introduction of a new set of monetary aggregates that track the supply of money and money-like claims held not for real economy but for financial economy transactions. The Federal Reserve's M2 aggregate measures the money demand of households and has been used to analyze growth dynamics and threats to price stability. Because the bulk of money claims included in M2 are insured, it was built following a hierarchy based on transactional liquidity. But for institutional cash pools, money begins where M2 ends, and as the crisis has shown, intra-system holdings of uninsured money market instruments can pose threats to financial stability. Institutional cash pools hold money claims mostly for portfolio management reasons and because they are too large to be eligible for deposit insurance, their focus is on money claims' safety – that is, proximity to the government – first, and transactional liquidity second. The design of a new set of monetary aggregates in this paper is also guided by this principle. According to these aggregates, the volume of money and money-like claims issued by the shadow banking system has shrunk from a peak of $8 trillion in 2008 to $5 trillion as of the end of 2013.

Second, parallel to the development of a new set of monetary aggregates, there is a strong case for the development of a set of Flow of Collateral, Flow of Risk, and Flow of Eurodollar satellite accounts to supplement the Flow of Funds accounts.[3] The Flow of Funds accounts were designed to

[2] The map of the financial ecosystem that accompanies this paper is more than 160 pages and is best viewed on a computer (not an iPad), one click at a time.
[3] The Flow of Funds accounts of the United States were recently re-named the Financial Accounts of the United States. This paper refers to the accounts by their old name to stress the parallels between funds, collateral and risk flows.

track who borrows and who lends in the real economy and through what type of securities (see "Tracking Money Flows in the Unites States Economy" by Copeland, 1947). Similar to M2, this perspective is useful to track growth and inflation dynamics, but is less useful to monitor risks to financial stability in an ecosystem where the securities connecting real economy borrowers and lenders have an increasingly active second act in life as collateral, and where securities financing transactions such as repurchase agreements (repos) and securities lending have grown dramatically to enable shorting and levered fixed income investing for asset managers, as well as to enable the manufacture of credit-safe, short-term assets for cash pools. Moreover, the Flow of Funds accounts end where derivatives and Eurodollar markets begin. Derivatives separate the flow of risks (foreign exchange, duration and credit risks via corresponding swaps) from the flow of funds, and hence looking at investors' exposure to bonds without looking at accompanying derivatives or offshore dollar funding needs makes the usefulness of the Flow of Funds accounts for financial stability monitoring purposes somewhat limited. The map presented with this paper shows how flows of short-term funding link up with the flows of collateral, the flows of risks (via swaps) and the flows of Eurodollars, with an ultimate aim to develop a set of Flow of Collateral, Flow of Risk, and Flow of Eurodollar accounts to augment the Flow of Funds accounts (see Pozsar, 2014, forthcoming).

Third, discussions regarding dealer banks' balance sheet dynamics mostly take into account micro-drivers (such as dealers' pursuit to maximize return on equity subject to VaR constraints, see Adrian and Shin, 2010), but not the secular changes in the global financial ecosystem that banks inhabit. However, understanding the ecosystem that banks operate in is imperative, as it can influence the types of lending activities they engage in, and the types of liabilities they issue. Indeed, the secular rise of the volume of securities financing transactions such as repos and securities lending, and the related increase in the size of dealer balance sheets is closely related to the proliferation of institutional cash pools and balance sheets with structural asset-liability mismatches since 2000. The latter include the balance sheets of reserve managers (due to sterilization costs), underfunded pensions and more broadly, fixed income return expectations that failed to adjust to the secular down-drift in interest rates since the 1980s. These mismatches are the drivers behind both the "low bang for the buck" lending of large volumes of long-term Treasury and agency securities for the manufacture of safe, short-term assets for institutional cash pools via dealers' repo liabilities, and allocations to "high bang for the buck" leveraged investments such as hedge funds, separate accounts and absolute return bond funds that are significant consumers of dealers' reverse repo assets. Securities financing transactions are crucial in setting the price of

financial assets and in particular the Treasury term premium, which affects the real economy through borrowing costs indirectly. Efforts to measure the collateral value of Treasury securities and the extent to which levered bids for Treasuries affect the term premium and credit spreads, respectively should be high on the research agenda. The accounting framework presented in this paper is a first step toward framing and understanding these questions better.

The paper has six parts as follows. Part one discusses the hierarchy of money in the modern financial system through various money claims' proximity to the government. It classifies money and money-like claims into four categories from a credit risk perspective. Such classification can be helpful in the design of a new set of monetary aggregates used not for the purposes of monitoring price stability but for the purposes of monitoring financial stability. Part one also explains how the Federal Reserve's reverse repo facility (RRP) helps streamline the plumbing of the financial system and reduce interconnections by giving dealers and money funds at the core of the shadow banking system access to reserve accounts for the very first time in the monetary history of the United States.

Part two discusses the hierarchy of access — the type of money claims institutional cash pools have access to. For cash pools, money begins where M2 ends and because of a systemic shortage of safe, short-term, public assets, the bulk of cash pools are constrained to be invested in private money claims with some degree of credit risk — not out of choice, but for a lack of better alternatives. Part two also explains how RRP balances could potentially evolve into becoming minimum liquidity requirements for shadow banks, much like reserves are the basis of liquidity requirements for banks.

Part three discusses the hierarchy of the uses of cash. It classifies the activities of core financial intermediaries and the buyside into three categories: money creation and loan-based lending, money dealing, and money market funding of capital market lending. The aim of the section is to highlight the unique role of dealers as intermediaries between institutional cash pools and levered fixed income investors, and to highlight data gaps in measuring the volume of repo funding raised by such investors as well as the volume of short-term Eurodollar funding and foreign exchange (FX) swaps used to fund dollar-denominated portfolios by non-U.S. banks globally. Part three also explains how RRPs will allow the Federal Reserve to set minimum haircuts on safe assets, and hence have much more control over market-based credit cycles than in the past when competition drove haircuts on safe assets to bare-bone minimums. Combined with the potential use of RRPs as reserve requirements for shadow banks, the control of haircuts across the system via RRPs could be viewed as the stick for the

ultimate carrot of the Federal Reserve's evolution to become a dealer of last resort in Bagehot's 21st century sense (see Mehrling, 2010, Mehrling et al, 2013, Carney, 2013 and Bank of England, 2013).

Part four sketches an accounting framework of the ecosystem of cash and risk portfolio managers that exists around dealers. This accounting framework depicts and measures the very core of the shadow banking system. The aim is to highlight that, for the most part, dealers are matched book intermediaries whether one looks at their securities financing or swaps books. Dealers intermediate, rather than transform, credit, maturity, FX, and liquidity risks.

Part five explains the global macro drivers behind the secular rise of the shadow banking system — in particular, the secular rise in the volume of securities financing and swaps transactions intermediated through dealers' balance sheets. The main message is that it is not possible to understand and regulate the shadow banking system without paying attention to the rise of global imbalances and their drivers. Many of these drivers are closely related to the drivers of "secular stagnation" (see Summers, 2014). Consequently, one way to interpret the phenomenon of shadow banking is as the financial economy reflection of real economy imbalances such as excess savings, slowing potential growth, and the rising share of corporate profits relative to wages in GDP. Finally, part six concludes the paper.

PART I — THE HIERARCHY OF MONEY

Money is usually defined from a functional perspective as a "unit of account, store of value and medium of exchange." However, this definition does not take into account the quintessential attribute of money — that money always trades at par on demand — and the institutional arrangements that underpin this attribute.

Money claims are also hierarchical (see Mehrling, 2012), in the sense that not all money claims are equally strong in their par on demand promise in all states of the world, and that always and everywhere money is something different for central banks, banks, shadow banks and all other participants in the financial ecosystem.

For example, under the gold standard, gold was money between central banks, reserves were money between banks, and deposits were money between participants in the real economy. At each level of the hierarchy, net payments were settled using the claims of entities at the next higher level of

the hierarchy. In normal times, participants in the real economy settled using bank deposits, banks settled using reserves and central banks settled using gold as international reserves. In crisis times, deposits were convertible into currency, currency into gold, and gold into foreign currency all at par on demand due to conversion rates and FX rates fixed in terms of gold.

The hierarchy of money is more complex in today's financial system but can be demonstrated through various money claims' proximity to the government, which is a function of the official liquidity and credit puts that may back them directly, indirectly or not at all.

There are four core institutions engaged in the issuance of money claims in the modern financial ecosystem: the central bank, banks (small and large), dealer banks and money market funds.

These institutions issue four core types of money claims. The central bank issues reserves. Banks issue deposits. Dealer banks issue repos. Money funds issue constant net asset value (NAV) shares.[4]

Each of these money claims is backed by assets and we can categorize money claims first according to whether the assets backing them are public or private. Public assets are U.S. Treasury bills and notes, and more broadly, agency debt and residential mortgage-backed securities (RMBS). Private assets are dollar-denominated bills, bonds, asset-backed securities (ABS), and loans issued globally.[5]

Money claims backed by public assets include: (1) currency and reserves, which are liabilities of the central bank backed by Treasury notes and agency debt and RMBS; (2) government repos, which are liabilities issued by dealers' government bond trading desks collateralized by public assets; and (3) constant NAV shares issued by government-only money funds, backed by Treasury bills and other short-term assets.

Money claims backed by private assets include: (1) deposits, which are liabilities of banks backed by loans; (2) private repos, which are liabilities issued by dealers' credit trading desks

[4] More precisely, constant net asset value shares, or shares that are meant to trade at stable transaction prices, are issued not only by money market funds but also by short-term investment funds and local government investment pools. We omit these investment pools from our discussion to concentrate the reader's mind only on the largest, core issuers of such shares: 2a-7 money market funds.

[5] The paper and accompanying map omit the details of agency debt and RMBS to concentrate the reader's mind on the extreme ends of the money/credit spectrum.

collateralized by private assets, such as corporate bonds, ABS and private-label RMBS; and (3) constant NAV shares issued by prime funds, backed by private bills, such as commercial paper, and other assets.

These instruments have one common attribute, which is that they promise to trade at par on demand. This makes them money.

But not all money claims are created equal. One area where money claims differ is in functionality, that is, whether they can be used for transactions, that is, for settlement purposes.

The net payments of dealers and money funds, and those of all other actors in the broader financial ecosystem, are settled using demand deposits, and net deposit flows between banks are settled via transfers of reserves between banks' reserve accounts maintained at the central bank. In this sense, banks and demand deposits are special among core institutions and core money claims because of their unique role in forming the backbone of the payments system and facilitating the payments of all entities lower in the system-hierarchy.[6]

Overnight repos and constant NAV shares are different. Unlike demand deposits, they cannot be used for settlement pruposes. But they are still considered money because they can be traded for a demand deposit at par on demand. In other words, they are convertible into payments system money, that is, cash, in the form of a demand deposit, which can then be used for settlement purposes. From the perspective of the holders of repos and constant NAV money fund shares the plumbing behind how these claims are converted into cash for settlement and transaction purposes does not matter as much as the price (par) at which they get converted into cash relative to par.

Money claims with stated maturities longer than overnight but less than a year are money-like claims. Money-like claims offer par at maturity (in the near-term) but not on demand, and in case one needs to convert them into payment systems money before maturity, they are breakable at a penalty or negotiable at prices normally very close to par. For example, negotiable time deposits issued by banks

[6] In the case of demand deposits, moneyness is a property that derives from the function of the institutions (banks as backbones of the payments system) around them. Similarly, gold is money only when there are institutions ensuring its liquidity and the stability of its value (the FX rate) vis-à-vis paper money.

and term repos issued by dealers are both money-like claims, as are U.S. Treasury bills and U.S. Treasury notes maturing within one year.[7]

In reality, the demarcation between money and money-like claims is not firm — money exists along a spectrum. Money-like claims with one, two, or three days or just a week left to maturity practically trade at par on demand because they have minimal price risk. That said, they are not quite as money-like as money claims proper, but are much more money-like than claims with for example one month to maturity (see Greenwood, Hanson and Stein, 2010 and Pozsar, 2011).

Another area where money and money-like claims differ is in the strength of their promise of par on demand and par at maturity, respectively, in all states of the world. The strength of these promises depends on the type and quantity of liquidity reserves, and the type and mix of liquidity and credit puts backing them. Each will be discussed later in this paper, and unless precise terms are needed, the rest of the paper will refer to money and money-like claims simply as money.

Except for the central bank, all core institutions engaged in the issuance of money need to hold money assets which are the money liabilities of institutions higher up in the hierarchy. For banks, money is reserves at the central bank. For dealers, money is overnight government repos with wholesale banks (a subset of banks to be discussed in Part III) and other dealers.[8] For government-only money funds, money is overnight government repos issued by dealers' government trading desks. And for prime money funds, money is overnight private repos issued by dealers' credit trading desks (note that these relationships are currently in flux with the introduction of the Federal Reserve's reverse repo facility, which effectively grants dealers and money funds access to reserve accounts; the macro implications of the facility is discussed at the end of Part I).[9]

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[7] Treasury bills and negotiable certificates of deposit are negotiable subject to market risk. Time deposits and term repos are breakable subject to penalties.

[8] We are concerned with the question of what money is for primary dealers. The U.S. Flow of Funds accounts show broker-dealers holding $117 billion in cash in checkable deposits at banks. This number, however, is skewed by the cash balances of thousands of smaller broker-dealers that are not primary dealers. Primary dealers minimize their exposure to unsecured bank deposits and keep their cash in the form of Treasury bills and reverse repos with a broad range of counterparties. Goldman, Sachs & Co., Goldman's U.S. broker-dealer subsidiary is a case in point. As of the third quarter of 2013 the consolidated entity held a total of $57.9 billion in overnight cash deposits. Of this, bank subsidiaries held $57.2 billion ($48.9 billion held as reserves at central banks). This leaves only $0.7 billion in overnight cash deposits between the holding company and the major broker-dealer subsidiaries. This number, however is dwarfed by the $86.3 billion in U.S. government obligations owned by the broker-dealer, an undisclosed portion of which is held as collateral against reverse repo agreements (see Goldman's 10-Q, 2013Q3, pp. 167-8).

[9] Prime funds also keep overnight government repos as part of their money balance, but only prime funds hold overnight private repo not government funds.

Importantly, these are not examples of money as a settlement medium for each institution (which has been discussed above) but how net payment surpluses accumulated for liquidity reasons are stored.

Net payment surpluses in the form of payments system money (deposits for dealers, money funds and other nonbanks) are never left uninvested, especially in wholesale amounts, for two reasons.

First, payment system money is noninterest bearing and on wholesale amounts pennies and basis points add up to millions quickly.

Second, payments system money in wholesale amounts is uninsured and represents credit exposure to the bank where they are deposited.

The credit-risky, yet noninterest bearing nature of wholesale deposits is the fundamental reason why large cash balances are always redeployed in the money market into claims that from a credit-risk perspective are superior to demand deposits and also pay interest.[10]

Banks, dealers, and money funds all issue liabilities that are safer, shorter-term and more liquid than their asset portfolio.

Borrowing short and lending long(er) on net is the essence of any form of banking and the source of intermediaries' interest margin, or carry. But running a maturity mismatch (that is, being in the maturity transformation business) involves rollover risks, and in case of a panic, survival depends on one's stock of overnight money assets (that is, liquidity) and access to emergency funding, which is not the same for all — this is the hierarchy of liquidity puts.

At the bottom of the hierarchy are money funds, which can raise only limited amounts of additional liquidity either by lending securities or via committed or uncommitted credit lines from banks.[11]

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[10] Another reason is that banks have a 10 percent reserve requirement on large transaction accounts (those greater than $89 million, see Federal Reserve, 2014), but this isn't an incentive for depositors but banks to swap liabilities.

[11] Borrowings cannot exceed 30 percent of a money fund's assets under management. While money funds maturity mismatch is small relative to other intermediaries, in a panic they have less room to get access to liquidity on scale than banks.

Dealers are next in the hierarchy. They have more room to borrow against assets, but still have only limited access to liquidity in a panic. If no private counterparty is willing to lend, money funds and dealers must sell, which will likely end in a fire sale.

Raising liquidity by borrowing against and selling assets is access to funding and market liquidity, respectively. Funding and market liquidity are private liquidity puts because both depend on private market participants (banks and dealers) for execution.

Retail and wholesale banks can borrow against assets or on a last resort basis put them to the central bank. As a result, banks rarely have to sell assets in a fire sale. These options represent access to funding and lender of last resort liquidity, respectively.

Finally, the sovereign has a monetary backstop. This option is typically used during times of war, and more recently during financial crises (see McCulley and Pozsar, 2012 and Ferguson et al, 2014).

Lender of last resort access and monetary backstops are public liquidity puts because they are administered by the central bank.

But lender of last resort access is of value only if one has the capital to put up the haircut at the central bank to raise liquidity. If capital is short, solvency is the key risk, and credit risk becomes paramount. Different money claims have different levels of credit protection — this is the hierarchy of credit puts.

At the top of the hierarchy are Treasury bills which are backed by the government's full faith and credit and authority to tax.

One level down in the hierarchy are insured deposits issued by retail banks, which are insured by the government (the Federal Deposit Insurance Corporation) up to $250,000.

Government guarantees and deposit insurance are public credit puts, because they are both administered by the official sector.

Next in the hierarchy are repos, which are secured claims. Repos can be tiered depending on the type and creditworthiness of counterparties, which may be wholesale banks or dealers, and the type of collateral involved, which may be public or private securities.

Repos are followed by money funds. Money funds invest in two types of assets: secured (such as repos, see above) and unsecured. In terms of unsecured investments, government-only funds invest only in government-guaranteed (and hence credit-safe) Treasury bills, while prime funds also invest in unguaranteed (and hence credit-risky) private bills, the risks of which they aim to minimize via diversification.[12]

In addition, money funds may also have reputational puts to their sponsors. However, these puts are fairly weak, because they are not contractual and depend on sponsors' strength (see McCabe, 2010).

Collateral, diversification, and reputational puts are private credit puts. They represent recourse to collateral and private resources in the form of issuers' or sponsors' capital (or net worth).

At the bottom of the hierarchy are uninsured bank deposits, those bigger than $250,000. Uninsured deposits are nothing more than unsecured and undiversified private credit claims (essentially, private bills) that in some states of the world may be worse credits than repos (which are secured claims) or prime money funds (which are backed by diversified portfolios of unsecured claims). In sum, without government insurance, deposits fall from the very top to the very bottom of the hierarchy of money.[13]

The types of assets and direct and indirect liquidity and credit puts behind various instruments yield four categories of money. These are purely public, private-public, public-private, and

[12] A more precise ranking of repos and money funds would go from government repos on top, government-only and prime money funds next, and private repo last.

[13] Counterarguments are that (1) failing banks usually merge into healthier ones so that depositors do not lose access to their deposits exceeding the amount of the Federal Deposit Insurance Corporation's (FDIC) deposit insurance cap; and (2) in the few instances of bank failures, uninsured depositors have been reimbursed expeditiously through depositor payouts (see Tarullo, 2013). However, these arguments downplay the fact that regulators always retain discretion in resolving banks. With very large holdings of uninsured deposits these may include taking into account the political economy dimensions of payouts being skewed toward large depositors at the expense of smaller uninsured depositors, and the sovereign's fiscal capacity and willingness to provide blanket guarantees on the uninsured deposits of the largest banks (see for example Cyprus in 2013 where large uninsured depositors suffered). The factors determining how banks will be resolved and how expeditiously uninsured depositors will be paid out are unnecessary risks to take if one has the option to go for repos, which are bankruptcy remote and offer same-day access to funds.

purely private money, with a decreasing strength to their promise of par on demand and par at maturity, during all phases of an interest rate or credit cycle — this is the hierarchy of money (see Figure 1).

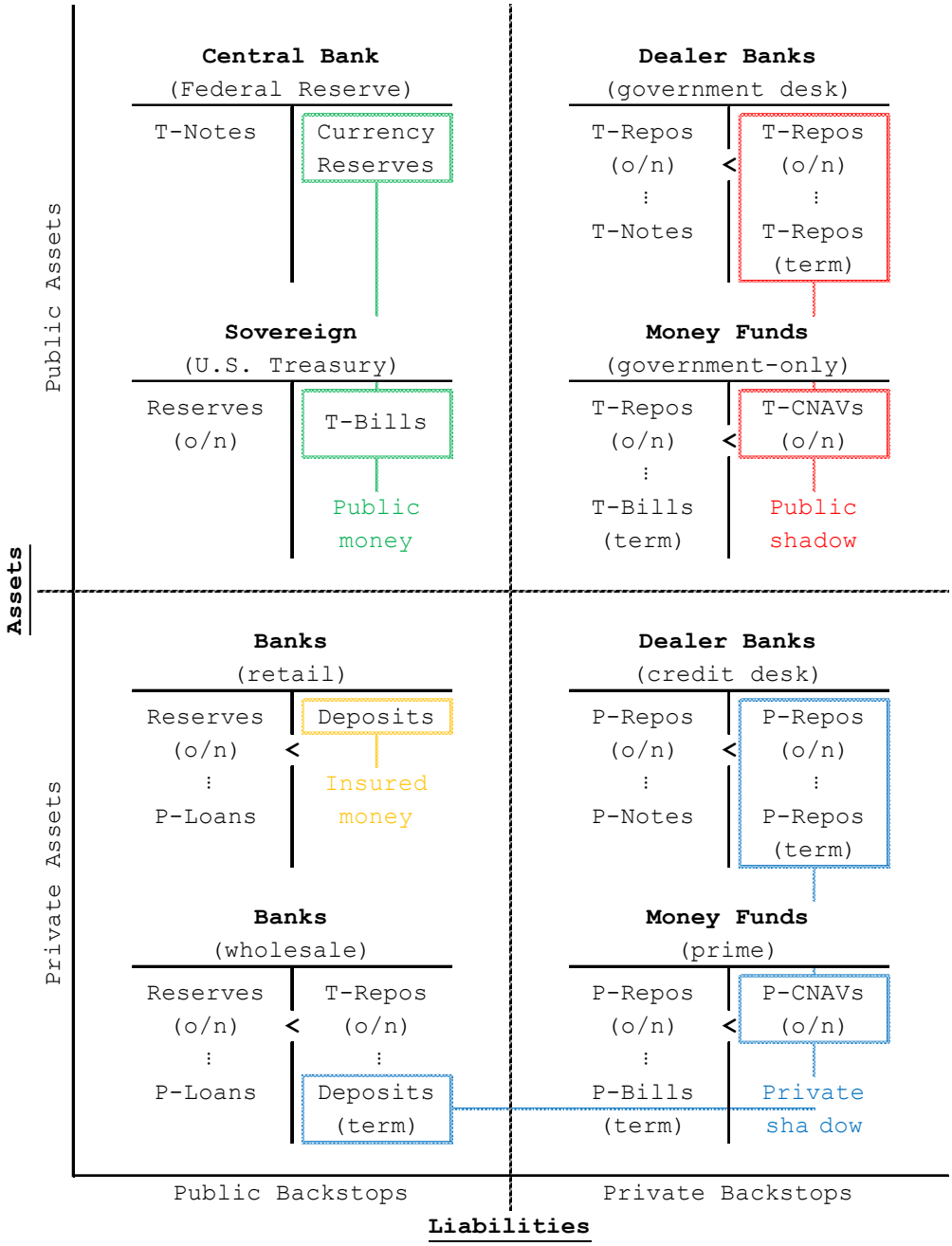
In the upper-left corner of the Money Matrix in Figure 1 are purely public monies. These are currency and reserves issued by the central bank and Treasury bills issued by the government. These are the safest of safe assets in the financial ecosystem. The remainder of the paper will refer to these instruments as "public money."

In the lower-left corner of the matrix are private-public monies. These are insured bank deposits.[14] Insured deposits are private-public money because they are backed mostly by private loans and are explicitly backstopped by both public liquidity and credit puts in the form of discount window access and deposit insurance. The emphasis here is on the explicit and public nature of backstops. The rest of the paper will refer to these instruments as "insured money."

In the upper-right corner of the matrix are public-private monies. These are government repos (repos collateralized by credit-safe public securities issued by dealers' government bond trading desks) and the constant NAV shares of government-only money funds.

[14] Demand and time deposits are just conceptual goal posts. In reality, demand deposits are called transaction accounts, negotioable order of withdrawal (NOW) accounts, money market deposit accounts (MMDAs) or savings accounts. In turn, time deposits may be small or large and if large, breakable or negotiable.

Figure 1: The Money Matrix[15]



Source: Pozsar (2014)

[15] The money matrix does not show bank equity and notions of leverage as the aim is to categorize money claims' according to their proximity to the government.

Public-private money claims are backed by public assets but are not backed by public liquidity and credit puts explicitly. They are private promises to pay par on demand and par at maturity. However, because of the public nature of the collateral and assets backing them, public-private claims effectively have implicit access to both public liquidity and credit puts, because public assets are open market operation eligible and have no credit risk.[16] The emphasis here is on the implicit and public nature of backstops. The remainder of the paper will refer to these instruments as "public shadow money."

In the lower-right corner of the matrix are purely private monies. These are private repos (repos collateralized by credit-risky private securities, such as corporate bonds, issued by dealers' credit trading desks) and the constant NAV shares of prime funds.

Purely private money claims are backed by private assets and, similar to public-private money claims, are not backed by public liquidity and credit puts explicitly. They too are private promises to pay par on demand or at maturity. However, private money lacks even indirect access to public liquidity and credit puts, because private assets are not open market operation eligible and have plenty of credit risk, which makes purely private claims relatively risky, peripheral forms of money. The emphasis here is on the lack of even implicit forms of public backstops. The remainder of the paper will refer to these instruments as "private shadow money."

Uninsured bank deposits are also private shadow money. Although the wholesale banks that issue these do have access to official liquidity puts, if the central bank is unwilling to lend to a bank during a panic — perhaps because it deems the bank insolvent — the absence of an explicit public credit put effectively makes uninsured deposits credit-risky private bills. Post-crisis limitations on the Federal Reserve's lender of last resort authority and the Federal Deposit Insurance Corporation's ability to guarantee banks' unsecured debt (such as uninsured deposits) make this point even starker (see Geithner, 2014).

Note that the Money Matrix in Figure 1 displays only the core institutions and instruments of the onshore U.S. dollar money market, institutions and instruments that are cornerstones in the

[16] For example, Goldman Sachs uses open market operations eligibility as justification for holding its liquidity in Treasuries and agencies (either outright or as collateral in reverse repos, 10-Q, 2013Q3, pp. 167-168). That said, Treasuries are truly credit risk free only if one ignores political risks around debt ceiling negotiations, but even with those political risks, the lack of cross default provision makes Treasuries the safest of safe assets around.

provision of a specific subset of safe assets, namely safe, short-term assets that carry no or only minimal credit and duration risks.[17]

Eurodollar (that is, offshore) money market instruments, to be discussed in Part III of this paper, and private bills other than uninsured deposits, are not displayed in the matrix, because from the perspective of onshore investors, they are secondary in the hierarchy of safe assets.[18] These instruments are more a means to enhance yield by taking on credit risk rather than cornerstone safe assets.

The Money Matrix is also useful to demonstrate where the shadow banking system sits within the broader ecosystem (see Figure 2).

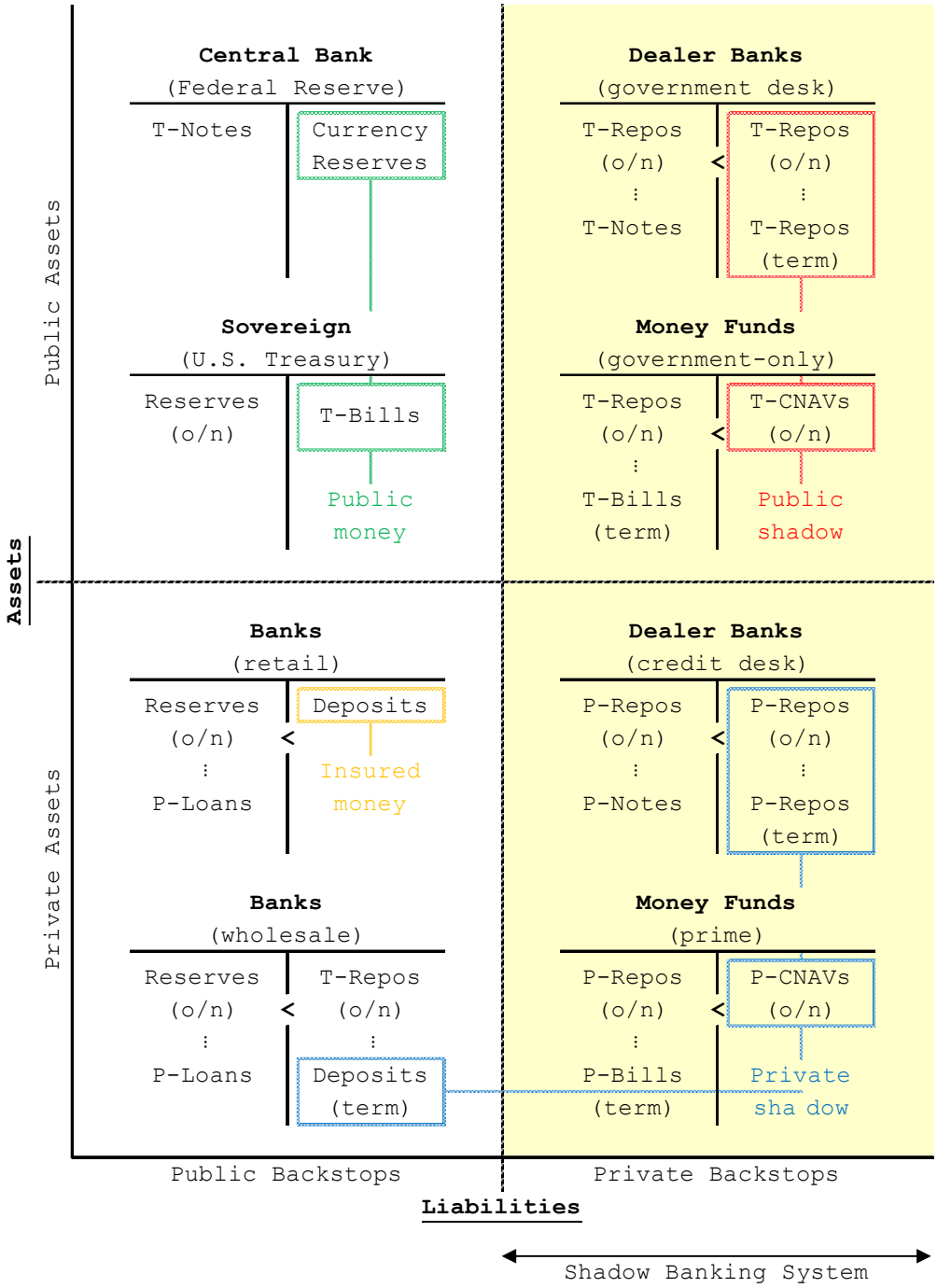
The shadow banking system (see McCulley, 2007) and its core institutions, dealers, and money funds, are on the right-hand side of the matrix and can be divided into two subsystems: a public-private and a purely private shadow banking subsystem, which in turn issue public shadow monies and private shadow monies, respectively.[19]

The public-private subsystem is built around public assets such as Treasuries, and agency debt and RMBS. It conducts maturity and liquidity transformation but no credit transformation because public securities have no credit risk.[20] Here maturity and liquidity transformation mean turning predominantly long-term public securities into short-term, par at maturity (that is, money-like) claims via term repos, and overnight, par on demand (that is, money) claims via overnight repos and constant NAV money fund shares, respectively.

The purely private subsystem is built around private assets, such as corporate bonds, asset-backed securities, and private-label RMBS. It also conducts maturity and liquidity transformation, as well as credit transformation via tranching and haircuts higher than on private repos because private

[17] The term safe asset is meant to imply safety from a credit risk perspective but credit-safe assets can still be risky from a duration or FX risk perspective.
[18] Conceptually, Eurodollar instruments and private bills such as commercial paper should be somewhere on the margins of the bottom quadrants of the matrix.
[19] We do not classify the now defunct structured investment vehicles and conduits as core intermediaries of the shadow banking system. Even at their peak, their sizes were dwarfed by the size of both dealers' and money funds' balance sheets.
[20] Assuming a fiat money system, that debts are denominated in national currency, and that central banks are willing to print when markets are unwilling to fund.

Figure 2: Placing Shadow Banking Within the Broader Ecosystem



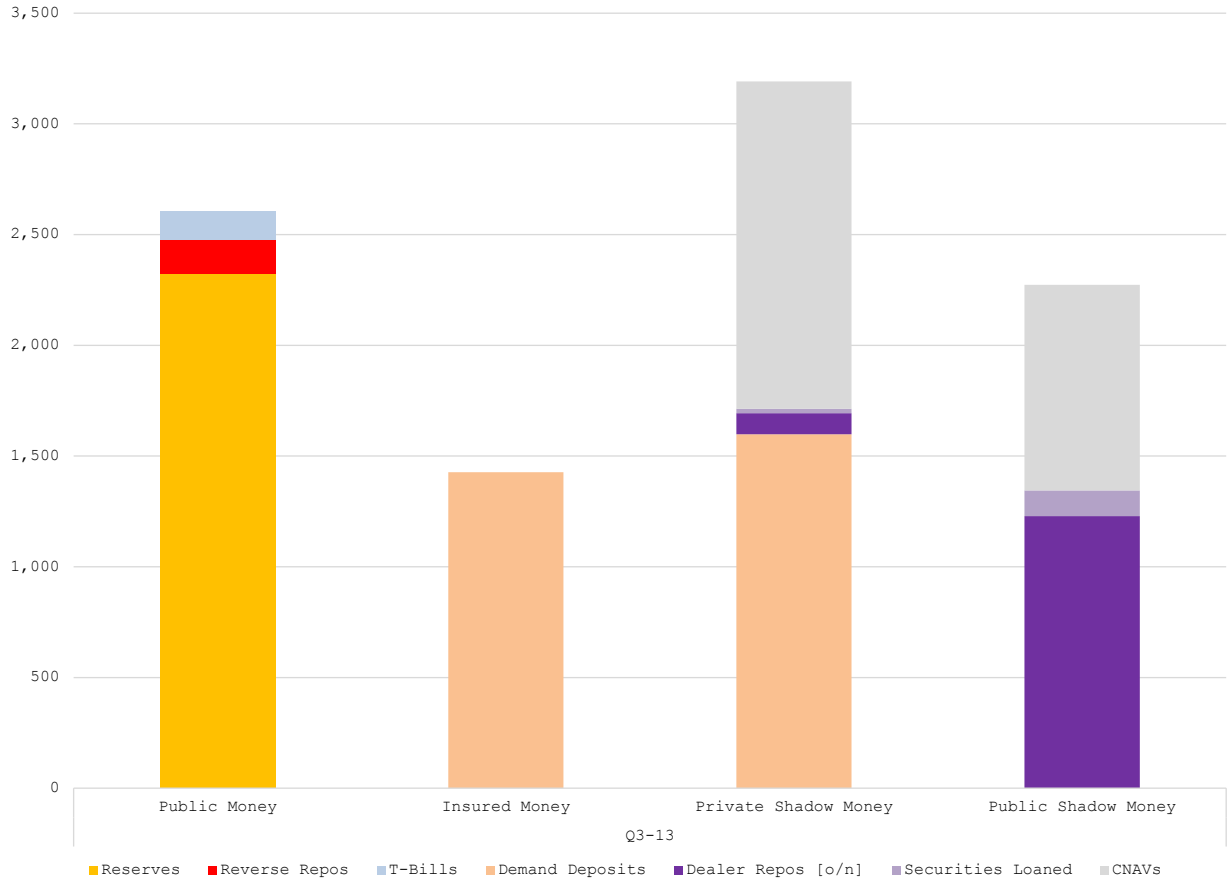
Source: Pozsar (2014)

securities collateral are credit-risky. It were the securitization and funding flows of this subsystem that were mapped and described by Pozsar, 2008 and Pozsar et al, 2010.

In terms of measurement, Chart 1 shows that at the end of 2013 the largest category of par on demand money claims was private shadow money comprised of uninsured demand deposits issued by banks, overnight private repos issued by dealers' credit desks, and the constant NAV shares of prime money funds at a total of $3.2 trillion.[21]

The second largest category was public money issued by the Federal Reserve at just under $2.5 trillion (excluding currency) and Treasury securities with a remaining maturity of less than seven days at more than $100 billion for a combined total of about $2.6 trillion.

Chart 1: Par on Demand Money Claims by Type, $ billion



Sources: Haver, Federal Reserve Board, Federal Reserve Bank of New York, FDIC

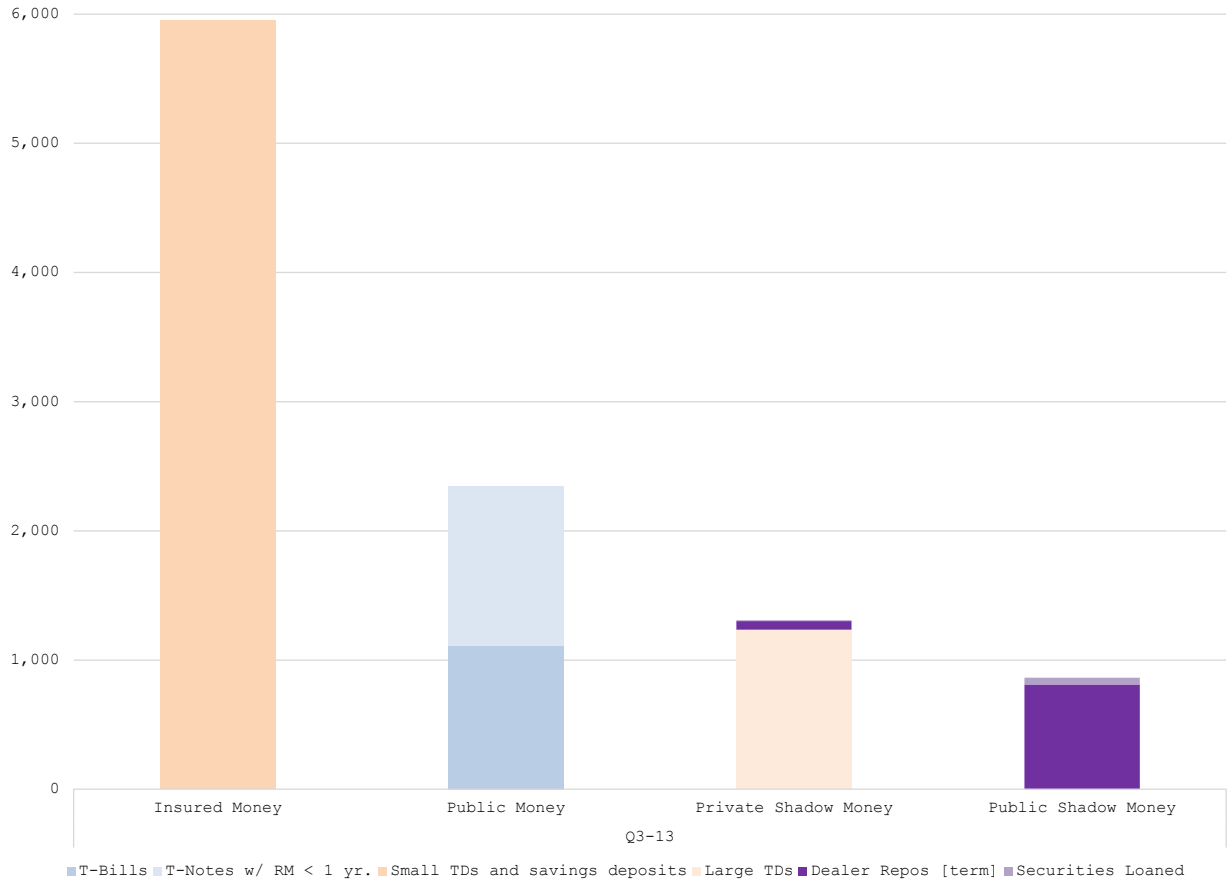
[21] The term demand deposits refers to the portion of uninsured, noninterest-bearing transactions accounts in excess of $250,000 as measured by the FDIC.

The third largest category was public shadow money comprised of overnight government repos backed by Treasuries and agency debt and RMBS and issued by dealers' government trading desks, and the constant NAV shares of government-only money funds at $2.3 trillion.

Finally, the smallest category was insured money claims comprised of insured demand deposits issued by banks at $1.4 trillion.

Chart 2 plots a similar ranking of par at maturity money-like claims. The largest category was insured money-like claims in the form of banks' insured savings and small time deposits at $6 trillion.

Chart 2: Par at Maturity Money Claims by Type, $ billion[22]



Sources: Haver, Federal Reserve Board, Federal Reserve Bank of New York, U.S. Treasury

[22] Netted for large time deposits, term repos and Treasuries held by money funds. Small time and savings deposits are insured, large time deposits are uninsured.

The second largest category was public money-like claims comprised of Treasury bills and notes with a remaining maturity of more than seven days but less than one year at more than $2.3 trillion.

The third largest category was private shadow money-like claims comprised mostly of banks' large deposits at more than $1.2 trillion.

Finally, the smallest category was public shadow money-like claims comprised of term government repos backed by Treasuries and agencies issued by dealers' government desks at around $800 billion.

Importantly, what these rankings show is that as of the third quarter of 2013, the shadow banking system, at more than $3.8 trillion, issued $800 billion more in par on demand money claims than retail and wholesale banks with $3 trillion in demand deposits.

By contrast, when it comes the provision of par at maturity money-like claims over the same period, the U.S. Treasury was a more important supplier than the shadow banking system, but both were dwarfed by savings and small and large time deposits issued by banks.

Altogether, the size of the core of the shadow banking system was just under $5 trillion as of the third quarter of 2013, down from a peak of over $8 trillion as of the second quarter of 2008.

These figures are lower than earlier measures of the system (see Pozsar et al, 2010) because they are narrower in focus: the estimates measure the net supply of money and money-like claims issued by dealers and money funds at the core of the system and disregards all forms of capital market lending not funded in the money market.

Initial measures of the system were gross, not netting for holdings between intermediaries, and included all forms of securitized credit regardless of whether they were funded in the money market or not, which inflated aggregate measures further.

Banks do more than just lending. They also issue money claims. By extension, if lending without money creation does not qualify as banking, neither should capital market lending without money market funding qualify as shadow banking (see for example the works of Mehrling et al, 2013,

Claessens et al, 2013 and OFR, 2013). Measures of shadow banking should be designed to reflect this perspective.

Importantly, the Federal Reserve's monetary aggregates for the United States measure only the tip of the monetary system discussed above. The Federal Reserve's M0, M1 and M2 aggregates measure mostly the insured money supply (insured bank deposits) and only parts of the public money supply (currency and reserves, but not RRPs and Treasury bills) and the shadow money supply (retail class money fund shares, but not institutional-class shares and repo liabilities).

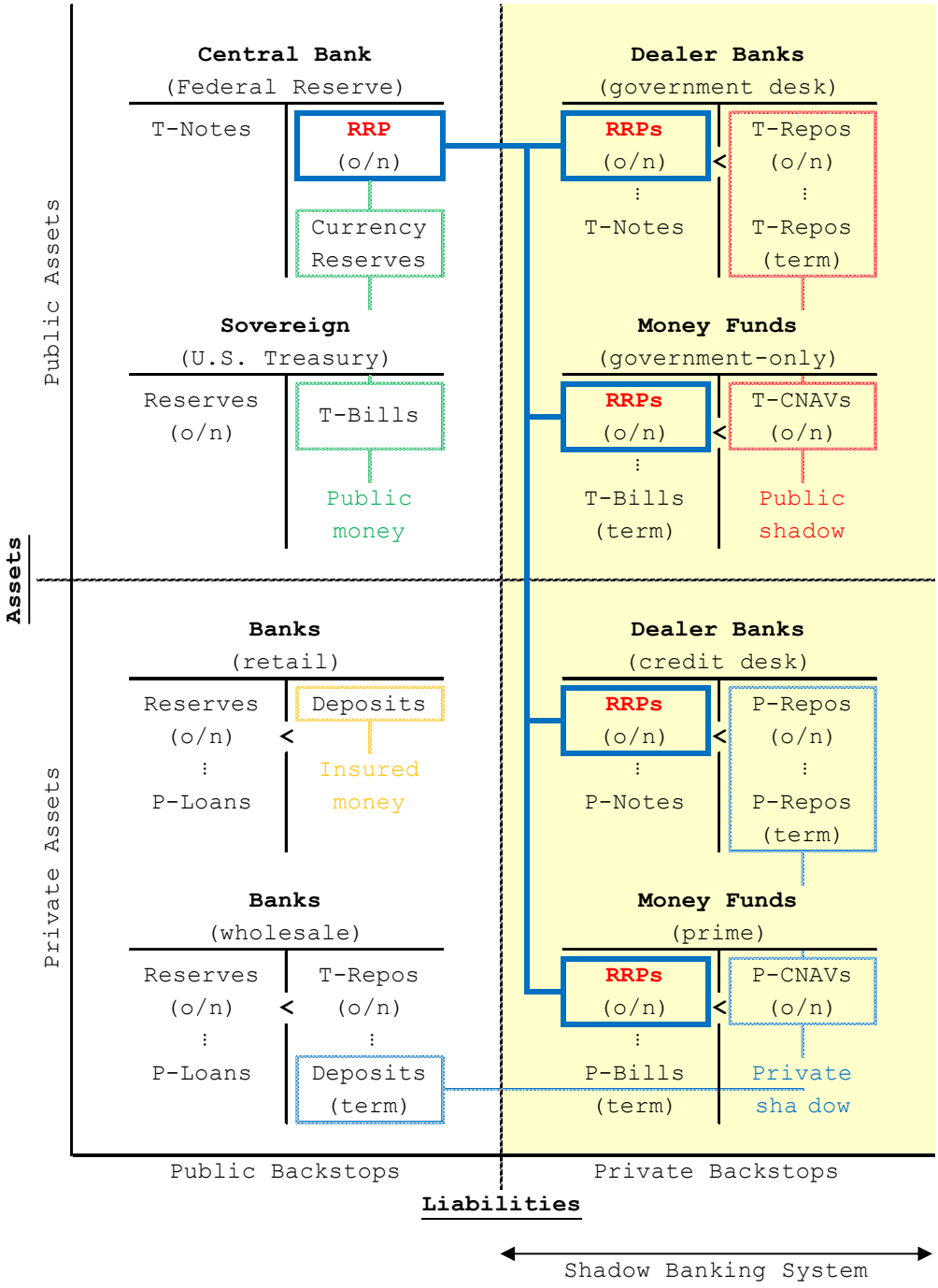
The categories of money described above could serve as a template to expand the scope of the Federal Reserve's money supply measures to the complexities of the modern financial ecosystem in a way that also takes into account the hierarchical nature of money.

One way to go about doing this would be to track the supply of both money and money-like claims across four categories ranging from purely public, private-public, public-private and purely private, denoted by PD_0, PD_1, PD_2 and PD_3 for Par on Demand money claims and PM_0, PM_1, PM_2 and PM_3 for Par at Maturity money claims, respectively.

Finally, how does the Federal Reserve's reverse repo facility fit into the money matrix? If permanent, the facility would effectively help reduce interconnections between banks, dealers and money funds — and thereby simplify the system — by eliminating the hierarchical relationships whereby money for dealers is government repos with wholesale banks, and money for money funds is repos with dealers (see page 10 and 11 above, and slides 22 – 25 in the accompanying map).

Reverse repos effectively grant shadow banks — dealers and money funds — a checking account at the Federal Reserve for the very first time in U.S. monetary history, similar to how reserves held at the central bank function as a checking account for traditional banks. Instead of having to keep cash with other counterparties, shadow banks will be able to hold cash with the Federal Reserve directly.

Figure 3: How Reverse Repos Simplify the Plumbing



Source: Pozsar (2014)

PART II — THE HIERARCHY OF ACCESS

Having covered the hierarchy of money, we now turn to the hierarchy of access — that is, the difference between the types of money that different classes of cash investors have access to.

There are two classes of non-intermediary cash investors in the financial ecosystem: retail and institutional.[23]

Retail cash investors are "mom and pop" depositors who keep cash balances mostly in the form of currency and insured bank deposits, that is, in M0, M1, and M2-types of money.[24]

Institutional cash investors are institutional cash pools (see Pozsar, 2011). There are four categories of institutional cash pools: (1) the liquidity tranche of FX reserves; (2) the cash balances of global corporations; (3) the centrally managed cash balances of institutional investors and the largest asset managers; and (4) the cash collateral reinvestment accounts of securities lenders.[25]

In the aggregate, cash pools had at least $6 trillion in cash under management at the end of 2013 (see Chart 3 and OFR, 2013), with average cash balances of about $10 billion and a minimum threshold to qualify as a cash pool of $1 billion (see Pozsar, 2011).

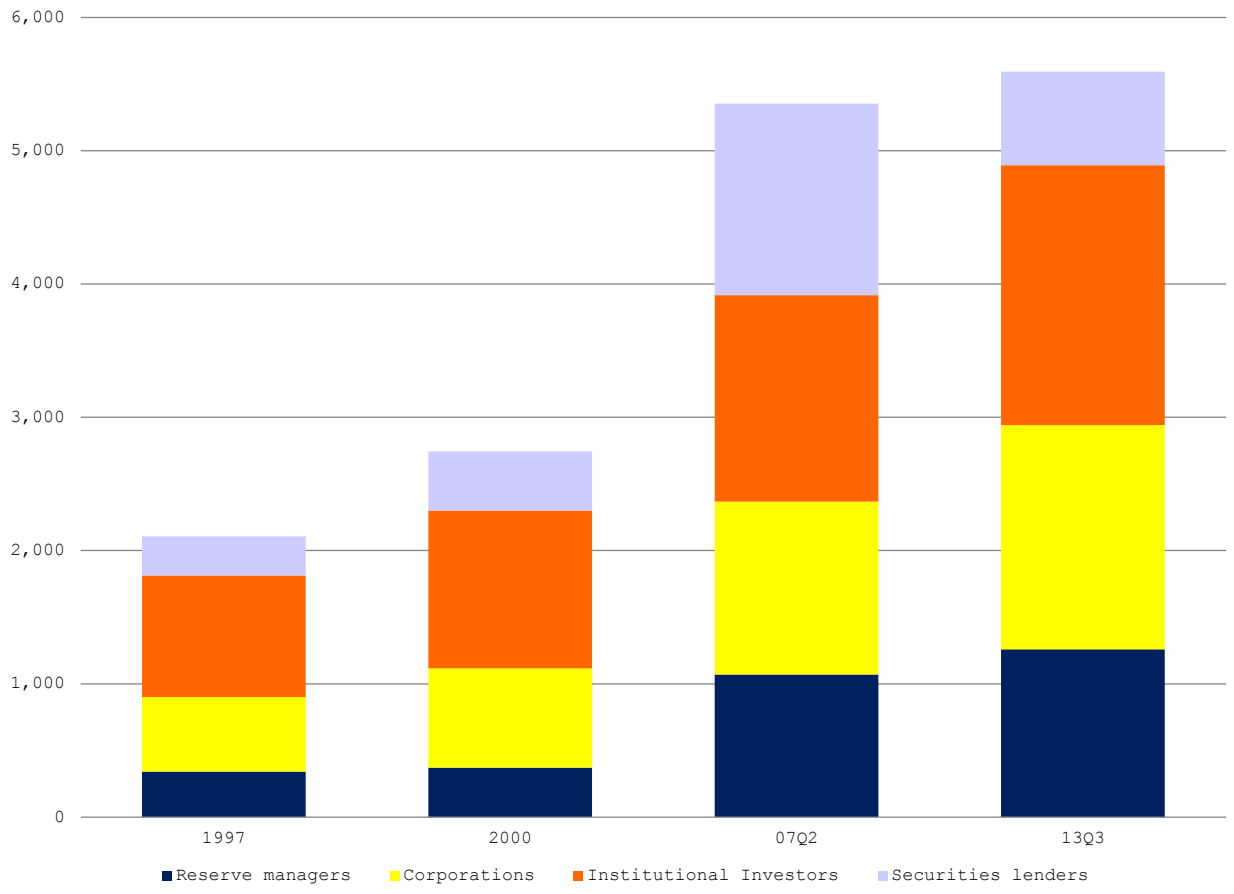
Unlike retail cash investors, who hold cash mostly for real economy transactions, cash pools hold cash balances mostly for financial economy transactions — for the daily fixing of FX pegs; for the safe-keeping of corporate cash balances; and for supporting the liquidity needs of the modern asset management complex, partly stemming from the increased use of derivatives-based investments (such as derivative-overlay investments) and securities lending.

Institutional cash pools are managed by cash portfolio managers (cash PMs) whose mandate is "do not lose." This mandate limits cash PMs to invest net payment surpluses in safe assets, or more

[23] Non-intermediary cash investors are cash investors outside the system. They aren't directly involved in funding between banks, dealers, and money funds.
[24] M2 also includes retail-class money market funds. However, retail holdings of money market fund shares are dwarfed by demand deposits and savings accounts.
[25] Institutional investors may manage cash in a principal or an agent role. Institutional investors in a principal role include for example pension funds, insurance companies and local governments, and in an agent role, asset managers.

precisely, safe, short-term assets with maturities ranging from overnight up to a year (that is, money and money-like claims) but usually not beyond.[26]

Chart 3: Institutional Cash Pools by Type, $ billion



Sources: Haver, Federal Reserve Board, ICI, BIS

However, unlike retail cash investors, cash PMs have no or only limited access to M0, M1 and M2-types of money for three reasons.

First, it would be physically impossible to handle billions in cash in the form of currency. Second, they have no access to reserve accounts at the Federal Reserve. Third, because of their sizes, which are well in excess of $250,000 (the current deposit insurance limit in the United States), they have no access to insured bank deposits.

[26] The term safe asset is meant to imply safety from a credit risk perspective but credit-safe assets can still be risky from a duration or FX risk perspective.

If cash PMs were to invest their pools in an uninsured deposit at a single bank, they would assume an unsecured and undiversified counterparty credit risk in relation to that bank, which is imprudent and would not get any risk manager's approval (also see Part I on why cash pools are never left behind uninvested in the payments system).

This is also true at the macro level as cash pools have grown ever bigger while options to diversify unsecured bank exposures have been shrinking because of consolidation among wholesale banks that are best able to absorb large pools of cash (see Pozsar, 2011).

This problem has been exacerbated by the fact that the same wholesale banks may also have served as providers of credit lines and derivatives and trading counterparties to cash pools, or more precisely, the larger entities they belonged to. This was a further constraint for cash PMs to keep cash in deposits on an unsecured basis, as that would only have added to wrong-way counterparty risks.

With public and insured money claims off limits, cash PMs are limited to choose mostly from a menu of mainly public and private shadow money claims, where allocations follow a hierarchical order. This is the hierarchy of access — or cash pools' access to money.

For overnight cash investments the safest possible options for cash pools are Treasury bills with only days left to maturity.

Overnight government repos with dealers' government trading desks come next, followed by government-only money funds. Money funds rank below repos because repos allow control over one's choice of counterparties and the exact issues of public securities accepted as collateral, whereas through money funds one is subject to the counterparty and collateral rules of fund managers. As an analogy think of bespoke versus off the rack suits: both fit the purpose but the former fits better and leaves no room (or margin) for error.

Prime money funds come next. The diversification they provide over private repos or unsecured exposures that uninsured deposits represent — the last allocation options — is of value to cash PMs.

Chart 4 shows that public money claims are only accessible for cash pools in the form of very short-term Treasuries in the amount of about $100 billion in recent years. Compared to Chart 1, Chart

4 underscores that currency, reserves, and reverse repos issued by the Federal Reserve are inaccessible for all institutional cash pools.

It also shows that in the third quarter of 2013, public shadow money claims in the form of the constant NAV shares issued by government-only money funds and overnight government repos issued by dealers' government bond trading desks absorbed more than $2 trillion in overnight money demand from institutional cash pools.

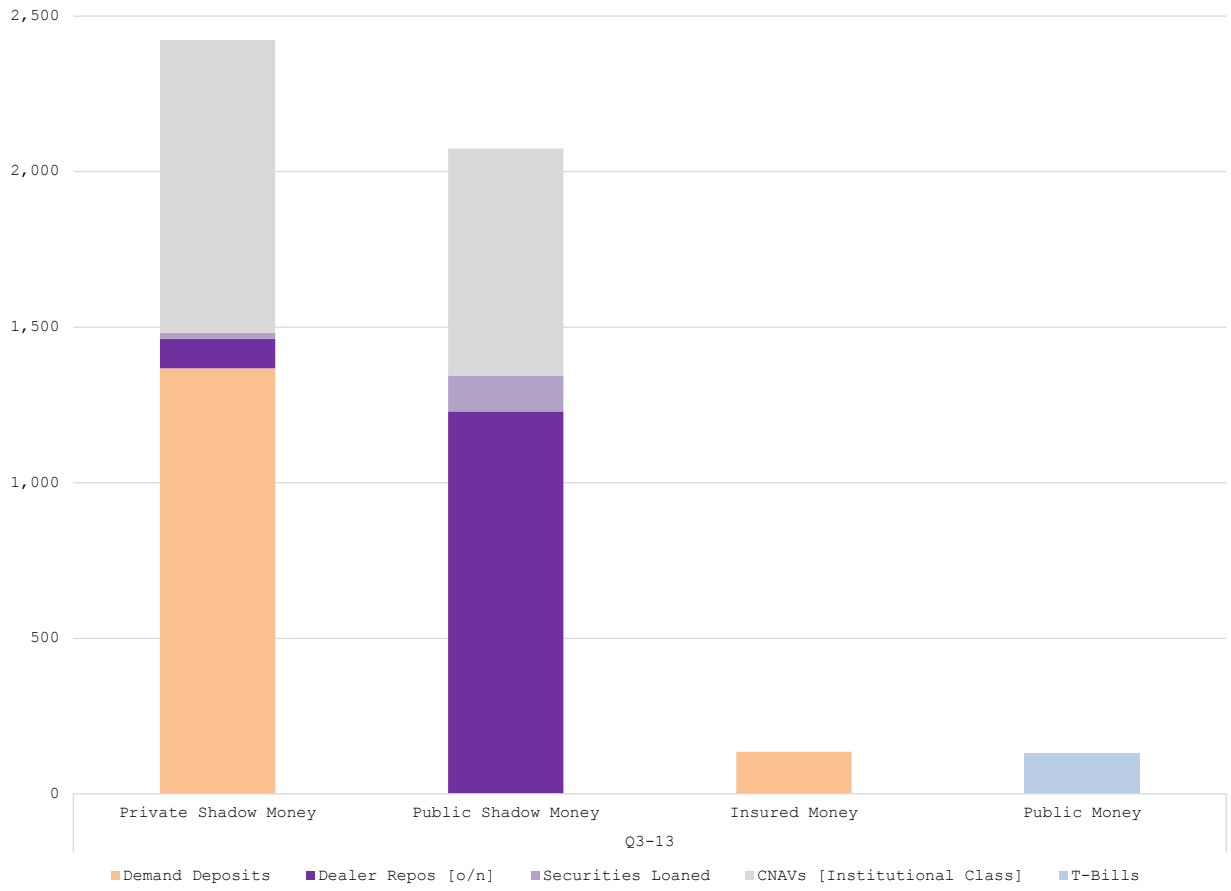
Private shadow money claims in the form of the constant NAV shares issued by prime funds and private repos issued by dealers' credit trading desks absorbed another $1 trillion in overnight money demand. And private shadow money claims in the form of uninsured demand deposits issued by banks absorbed nearly $1.5 trillion.

Importantly, not all of these uninsured deposits are held by cash pools. What is safe to assume about the data in Chart 4 is that repos, overnight Treasury bills, and institutional-class money fund shares are all held by institutional cash pools — retail investors do not invest in these instruments. However, this is not the case with uninsured deposits which may be held by both retail and institutional investors. The volume of uninsured deposits in Chart 4 refers to uninsured deposits at banks with assets of at least $50 billion, and according to the FDIC, it is the aggregate of thousands of accounts with an average size of between $2 and $3 million.

As such, the volume of uninsured deposits in Chart 4 reflects a mix of holdings by cash pools (balances well above the $250,000 deposit insurance limit) as well as retail investors (balances marginally above the insurance limit). However, drawing a more precise line between these two types of uninsured depositors is not possible with the granularity of the presently available data.

Similar to the case of money claims, cash PMs also face limited access to public money-like claims. Although Treasury bills are a perfectly safe public money claim for cash PMs to invest in, supply is insufficient for all cash PMs to invest in them on scale (this shortage of Treasury bills was documented in detail by Pozsar, 2011 and Claessens et al, 2012 and through an analysis of the liquidity premium of Treasury bills by Greenwood, Hanson and Stein, 2010).

Chart 4: Cash Pools' Access to Par on Demand Money Claims, $ billion[27]



Sources: Haver, Federal Reserve Board, Federal Reserve Bank of New York, ICI

Term cash balances can be invested in volume only in term repos collateralized by public or private securities and (depending on cash PMs' appetite for safety versus yield) unsecured credit instruments such as uninsured certificates of deposit (CDs) and commercial paper (CP).

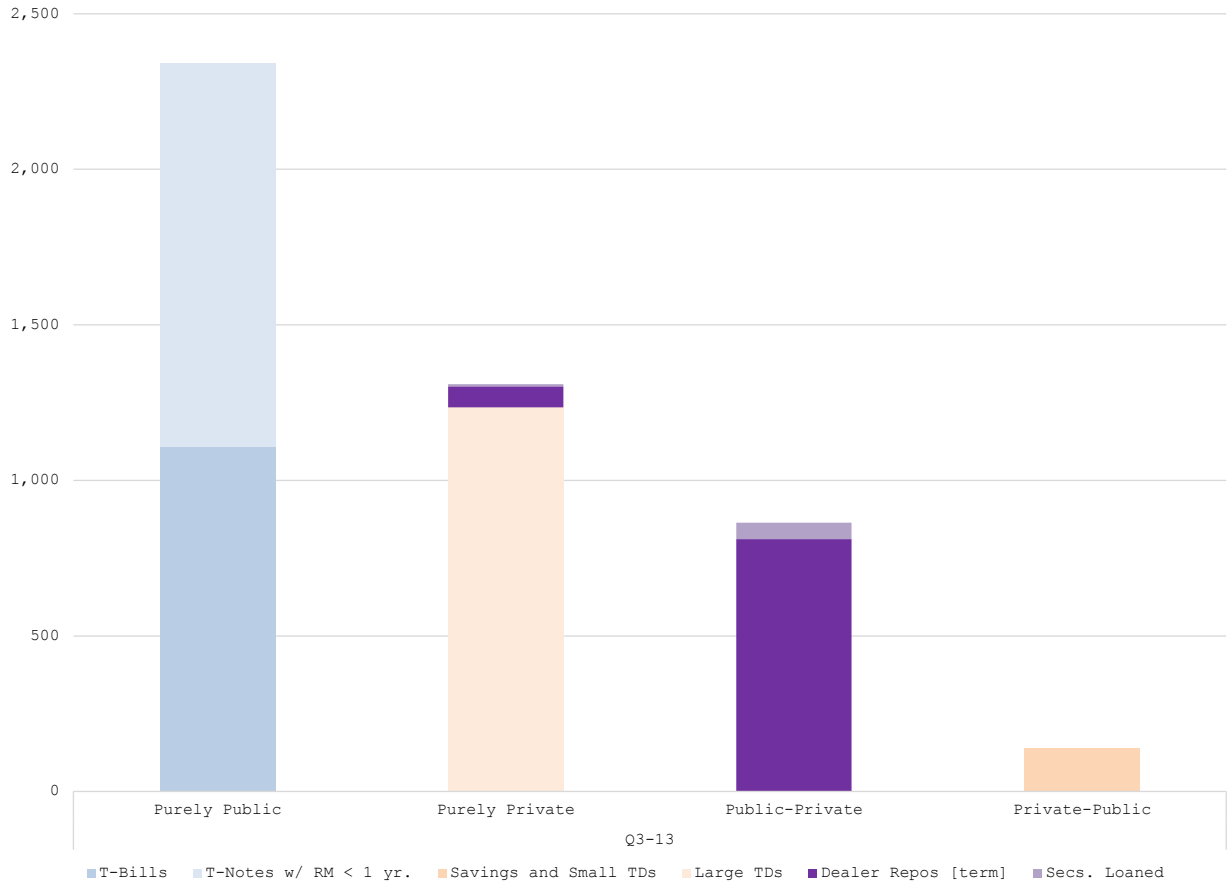
Chart 5 shows that in the third quarter of 2013, public money-like (that is, par at maturity) claims in the form of short-term Treasuries absorbed about $2.3 trillion in term money demand from cash PMs. Public shadow money-like claims in the form of term government repos issued by dealers' government trading desks absorbed close to $900 billion. Insured money-like claims in the form of insured small deposits (which cash PMs obtain by dividing cash balances into insured portions and

[27] Chart 4 is derived by subtracting retail-class money fund shares and insured demand deposits held by households from the first, third, and fourth columns of Chart 1, respectively, and subtracting reserves and RRPs from the second column.

spreading it among banks) absorbed $140 billion. And private shadow money-like claims, in the form of large, uninsured time deposits, absorbed more than $1.2 trillion.

Similar to uninsured demand deposits in Chart 4, data gaps do not allow for a more precise breakdown of uninsured time deposits held by institutional versus retail cash investors in Chart 5.

Chart 5: Cash Pools' Access to Par at Maturity Claims, $ billion[28]



Sources: Federal Reserve Z.1 and H.8, FR 2004 via Haver

The above charts show that cash pools, unlike retail cash investors, do not have access to M0, M1 or M2 types of money. That is, for institutional cash pools money begins where M2 ends.

The fact that institutional cash pools are constrained to holding mainly public-private and purely private shadow money claims means that they always face some counterparty and collateral-

[28] Short-term Treasury securities and large time-deposits have been netted for money funds' holdings of these instruments. Cash pools' access to small time deposits is achieved by splitting cash pools into insured amounts across banks.

related risks in cash portfolios. This is the fundamental reason behind the fickle and finicky nature of the wholesale funding market today, which is not as much an interbank (see Shin, 2010a) but rather an institutional cash pools to wholesale banks and dealers market.

It follows that, a financial ecosystem increasingly funded by a relatively low number of well informed, very large and uninsured institutional cash pools is bound to be much less stable than one funded by a very large number of uninformed, small and insured depositors. This makes the rise of institutional cash pools a most fundamental, yet underappreciated source of systemic risk today.

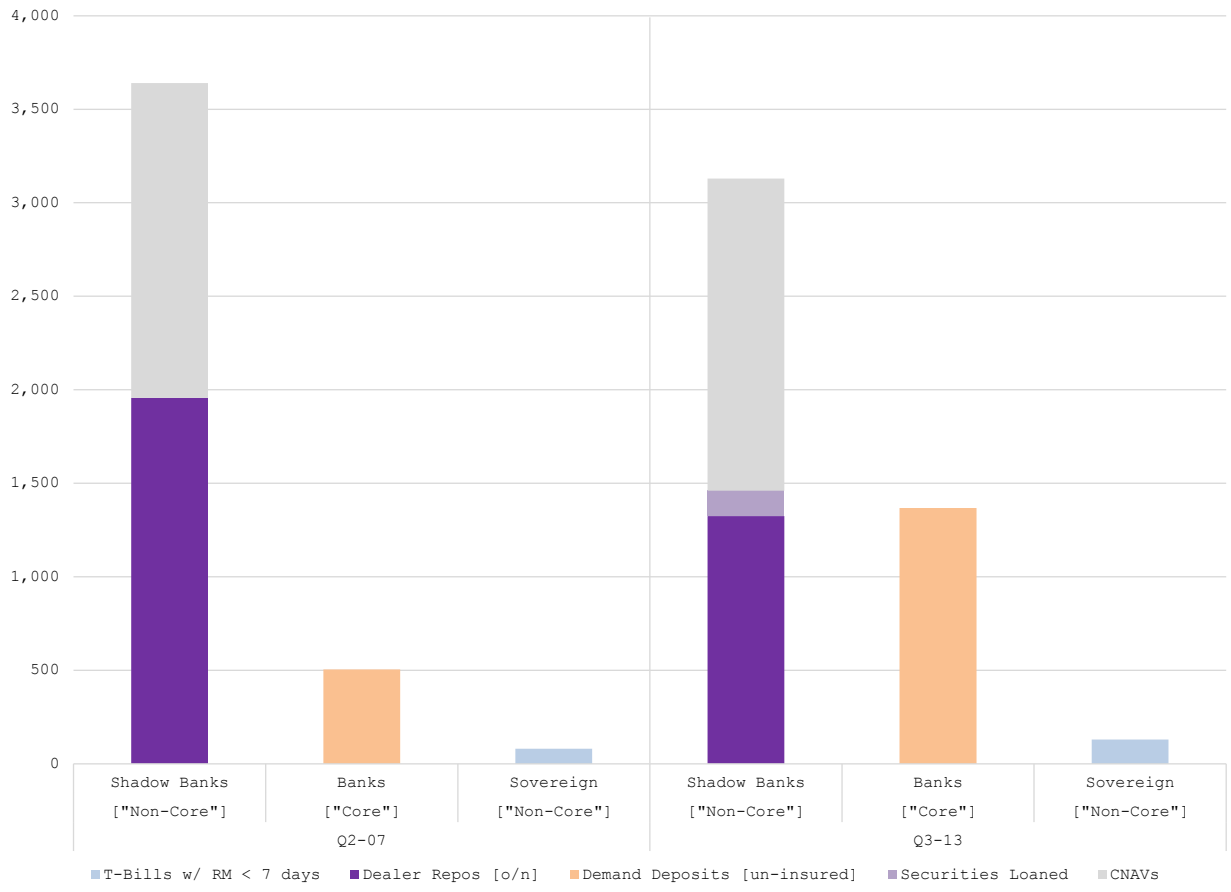
What this analysis also implies is that any discussion of "core" versus "noncore" (that is, deposit versus nondeposit) liabilities (see Shin, 2011) should be context dependent.

The core versus noncore characterization of liabilities has been shaped by analyzing peripheral cases — Northern Rock in the U.K. (see Shin, 2010a) and South Korean banks' noncore liabilities which have historically been dominated by U.S. dollar borrowings (see Shin, 2010b).

However, the picture looks completely different at the core of the dollar-based global financial system (see for example Mehrling, 2011 and Mehrling et al, 2013), where certain types of core intermediaries such as dealers fund balance sheets almost exclusively using noncore repos, and where cash PMs — as an increasingly dominant group of funding providers in the ecosystem — prefer to invest their cash in noncore liabilities that put them in a legally senior position relative to uninsured core liabilities such as deposits (see Pozsar, 2011).

In particular, what are usually referred to as intermediaries' core par on demand liabilities (demand deposits) are typically marginal assets in institutional cash portfolios because of insurance limits, and what are referred to as intermediaries' noncore par on demand liabilities (overnight dealer repos and money fund shares) are the dominant assets in institutional cash portfolios (see Chart 6).

Chart 6: "Core" versus "Noncore" Overnight Money Claims, $ billion



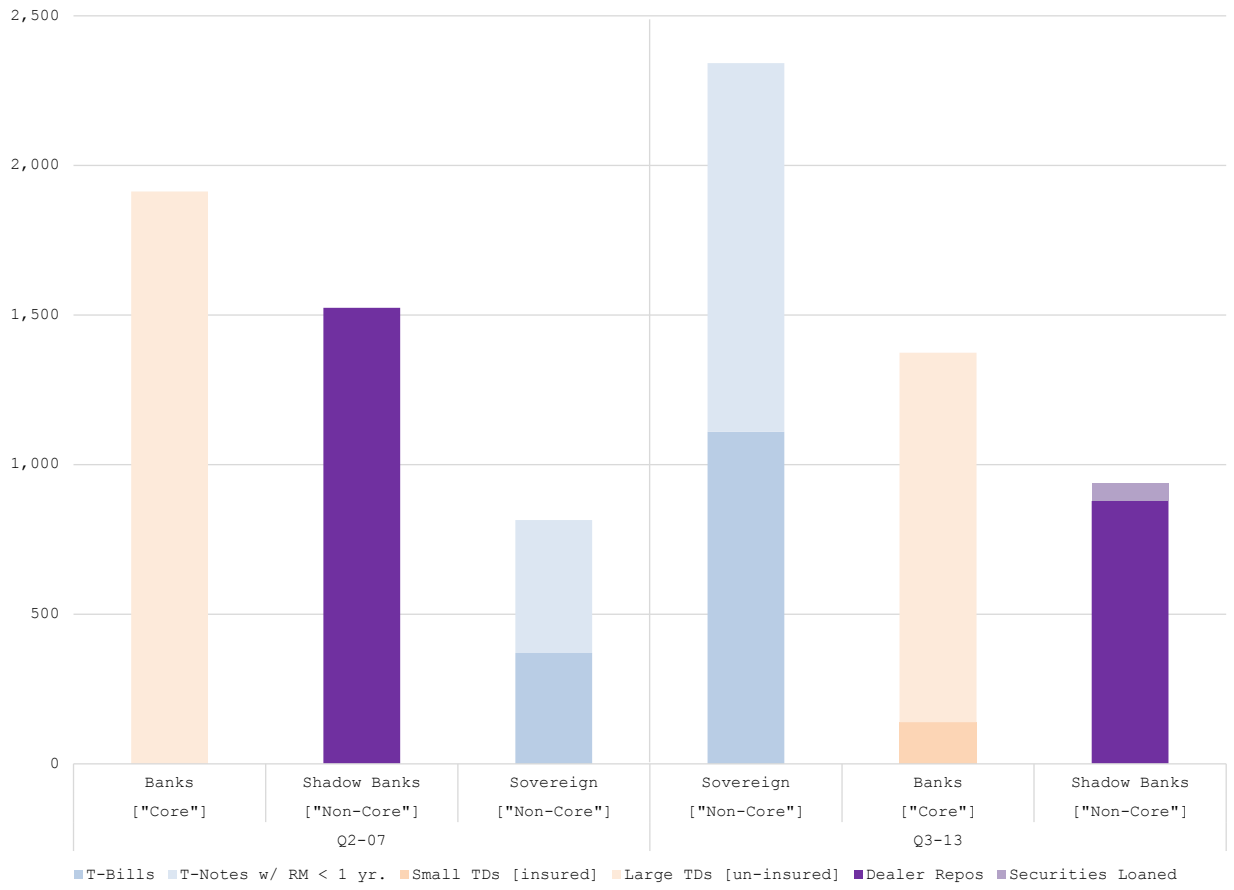
Sources: Haver, Federal Reserve Board, Federal Reserve Bank of New York, FDIC, U.S. Treasury

Similarly, intermediaries' core par at maturity liabilities (time deposits and negotiable CDs) are less prominent in institutional cash portfolios due to deposit insurance limits relative to the sum of noncore money-like claims (term dealer repos and short-term Treasuries, respectively), which are the dominant term assets in institutional cash portfolios (see Chart 7).

Finally, what does the Federal Reserve's reverse repo facility mean from the perspective of institutional cash pools?

Unlike retail cash investors, for whom public money is available in the form of currency, institutional cash pools still do not have direct access to public money, as reverse repos are available only to shadow banks, not cash pools. That said, reverse repos mean that the shadow money claims

Chart 7: "Core" versus "Noncore" Term Money Claims, $ billion



Sources: Haver, Federal Reserve Board, Federal Reserve Bank of New York, FDIC, U.S. Treasury

that cash pools keep the bulk of their cash balances in are now backed — at least in part — by something of much higher quality than anything that was available before: the gradual increase in the size of the Federal Reserve's reverse repo facility with individual shadow bank counterparties means a gradual increase in the share of shadow money claims backed by the safest of safe assets — the liabilities of the Federal Reserve.

It is also worth emphasizing that reverse repos, if permanent, could become the basis of a liquidity-requirement regime for shadow banks. Much like banks have a minimum reserve requirement against the demand deposits they issue, minimum reverse repo balances could become the equivalent of minimum reserve requirements for shadow banks against the overnight repo and constant NAV liabilities they issue.

Were such minimum reverse repo requirements to become the norm, the safety of shadow money claims would increase for two reasons: there would be more explicit official liquidity buffers backing them, and, operationally, shadow banks would have a standing account relationship with the Federal Reserve. Potential liquidity requirements for shadow banks, coupled with enhanced supervisory powers over shadow banks, could potentially be an important step along the Federal Reserve's evolution toward becoming a "dealer of last resort" in Bagehot's 21st century sense (see Mehrling, 2010 as well as Mehrling et al, 2014).

PART III — THE HIERARCHY OF USES

Once cash PMs have invested their cash balances with wholesale banks, dealers, and money funds, their cash will be used toward different ends. Some will be used to redistribute dollar liquidity between intermediaries in the financial ecosystem globally, and some to fund large portfolios of capital market bonds, also globally. This section of the paper discusses the hierarchy of the uses of cash — hierarchy because some forms of intermediation get cash to the economy directly, some less directly, and some even less directly by setting the price of securities (and hence risk premia) in secondary markets.

One way to rank the uses of cash within the ecosystem is to start with the lending and money creation function of banks on top. The vast majority of credit and money claims in the ecosystem begin life as a loan and the creation of a demand deposit in equal amounts (see Turner, 2013, Bank of England, 2014 and Kumhof and Jakab, 2014).

Some loans are retained by banks and some are securitized, but what is certain is that once a loan and corresponding demand deposit account have been made, the borrower will draw on that account and spend the cash in it. When the account is drawn, the loan remains on the bank's balance sheet and the bank will have to find funding for it, and will turn to money dealers in the money market to do so.

Money dealing (see Mehrling et al, 2013) is next in the hierarchy. Money dealing is market making both within and across onshore and offshore (Eurodollar), and secured and unsecured money markets between wholesale banks, dealers, and money funds globally. It involves the borrowing and

lending of cash both on a short-term basis — using money market funding to fund money market lending.

Money market funding of capital market lending, or the running of global portfolios of dollar-denominated capital market claims with funding raised in secured and unsecured dollar money markets globally is third in line in the hierarchy of the uses of cash. Money market funding of capital market lending is different from money dealing in that the latter uses short-term funding exclusively for short-term lending in the money market whereas the former uses short-term funding for the funding of portfolios of long-term, capital market claims.

These three uses of cash — loan-based lending, money dealing, and money market funding of capital market lending — can be found on the balance sheets of banks, dealers, money funds, and other investors to varying degrees. Banks do all three, dealers do both money dealing and money market funding of capital market lending, money funds do exclusively money dealing while other investors do exclusively money market funding of capital market lending. The remainder of this section will discuss various types of money dealing and money market funding of capital market lending and provide examples of each (charts showing the volume of each will follow at the end of this section).

III.1 — Money Dealing

There are five basic forms of money dealing. Four of them support the redistribution of liquidity within the U.S. financial ecosystem and one supports the redistribution of dollar liquidity globally.

1. Interbank money dealing, whereby wholesale banks borrow money in the federal funds market from banks with a net surplus of reserves and relend it to banks with a net shortage of reserves.
2. Interoffice money dealing, whereby the New York branches of foreign banks borrow money by selling Yankee CDs and CP to prime funds and relend it to headquarters to fund global dollar lending.
3. Interdealer money dealing, whereby dealer banks borrow money among themselves via inter-dealer brokers in the general collateral financing (GCF) repo market using public securities.
4. "Interlinked" money dealing, whereby both government-only and prime funds borrow money from cash PMs and relend it to dealers and wholesale banks via the tri-party (TRP) repo market.

5. Client-driven money dealing, whereby dealers borrow money from money market funds as well as from cash PMs directly and relend it to buyside customers via the bilateral (DvP) repo market.

Being at the center of money dealing in both the secured and unsecured money markets makes wholesale banks (which include the clearing banks and the New York branches of foreign banking organizations), dealers and money market funds money dealers.

As dealers they quote a two-sided market and absorb the resulting order flow on their balance sheets. Some of this order flow results in matched books, but a money dealer who insisted on matched book at every point in time would not, strictly speaking, be supplying market liquidity at all. If customers are able to buy and sell quickly, in volume, and without moving the price of money, it is because a money dealer is willing to take the other side of that trade without taking the time to look for an offsetting customer trade. The result is inventories, sometimes long and sometimes short, depending on the direction of the imbalance in order flows (see Mehrling et al, 2013).

Long inventories refer to overnight funding of term money market loans, short inventories refer to term funding of overnight money market loans, and the idealized (an relatively low-in-volume) matched books refer to matching overnight to overnight and term-to-term books.

Money dealing in the domestic federal funds, GCF, and triparty repo markets is well researched (see Afonso et al, 2013 and Copeland et al, 2012, respectively), as is money dealing in the global dollar funding market (see Mehrling, 2011 and Mehrling et al, 2013 on FX swaps and Eurodollars and Shin, 2011 on interoffice lending).[29]

The fifth category of money dealing — buyside-driven money dealing in the bilateral repo market — is under-researched and relatively poorly understood, primarily because of a lack of data.

Efforts to collect data on the bilateral repo market tend to focus on the quantitative aspects of repo (such as volumes, rates, haircuts and the collateral involved) and less on the qualitative aspects of repo (such as why particular repo transactions take place).

[29] FX swaps as risk transfer instruments will be discussed later in this section. FX swaps as a source of funding are not discussed in this paper. For the use of FX swaps in funding, see Mehrling, 2013, Stein, 2012 and McGuire and von Peter.

Even without actual data, however, a basic review of why dealers' buyside customers engage in repos can help enhance our understanding of the role that repo plays in the modern financial ecosystem.

We can collectively think of buyside customers that use repo as risk portfolio managers (or risk PMs). Risk PMs come in many shapes and forms, and their unifying mandate is to "beat the benchmark".

What sets risk PMs apart from traditional, long-only investment managers (such as mutual funds) is their ability to use leverage. Risk PMs may be hedge funds or any investment vehicle (such as an absolute return bond fund or unconstrained bond fund) or separate account with a mandate that allows the use of at least some leverage.

Investors that place funds with risk PMs understand that there are both upside and downside risks to their investment. In contrast, when they place funds with cash PMs — whose mandate is "do not lose" — the assumption is that there are no downsides, just modest returns.

Beating benchmarks is possible either with or without the use of leverage. The latter involves skilled market timing and security selection and the former — leverage — involves the use of borrowed cash for three ends: funding, shorting, and derivatives margining.[30]

In the case of funding, risk PMs need cash for funding levered fixed income positions. In the case of shorting, risk PMs need cash as collateral for shorting securities expected to go down in value. In the case of derivatives, risk PMs need cash for margining purposes.

Bilateral repos and dealers play a role in facilitating all of these forms of leverage. The following sections provide examples of each, with the emphasis in each example on the use of cash in various kinds of investment management strategies and how dealers' money dealing function helps facilitate the implementation of these strategies (to remind, this section is about the hierarchy of the uses of cash, and in specific the function of money dealing).

III.1.a — Money Dealing - Bilateral Repos: Cash for Funding

[30] Benchmark beating returns can come in two basic forms: pure alpha (through smart portfolio selection, market timing and hedges) and alpha masquerading as levered beta (through the use of funding, securities lending and derivatives).

First, consider the case of cash for funding. A risk PM — for example a mortgage REIT (or M-REIT) — decides to go long a portfolio of agency RMBS with 10 percent equity down and the rest of the position funded. The equity is the M-REIT's assets under management, and the M-REIT's goal is to beat its benchmark using leverage through funding.

To construct this portfolio, the M-REIT pledges the agency RMBS it wants to buy as collateral in a repo transaction and receives the cash from the government trading desk of a dealer to pay for this investment. In turn, to fund its cash (or reverse repo) loan to the M-REIT, the dealer repledges the agency RMBS to a cash PM for a cash loan also in the form of repo, completing a matched book transaction.

III.1.b — MONEY DEALING - BILATERAL REPOS: CASH FOR SHORTING

Second. consider the the case of cash for shorting. Every time a security gets shorted, a risk PM — a short seller — a dealer and a securities lender (in either an agent or a principal role) are involved. Once a compelling investment thesis to short a specific security is identified, the short-seller posts cash as collateral (so-called initial margin) with a dealer to borrow the security in question.

The goal of the short seller is to beat its benchmark by generating uncorrelated returns using leverage through shorting. Short sellers borrow securities when prices are high and return them when prices are low, the inverse of a buy-low-sell-high strategy.

If the dealer does not have the particular security in its inventory, it would look for a securities lender — say a corporate bond ETF — to borrow it from.[31] The dealer would then take the borrowed security and repledge it to the short seller. Similar to the cash for funding example, this transaction would show up on the dealer's balance sheet as a repo liability to the short seller (who posted cash as collateral) and a reverse repo asset to the ETF (which took cash as collateral), completing a matched book repo transaction.

To close the loop, the ETF would reinvest the cash collateral it received for the securities loaned, with the transfer of cash to a cash collateral reinvestment account, where it is invested with the

[31] A securities lender may also be a pension fund, a foreign central bank's FX reserves management desk or a long-only mutual fund either directly or indirectly through the securities lending program of a large custodian bank.

same type of intermediaries it was withdrawn from when the short seller decided to withdraw its cash from safe assets and post it as risk capital in the form of collateral for securities borrowed.

The ETF's incentive to engage in securities lending is the lending fee it receives for securities loaned and the reinvestment income it receives on the reinvestment of cash collateral balances. Such lending fees and reinvestment incomes are important sources of return that securities lenders book either as excess return over a benchmark or as a lower fee relative to those of their competitors.[32]

The relative size of the lending fee and reinvestment income in a securities lending transaction depends on the nature of the securities loaned. If the securities are special, meaning the security being lent has an intrinsic value in the collateral market and the transaction is motivated mainly by the borrower's desire for a specific security, lending fees dominate and reinvestment tends to be on the conservative side. On the contrary, if the securities loaned are general, reinvestment incomes dominate and the lending fees tend to be relatively small. As a rule of thumb, lending fees dominate in the case of private securities and reinvestment income dominates in the case of public securities (see Keane, 2013).[33]

Importantly, while the direction of the flows of cash and collateral in this example is identical to the one in the previous cash for funding example, the economic motivations behind them are completely different. In the previous example, a matched book repo intermediated a cash loan versus securities as collateral for the purposes of funding. In the present example, a matched repo book intermediates a security loan versus cash as collateral for the purposes of shorting. The distinction that collateral can be both cash and securities is crucial, but one that some literature on collateral markets does not fully appreciate (see Singh, 2013).[34]

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[32] Both the securities lender and the short seller get excess return from securities lending. However, if the strategy to go short works, the bulk of the returns will accrue to the short seller. The securities lender would still take a hit to its NAV, which will be mitigated by securities lending revenues only marginally.

[33] As Keane notes: "An implication of this relationship is that if the securities have no intrinsic value in the collateral market, then the rebate rate [the rate that is typically paid by the securities lender on the cash received as collateral and is also known as the lending fee] will be equal to the general level of money market interest rates. If, instead, the rebate rate is lower than the relevant general money market rate, then the rebate rate signals that the security being lent has intrinsic value in the collateral market and the transaction is motivated, at least partly, by the borrower's desire for specific securities [in which case the rebate rate may even be negative and hence the lending fee positive]. The level of the rebate rate in a securities loan provides the same price signal as the level of the repo rate in a repo transaction."

[34] In particular, securities serve as collateral to borrow cash, and cash serves as collateral to borrow securities via repo. Also note that cash in one currency serves as collateral to borrow cash in another currency via the FX swap market. Note here the conceptual and mechanical parallels between repos and FX swaps!

III.1.c — MONEY DEALING - BILATERAL REPOS: CASH FOR MARGINING

Third, consider the case of cash for margining. A risk PM — for example, the manager of a total return bond (TRB) fund that invests in corporate and sovereign bonds globally — senses an impending sell-off in markets due to some data surprises unexpected by the market.

The risk PM does not expect the sell-off to be long lasting and sees no problem with the fund's structural asset allocation, and so puts on a tactical hedge such that the selloff does not translate into falling net asset values leading to redemptions for the fund.

The risk PM's choice of instruments for this tactical hedge are swaps executed with dealers' swap desks — foreign exchange swaps (FXS) to hedge against a dollar rally which would hurt its local currency bonds in emerging markets, and interest rate swaps (IRS) and credit default swaps (CDS) to keep the fund's mortgage duration on target and hedge against widening corporate spreads, respectively.

If all goes well with the risk PM's plan, falling bond values would be offset by speedy cash collateral transfers on the swaps, keeping the TRB fund's net asset value stable amidst a temporary market sell-off, enabling the risk PM to outperform the benchmark.

But what if the plan backfires? If, instead of a sell-off, unexpectedly positive data and hawkish policy comments spark a rally in EM and corporate spreads and a selloff in rates, the swaps intended as a hedge become a drain on the TRB fund's performance.

Instead of harvesting cash collateral as a result of mark-to- market gains, the fund has to post cash collateral (as specified by its dealer) on mark-to-market losses before closing out the swaps.

As a bond investor, the TRB fund would carry only minimal cash balances, which it needs to hold for redemption purposes. Thus, to pay its counterparty (Dealer A), the fund has to repo some of its bonds to raise liquidity to settle derivatives payables.

Doing so will involve another dealer (Dealer B) who in a manner similar to the first example (see cash for funding) would lend the risk PM cash against a portfolio of bonds that the dealer would then repledge to cash PMs to fund the loan on a matched book repo basis.

While the direction of the flows of cash and collateral are the same as in previous examples, the motivation is again different: not to fund a bond position, not to go short, but to raise liquidity in order to settle derivatives payables — that is, to pay margin.

But the example does not end here. Dealer A takes the opposite side of the TRB fund's trades only initially, and as a risk dealer (which operates similar to a money dealer, see Mehrling et al, 2013), it would later turn around and offload them in a matched book swap transaction to another risk PM — for example a macro hedge fund — who effectively takes the opposite (bullish) view of the world (expecting a bout of strong macro data) than the TRB fund's manager.[35]

Once the TRB fund has raised the cash from Dealer B and transferred it to Dealer A, Dealer A — as a matched book intermediary — then transfers it to the macro hedge fund, which is the final recipient in this transaction and the ultimate winner of the bet that the near-term data flow will turn unexpectedly strong.

The risk PM taking the other side of the derivatives trade does not necessarily have to be a macro hedge fund, but may be any type of investor that invests using derivative overlay strategies instead of investing in cash bonds. This strategy involves a portfolio of derivatives run by a risk PM and a cash pool run by a cash PM where cash needs to be accessible at par on demand for margining purposes.

Such derivative overlay strategies are becoming increasingly prominent in asset management, as the traditional, long-only products in the industry have come under competitive pressure from (1) hedge funds providing alpha through high-margin, absolute-return strategies, and (2) index replication products such as ETFs providing beta at a low cost. Traditional asset managers have responded to the pressure by offering innovative products based on the investment techniques used by hedge funds using derivatives.

III.2 — Money Market Funding of Capital Market Lending

[35] Macro hedge funds and derivative overlay investment strategies are similar in nature to short sellers, in that until an investment opportunity to go short or a view of the world gets formulated and expressed using derivatives, these investors are mere cash PMs, keeping their cash balances in safe assets. Once these cash balances are used as collateral for short positions or are combined with a portfolio of derivatives, they become risk capital. What these examples show is that some strategies straddle the world of both risk PMs and cash PMs.

Money market funding of capital market lending, via funding raised through a money dealer, may take place onshore or offshore, and on at least four different kinds of balance sheets.

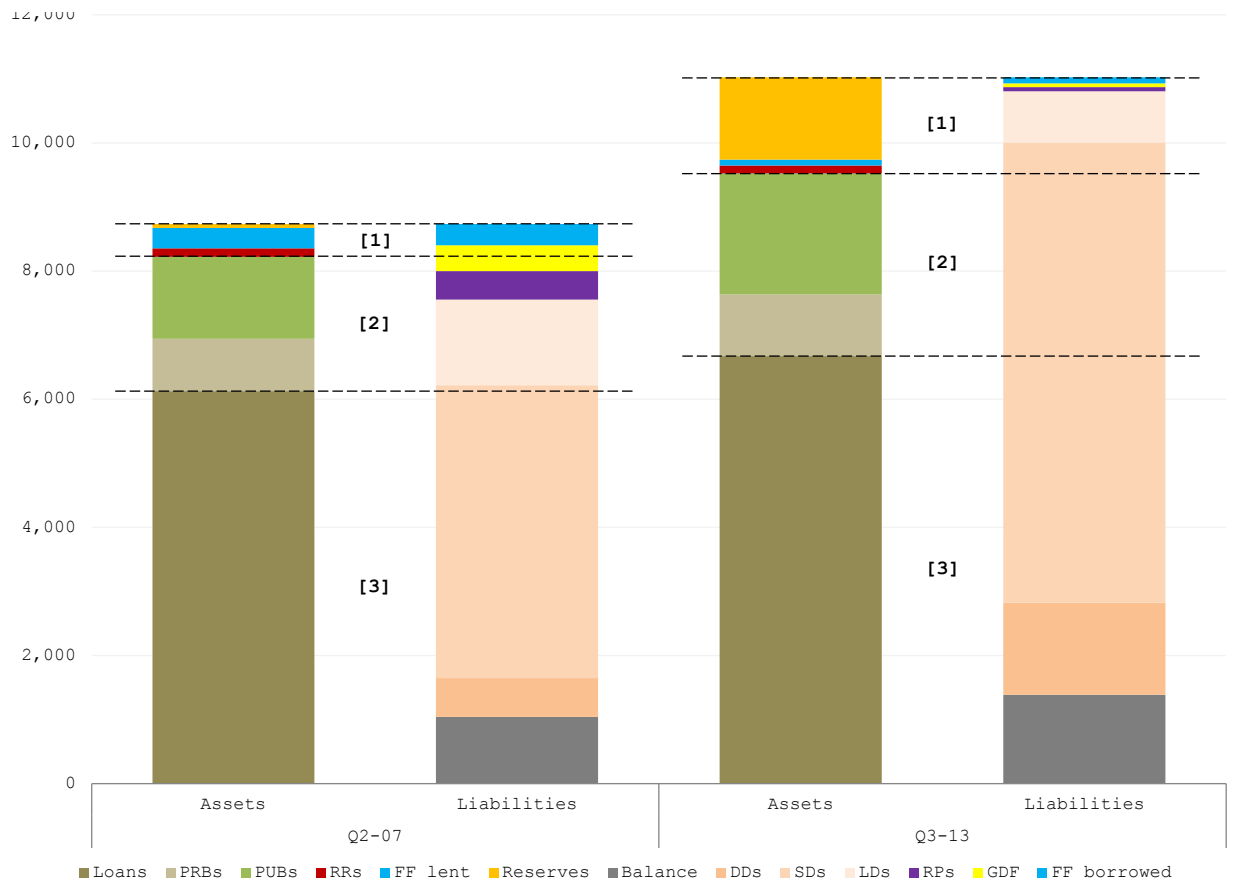
1. Funded risk PMs' securities portfolios. These include for example the aforementioned M-REITs, but also risk parity funds that aim to engineer targeted risks and returns (see Dalio, 2010) as well as any type of fixed income investment strategy that uses short-term funding to invest in a portfolio of bonds. Funding for such portfolios is typically raised through bilateral (DvP) repos via dealers.
2. Foreign banks' U.S. dollar securities portfolios. These include European and other developed economy banks' portfolios of mostly private U.S. securities (for example, ABS and private-label RMBS precrisis) funded via interoffice claims or the Eurodollar or FX swap markets (see for example Bernanke et al, 2011 and Shin, 2011).
3. U.S. wholesale banks' securities portfolios. These include public and private securities issued by U.S. residents and dollar-denominated corporate and sovereign bonds issued globally. Funding for these portfolios is typically raised through a diverse mix of money market instruments sold to prime money market funds.
4. Dealers' securities inventories, but only the portion funded in the repo market. Similar to U.S. wholesale banks, these include public and private securities issued by U.S. residents and dollar-denominated corporate and sovereign bonds issued globally.[36]

III.3 — The Hierarchy of Uses – Data and Data Gaps

Chart 8 shows the volume of money dealing, money market funding of capital market lending and loan-based lending by U.S. chartered banks. Segment [1] shows that the volume of money dealing by U.S. banks rose from about $500 billion to $1.5 trillion between the second quarter of 2007 and the third quarter of 2013, or from 5 percent to 15 percent of total assets, respectively. The blue rectangles show that interbank money dealing accounted for half of U.S. banks' money dealing activity precrisis and shrank significantly since then.

Chart 8: The Hierarchy of Uses — U.S. Banks, $ billion

[36] This section is concerned with the phenomenon of money market funding of capital market lending. Dealer inventories funded by long-term bonds and equity don't meet this criteria, only the part funded via the short-term repo market.



PRB = private bonds. PUB = public bonds. RR = reverse repos. FF = federal funds. DD = demand deposits. SD = savings and small time deposits. LD = large time deposits. RP = repos. GFD = global dollar funding. Balance = equity and term debt, derived as the difference between total assets and short-term liabilities. The chart excludes funding from the Federal Home Loan Bank (FHLB) system and mortgages pledged for FHLB funds.

Sources: Haver, Federal Reserve Board, and author's calculations

Segment [2] shows that over the same period, the volume of money market funding of capital market lending by U.S. banks rose from around $2 trillion to nearly $3 trillion, maintaining a roughly 25 percent share of total assets. Segment [3] shows that over the same period the volume of loan-based lending by U.S. banks rose from just over $6 trillion to more than $6.5 trillion, representing a decline from 70 percent to 60 percent of total assets. On net, U.S. banks raised about $400 billion of dollar funding in Eurodollar markets globally during the second quarter of 2007, less than 5 percent of total assets (see yellow rectangle on the liability side of the chart). This amount has fallen to marginal amounts since then.

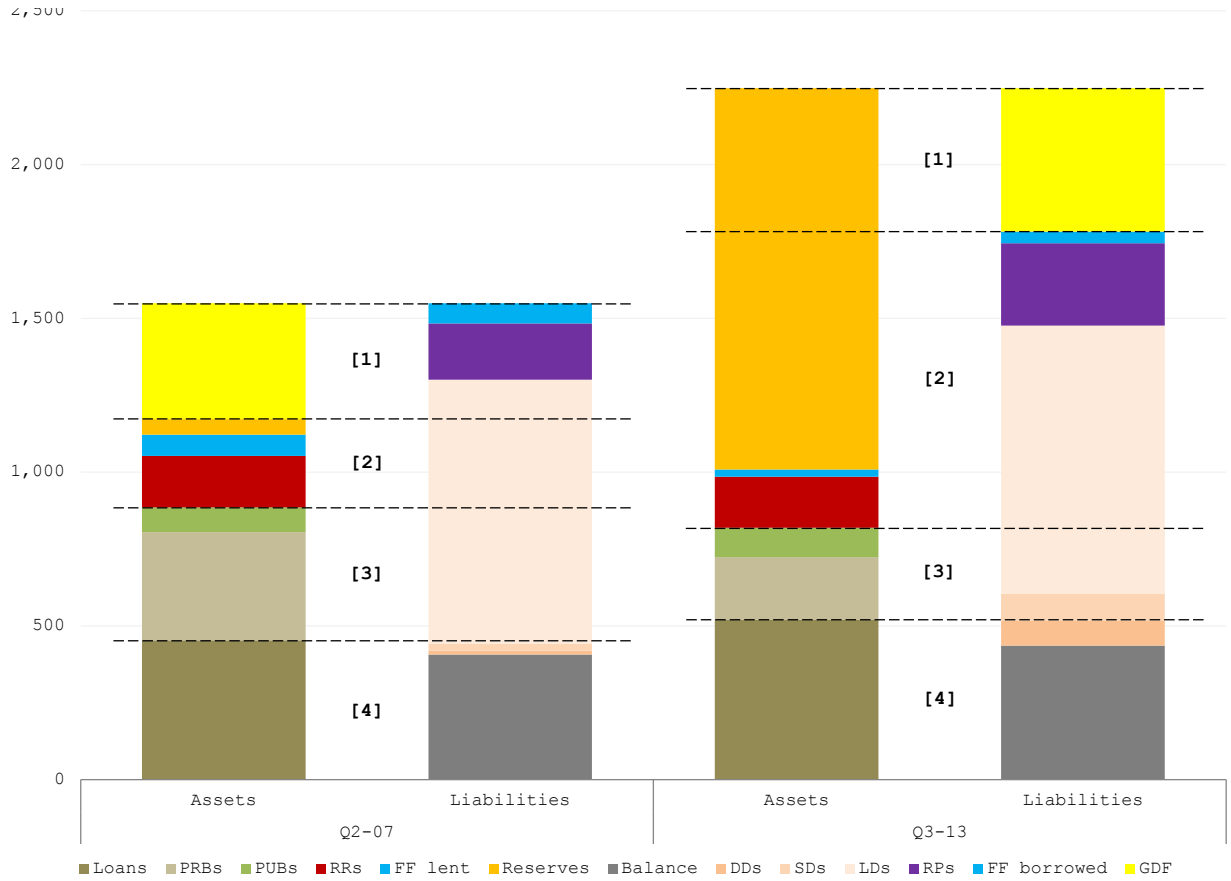
Chart 9 shows the volume of global and domestic money dealing, money market funding of capital market lending, and loan-based lending by the New York branches of foreign banks. Segment [1] shows that between the second quarter of 2007 and the third quarter of 2013 the volume of global (or interoffice) money dealing by these branches went from raising $400 billion in the U.S. money market and lending it to headquarters globally in order to fund Eurodollar lending, to raising over $500 billion in Eurodollar markets and funneling these back to the United States to fund reserves at the Federal Reserve.

Segment [2] shows that over the same period the volume of domestic money dealing by the New York branches of foreign banks rose from just under $300 billion to nearly $1.5 trillion, or from 20 percent to 65 percent of total assets. Segment [3] shows that the volume of money market funding of capital market lending fell from just over $400 billion to $300 billion, or from about 30 percent to 15 percent of total assets. And finally, segment [4] shows that loan-based lending rose from about $450 billion to $500 billion, representing a decline from 30 percent to 25 percent of total assets.

Segment [4] also shows that the loan books of the New York branches of foreign banks are primarily funded with term debt — that is, on the lending side of their business the New York branches of foreign banks conduct mostly credit transformation, not maturity transformation. Maturity transformation is confined mainly to money market funding of capital market lending activities, and the bulk of their balance sheets is dedicated to money dealing, which is a liquidity function, as opposed to a credit or maturity transformation function.

The balance sheet composition by activity of the New York branches of foreign banks is in marked contrast to the balance sheet composition by activity of U.S. banks, which (as shown in Chart 8) are first and foremost lenders via loans and second, lenders via portfolios of capital market instruments, activities funded primarily with deposits. At 15 percent of total assets as of the third quarter of 2013, money dealing by U.S. chartered commercial banks was also much lower relative to that of foreign banks' New York branches.

Chart 9: The Hierarchy of Uses — Foreign Banks NY Branches, $ billion

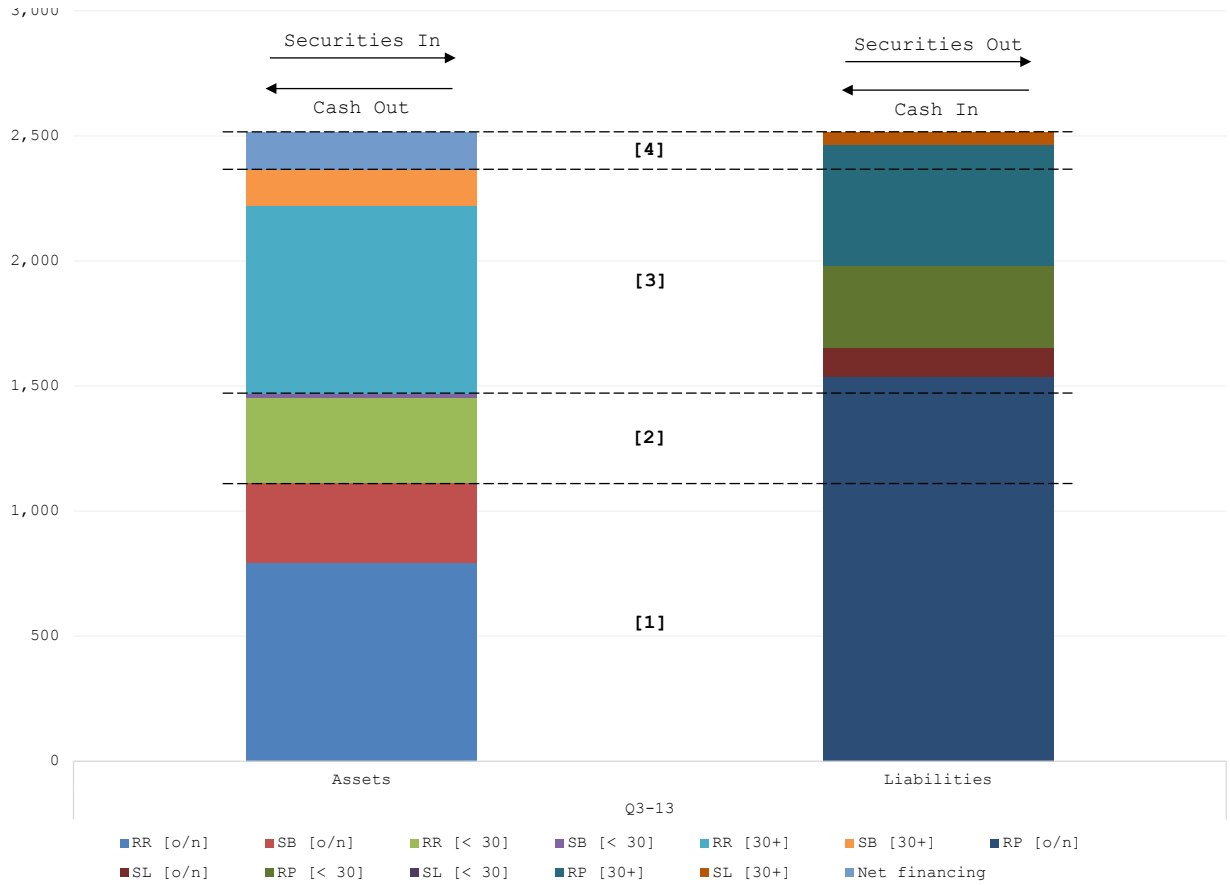


PRB = private bonds. PUB = public bonds. RR = reverse repo. FF = federal funds. DD = demand deposits. SD = savings and small time deposits. LD = large time deposits. RP = repo. GFD = global dollar funding. Balance = equity and term debt (derived as the difference between the total assets of foreign banks' NY branches and the short-term liabilities above).

Sources: Haver, Federal Reserve Board, and author's calculations

Chart 10 shows the volume of money dealing and money market funding of capital market lending by dealers using public securities (Treasuries and agency debt and RMBS) as collateral. Unlike banks, which deal in both secured and unsecured and local as well as global money markets, dealers deal exclusively in local, secured money markets. The secured nature of dealers' activities is denoted by the arrows on top of Chart 10 marking the flow of cash from right to left and the corresponding flow of collateral from left to right.

Chart 10: The Hierarchy of Uses – Dealers' Government Desks, $ billion



RR = reverse repo. SB = securities borrowed. RP = repo. SL = securities lent. Net financing = the portion of dealers' securities inventory financed via repos (as opposed to term debt or equity). [o/n] = overnight. [< 30] = secured securities financing transactions longer than overnight but within 30 days. [30+] = transactions longer than 30 days but shorter than a year.

Sources: Haver, Federal Reserve Bank of New York, and author's calculations

Unlike banks, whose money dealing activities are not broken down in the Federal Reserve's H.8 release by maturity, the FR 2004 survey of the Federal Reserve Bank of New York breaks out the borrowing and lending activities of dealers by term (into overnight, < 30 days, and 30 days <) and by asset class, although starting only from 2013.

Segment [1] shows that during the third quarter of 2013, dealers conducted just over $1 trillion in overnight secured money dealing on a matched book basis. Dealers funded about $1 trillion of overnight secured cash loans with the same amount of secured cash borrowings, which accounted for

45 percent of the size of dealers' government bond trading books and 40 percent of dealers' short-term liabilities.

Segment [2] shows that the volume of secured lending on tenors longer than overnight but less than 30 days, and funded with overnight repos was about $350 billion, or about 15 percent of the size of dealers' government bond trading books. Segment [3] shows that the volume of secured lending on tenors longer than 30 days was nearly $900 billion, or about 35 percent of dealers' government bond trading books, funded with overnight liabilities of $200 billion, liabilities longer than overnight but less than 30 days of about $300 billion, and the balance with liabilities longer than 30 days of $400 billion.

Segments [1] to [3] show that during the third quarter of 2013 the total volume of secured money dealing by dealers was nearly $2.5 trillion, or about 95 percent of their government bond trading book.

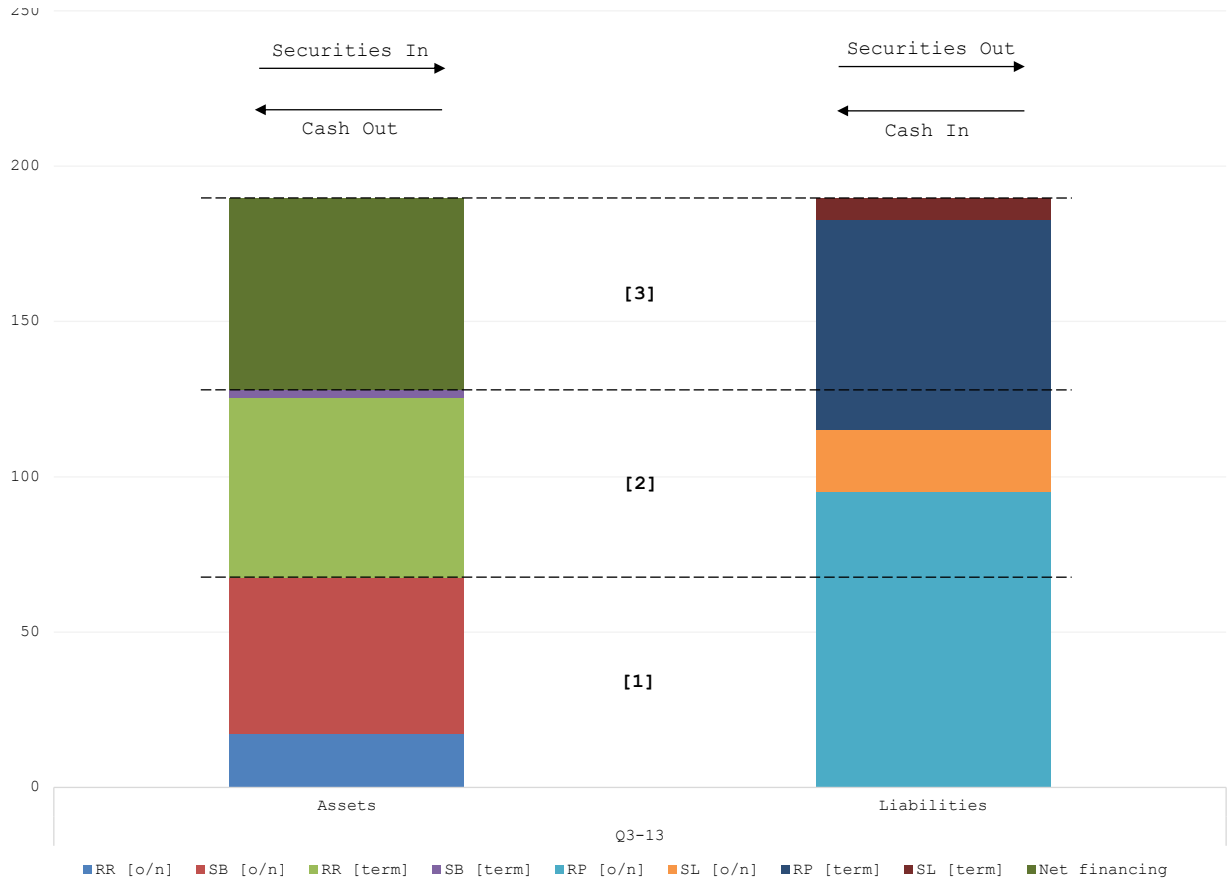
By contrast, segment [4] shows that the volume of money market funding of capital market lending — the funding of inventories of U.S. Treasuries and agency debt and RMBS via repos — was only $150 billion, or 5 percent of dealers' total short-term liabilities.[37]

Chart 11 shows the volume of money dealing and money market funding of capital market lending by dealers using private securities (that is, corporate bonds, ABS and Eurodollar bonds) as collateral. Segment [1] shows that during the third quarter of 2013, dealers conducted about $70 billion overnight secured money dealing on a matched book basis — that is, they funded that much of overnight secured cash loans with the same amount of secured cash borrowings. This accounted for 35 percent of the size of dealers' credit trading books and less than 5 percent of total short-term liabilities.

Segment [2] shows that the volume of secured lending on tenors longer than overnight was about $60 billion, or about 30 percent of the size of dealers' credit trading books. The bulk of these loans were funded with overnight liabilities of nearly $50 billion and the balance of $10 billion with secured liabilities longer than overnight.

Chart 11: The Hierarchy of Uses — Dealers' Corporate Desks, $ billion

[37] Dealer inventories are much larger than this, but the bulk of dealers' inventory is funded with term debt and equity, not via repo in the money market.



RR = reverse repo. SB = securities borrowed. RP = repo. SL = securities lent. Net financing = the portion of dealers' securities inventory financed via repos (as opposed to term debt or equity). [o/n] = overnight. [term] = secured loans with maturities longer than overnight.

Sources: Haver, Federal Reserve Bank of New York, and author's calculations

Segment [3] shows that the volume of money market funding of capital market lending by dealers using private securities (the funding of inventories of corporate bonds, ABS and Eurodollar bonds via short-term repos) was about $60 billion. This volume accounted for about 30 percent of the size of dealers' credit trading books, and less than 5 percent of total short-term liabilities.[38]

The previous examples show that dealer banks function primarily as money dealers and use only a small share of their balance sheets to fund term securities. Put differently, the bulk of their short-term liabilities fund short-term, securities financing transactions, as opposed to inventories of long-term securities such as bonds.

[38] Dealer inventories are much bigger than this, but the bulk of dealers' inventory is funded with term debt and equity, not via repo in the money market.

Chart 12 shows the volume of money dealing by government-only money funds (that is, money funds that invest exclusively in short-term Treasuries and agency debt, and repos backed by both short and long-term Treasuries, and agency debt and RMBS as collateral).

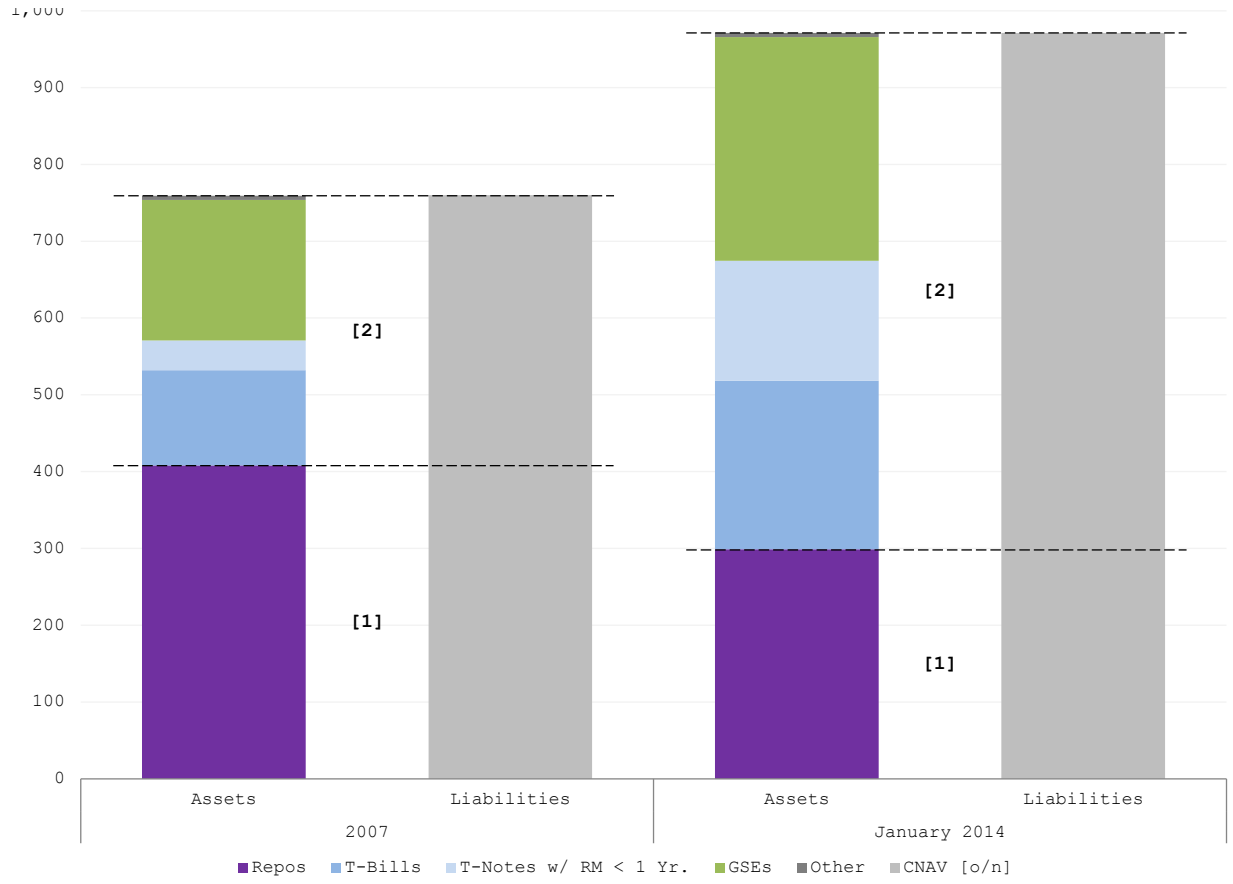
Unlike banks and dealers, whose money dealing activities can be funded by money market funding that may range from overnight to term, money funds can be thought of as "one-sided" money dealers. Money funds' money dealing is funded solely via overnight claims, in the form of the constant NAV shares — their quintessential product.

Furthermore, unlike banks and dealers, money funds do money dealing only but no money market funding of capital market lending, as their mandates do not allow holding term, capital market assets.

Segment [1] shows that between the second quarter of 2007 and the third quarter of 2013, the volume of overnight, matched book money dealing by government-only money funds (through overnight government repo investments) fell from more than $400 billion to $300 billion, or from over 50 percent to about 30 percent of total assets.

Segment [2] shows that over the same period, the volume of term money dealing by government-only money funds (through short-term U.S. Treasuries and agency discount notes) rose from $350 to over $650 billion, or from around 50 percent to 70 percent of total assets.

Chart 12: The Hierarchy of Uses — Government Money Funds, $ billions



GSEs = agency discount notes. CNAV [o/n] = par on demand, constant NAV, overnight money fund shares.

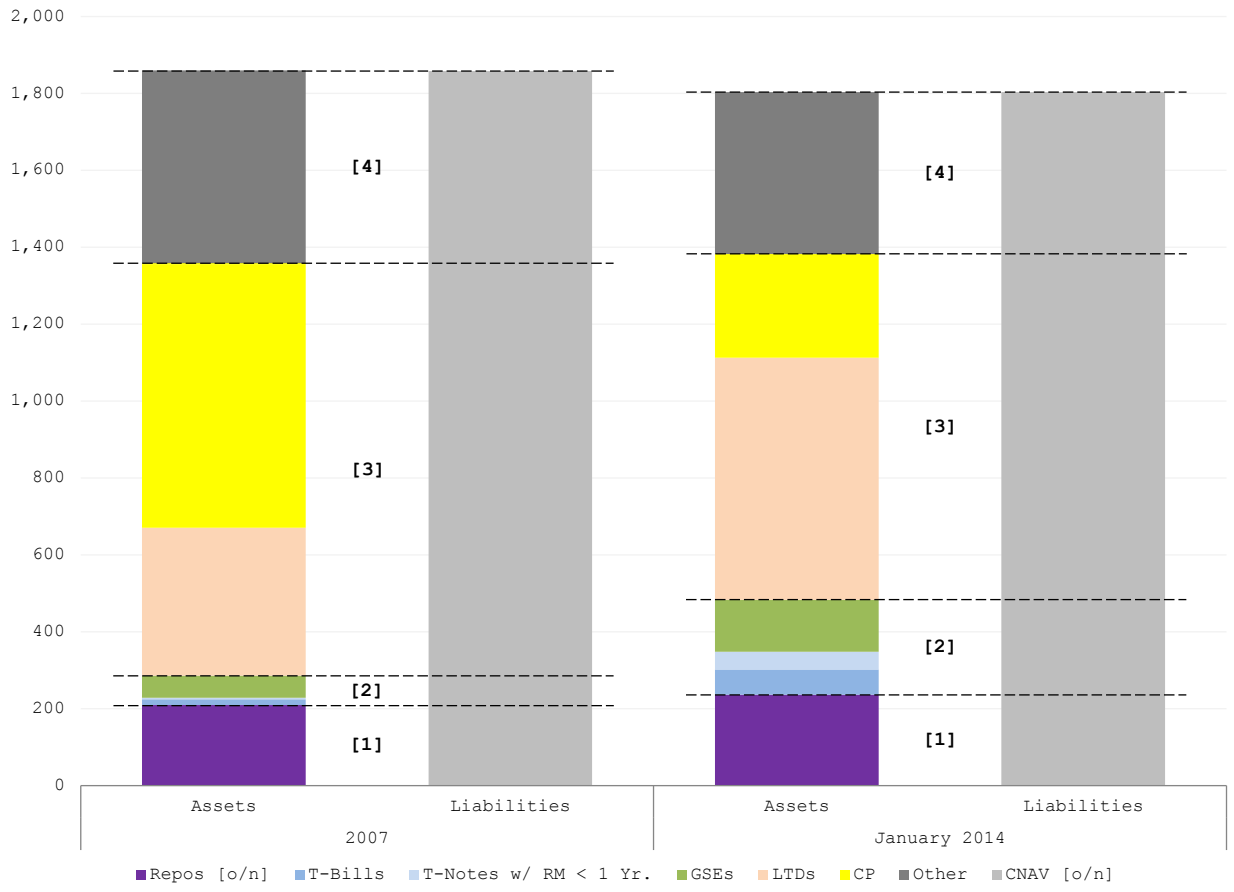
Sources: Haver, Federal Reserve Board, SEC, and author's calculations

Chart 13 shows the volume of money dealing by prime money funds (that is, money funds that can invest not only government and government-backed claims, but also credit risky, private claims).

Segment [1] shows that during both the second quarter of 2007 and the third quarter of 2013 the volume of overnight, matched book money dealing by prime money funds (through overnight repos to dealer banks) was roughly $200 billion or about 10 percent of total assets.

Segment [2] shows that over the same period, the volume of term money market lending to the sovereign and the government-sponsored enterprises (GSEs) increased from just under $100 billion to just over $200 billion, or from 5 percent to 10 percent of total assets.

Chart 13: The Hierarchy of Uses — Prime Money Funds, $ billions



GSEs = agency discount notes. LTDs = large time deposits. CP = financial commercial paper. Other = non-financial CP and asset-backed CP. CNAV = par on demand, constant NAV shares.

Sources: Haver, Federal Reserve Board, SEC, and author's calculations

Segment [3] shows the volume of term money market lending to wholesale banks dropping from about $1.1 trillion to around $900 billion, or from 60 percent to 50 percent of total assets. The bulk of these loans was extended to foreign banks either directly via Eurodollar CDs (certificates of

deposit) and CP (commercial paper) or indirectly through their New York branches via Yankee CDs and CP.

Segment [4] shows the volume of money market lending to real economy participants (as opposed to intermediaries or the sovereign) via nonfinancial commercial paper and asset-backed commercial paper, a significant portion of which also represents offshore dollar needs.

Data gaps prevent providing additional examples of money market funding of capital market lending other than the previously mentioned cases of onshore securities portfolios and inventories of banks and dealers. At present, there is no systematic effort to gauge the volume of short-term repo financing raised by risk PMs or the volume of short-term Eurodollar funding raised by global banks offshore to fund U.S. dollar-denominated bond portfolios.

Other than the mortgage REITs (or M-REITs), no official statistics exist on the volume of repo borrowings by separate accounts, risk parity funds, relative value hedge funds, total return bond funds and less traditional bond funds, such as absolute return and unconstrained bond funds (see for example Foley, 2014).

Judging from the volume of primary dealers' reverse repo books and netting for interdealer and dealer-to-bank repos (see Part IV for more detail) a conservative estimate for the volume of such repo borrowings could be at least $1 trillion, split about 1:2 between mortgage REITs and other risk PMs on the buyside of the ecosystem.

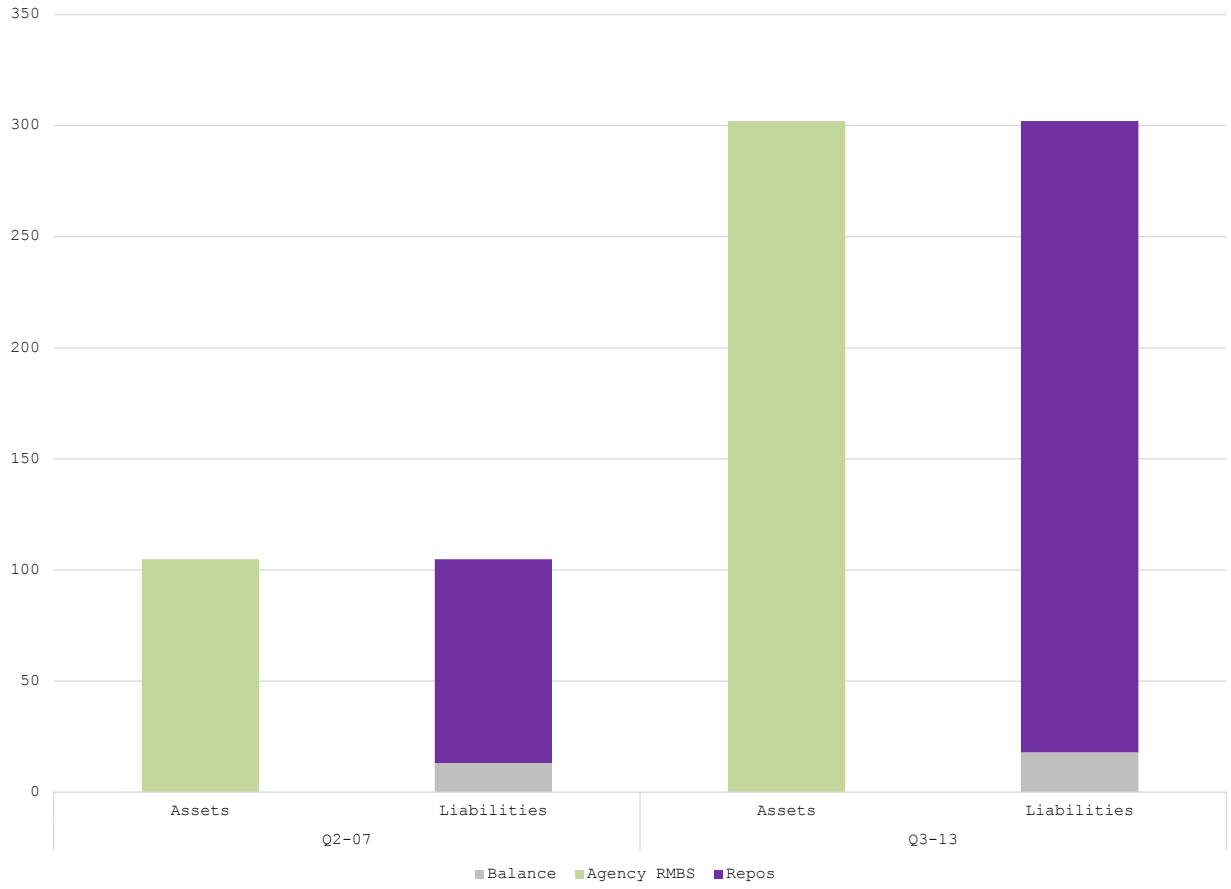
Chart 14 shows the evolution of the volume of money market funding of capital market lending done by agency mortgage REITs between the second quarter of 2007 and the third quarter of 2013.

The majority of M-REITs' repo funding is raised from dealers (which would show up as reverse repos on dealers' balance sheets). Based on a sampling of the SEC filings of public M-REITs, about 10 percent of this funding will be shorter than 30 days; the rest longer.

Finally, we know very little about the details of offshore dollar lending and borrowing that go through global banks' balance sheets outside U.S. borders. For example, the locational banking statistics of the Bank for International Settlements (BIS) provide estimates about the volume of U.S. dollar assets

and liabilities of banks outside the Unites States — that is, the volume of Eurodollar lending and borrowing by globally active banks outside U.S. borders.

Chart 14: The Hierarchy of Uses — Mortgage REITs, $ billion



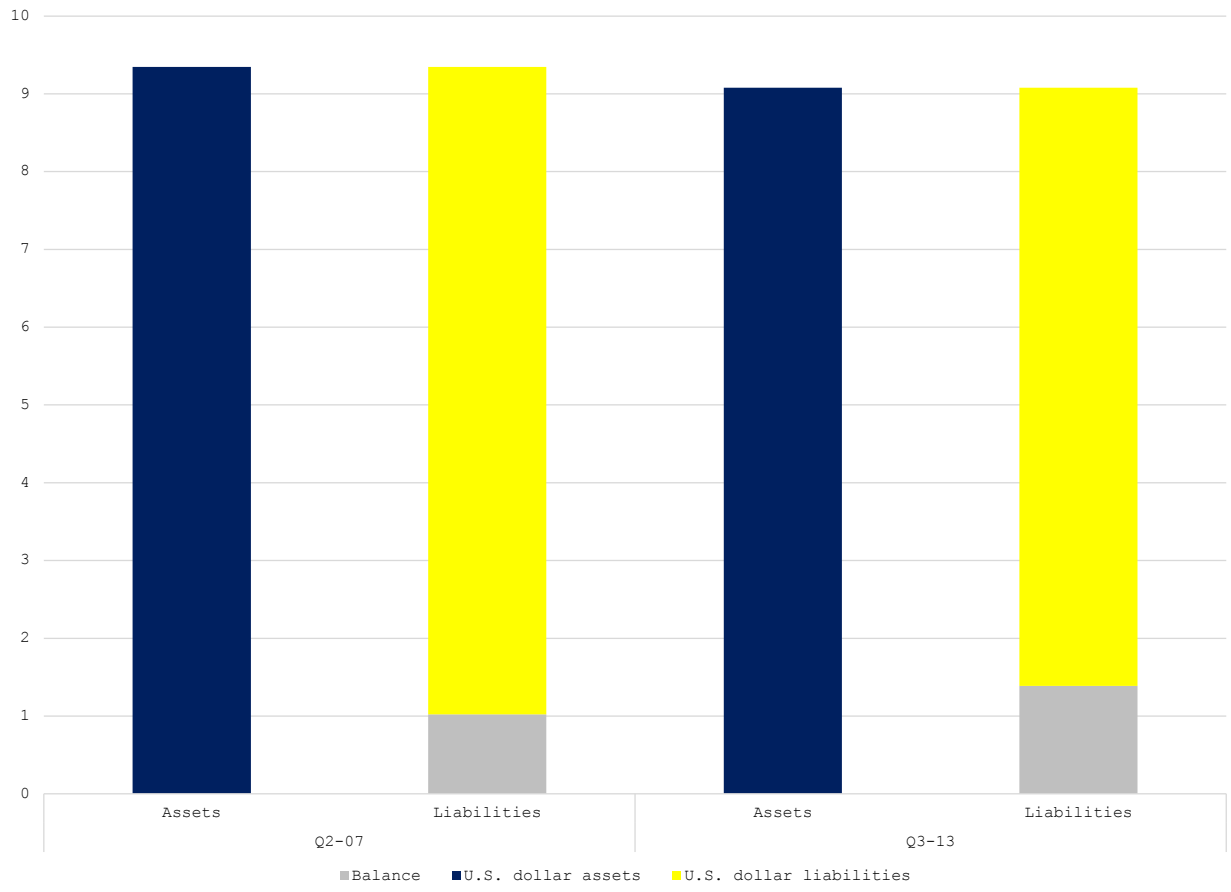
Balance refers to the difference between Agency RMBS and repos. It is a proxy of M-REITs' equity capital and other, short or long-term non-repo liabilities such as term debt.

Source: Haver, Federal Reserve Board, and author's calculations

Chart 15 shows that as of the end of the third quarter of 2013, the U.S. dollar lending and borrowing by banks outside the U.S. amounted to about $9 trillion and nearly $8 trillion, respectively.

But beyond that, we have no information about whether these dollar assets were loans or portfolios of bonds. Similarly, we do not know if corresponding dollar liabilities were long-term (such as bank bonds) or short-term, and if short-term, whether they were deposits, commercial paper, repos (done in Europe) or FX swaps.

Chart 15: The Hierarchy of U.S. — Offshore Dollar Banking, $ trillion



Source: Haver, BIS

To be able to provide a more or less complete mapping of the volume of U.S. dollar-denominated loan-based lending, money dealing and money market funding of capital market lending done by various kinds of intermediaries both within and outside the United States, we would need to survey the repo borrowings of all risk PMs (or equivalently, the reverse repo lending of dealers by counterparty) and would need more details on the U.S. dollar assets and liabilities of banks outside of U.S. borders (see McCauley and McGuire, 2014).

PART IV – THE DEALER ECOSYSTEM

As the previous examples show, dealers are unique among core intermediaries. Unlike banks and money funds, dealers conduct money dealing not only with other intermediaries but also the buyside. Effectively, they are the primary source of funding for the entire spectrum of levered

investment strategies in the asset management complex. Dealers are also the primary source of derivative trades.

We can sketch a simple accounting framework of the unique role of dealers by abstracting from the details of the balance sheets of cash and risk PMs, and by tuning out the forms of money and banking (deposits and central, retail and wholesale banking) we know well.

Cash PMs invest in the money market and are risk averse by their mandate. They seek minimal credit, duration, and liquidity risk. Their balance sheets consist of portfolios of money market instruments on the asset side financed with equity or security loans in the case of securities lenders' cash collateral reinvestment accounts.

Risk PMs invest in the capital market and are risk seeking by their mandate. They venture far out on the credit, duration, and liquidity spectrum. Their balance sheets typically consist of bonds on the asset side financed with some mix of equity and repos on the liability side, as well as derivatives, which given risk PMs' long positions in bonds, are used mainly for hedging and risk management.

Some investment strategies straddle the realms of both risk PMs and cash PMs. Recall the examples of short sellers and derivative overlay investors who take risks by shorting securities and expressing their market views using derivatives with their risk PM hats, and are looking for safety with their cash PM hat as managers of cash pools maintained to pay margin on their short and derivative positions.

Cash PMs and risk PMs are natural complements to each other. Cash PMs are cash rich but "safety poor" because they are too large to be eligible for deposit insurance, which drives them toward insured deposit alternatives such as repos and money funds (see Pozsar, 2011).

On the other hand, risk PMs are securities rich but "return poor" in the sense that they are mandated to beat benchmarks. To that end, they employ the techniques of funding, shorting, and derivatives.

In all of these cases, risk PMs repo securities out and cash in (to get funding, to lend securities, to raise cash to pay margin on out of the money derivative positions), and on the flipside, cash PMs

repo securities in and cash out (to lend cash on a secured basis or to build a short position in specific securities).

Cash PMs have their safety (thanks to the securities posted by risk PMs as collateral) and risk PMs have their enhanced return (thanks to cash PMs' cash loans in exchange for collateral — and assuming that risk PMs' levered bets ultimately work out as planned).

Dealers are thus intermediaries between risk PMs and cash PMs. Risk PMs interface with dealers on the asset side of dealer's balance sheet, and cash PMs interface with dealers on the liability side of dealers' balance sheets. In this process, dealers intermediate risks (credit, duration, liquidity as well as foreign exchange (FX) risks) away from cash PMs and toward risk PMs using repos and derivatives. This is risk intermediation (see Checki, 2009 and Pozsar, 2013).

As risk intermediaries, dealers perform two core functions: money dealing and risk dealing. Money dealing involves trading cash for collateral via dealers' government and credit trading desks. Risk dealing involves trading risks for collateral via dealers' swaps trading desks. Together, dealers' money and risk dealing activities represent what is typically referred to as dealers' fixed income, currencies and commodities (or FICC) trading business.

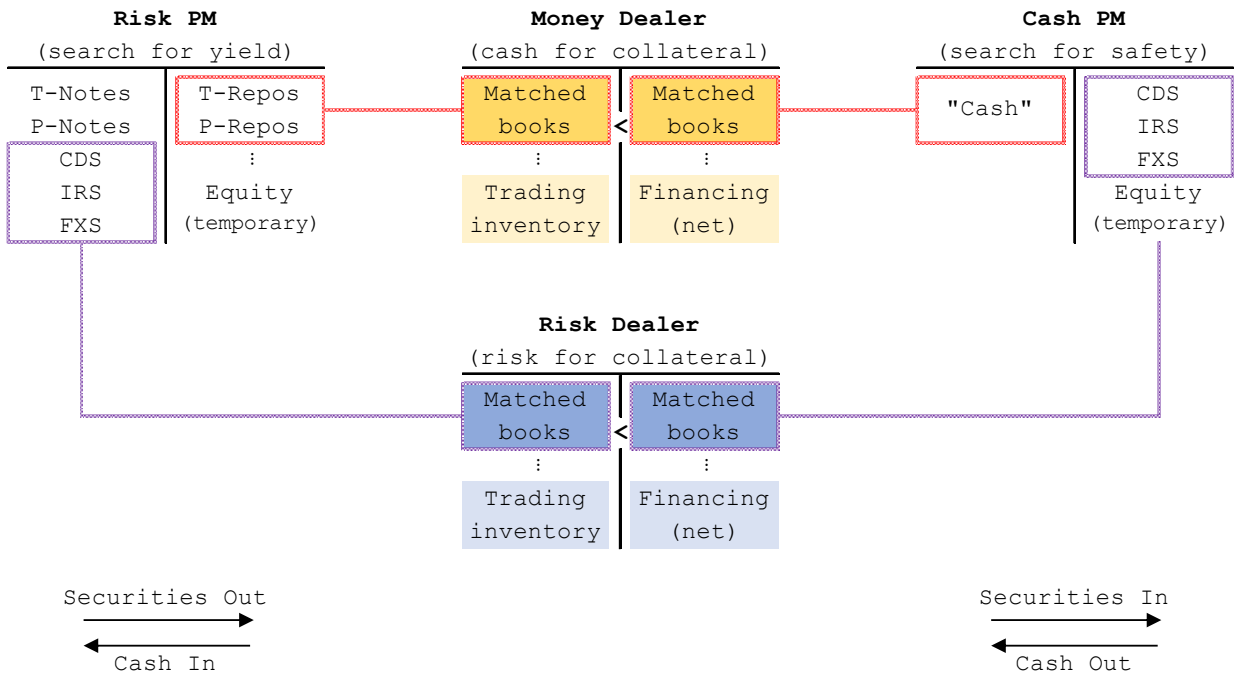
The vast majority of dealers' money and risk dealing activities via repos and derivatives, respectively, occur on a matched book basis. This means that the bulk of dealers' activities reflect the intermediation of risks between risk PMs and cash PMs, and only a small portion of their balance sheets reflects their absorption of risks (by virtue of their dealer function) via inventory positions.

Conceptually, one can distill this ecosystem into a model made up of six simple building blocks: risk PMs and cash PMs, money dealers and risk dealers, and matched books and speculative books. This model has been developed by the Shadow Banking Colloquium at INET (see Figure 4 and "Bagehot Was a Shadow Banker" by Mehrling et al, 2013).[39]

[39] A key departure from Mehrling et al's model is how this paper arrives at what Mehrling et al call the "capital funding bank." The capital funding bank is conceptualized as an investor who holds a portfolio of bonds and hedges all the risks of this portfolio via interest rate swaps, foreign exchange swaps, and credit default swaps, effectively holding a funded Treasury bill portfolio. This in fact was the business model of the first structured investment vehicles (SIVs), Alpha, Beta, and Sigma Finance Corporations. In this paper, we arrive at something like a capital funding bank's portfolio by collapsing various risk PMs' balance sheets into a single stylized balance sheet. The balance sheet items and instruments used in both cases are the same, but their net effect is different. Whereas the capital funding bank's aim is to run a levered bill portfolio, the stylized

Data limitations hamper gauging the scale of money and risk dealing between cash PMs and risk PMs. This problem is more acute in the case of risk dealing via swaps, because we only know the aggregate volume of transactions (both on a gross notional and a net credit exposure basis) but have very limited information about the identities of the buyers and sellers of credit, interest rate and FX risks.

Figure 4: The Dealer Ecosystem



Source: Bagehot Was a Shadow Banker - Mehrling et al (2013)

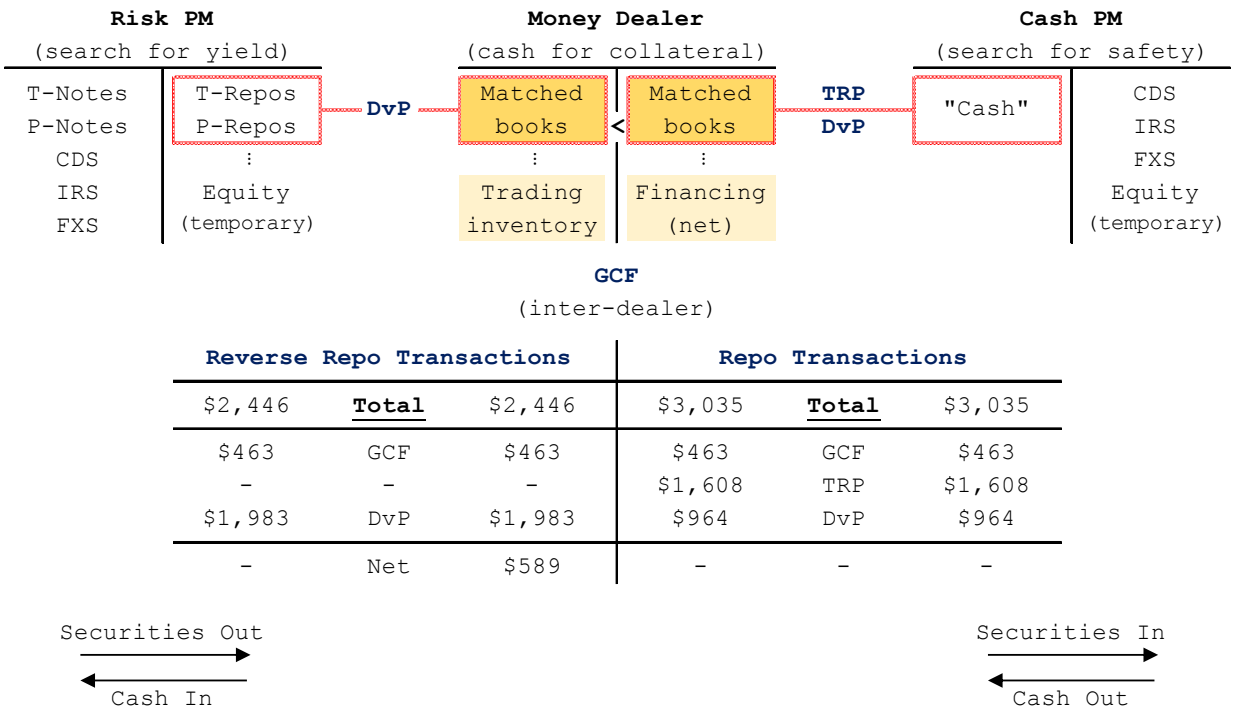
Gauging the scale of money dealing activities in the repo market is somewhat easier, but the picture is still far from complete. Figure 5 shows that, the bulk of cash PM's cash entering the dealer ecosystem arrives via tri-party repos. Bilateral repos account for a relatively small share of cash entering the system. General collateral finance repos happen exclusively on an interdealer and triparty basis. And cash lending by dealers to risk PMs occurs exclusively through bilateral repos.

Combining the conceptual map of the dealer ecosystem with the accounting exercise of Copeland et al (2012) shows that as of the second quarter of 2012, cash PMs placed more than $3

risk PM portfolio implies that some investors are levered on a funded basis, some are levered because they lent securities`, and some are levered through the use of derivatives either to speculate or to hedge.

trillion in cash with dealers. Of this amount, $2.5 trillion was lent on, with the difference used to finance dealers' securities inventories. Of the $2.5 trillion about $500 billion was lent on to other dealers in the GCF repo market against general collateral and the remaining $2 trillion was lent on in the bilateral repo market. Because of data limitations, we do not know how much of the $2 trillion was lent to risk PMs versus other banks and dealers, but anecdotal evidence suggests about a 1:1 split between banks and dealers, and risk PMs.[40]

Figure 5: Mapping and Sizing the U.S. Repo Market

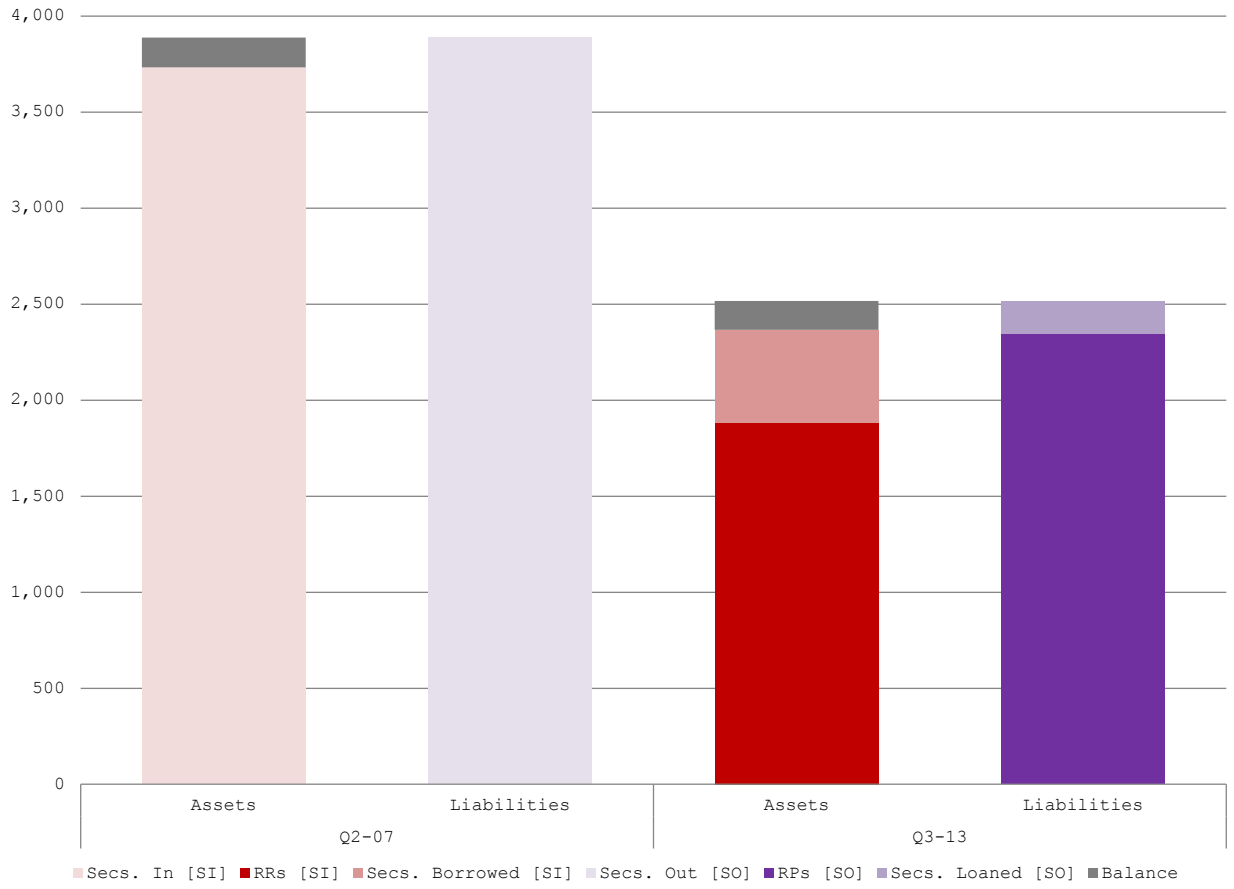


Source: Mehrling et al (2013) and Copeland et al (2012)

The following charts show the volume of money dealing by motivation — whether to borrow securities to make markets and facilitate client short positions; or whether to provide financing for clients via reverse repos either to fund of long positions in bonds or raise liquidity for derivatives margining (a breakdown that is impossible to determine with the present granularity of the data).

[40] For the nuances and caveats behind the estimates see Copeland et al, 2012.

Chart 16: Money Dealing Using Public Bonds as Collateral, $ billion[41]

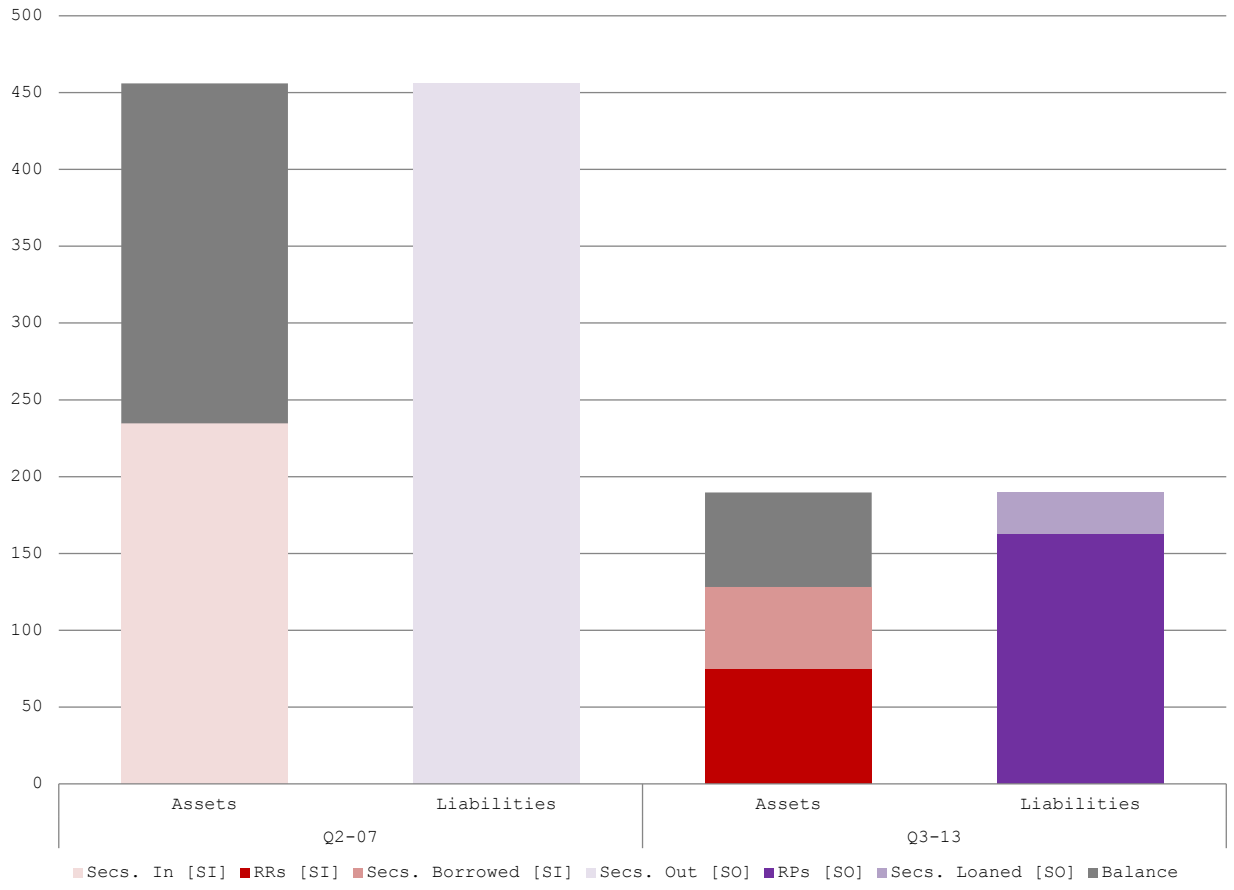


Sources: Haver, Federal Reserve Bank of New York

Chart 16 shows that in the third quarter of 2013, the $2.5 trillion in funding raised by dealers using public bonds (U.S. Treasuries and agency debt and RMBS) came almost exclusively through repos and only a small portion through client short positions. About 80 percent of the $2.5 trillion raised was used to fund customers' needs via reverse repos and only 20 percent was used to post cash as collateral to borrow securities as market makers.

Chart 17: Money Dealing Using Private Bonds as Collateral, $ billion[42]

[41] Public shadow money collateralized by Treasury and agency debt and RMBS. "Securities In" refers to the sum of reverse repos and securities borrowed (both transactions involve lending cash versus securities). "Securities Out" refers to the sum of repos and securities loaned (both transactions involve borrowing cash versus securities). Before 2013, data on securities in and out were not broken down by transaction types. "Balance" refers to net financing, the volume of dealers' securities inventory funded on a short-term basis. Net financing only reflects a portion of dealers' securities inventories, the bulk of which is financed by intercorporate loans, long-term debt securities, and equity.



Sources: Haver, Federal Reserve Bank of New York

Chart 17 shows that over the same period, roughly $200 billion in funding raised by dealers using private securities (corporate bonds, ABS and private-label RMBS) also came almost exclusively through repos and only a small portion through client shorts. Less than half of the $200 trillion raised was used to fund customers' needs via reverse repos and the rest to borrow securities and fund inventories of private securities to trade as market makers.

PART V — THE MACRO PERSPECTIVE

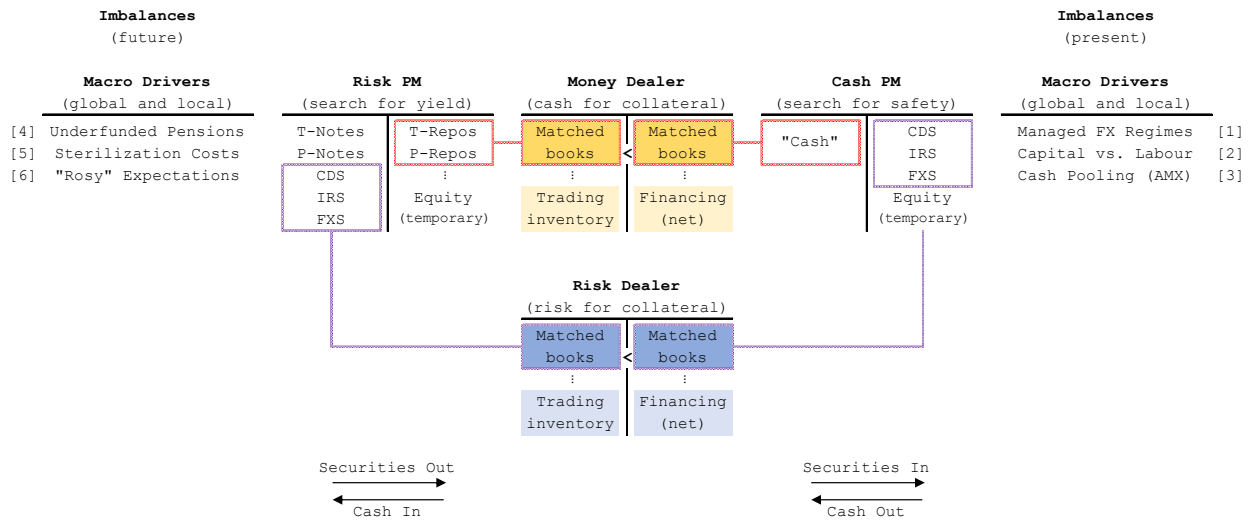
The global financial ecosystem that dealers operate in can be understood at two levels: first, by profiling the types of institutional investors that dealers interact with on both the asset and liability sides of their balance sheets (questions of "who" and "what"), and second, by identifying the global macro drivers behind the rise of these institutional investors and their needs (questions of "why").

[42] Private shadow money claims collateralized by private securities (such as corporate bonds, asset-backed securities, private-label RMBS, collateralized loan obligations, and collateralized debt obligations, as well as whole loans).

We discussed the questions of "who" and "what" in Parts III and IV of the paper. Turning to questions of "why", the secular rise of cash PMs seeking safety and risk PMs seeking yield has been driven by macro imbalances – both global and local, present and future.

The secular rise of cash PMs could be attributed to at least three macro imbalances (see Figure 6, items 1 to 3 on the right), although more analysis in this area is needed.[43]

Figure 6: Macro Imbalances Shaping the Dealer Ecosystem



Source: Pozsar (2014) expanding on Bagehot Was a Shadow Banker - Mehrling et al (2013)

First, on the global level, the secular rise of managed FX regimes in relation to the U.S. dollar is one explanation for the rise of cash pools held by FX reserve managers in the form of FX reserves' liquidity tranches, which are estimated at $1.5 trillion.[44]

Second, on both the global and local levels, the largest global corporations are holding more cash than ever before, estimated at more than $1.5 trillion. Unlike in previous decades, corporations today are net funding providers. There are many possible explanations for the increase in corporate cash pools. A likely contributing factor is the long-term secular increase in corporate profits as a share

[43] All numbers referenced below are as of the second quarter of 2013 (see the Office of Financial Research's 2013 Annual Report).

[44] The share of countries under a freely floating FX arrangement vis-à-vis the U.S. dollar declined from just over 45 percent of world GDP and world exports in 2000 to just over 35 percent in 2007 (see Eichengreen et al, 2011). On the secular rise of FX reserve accumulation contributing to the rise of short-term assets held by reserve managers see Pozsar, 2011 and McCauley and Rigaudy, 2011.

of national income, relative to wages. Corporations hold cash as a liquidity buffer for future investments; multinational firms may hold cash in foreign subsidiaries to defer or avoid taxes.[45]

Third, on the local level, the rise of cash pools within the asset management complex estimated at more than $3 trillion is explained by consolidation among asset managers, the centralized liquidity management of fund complexes, and the secular growth in securities lending and derivative overlay strategies (see Part III).

These examples reflect imbalances in the distribution of present incomes — between countries with current account surpluses and deficits, between capital and labor, and as a result of an increasingly large share of savings being managed by ever fewer asset managers.[46]

By contrast, the secular rise of risk PMs reflects imbalances between expected future investment returns, which exceed present yields on long-term investments on an unleveraged, long-only basis. These imbalances can be observed in at least two different cases (see Figure 5, items 4 to 6 on the left and Pozsar, 2013).[47]

First, underfunded pensions. The wedge between expected and actual long-term returns is the principal driver of the trend that pension funds using overly optimistic discount rates allocate an

[45] Corporate cash pools are stocks of accumulated profit flows over time. Corporate profits have risen to record highs as a share of GDP at the expense of wages (see "Labour pains," *The Economist*, November 2, 2013). However, high profit margins do not explain why corporations chose to hold on to more of the cash they generate (a trend that was entrenched even before the crisis). Debate about this remains unsettled, but one oft-cited argument is the rapid decline in the cost of capital goods, especially that of information technology equipment by virtue of Moore's law (see for example Summers, 2013). Other contributing factors include cloud computing, where businesses rent hardware rather than owning their own (this improves free cash flow) and the absence of investment needs associated with selling additional units of software (GM had to invest in capacity to produce more cars, Microsoft doesn't have to).

[46] See for example "Asset management hits record level," *Financial Times*, July 9, 2013 which notes that the asset management "industry is [increasingly] taking on winner-takes-all characteristics. For example, the top 10 U.S. managers took almost two-thirds of all net new fund assets among managers with positive net flows in 2012, compared with 54 per cent in 2011". Also see the OFR study on asset managers which notes: "economies of scale in portfolio management and administration, combined with index-based strategies, have increased industry concentration in recent years" (see "Asset Management and Financial Stability," Office of Financial Research, 2013).

[47] On the degree of corporate pension funds' structural under-funded status see Towers Watson, 2012; on the degree of state and local pension funds' structural under-funded status see Novy-Marx and Rauh, 2013. On the secular rise of risk PMs see the rise in hedge fund's assets under management from less than $50 billion in 1990 to $500 billion in 2000 and $2.25 trillion in 2012 (see McKinsey Global Institute, 2007 and HFR, 2012). Finally, on the rise of pension funds' and endowments' increased allocation to hedge funds see the increase in hedge funds' capital under management from pension funds and endowments rise from about 15 percent in the mid-1990s to 30 percent in the mid-2000s and nearly 35 percent as of March, 2012 (see McKinsey Global Institute, 2007 and FSA, 2012) and U.S. pension funds' allocations to alternative investments doubling from 10 percent in 2002 to more than 20 percent in 2012 (see Towers Watson, 2012).

increasing share of their assets to risk PMs (see Caballero, 2013) in the form of hedge funds and alternative investment strategies.[48]

In an ever lower yield environment, risk PMs may also have an extra incentive to increase the use of leverage via funding, securities lending, shorting and derivatives, with an aim to enhance returns and avoid major portfolio drawdowns. They are all aiming to provide equity-like returns with bond-like volatility for pensions.[49]

Second, FX reserve managers, whose needs are somewhat similar to those of pension funds, because the maintenance of FX pegs is typically a negative carry proposition (see IMF, 2010).[50] This is because the bills issued to sterilize the exchange of foreign currency to domestic currency yield more than the foreign currency bonds that FX reserves are held in, which is a fiscal cost. To minimize these costs, reserve managers also employ the techniques of securities lending and as well as other forms of leverage to enhance returns.[51]

Thus, the modern financial ecosystem has five groups of players, each with a well-defined goal (see Figure 7).

Chief investment officers (CIOs) at pension funds and foreign central banks — the first group — are mandated to "meet liabilities."

They do so by allocating more and more of their portfolios to risk PMs (hedge funds, separate accounts, etc) — the second group — mandated to "beat the benchmark" and use leverage to that end.

Cash PMs — the third group — whose mandate is "do not lose," shun credit, duration, and liquidity risks and invest cash on a collateralized and diversified basis. Finally, the cash pools managed by cash PMs are the products of decisions taken by government and corporate CEOs — the fourth group — whose mandate from voters and shareholders is to "grow" their economies and profits, respectively.

Figure 7: Four Simple Goals that "Make the World Go 'Round"

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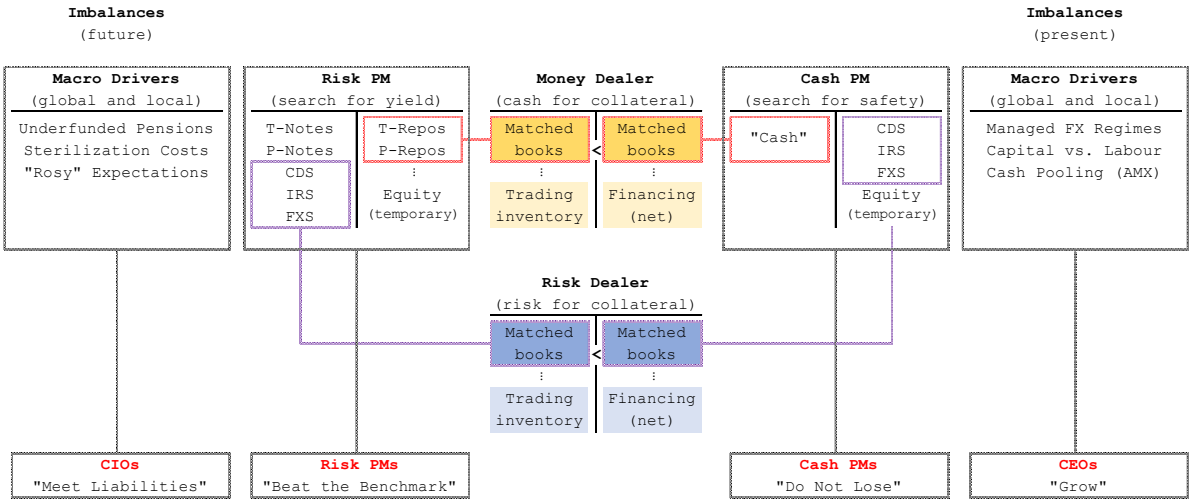
[48] See "The Shortage of Safe Assets," 2013 presentation by Ricardo Caballero at the Bank of England. The graph on p. 19 of the presentation shows a strong positive correlation between pension funds' underfundedness and their tendency to increase their allocation to riskier assets and asset management strategies.

[49] Because risk PMs are mandated to beat their benchmark, they always search for yield. However, there may be added pressures to search for yield if ultimate investors' yield expectations don't adjust to an ever-lower yield environment.

[50] Unlike FX reserves' liquidity tranches discussed above, this section refers to FX reserves' long-duration segments where search for yield is more prevalent.

[51] "The SNB's bond buying: now with more context," FTAlphaville, October 8, 2012



Source: Pozsar (2014) expanding on Bagehot Was a Shadow Banker - Mehrling et al (2013)

The goals of these market participants — meeting liabilities for CIOs, beating benchmarks for risk PMs, par on demand liquidity for cash PMs, and growth for CEOs — represent nominal rigidities in the ecosystem that drive what dealers — the fifth group — do.

Dealers' role is to make markets and intermediate risks *away* from cash PMs *to* risk PMs, enabling them to preserve their wealth in the present and help meet liabilities in the future, respectively.

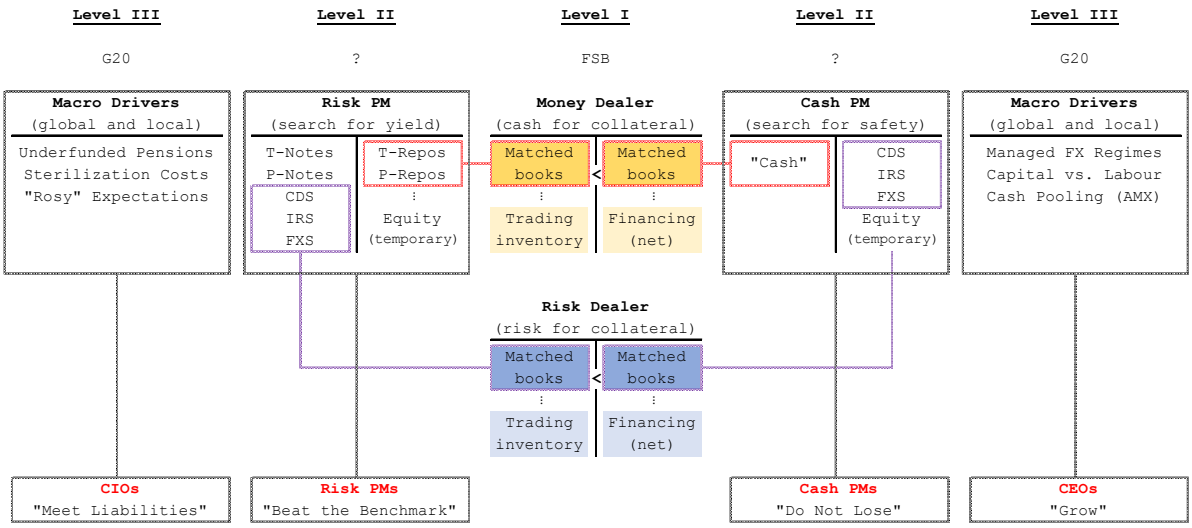
Dealers, for the most part, engage in risk intermediation through their matched book positions and only engage in risk transformation through their inventory positions (either in the form of a portfolio of securities or derivatives), which — as more than "just" brokers — they accumulate through market making activities.[52]

The macro view of the dealer ecosystem presented above suggests that there are at least three possible entry points for policymakers to supervise the global financial ecosystem and enhance its stability. These entry points are at the dealer level, the PM (or asset manager level) and at the global macro level (see Figure 8).

To date, however, financial reform has focused mostly on dealers (and wholesale banks) — their capitalization, funding, trading, and separation from retail banking (see the Volcker and Vickers rules).

[52] It follows that risk intermediation corresponds to matched books and risk transformation corresponds to net long or short inventories. If a risk PM sheds risks to a dealer using derivatives and a cash PM assumes the same risks from the dealer through a matched book transaction, then risks have been intermediated. However, if a risk PM sheds risks but the dealer is unable to offload it to anyone, then, from the PM's perspective, the dealer transformed these risks through its equity, much like banks would transform the credit, maturity, and liquidity risk of loans from depositors' perspective via deposits.

Figure 8: A Three Level Policy Problem



Source: Pozsar (2014) expanding on Bagehot Was a Shadow Banker - Mehrling et al (2013)

However, focusing on dealers only, while leaving risk and cash PMs' and their CIO and CEO masters' needs unaddressed, will shift problems around but not solve them. Ultimately, the policy extremes are to either address the underlying macro imbalances[53] or accommodate the ecosystem as it is by giving the dealers at its core access to official liquidity puts (the "dealer of last resort" option, see Mehrling, 2010, Carney, 2013, and the Bank of England's recently updated Sterling Monetary Framework, 2013).

If neither shrinking imbalances or broadening the official safety net is palatable, partial solutions would recognize that the ecosystem's existing needs will be met by new structures that need to be understood and monitored to avoid new systemic excesses.

Partial solutions include the Fed's full allotment reverse repo facility, and the U.S. Treasury increasing its supply of Treasury bills and floating rate notes (FRNs) with the aim to absorb more of cash PMs' demand for money (par on demand) and money-like (par at maturity) claims with public as opposed to private money claims.

However, these policy measures only address cash investors' needs, but not those of risk PMs, who as a result will effectively have to compete with the public sector for funding and lose business to it. There are at least two avenues through which this may show up.

[53] At the sovereign level, this may happen if current account surplus countries decide to pursue expansionary policies. At the corporate level, this may happen through changes in the corporate tax code (see "G20 back fundamental reform of corporate taxation," *Reuters*, July 19, 2013, and "Japan can put people before profits," *FT*, February 5, 2013).

First, there may be fewer opportunities to lend Treasuries and agency RMBS, a significant portion of which were lent in order to enable dealers to absorb cash pools' demand for safe, short-term assets via repos backed by Treasury and agency RMBS. With the Federal Reserve willing to lend its inventory of Treasury and agency securities via RRPs, there will be less need for dealers to borrow these securities from securities lenders in order to source collateral in order for them to absorb the money demand of cash PMs via Treasury and agency repos.

Second, the costs of raising liquidity for margin and funding for relative value trades involving Treasuries and agency RMBS may rise. The latter is evident from the fact that the RRP facility will set the minimum haircut on Treasury and agency collateral and thus the Fed will control how much cash and leverage Treasury and agency collateral will raise.

This is the third significant aspect of the RRP facility, the first being that RRPs simplify the plubing by giving shadow banks access to a quasi reserve account at the Federal Reserve as explained in Part I of the paper, and the second being that that minimum RRP balances could one day become the equivalents of what reserve requirements are for banks as explained in Part II of the paper.

RRPs could also give the Federal Reserve ability to set minimum haircuts on safe assets such as Treasuries – and the more collateral the Fed gives for the cash it takes in from shadow banks, the more collateral the rest of the ecosystem will have to pledge to shadow banks to lever up. Minimum haircut requirements could become the equivalents of minimum capital requirements for the backing of shadow money claims, and could give the Federal Reserve macro-prudential control over market-based credit cycles - a control it did not have precrisis when competition drove haircuts to bare bone minimums.

Therefore, with profit opportunities from the lending of general collateral about to erode, and the price of the provision of leverage and liquidity to risk PMs about to get more expensive, but the fundamental reasons for search for yield unaddressed, it will be imperative to monitor how the ecosystem will evolve in its search for cheaper funding and ways to reduce asset-liability mismatches.

But we cannot monitor what we do not measure. The Flow of Funds accounts were not designed to measure the ecosystem described in this paper.

The Flow of Funds accounts have been designed to show who borrows, who lends, and through what types of instruments. But it is too aggregated to provide accounting information about

the cash and risk PMs that make up the dealer ecosystem, and does not provide information on the asset-liability mismatches of pension funds and FX reserve managers; it does not cover hedge funds and separate accounts which make up an increasing share of institutional investors' portfolios; it does not provide a breakdown of dealers' matched repo books to gauge the volume of funding passed on to the buyside, or the purpose of that funding: whether it was to fund a bond position or a short position, or to raise liquidity for margin; and it does not measure the size of the offshore Eurodollar market and the volume and type of dollar lending Eurodollars fund globally.

Moreover, the Flow of Funds accounts end where derivatives begin: derivatives effectively separate the flow of risks (credit, duration, and FX risks) from the flow of funds. As such, examining holdings of bonds without looking at accompanying derivatives limits the usefulness of the Flow of Funds accounts. Without these measures, our ability to understand asset prices is also limited.

One recommendation would be for the U.S. Flow of Funds accounts to be augmented over time to incorporate measures of structural asset-liability mismatches and supplemented with a set of Flow of Collateral and a set of Flow of Risk satellite accounts to tabulate the sources, types, and flows of collateral that back the flow of funds and risks within the financial ecosystem.

From a financial globalization perspective (see Mehrling et al, 2013) the Flow of Funds accounts could also be supplemented with a set of Flow of Eurodollar satellite accounts in recognition of the fact that an increasing share of credit to U.S. residents is funded in the Eurodollar markets by foreign banks outside the United States.

These satellite accounts would be an essential first step toward understanding and modeling asset price dynamics better and having a comprehensive macro-financial data set that would help identify and measure "risk and liquidity pockets" and "liquidity mismatches" as proposed by Brunnermeier, Gorton and Krishnamirthy (2011) in the paper "Risk Topography."

Furthermore, since these satellite accounts would be organized around timeless concepts (flows of collateral, risk and Eurodollars), its keepers would be forced to keep up with the ever-changing instrumentality of the financial ecosystem, much like the Flow of Funds accounts periodically incorporate new instruments (for example, ETFs) through which savers and borrowers exchange money. The Flow of Collateral accounts would have to keep track of the collateral flows in secured funding markets by periodically incorporating new secured financing arrangements (for example, collateralized commercial paper), and the Flow of Risk accounts would have to keep track of the

trading of "basic" risks – credit, duration and FX risks — by periodically incorporating new derivatives (for example, the trend of the "futurization" of swaps).

CONCLUSION

The aim of this paper was to provide a macro-financial map to better understand the drivers behind the rise of the shadow banking system and the unique role of dealers at the core of the system: Dealers are not real economy lenders, but intermediaries between cash and risk PMs who search for the symmetrical extremes of safety and yield.

Dealers provide collateralized safe assets in the form of repos to cash PMs on the liability side of their balance sheet, and leverage via collateralized cash loans in the form of reverse repos to risk PMs on the asset side of their balance sheet. This helps cash PMs safekeep growing cash pools and risk PMs provide returns that are in excess of the real economy's growth potential.

As a result of these collateralized transactions, bonds are becoming more and more valuable as collateral and bond portfolios are becoming more and more leveraged across the financial ecosystem.

From a policy perspective, the fundamental problem at hand is a financial ecosystem that has outgrown the safety net that was put around it many years ago. Today we have a different class of savers (cash PMs versus retail depositors), a different class of borrowers (risk PMs to enhance investment returns via financial leverage versus ultimate borrowers to enhance their ability to spend via loans) and a different class of intermediaries (dealers who do securities financing versus banks that finance the economy directly via loans) to whom discount window access and deposit insurance do not apply.

These twin pillars of the official safety net were erected around traditional, deposit-funded banks to address retail runs. In contrast, the 2007-08 crisis was sparked by institutional runs: cash PMs ran on dealers and dealers ran on risk PMs. But importantly, as our examples demonstrate, beyond the institutional façade of the ecosystem it is ultimately retail wealth and promises that are at stake.

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