

Forum Paper

Collateral flows and balance sheet(s) space

Manmohan Singh

International Monetary Fund, 1900 Pennsylvania Avenue NW, Washington, DC 20431, USA;
email: msingh@imf.org

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ABSTRACT

Collateral does not flow in a vacuum; it needs balance sheets to move within the financial system. The new regulations constrain private sector bank balance sheets and thus impede market plumbing. This paper looks at securities-lending, derivatives and prime-brokerage markets as suppliers of collateral (as much has been written on the repo market). Going forward, the choice of balance sheet(s), private or public, should be driven by market forces and not by the ad hoc allocation of central banks. Otherwise, this may be suboptimal for monetary policy transmission.

Keywords: collateral flows; securities lending; prime-brokerage; derivatives; balance sheets; monetary policy transmission.

1 INTRODUCTION

Collateral flows lie at the heart of any proper understanding of market liquidity and, hence, financial stability. No other market is so critical to the functioning of the financial system and yet so poorly understood. In addition, though, as policy makers begin to acknowledge the inadequacies of traditional theories of money and lending, collateral flows are increasingly being recognized as a driver of credit creation that is just as important as money itself. Despite this, a true appreciation of the importance

of collateral flows is hampered by the inadequacy of the way in which they are accounted for.

For overall financial lubrication, the financial system requires collateral or money for intraday debits and credits. The cross-border financial markets traditionally use “cash or cash-equivalent” collateral (ie, money or highly liquid fungible securities) in lieu of cash to settle accounts. Financial collateral does not have to be highly rated (AAA/AA): as long as the securities (which can be either debt or equity) are liquid, mark-to-market and part of a legal cross-border master agreement, they can be used as “cash equivalent”. In this way, collateral underpins a wide range of secured funding and hedging (primarily with over-the-counter (OTC) derivatives) transactions. Increasingly, collateral has a regulatory value in addition to being cash-equivalent. Such financial collateral has not yet been quantified by regulators and is not (yet) part of official sector statistics; however, it is a key component of financial plumbing (Baklanova *et al* 2016).

1.1 The discomfort with “collateral chains”

The term “pledged for reuse” means that the collateral taker has the right to reuse it in their own name. Its practical effect is economically equivalent to title transfer (ie, a change in ownership) and is essential to the financial lubrication that makes collateral akin to cash-equivalent. In the bilateral market, contracts that embrace repurchase agreement (repo), securities-lending, OTC derivatives and customer margin loans may involve title transfer. Under a title-transfer arrangement, the collateral provider transfers ownership of collateral to the collateral taker.

The latter acquires full title to the collateral received and, as its new owner, is completely free to utilize it. In return, the parties agree that, once the collateral provider has discharged its financial obligation to the collateral taker, the collateral taker will return equivalent collateral to the collateral provider. Note that the obligation is to return equivalent collateral: that is to say, securities of the same type and value terms, but not the original security. This point about equivalence is important. After the collateral has changed hands via title transfer and been reused by the collateral taker, it would not be obligatory on the part of the collateral taker to return exactly the same property initially received as collateral. A simplistic example is a physical twenty-dollar bill with serial number XYZ. If you provide that very bill as collateral to the collateral recipient, it does not matter if they give you back a different twenty-dollar bill – any twenty-dollar bill will do.

Although the terms “rehypothecation” and “pledged collateral that can be reused” are often employed interchangeably, each has a specific and slightly different meaning. “Rehypothecation” means the use of financial collateral by a collateral taker as security for their own obligations to some third party (ie, onward pledging). Reuse is broader in

scope, encompassing not only repledging but also any use of the collateral compatible with ownership of the property (such as selling or lending it to a third party). Not all pledged collateral can be reused in this way. Rights of reuse are thus inherent in title-transfer financial collateral arrangements, because ownership of the property actually changes, whereas under a pledge the collateral taker takes a security interest only in the pledged assets, and they will enjoy rights of rehypothecation only if reuse is expressly granted in the pledge agreement.¹ Market practice suggests that rehypothecation of assets has historically been a cheaper way of financing the prime business than turning to the repo market, and some of the recent regulations are more beneficial to netting for prime brokerage (eg, equity long/short positions) than repo.

Within the United States, rehypothecation rights are strictly limited. Outside the United States (that is, outside New York-governed contracts), the prevalence of rehypothecation allows for a market clearing price for financial collateral (ie, the United Kingdom and continental Europe). Rights of reuse have a strong legal underpinning under the Financial Collateral Directive of the EU. The EU legal framework for financial collateral is flexible and can accommodate the preferences of prudent and risk-averse clients and counterparties. Whether or not sophisticated market participants strike bargains that offer them appropriate protection is a matter for them alone to decide. In most cases, UK broker-dealers operate subject to contractually agreed reuse limits (see Appendix A).

Some policy makers, especially in the financial stability groups (eg, the Financial Stability Board (FSB)), perceive “rehypothecation” to be systemically dangerous (because of the way it can drive leverage). However, ordinary banking is not fundamentally different. In economic terms, the “reuse” or rehypothecation of a security is identical to the money creation that takes place in commercial banking through the process of accepting deposits and making loans. So, why is it that a deposit at a bank of US\$100 dollars can be lent, but financial collateral that is mark-to-market at US\$100 dollars is restricted for reuse by policy makers? A bank such as Citibank has capital; so does shadow banking via haircuts and overcollateralization whenever collateral is reused. Central banks are trying to rejuvenate the credit-creation engine via quantitative easing (QE); so far, they are not having great success. Monetary policy

¹ Under a pledged collateral agreement, the collateral taker, or the “pledgee”, does not have automatic rights of reuse or rehypothecation in the pledge agreement unless such rights of reuse are expressly granted in the contract. The pledgor will not be able to seize or use that pledged collateral for their own purposes unless the “pledgor” defaults on their obligation to the pledgee, triggering enforcement. However, in cases where a pledgor, or collateral provider, grants a pledgee rights of rehypothecation over pledged collateral, and if the pledgee has exercised this right prior to insolvency, the pledgor’s legal rights are as if they had transferred title in the property to the pledgee. The pledgor’s legal remedies against an insolvent pledgee are, in practice, extremely limited.

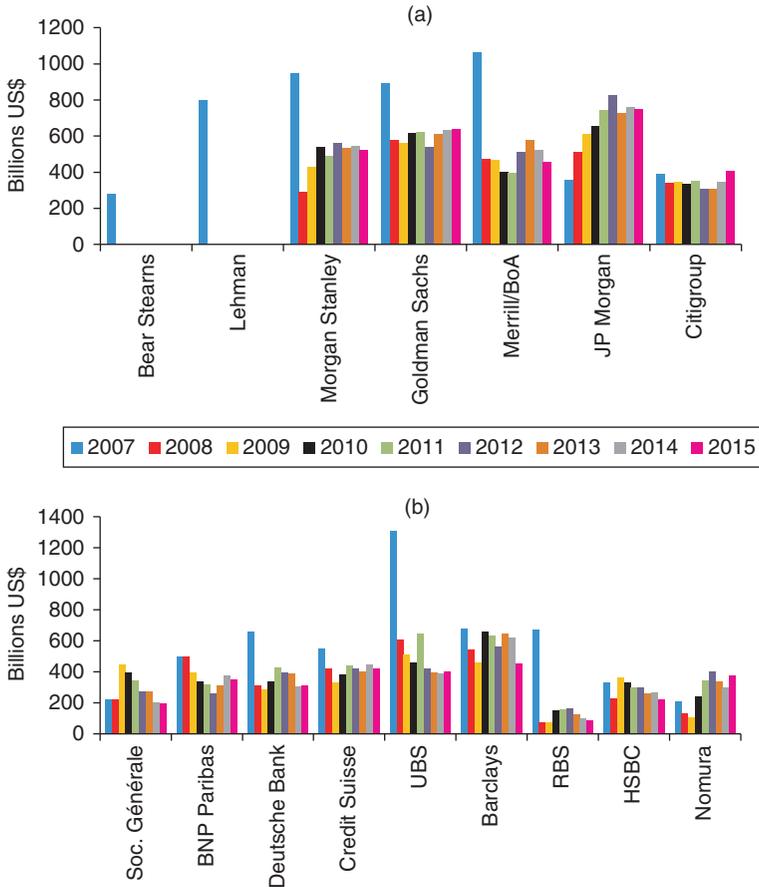
is ultra loose. Restricting collateral reuse is a tight monetary policy that seems to be at odds with the current policies of key monetary authorities. In fact, the money metrics such as M0, M1 and M2 need to integrate the sizable pledged collateral metrics. Otherwise, fully understanding the financial plumbing (that accepts both money and pledged collateral as lubricants) will not be possible.

2 QUANTITATIVE EASING AND REGULATIONS

Expanded central bank balance sheets that silo sizable holdings of US treasuries, UK gilts, Japanese government bonds (JGBs), German bunds and other AAA eurozone collateral have placed central bankers in the midst of market plumbing. It is now going to be very difficult for them to walk away from that role. For example, had QE not happened then deposits would have grown roughly in line with the economy's growth and/or household wealth. However, in the United States, where QE has ended, data from June 2015 shows that deposits with the Federal Deposit Insurance Corporation (FDIC) have doubled in the top fifty US bank holding companies relative to June 2008 levels. The eurozone and Japan are in the midst of their QE at present.

Given the near double digit return that global systemically important financial institutions (G-SIFIs) need for their shareholders, some deposits are being pushed out to the official sector balance sheet; otherwise, these deposits would be a drag for the banks and result in lower returns for their shareholders. In other words, the excess deposits (stemming from nonbank sales of collateral to the central banks) and forthcoming regulations, such as the leverage ratio, which effectively requires banks to hold capital against deposits, are too "costly" for banks; hence the reluctance by banks to take these deposits on their balance sheet. A typical bank's marginal return on these sizable deposits is below their marginal return to their shareholders. Given the limited balance sheet space at the private sector banks, the demands for the official sector (ie, central banks') balance sheets will remain important unless regulations are fine-tuned to allow for more bank/nonbank intermediation.

The recent experience of the United States Federal Reserve (Fed) sheds some light on the operational aspects that are relevant. For example, the taper tantrum of May 2013 highlighted market volatility concerns; not surprisingly, the Fed's liftoff decision in December 2015 was associated with a large reverse-repo program (RRP), which is a deft way of handling financial stability concerns stemming from losses and/or volatility on longer-tenor US treasuries. Large foreign repo pools at the Fed (ie, the deposits of foreign governments, central banks and international official institutions) and deposit accounts for central counterparties (CCPs) at central banks, etc, also suggest an expanded role for central bank balance sheets. However, financial plumbing, where money and collateral interface, is a role that has historically always been associated with private-sector market participants (ie, banks, nonbanks, custodians,

FIGURE 1 Bilateral pledged collateral flows via the key banks in this market.

This includes collateral flows from repo, securities lending, prime brokerage and derivatives. (a) Pledged collateral received by US banks (2007–15). (b) Pledged collateral received by European banks and Nomura (2007–15). *Source:* annual report of banks (eg, 10 000 filings), hand-picked data by the author.

etc), not with central banks, whose mandate is about monetary policy. Market interest rates are effectively determined in the pledged collateral market, where banks and other financial institutions exchange collateral (such as bonds and equities) for money.

In 2007, this global bilateral collateral market, where the plumbing takes place, was US\$10 trillion in size; now it is well below US\$6 trillion (see Figure 1 and also Box 1; note that the pledged collateral shown here is cross-border and not limited to reuse (unlike collateral within the triparty structure in the United States)). About half of the

pledged collateral comes from the hedge fund industry; the other source of pledged collateral is pensions, insurers, central banks, sovereign wealth funds (SWFs), etc (Singh 2011; European Systemic Risk Board 2014).

From Lehman's last annual report:

At November 30, 2007, the fair value of securities received as collateral that were permitted to sell or repledge was approximately [US]\$798 billion.... The fair value of securities received as collateral that were sold or repledged was approximately [US]\$725 billion at November 30, 2007.

Pledged collateral from bilateral, securities-lending, prime brokerage, and OTC derivatives margin is hard to disentangle as it shows up bunched up in footnotes to balance sheets. Collateral with title transfer is pooled at the central collateral desks at large banks (the top-tier G-SIFIs that have a global footprint). Major dealers active in the collateral industry include Goldman Sachs, Morgan Stanley, JP Morgan, Bank of America/Merrill and Citibank in the United States. In Europe and elsewhere, important collateral dealers are Deutsche Bank, UBS, Barclays, Credit Suisse, Société Générale, BNP Paribas, HSBC, Royal Bank of Scotland and Nomura. This collateral with title transfer (or a variant thereof) can come into the banks via reverse repo, securities borrowing or OTC derivatives margin posting, or the use of client assets under a prime-brokerage agreement. Thus, any collateral metric should capture the typical documentation that underpins collateral use and reuse in contracts such as the global master securities lending agreement (GMSLA), global master repurchase agreement (GMRA) and International Swaps and Derivatives Association (ISDA) agreement, etc. The documentation does not restrict collateral reuse to one jurisdiction (or region); hence, the collateral metric needs to be global.

Table 1 provides a succinct summary of the sources of collateral, the total volume received by the large banks and the resultant velocity. The velocity is not an exact metric but gives an idea of the length of the collateral chains in that year. So, we can infer that, on average, the collateral chains were longer in 2007 than in 2015. The intuition is that counterparty risk before the collapse of Lehman Brothers was minimal. In the aftermath of Lehman's demise, fewer trusted counterparties in the market owing to elevated counterparty risk led to stranded liquidity pools; incomplete markets; idle collateral; and shorter collateral chains, missed trades and deleveraging. At present, the collateral landscape has changed even more due to central banks' QE policies, new regulations, etc. Collateral reuse (or velocity) is at an all-time low of about 1.8, compared with 3.0 before Lehman's demise. This collateral reuse rate is a central theme of this special edition of *The Journal of Financial Market Infrastructures* and deserves more attention in policy circles (for example, the recent Jackson Hole papers straddled plumbing issues but were silent on collateral reuse rate).

BOX 1 The ten to fifteen banks at the core of global financial plumbing.

Let the financial system that includes banks, hedge funds, pension funds, insurers, SWFs, etc, be represented by A to Z. Only a handful (say XYZ) can move financial collateral across borders. XYZ also happen to be the large ten to fifteen banks discussed earlier. The rest of the financial system from A to W that demand and supply collateral need to connect with each other via XYZ. Entry into this market is not prohibited but extremely expensive and difficult, as we need a global footprint and global clients (and the acumen and sophistication to move and price liquid securities very quickly, in seconds sometimes). For example, a Chilean pension fund may want Indonesian bonds for six months, and W (for example, a hedge fund or a securities lender in Hong Kong) may be holding these bonds and willing to rent out to A for six months for a small fee. But W does not know there is demand from A. Only via XYZ can A connect to W. Since XYZ sit in the middle of the web, they have the ability to optimize in ways that give them an advantage; the Indonesian bonds may come into their possession because they have loaned W money, or because they have a derivative with W or through a security lending agreement.

Such securities that need to move cross-border under a “repo” or “security lending” or related transaction need to be legally perfected (herein, legal perfection entails rules such as title transfer and rehypothecation). Perfection is also possible under pledge, as documented in the master securities lending agreement (MSLA). Similarly, for OTC derivative margins, there is an ISDA master agreement. For prime-brokerage/hedge-fund collateral, there is a similar master agreement that resonates easily between XYZ. Thus, it is not easy for all real-economy collateral to be able to move across borders. This market for bilateral pledged collateral is the only true market that prices at mark-to-market all liquid securities (bonds + equities). Given that collateral is in short supply (as reflected by repo rates), one of two things is likely to happen.

- (a) The velocity of collateral may come back: this is a task that only XYZ can handle in bulk if more good collateral is sourced through them. However, regulatory proposals such as leverage and liquidity ratio have resulted in balance-sheet constraints for XYZ to do collateral transformation. So, the velocity or reuser rate is unlikely to come back (see Table 2).
 - (b) Central banks can make balance-sheet “space” in order to augment the balance sheets with XYZ, for example, the Fed’s reverse repo program since September 2013, which was augmented to almost US\$2 trillion in December 2015. But this program does not release collateral to the market, as it uses the triparty structure; so, the Fed’s counterparty gets ownership but not possession. This is one way to not let the collateral “velocity” escape, which, in turn, would increase repo rates (and this might create a wedge with the policy rate, so, conservatively, there is no leakage of duration to the market); thus, all maturing bonds bought under QE are reinvested. The European Central Bank (ECB)-type of approach (that was seen during the EU crisis with subsidized haircuts relative to market) may not be market based. More recently, in the aftermath of the ECB’s QE since March 2015, its securities-lending program has remained in its infancy. On the other hand, the Reserve Bank of Australia will not issue new debt to meet collateral demand, but it will provide good collateral (or high-quality liquid assets) at market price.
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TABLE 1 Sources of pledged collateral, volume of market and velocity (2007; 2010–15).

Year	Sources			Volume of secured operations	Reuse rate (or velocity)
	Hedge funds	Securities lending	Total		
2007	1.7	1.7	3.4	10.0	3.0
2010	1.3	1.1	2.4	5.8	2.4
2011	1.3	1.05	2.35	6.1	2.5
2012	1.8	1.0	2.8	6.0	2.2
2013	1.85	1.0	2.85	5.8	2.0
2014	1.9	1.1	3.0	5.8	1.9
2015	2.0	1.1	3.1	5.6	1.8

In trillions of US dollars; velocity in units. *Sources:* Risk Management Association (RMA); International Monetary Fund (IMF) Working Paper, “Velocity of pledged collateral” (Singh 2011).

3 EVIDENCE FROM SECURITIES-LENDING, DERIVATIVES AND PRIME-BROKERAGE MARKETS

Much has been written about repo markets shrinking, but securities lending, derivatives and prime brokerage are also key avenues for collateral flows and reuse. Thus, the focus here is on these avenues, but repo (bilateral and triparty) is discussed succinctly in Box 2. Collateral does not flow in a vacuum and thus needs balance sheet space to move.

3.1 Securities lending

Although the large banks are unlikely to make room for the “high volume, low margin” securities lending business (due to leverage ratio), it is often assumed that the major custodians, such as Bank of New York (BNY) Mellon, Citibank, State Street, Euroclear and Clearstream, will have “balance sheet space” to move collateral around. Assets held by custodians are not part of their balance sheets; only principal positions are on these balance sheets. However, an indemnification requirement to clients requires upfront capital provision, and this is not cost effective. Pre-Lehman, dealers would oblige the custodians that pushed out general collateral (eg, IBM or Merck equities) along with specials that the dealers really wanted (and still do). In this era, custodians would set a general collateral (GC) to “specials” ratio as high as 5:1 or even 13:1; there was less balance sheet constraint. For almost a decade now, there has been no tying of GC to specials.

The asset-management complex, which includes pensions, insurers and official sector accounts such as SWFs and central banks, is a rich source of collateral deposits. The securities they hold are continuously reinvested (via securities lending) to maximize

returns over their maturity tenor. In a repo, there is an outright sale of the securities, which is accompanied by the specific price and date at which the securities will be bought back. On the other hand, securities-lending transactions generally have no set end date and no set price, although the market for defined-term trades is growing securities.² Borrowing is generally done with a specified purpose, and in many cases a legal purpose test is required. As such, securities-lending markets are utilized to borrow specific securities, whereas repo markets are generally non-security specific. In 2007, securities-lending volumes were US\$1.7 trillion. In recent years, despite collateral constraints, the volumes are flat at around US\$1 trillion, according to the RMA, which, unlike many other vendors, does not include reuse of securities in their data (Table 2).

Initially, risk aversion due to counterparty risk immediately following Lehman led many pension and insurance funds' official accounts to not let go of their collateral for incremental returns (ie, supply was constrained). More recently, demand-side pressures, such as the regulatory squeeze on the use of balance sheet and low returns on cash holdings, have put a lid on this market. These figures are not rebounding as per the end-of-2015 financial statements of banks. The RMA's data includes the largest custodians, such as BNY, State Street and JP Morgan.³

Some suggestions for uplifting the securities lending market in the new regulatory environments include the following.

² It is standard practice to use title transfer in repo and securities-lending activities. (Securities lending transactions in the United States are done via pledge; securities lending in Europe involves title or "pure" transfer.) Further, with respect to legal rights, securities lending is effectively identical to repo; however, some securities lenders take the view that their clients' rights are more secure than they would be via a repo. This is due to the indemnification of the borrower's potential failure to return securities or default. In Europe, the securities lending is done via the GMRA or the GMSLA. (In the United States, the respective documents are the MRA and the MSLA.) Also, OTC derivatives contracts under the ISDA use English law, in which title transfer is part of the credit support agreements (CSAs).

³ The decline in the first row of Table 2 requires some explanation. The US regulatory rules that guide borrowers permit only cash and certain government securities (and investment grade corporates). Hence, the United States developed as a cash collateral business, where the lending agent lends client assets versus cash and then reinvests the cash according to the client's direction in very short-term reinvestments. Outside of the United States (in the United Kingdom, for instance), regulatory rules permit certain types of noncash collateral that are readily available (such as Financial Times Stock Exchange (FTSE) equities). In the aftermath of Lehman and the liquidity crisis, borrowers in the United States borrowed more hard-to-borrow stocks (specials) and less general collateral; this explains the decline. Noncash collateral deals (ie, collateral for collateral) effectively provide lenders with a hard fee for the deal; however, these deals do not give temporary cash to generate excess returns by creating a short-term, money-market book.

TABLE 2 Sources of pledged collateral, velocity and collateral (2007; 2010–13).

	Collateral received from pension funds, insurers, official accounts, etc (US dollars, billions)								
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Securities lending vs cash collateral	1209	935	875	818	687	620	669	701	644
Securities lending vs noncash collateral	486	251	270	301	370	378	338	425	454
Total securities lending	1695	1187	1146	1119	1058	998	1008	1137	1098

All data in US trillions; velocity in units.

- The noncash collateral market in the United States should work toward those in Europe; at present, the United States has more attractive collateral rates (than elsewhere), in part due to the repo rates being floored at 25 basis points (bps) at present, which is due to the Fed's monetary policy.
- Equities can be increasingly mobilized and swapped with US treasuries, but regulations may need to change here (eg, the Securities and Exchange Commission's (SEC's) Rule 15c3).
- Moreover, large holders of good collateral (eg, US treasuries) in the Gulf region or some Asian countries cannot lend, as their rules prohibit the netting of sovereign client's transactions (ie, their immunity angle).⁴ Given the higher leverage ratio requirements for G-SIBs (especially in the United States),

⁴ For transactions collateralized by cash, the collateral receiver gives out cash and has a receivable (asset), and the collateral provider receives cash and books as payable (liability). Essentially, the transaction is booked as a cash loan, or cash borrowed, collateralized by the security lent (or repod) from an accounting standpoint. Under US generally accepted accounting principles (GAAP), if certain conditions are met (ie, same counterparty, same explicit maturity date (not open), intent to net settle, master netting agreement in place and legal right to offset in default), only then may accounts receivables and payables be netted down. Under Basel rules, if similar, but slightly more expansive, requirements are met, then the transactions may be netted. The legal right to offset in default has led to many prime brokers determining that certain counterparties, most specifically SWFs and central banks, cannot be netted.

certain transactions do not make economic sense for some prime brokers to enter.⁵ Note that noncash trades are off balance sheet unless the collateral is re-hypothecated, so the re-hypothecation is what leads to a leverage issue.

- While the supply side (ie, central banks and SWFs) may be eager to increase lending, and the demand side (ie, hedge funds) may be eager to increase borrowing, the intermediaries (ie, large banks and agency lenders) will remain constrained by the regulations for banks' leverage and liquidity ratios; for agents, single counterparty credit limits and conservative risk-based capital rules.

If the market were to grow back to pre-crisis size, it would probably involve a much larger participation by nonregulated institutions, and/or connect supply to demand without an intermediary. While this is possible (the FSB already has a working group to look at nonbank-to-nonbank collateral moves), it would be a very different market from that which operates today, and one in which credit and duration management and intermediation would have to be assumed by a different group of players, and potentially under a different set of rules.

3.2 Derivative markets use of collateral

Unlike the “gross” flow of collateral in repo and securities lending, in the OTC derivatives market, the collateral flows in line with the risk (and, thus, on a “net” basis). Still, the “undercollateralization” in this market is large, about US\$3 trillion by Bank for International Settlements estimates (Table 3), which, if calibrated further, suggests that a sizable flow of collateral (or cash) will be required through the balance sheets. This may be arduous, as many of the initial margins are not allowed to move, so they will be “parked” somewhere on a balance sheet. Collateral velocity is much lower now than in pre-Lehman times, and if we adjust for this metric, then it is unclear whether balance sheets have the space to accommodate the required flows, unless the regulations create balance sheet space (eg, by tweaking the leverage ratio, as acknowledged by the Bank of England's Financial Policy Committee Statement minutes of July 2016).⁶

⁵ Also, in the United States, almost all states allow netting, so it is easier for large pension funds/insurers to securities-lend to the large domestic banks.

⁶ It is useful to mention a particular bias and the way it affects our regulators. In repo and securities lending, collateral moves gross: ie, if X has \$100 million exposure to a bond and needs financing, X will send the full \$100 million market value of collateral (ie, the bond) and will receive \$90+ million in funding after haircut. That makes big numbers from small risk: numbers, in fact, that are “on a par with money metrics”. In derivatives, both of those big numbers (my \$100 million exposure and your \$90+ million exposure) are imbedded in the swap, and collateral travels for the risk only (ie, net).

Cognizant of the dilemma and push toward mandatory clearing of standard contracts at CCPs, these large institutions are now allowed to park client margins at central banks (including at the Fed).

3.3 Prime brokerage

Some of the recent prime brokerage activity indicates that equity long/short positions (ie, the delta bias) and associated netting are more balance-sheet friendly than other collateral transactions (see Figure 2). Intuitively, the more long positions there are relative to short positions, the more collateral is released to the market. Hedge funds borrow from prime brokers (mostly the ten to fifteen banks alluded to in Box 1) for equity long/short and event-driven (eg, credit/distressed and merger arbitrage) strategies. Since Lehman, hedge funds have financed via prime brokerage and repo strategies roughly equally (adjusting for derivatives use/leverage within each strategy).

However, in the last couple of years, regulations have changed incentives, since equity/long short are “netted” on balance sheet and thus require less balance sheet space from the prime broker (unlike repos, which are gross positions on the balance sheet). Most recent flows suggest a much higher fraction of collateral released to the market via prime brokerage (about US\$1.3 trillion) relative to about 700 billion via repo strategies. These figures were roughly US\$900 billion each via prime brokerage and repo prior to the Lehman crisis.

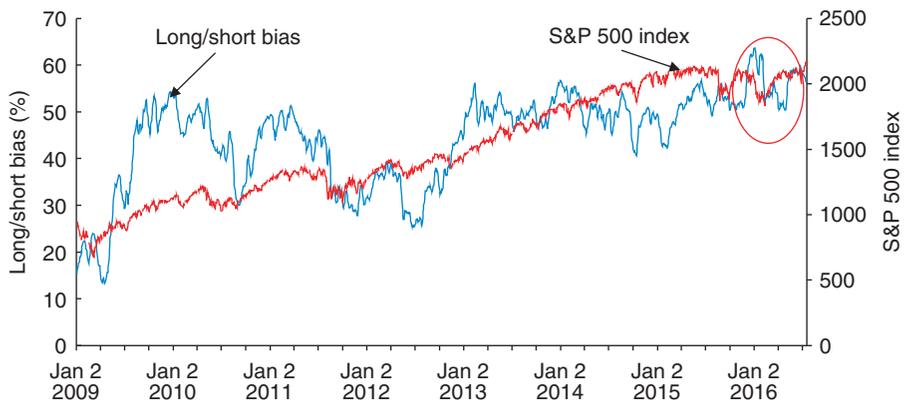
The accounting for prime-brokerage lending and short covering offers more opportunities for balance sheet netting than are offered by other contractual forms for the same market risk. In repo, each transfer of cash between counterparties (with limited exceptions) is separately accounted for as an asset or liability. In prime brokerage, the customer’s net cash position after all security purchases and sales is all that goes directly on the balance sheet. So, if the prime broker can minimize on-balance-sheet trades with non-prime-brokerage customers that are required to meet the securities and cash needs of their prime-brokerage customers (by rehypothecating one customer’s long position to deliver against another’s short, for instance), then they can minimize their reported balance sheet. Simply put, the accounting in prime brokerage follows the money, not the securities. The more the prime broker is able to optimize securities available against securities needed, the smaller the balance sheet required to provide the same services.

In summary, long/short equity via prime brokerage looks to be the best option so far, with a “net” and elasticity of 140% (see Appendix A). This is followed by derivatives, as collateral flows on a “net” basis only; then repo, as it is primarily for funding and not to augment returns; and then securities lending. However, some of the biggest clients will now be “lost”, as they are sovereign (and their immunity does not allow for netting).

TABLE 3 Risk after enforcement of netting agreements in OTC derivatives market: under-collateralization in the OTC derivatives market.

	Gross market value														
	H2 2008	H1 2009	H2 2009	H1 2010	H2 2010	H1 2011	H2 2011	H1 2012	H2 2012	H1 2013	H2 2013	H1 2014	H2 2014	H1 2015	H2 2015
Grand total	35 281	25 314	21 542	24 673	21 296	19 518	27 285	25 392	24 740	20 245	18 825	17 438	20 880	15 313	14 498
(a) FEX contracts	4 084	2 470	2 070	2 524	2 482	2 336	2 555	2 217	2 304	2 427	2 284	1 724	2 944	2 359	2 579
(b) Interest rate contracts	20 087	15 478	14 020	17 533	14 746	13 244	20 001	19 113	18 833	15 238	14 200	13 461	15 608	11 062	10 148
(c) Equity-linked contracts	1 112	879	708	706	648	708	679	645	605	692	700	678	615	606	495
(d) Commodity contracts	955	682	545	457	526	471	487	390	358	384	264	269	317	237	297
(e) Credit default swaps	5 116	2 987	1 801	1 666	1 351	1 345	1 586	1 187	848	725	653	635	593	453	421
(f) Unallocated	3 927	2 817	2 398	1 788	1 543	1 414	1 977	1 840	1 792	779	724	671	803	596	558
Gross credit exposure*	5 005	3 744	3 521	3 578	3 480	2 971	3 912	3 668	3 626	3 784	3 033	2 826	3 358	2 870	2 853

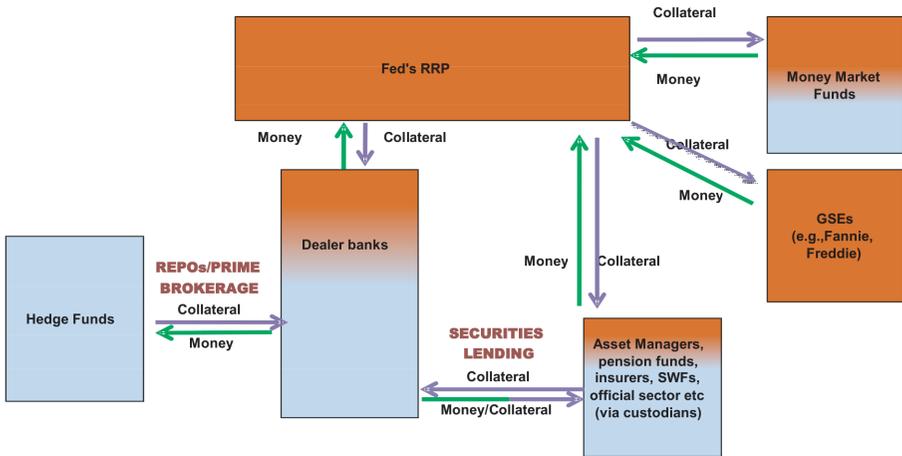
*Gross market values have been calculated as the sum of the total gross positive market value of contracts and the absolute value of the gross negative market value of contracts with non-reporting counterparties. Gross credit exposure is after taking into account legally enforceable bilateral netting agreements.

FIGURE 2 Equity long/short hedge fund position (ie, delta bias).

4 COLLATERAL REUSE AND BALANCE SHEET CONSTRAINTS

As central banks unwind their balance sheets in the future, they will be careful to let the market have possession of securities as collateral, bought via QE, since the reuse rate of these securities is outside their control. With a large balance sheet, the unwind will be over a significant period of time, and thus not a short-term conflict, as is assumed in the monetary policy literature. Further, if central banks remain part of the plumbing and take money directly from nonbanks, the financial plumbing that relies on such money gets rusted, as dealer banks do not receive the money flow. Thus, the dealer banks that connect the money pools and collateral pools will unwind such connections, thereby leading the plumbing to rust.

As alternatives to the likely dilemma of central banks' providing balance sheet space, can nonbanks be providers of liquidity? Long-term asset managers (ie, life insurance and pension funds) and SWFs desire collateral that is of low volatility but not necessarily highly liquid. These entities should be net providers of liquidity, either in the form of cash or liquid collateral. But, critically, their "need" for collateral is relatively static (or, as providers of liquidity, they can dictate that counterparties take a fixed amount). However, hedge funds, money market funds and, with new regulations, dealer banks have a dramatically shifting need for collateral and a large number of counterparties. Their need is for liquid collateral. So, a market for collateral could, in theory, work. Thus, the "principal" model (that embodies the banking industry) shifts to an "agency" model. Presently, it is not possible for nonbanks such as pensions and insurers to directly deal with other nonbanks such as hedge funds, since the latter are not rated; such constraints will keep the global banks at the center of financial plumbing (unless replaced by central banks).

FIGURE 3 Plumbing with both private and public balance sheets.

Source: author's illustration.

5 CONCLUSION

QE created excess reserves, but removing them from the financial system impacts elements of plumbing that will need to be incorporated into monetary policy decision making. The new regulations that constrain bank balance sheets further impede market plumbing. However, given the role of the banking system as conduits for collateral flow, the plumbing will always be available for privileged clients of the banks (or custodian banks) but not for everyone else, since the private balance sheet space is being rationed. Going forward, the choice of balance sheet, private or public, should be driven by market forces, and not by the ad hoc allocation of central banks (see Figure 3, where the red area is the reduction in plumbing since money flows directly to the central bank and not to the market plumbing (or blue area)). More importantly, monetary policy transmission is weakened if parts of the plumbing move to a central bank balance sheet.

APPENDIX A. REHYPOTHECATION AND THE LEHMAN EPISODE

Since the Lehman Brothers bankruptcy, there has been criticism from the United States that the United Kingdom does not have rigid quantitative regulatory caps on rehypothecation equivalent to those applicable to broker-dealers regulated by the SEC in the United States (even though many UK brokers agree to caps in contracts).

BOX 2 The global bilateral collateral market (relative to the US triparty repo market).

Collateral use and reuse in financial markets is popular. Before the Lehman crash, the volume of funding via pledged collateral (including title transfer) was about US\$10 trillion, higher than the US broad measure of money, M2. This box tries to summarize the difference between the much-researched triparty “repo” market and the less-researched bilateral collateral market; the latter includes collateral flows from not only bilateral repo but also securities lending, derivatives and prime brokerage.

The US bilateral repo market is a subset of the “market for collateral” (securities for possession and use, incidentally against cash). The triparty repo (TPR) market in the United States is a “market for funding” (money for broker-dealers/banks, incidentally collateralized by securities). The TPR market is currently estimated at US\$1.6 trillion from a peak of almost US\$3 trillion before the Lehman crisis. The TPR market provides banks with cash on a secured basis, with the collateral being posted to cash lenders (eg, money market funds) through one of the two clearing banks: BNY Mellon and JP Morgan. The bilateral repo market is sizable, and although no official statistics exist, some recent work at central banks suggests this market to be on par with or bigger than the TPR market (eg, the New York Fed estimates this market to be between US\$1 and US\$2 trillion in the United States alone) (Baklanova *et al* 2016).

Think of the bilateral repo market using this analogy for the old-clothing trade. Typically, merchants in developed countries shrink wrap old clothes in shipping-container-sized bundles (under pressure) and send these plastic-wrapped blocks to poor countries. There, clothing brokers buy the blocks and resell them by weight to jobbers. So, if a block weighs 500 pounds, and the broker decides to sell it in 10-pound lots, fifty people will gather around to make a purchase. However, some people will pay slightly more to be at the front of the crowd, and some will pay slightly less to be at the back. When the jobber pops the bundle open with a big knife and the shrink wrap explodes, everyone gathered around scrambles for the best pieces. Collateral desks are a bit like those jobbers. Big lots come in from hedge funds and security lenders, and the large bank’s collateral desk paws through it, searching for gems. Those gems go out bilaterally to customers who will pay a premium. The remainder goes to the guys at the back of the crowd (for example, TPR repo). To the extent that securities eligible for the TPR market are in demand in the bilateral market, banks will generally use them first in the bilateral market, as it offers a better price.

The figures shown above that depict the bilateral-pledged collateral do not count TPR-related collateral, as this is trapped within the TPR structure. The operational structure of the RRP facility puts practical restrictions on the reuse of collateral outside the triparty system. Collateral can only be used in a triparty repo liability. (So, a firm that is a “dealer” in the triparty system, such as JPMorgan Chase or BNY Mellon, could have as an asset a Fed RRP and as a liability a triparty repo with a customer.) Members of the Government Securities Division (GSD) of the Depository Trust and Clearing Corporation (DTCC) can reuse the collateral within the General Collateral Finance (GCF) triparty system. Here, we use the term “banks” very loosely; for example, Citibank could take collateral from the Fed and give this to a Fidelity mutual fund as a triparty investment, or it could take collateral from the Fed and give this in the GCF to Credit Suisse to give to that Fidelity fund. To be clear, members of the GSD may be classified differently: Goldman Sachs is actually Goldman Sachs & Co., Deutsche Bank is Deutsche Bank Securities Inc. and Barclays is Barclays Capital Inc. Members also include Pierpont Securities LLC, Jefferies LLC and Cantor Fitzgerald & Co. The important point is that reuse of collateral can only end in a triparty repo; it can have no other use outside this system.

Specifically, some feel that this asymmetry is akin to regulatory arbitrage and that the United Kingdom offers a unique forum for “unlimited rehypothecation”.⁷

Proposed regulations seem to be at odds with “title transfer”. If I transfer title, then the recipient of collateral is able to use that asset in any way they deem fit. This is not compatible with regulations that treat the asset as “client property” and limit rehypothecation or segregate for the client. In fact, insisting on segregation undermines the legal construction under which title was transferred. An important distinction is the interpretation of the prefix “re” in “rehypothecation”. In the United States, this is normally done with a pledge with consent to reuse. So, there is a clear distinction between pledged securities and sold securities. However, in Europe a repo is a contract of sale with a promise to repurchase at an agreed future date and price. Legally, if I sell securities, the resulting securities are no longer my securities; if these securities are then onward pledged, that is not a rehypothecation from my angle. However, is this economically different if I sell securities on the basis that you agree to sell me equivalent securities at some future time? The Basel approach is along the lines that the existence of the promise to sell back means that the original sale is no longer a “pure” sale, and therefore it is caught by the rehypothecation restrictions.

But these criticisms risk overlooking three significant counterarguments. First, as subsequent litigation has revealed, the UK broker Lehman Brothers International Europe (LBIE) appeared to have broken the UK rules on client asset segregation. In certain cases, it appears that LBIE had not been properly segregating client property. Quantitative limits on reuse do not protect clients whose brokers do not follow the rules. Second, it could be argued that Lehman clients who had voluntarily agreed to give broad rights of reuse in their prime-brokerage contracts essentially got what they bargained for when LBIE failed. Those clients (for the most part, professional and sophisticated counterparties) had misjudged the counterparty credit risk on Lehman, but they had not been cheated any more than an uninsured depositor is “cheated” by a failing bank. Third, the supposed uniqueness of the UK legal regime is perhaps

⁷ A key reason why hedge funds may have previously opted for funding in Europe is that leverage is not capped as in the United States via the 140% rule under Rule 15c3–3. In the United States, the SEC’s Rule 15c3–3 prevents a broker-dealer from using its customer’s securities to finance its proprietary activities. Under this rule, the broker-dealer may use/rehypothecate an amount up to 140% of the customer’s debit balance (ie, borrowing from the broker-dealer). As an example, assume a customer has US\$500 in pledged securities and a debit balance of US\$200, resulting in net equity of US\$300. The broker-dealer can rehypothecate up to US\$280 of the client’s assets (140% × US\$200). Created by the Securities Investor Protection Act (SIPA), the Securities Investor Protection Corporation (SIPC) is an important part of the overall system of investor protection in the United States. SIPC’s focus is very specific: restoring securities (rather than cash) to investors with assets in the hands of bankrupt brokerage firms (eg, Lehman). MF Global is a useful recent precedent.

overplayed: the types of counterparties that go to London, rather than Frankfurt or Paris, do not do so for any unique features of UK law. In fact, the strong legal basis for title-transfer financial collateral actually has its roots in English law, which also underpins the Financial Collateral Directive of the EU. The market is in London not because it offers unique arbitrage but because UK courts are viewed as having a long history of contractual adjudication and legal principles.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper. The views expressed are done in a personal capacity and should not be reported as representing the views of the IMF or IMF policy.

REFERENCES

- Baklanova, V., Caglio, C., Cipriani, M., and Copeland, A. (2016). The US bilateral repo market: lessons from a new survey. Report, Office of Financial Research.
- European Systemic Risk Board (2014). An analysis of the ESRB's first data collection on securities financing transactions and collateral (re)use. Occasional Paper 6, September, ESRB.
- Gourinchas, P.-O., and Jeanne, O. (2012). Global safe assets. Working Paper 399, December, Bank for International Settlements.
- Singh, M. (2011). Velocity of pledged collateral: policy and analysis. Working Paper 11/256, International Monetary Fund.
- Singh, M. (2014). *Collateral and Financial Plumbing*. Risk Books, London. URL: <http://bit.ly/2aGBgcF>.
- Singh, M. (2015). Managing the Fed's liftoff and transmission of monetary policy. Working Paper 15/202, International Monetary Fund.