

## Jeremy C Stein: The fire-sales problem and securities financing transactions

Speech by Mr Jeremy C Stein, Member of the Board of Governors of the Federal Reserve System, at the Workshop on “Fire Sales” as a Driver of Systemic Risk in Tri-Party Repo and Other Secured Funding Markets, Federal Reserve Bank of New York, New York City, 4 October 2013.

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*I am grateful for helpful comments from Matt Eichner, Mike Gibson, Nellie Liang, Bill Nelson, and Mark Van Der Weide. The thoughts that follow are my own, and are not necessarily shared by other members of the Federal Open Market Committee.*

Thank you. It’s a pleasure to be here at this workshop. In an effort to provide some broad framing for the sessions to follow, I thought I would try to do three things in my opening remarks. First, I will briefly discuss the welfare economics of fire sales. That is, I will try to make clear when a forced sale of an asset is not just an event that leads to prices being driven below long-run fundamental values, but also one that involves a market failure, or externality, of the sort that might justify a regulatory response. Second, I will argue that securities financing transactions (SFTs) are a leading example of the kind of arrangement that can give rise to such externalities, and hence are particularly deserving of policy attention. And third, I will survey some of the recently enhanced tools in our regulatory arsenal (e.g., capital, liquidity, and leverage requirements) and ask to what extent they are suited to tackling the specific externalities associated with fire sales and SFTs.

To preview, a general theme is that while many of these tools are likely to be helpful in fortifying individual regulated institutions – in reducing the probability that, say, a given bank or broker-dealer will run into solvency or liquidity problems – they fall short as a comprehensive, marketwide approach to the fire-sales problem associated with SFTs. In this regard, some of what I have to say will echo a recent speech by my Board colleague Daniel Tarullo.<sup>1</sup>

### The positive and normative economics of fire sales

In a recent survey paper, Andrei Shleifer and Robert Vishny write that: “...[A] fire sale is essentially a forced sale of an asset at a dislocated price. The asset sale is forced in the sense that the seller cannot pay creditors without selling assets....Assets sold in fire sales can trade at prices far below value in best use, causing severe losses to sellers.”<sup>2</sup> Shleifer and Vishny go on to discuss the roles of investor specialization and limited arbitrage as factors that drive the magnitude of observed price discounts in fire sales, and there is, by now, a large body of empirical research that supports the importance of these factors.

However, by itself, the existence of substantial price discounts in distressed sales speaks only to the positive economics of fire sales, not the normative economics, and hence is not sufficient to make a case for regulatory intervention. To see why, consider the following example: An airline buys a 737, and finances the purchase largely with collateralized borrowing. During an industry downturn, the airline finds itself in distress, and is forced to sell the 737 to avoid defaulting on its debt. Other airlines also are not faring well at this time, and are not interested in expanding their fleets. So the only two bidders for the 737 are a movie

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<sup>1</sup> Daniel K. Tarullo (2013), “[Evaluating Progress in Regulatory Reforms to Promote Financial Stability](#),” speech at the Peterson Institute for International Economics in Washington, D.C., May 3.

<sup>2</sup> Andrei Shleifer and Robert Vishny (2011), “[Fire Sales in Finance and Macroeconomics \(PDF\)](#),” *Journal of Economic Perspectives*, vol. 25 (Winter), p. 30.

star, who plans to reconfigure it for his personal use, and a private-equity firm, which plans to lease out the plane temporarily and wait for the market to recover so the firm can resell it at a profit. In the end, the private-equity firm winds up buying the plane at half its original price. Two years later, it does indeed resell it, having earned a 60 percent return.

This is clearly a fire sale in the positive-economics sense, but is there a market failure here that calls for regulation? Intuition suggests not. The airline arguably caused the fire sale by using a lot of leverage in its purchase of the 737, but it also seems to bear most of the cost, by being forced to liquidate at a large loss. The movie star and the private-equity firm are, if anything, made better off by the appearance of a buying opportunity, and there are no other innocent bystanders. So the airline's ex ante capital structure choice would seem to internalize things properly; the fire sale here is just like any other bankruptcy cost that a firm has to weigh in choosing the right mix of debt and equity.

For a fire sale to have the sort of welfare effects that create a role for regulation, the reduced price in the fire sale has to hurt somebody other than the original party making the leverage decision, and this adverse impact of price has to run through something like a collateral constraint, whereby a lowered price actually reduces, rather than increases, the third party's demand for the asset.<sup>3</sup> So if hedge fund A buys an asset-backed security and finances it largely with collateralized borrowing, A's fire selling of the security will create an externality in the conventional sense only if the reduced price and impaired collateral value lower the ability of hedge funds B and C to borrow against the same security, and therefore force them to involuntarily liquidate their positions in it as well.<sup>4</sup> The market failure in this case is not simply the fact that this downward spiral causes a large price decline, it is that when hedge fund A makes its initial leverage choice, it does not take into account the potential harm – in the form of tightened financing constraints – that this may cause to hedge funds B and C.<sup>5</sup>

Another key point is that the fire-sales problem is not necessarily caused by a lack of appropriate conservatism on the part of whoever lends to hedge fund A in this example – let's call it dealer firm D. By lending on an overnight basis to A, and with an appropriate haircut, D can virtually assure itself of being able to terminate its loan and get out whole by forcing a sale of the underlying collateral. So D's interests may be very well-protected here. But precisely in the pursuit of this protection, A and D have set up a financing arrangement that serves them well, but that creates a negative spillover onto other market participants, like B and C. It follows that even if policies aimed at curbing too-big-to-fail (TBTF) problems are entirely successful in aligning D's interests with those of taxpayers, this is not sufficient to deal with fire-sales externalities. They are a fundamentally different problem, and one that arises even absent any individually systemic institutions or any TBTF issues.

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<sup>3</sup> An alternative mechanism that works similarly is when the third party is a regulated intermediary and mark-to-market losses reduce its capital ratios, and again force it to involuntarily sell assets in the face of falling prices.

<sup>4</sup> The fundamental welfare economics at work here is developed in John Geanakoplos and Heracles M. Polemarchakis (1986), "Existence, Regularity, and Constrained Suboptimality of Competitive Allocations When the Asset Market Is Incomplete," in Walter P. Heller, Ross M. Starr, and David A. Starrett, eds., *Essays in Honor of Kenneth Arrow: Vol 3., Uncertainty, Information, and Communication* (New York: Cambridge University Press), pp. 65-95. A discussion of the connection of this work to specific aspects of macroprudential regulation is in Samuel G. Hanson, Anil K. Kashyap, and Jeremy C. Stein (2011), "[A Macroprudential Approach to Financial Regulation \(PDF\)](#)," *Journal of Economic Perspectives*, vol. 25 (Winter), pp. 3-28.

<sup>5</sup> This is the first-round externality. Adverse spillovers from a fire sale of this sort may also take the form of a credit crunch that affects borrowers more generally. Such a credit crunch may arise as other financial intermediaries (e.g., banks) withdraw capital from lending, so as to exploit the now-more-attractive returns to buying up fire-sold assets. Ultimately, it is the risk of this credit contraction, and its implications for economic activity more broadly, that may be the most compelling basis for regulatory intervention.

## **Fire-sale externalities in securities financing transactions**

The preceding discussion makes clear why SFTs, such as those done via repurchase (repo) agreements, are a natural object of concern for policymakers. This market is one where a large number of borrowers finance the same securities on a short-term collateralized basis, with very high leverage – often in the range of twenty-to-one, fifty-to-one, or even higher. Hence, there is a strong potential for any one borrower’s distress – and the associated downward pressure on prices – to cause a tightening of collateral or regulatory constraints on other borrowers.

I won’t go into much detail about the institutional aspects of SFTs and the repo market. Instead, I will just lay out two stylized examples of SFTs that I can then use to illustrate the properties of various regulatory tools.

### ***Example 1: Broker-dealer as principal***

In this first example, a large broker-dealer firm borrows in the triparty repo market – from, say, a money market fund – in order to finance its own holdings of a particular security. Perhaps the broker-dealer is acting as a market-maker in the corporate bond market, and uses repo borrowing to finance its ongoing inventory of investment-grade and high-yield bonds. In this case, the asset on the dealer’s balance sheet is the corporate bond, and the liability is the repo borrowing from the money fund.

### ***Example 2: Broker-dealer as SFT intermediary***

In this second example, the ultimate demand to own the corporate bond comes not from the dealer firm, but from one of its prime brokerage customers – say, a hedge fund. Moreover, the hedge fund cannot borrow directly from the money market fund sector in the triparty repo market, because the money funds are not sufficiently knowledgeable about the hedge fund to be comfortable taking it on as a counterparty. So instead, the hedge fund borrows on a collateralized basis from the dealer firm in the bilateral repo market, and the dealer then turns around and, as before, uses the same collateral to borrow from a money fund in the triparty market. In this case, the asset on the dealer’s balance sheet is the repo loan it makes to the hedge fund.

Clearly, there is the potential for fire-sale risk in both of these examples. One source of risk would be an initial shock either to the expected value of the underlying collateral or to its volatility that leads to an increase in required repo-market haircuts (e.g., the default probability of the corporate bond goes up). Another source of risk would be concerns about the creditworthiness of the broker-dealer firm that causes lenders in the triparty market to step away from it.

In either case, if the associated externalities are deemed to create significant social costs, the goal of regulatory policy should be to get private actors to internalize these costs. At an abstract level, this means looking for a way to impose an appropriate Pigouvian (i.e., corrective) tax on the transactions.<sup>6</sup> Of course, the tax must balance the social costs against the benefits that accompany SFTs; these benefits include both “money-like” services from the increased stock of near-riskless private assets, as well as enhanced liquidity in the market for the underlying collateral – the corporate bond market, in my examples.<sup>7</sup> So in the

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<sup>6</sup> Of course, the Pigouvian taxation approach by itself cannot completely eliminate the ex post costs associated with fire sales. This would require a broad and active lender-of-last resort function, which I do not discuss here. The best that any form of ex ante regulation can hope to do is to reduce the incidence and magnitude of ex post fire-sales damage.

<sup>7</sup> Further discussion on the money-like benefits that are created by near-riskless private assets such as repo can be found in the following: Arvind Krishnamurthy and Annette Vissing-Jorgensen (2012), “[The Aggregate Demand for Treasury Debt](#),” *Journal of Political Economy*, vol. 120, issue 2 (April),

absence of further work on calibrating costs and benefits, there is no presumption that the optimal tax should be large, only that it may be non-zero, and that it may make sense for it to differ across asset classes.

### **Can existing regulatory tools be used to tax SFTs efficiently?**

With this last observation in mind, my next step is to run through a number of our existing regulatory instruments, and in each case ask: to what extent can the instrument at hand be used efficiently to impose a Pigouvian tax on an SFT, either one of the dealer-as-principal type or one of the dealer-as-intermediary type? As will become clear, the answer can depend crucially on both the structure of the transaction as well as the nature of the underlying collateral involved. Also, I should emphasize that nothing in this exercise amounts to a judgment on the overall desirability of any given regulatory tool. Obviously, even if risk-based capital requirements are not particularly helpful in taxing SFTs, they can be very valuable for other reasons. I am asking a different question: to what extent can the existing toolkit be used – or be adapted – to deal with the specific problem of fire-sale externalities in SFTs?

#### **1. Risk-based capital requirements**

Current risk-based capital requirements are of little relevance for many types of SFTs. In my Example 1, where the dealer firm holds a corporate bond as a principal and finances it with repo borrowing, there would be a capital charge on the corporate bond, but this capital charge is approximately independent of whether the corporate bond is financed with repo or with some other, more stable, form of funding. So there is no tax on the incremental fire-sale risk created by the more fragile funding structure.<sup>8</sup>

In Example 2, in which the dealer is an intermediary with a matched book of repo borrowing and lending, there is, in principle, a capital requirement on its asset-side repo loan to the hedge fund. However, the Basel III risk-based capital rules allow banks and bank holding companies to use internal models to compute this capital charge for repo lending, and the resulting numbers are typically very small – for all practical purposes, close to zero – for overcollateralized lending transactions, with repo being the canonical example.

I'm not arguing that the very low risk-based charges on repo lending in Basel III are "wrong" in any microprudential sense. After all, they are designed to solve a different problem – that of ensuring bank solvency. And if a bank holding company's broker-dealer sub makes a repo loan of short maturity that is sufficiently well-collateralized, it may be at minimal risk of bearing any losses – precisely because it operates on the premise that it can dump the collateral and get out of town before things get too ugly. The risk-averse lenders in the triparty market – who, in turn, provide financing to the dealer – operate under the same premise. As I noted earlier, these defensive reactions by providers of repo finance mean that the costs of fire sales are likely to be felt elsewhere in the financial system.

#### **2. Liquidity requirements**

Liquidity requirements, such as those embodied in the Basel III Liquidity Coverage Ratio (LCR), can impose a meaningful tax on certain SFTs in which the dealer acts as a principal.

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pp. 233–267; Gary B. Gorton and Andrew Metrick (2012), "[Securitized Banking and the Run on Repo](#)," *Journal of Financial Economics*, vol. 103, pp. 425–451; and Jeremy C. Stein (2012), "[Monetary Policy as Financial-Stability Regulation](#)," *Quarterly Journal of Economics*, vol. 127, pp. 57–95.

<sup>8</sup> To be more precise, under Basel III capital rules, there is a small risk-based capital requirement on the repo liability. This requirement is driven by counterparty credit risk, not liquidity risk, and is independent of the term of the repo borrowing. The basic idea is that the repo borrower has to hold a little bit of capital because it has sent \$102 in Treasury securities over to its counterparty lender and only received \$100 cash. If the repo lender defaults, the borrower could be out \$2.

If the dealer holds a corporate bond and finances it with repo borrowing of less than 30 days' maturity, the LCR kicks in and requires the dealer to hold high-quality liquid assets (HQLA) against the risk that it is unable to roll the repo over. In this particular case, there can be said to be a direct form of regulatory attack on the fire-sales problem. However, this conclusion is sensitive to the details of the example. If, instead of holding a corporate bond, the dealer holds a Treasury security that is deemed to count as Level 1 HQLA, there is no impact of the LCR.

Moreover, the LCR plays no role in mitigating fire-sales externalities in the important matched-book case in which the dealer acts as an intermediary.<sup>9</sup> If a dealer borrows on a collateralized basis with repo and then turns around and lends the proceeds to a hedge fund in a similar fashion, the LCR deems the dealer to have no net liquidity exposure – and hence imposes no incremental liquidity requirement – so long as the lending side of the transaction has a maturity of less than 30 days. The implicit logic is that as long as the dealer can generate the necessary cash by not rolling over its loan to the hedge fund, it will always be able to handle any outflows of funding that come from being unable to roll over its own borrowing. This logic is not incorrect per se, but it is very micro-focused in nature, and does not attend to fire-sales externalities. It worries about the ability of the dealer firm to survive a liquidity stress event, but does not take into account that the dealer's survival may come at the cost of forcing its hedge fund client to engage in fire sales.<sup>10</sup>

### **3. Leverage ratio**

If a broker-dealer firm faces a binding leverage ratio, this constraint can act as a significant tax on two types of SFTs that are largely untouched either by risk-based capital requirements or by liquidity regulations. The first is when the dealer, acting as a principal, uses repo to finance its holdings of Treasury securities or agency mortgage-backed securities, assets that generally have only modest risk weights when held as trading positions. The second is when the dealer acts as an intermediary and has a matched repo book. In both cases, the SFTs blow up the firm's balance sheet and, hence, the denominator of the leverage ratio, even while having little impact on risk-based capital or LCR calculations.

The crucial issue here, however, is whether the leverage ratio does, in fact, bind. A traditional view among regulators has been that the leverage ratio should be calibrated so as to serve as a meaningful "backstop" for risk-based capital requirements, but that under ordinary circumstances it should not actually be the binding constraint on firms. For if it were to bind, this would put us in a regime of completely un-risk-weighted capital requirements, where the effective capital charge for holding short-term Treasury securities would be the same as that for holding, say, risky corporate debt securities or loans.

Recently, U.S. regulators have issued a proposed rulemaking that seeks to raise the Basel III supplementary leverage ratio requirement to 5 percent for the largest U.S. bank holding companies, and to 6 percent for their affiliated depository institutions. While this increase might be considered a parallel shift that preserves the backstop philosophy in light of the fact that risk-based requirements have also gone up significantly, it does increase the likelihood that the leverage ratio may bind for some of these firms at some times – particularly for those firms with a broker-dealer-intensive business model in which the ratio of total assets to risk-

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<sup>9</sup> A similar comment applies to the Net Stable Funding Ratio (NSFR), which requires regulated firms to fund illiquid exposures with some amount of long-term debt or other form of stable funding. Like the LCR, the NSFR effectively treats matched-book repo as creating no net liquidity exposure, and hence imposes no requirement on it.

<sup>10</sup> Even from a microprudential perspective, the LCR can be said to have a flaw in that it is blind to maturity mismatches within the 30-day window. For example, if a dealer borrows on an overnight basis from a money fund, and then makes a 29-day loan to a hedge fund, the LCR deems it to be fully matched, and to have no incremental liquidity exposure.

weighted assets tends to be higher. In this event, there would indeed be a significant tax on SFTs undertaken in the affected firms. However, because it is unlikely that the leverage constraint would bind symmetrically across all of the largest firms, my guess is that the effect would be less to deter SFT activity in the aggregate than to cause it to migrate in such a way as to be predominantly located in those firms that – because they have, say, a larger lending business and, hence, more risk-weighted assets – have more headroom under the leverage ratio constraint.

### **Other possible approaches**

To summarize the discussion thus far, the mainstays of our existing regulatory toolkit – risk-based capital, liquidity, and leverage requirements – have a variety of other virtues, but none seem well-suited to lean in a comprehensive way against the specific fire-sale externalities created by SFTs. The liquidity coverage ratio affects a subset of SFTs in which a dealer firm acts as a principal to fund its own inventory of securities positions, but does not meaningfully touch those in which it acts as an intermediary. By contrast, an aggressively calibrated leverage ratio could potentially impose a significant tax on a wider range of SFTs, but the tax would by its nature be blunt and highly asymmetric, falling entirely on those firms for whom the leverage ratio constraint was more binding than the risk-based capital constraint. As such, it would be more likely to induce regulatory arbitrage than to rein in overall SFT activity.

These observations raise the question of whether there are other tools that might be better suited to dealing with SFT-related fire-sales externalities. I will touch briefly on three of these.

#### **1. Capital surcharges**

In his May speech, Governor Tarullo alluded to the possibility of liquidity-linked capital surcharges that would effectively augment the existing regime of risk-based capital requirements.<sup>11</sup> Depending on how these surcharges are structured, they could act in part as a tax on both the dealer-as-principal and dealer-as-intermediary types of SFTs. Accomplishing the latter would require a capital surcharge based on something like the aggregate size of the dealer's matched repo book; this comes quite close to the Pigouvian notion of directly taxing this specific activity. As compared to relying on the leverage ratio to implement the tax, this approach has the advantage that it is more likely to treat institutions uniformly: the tax on SFTs would not be a function of the overall business model of a given firm, but rather just the characteristics of its SFT book. This is because the surcharge is embedded into the existing risk-based capital regime, which should in principle be the constraint that binds for most firms.

There are a couple of important qualifications, however. First, going this route would involve a significant conceptual departure from the notion of capital as a prudential requirement at the firm level. As noted previously, a large matched repo book may entail relatively little solvency or liquidity risk for the broker-dealer firm that intermediates this market. So, to the extent that one imposes a capital surcharge on the broker-dealer, one would be doing so with the express intention of creating a tax that is passed on to the downstream borrower (i.e., to the hedge fund, in my example).

Second, and a direct corollary of the first, imposing the tax at the level of the intermediary naturally raises the question of disintermediation. In other words, might the SFT market respond to the tax by evolving so that large hedge funds are more readily able to borrow via repo directly from money market funds and securities lenders, without having to go through broker-dealers? I can't say that I have a good understanding of the institutional factors that

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<sup>11</sup> Tarullo (2013).

might facilitate or impede such an evolution. But if the market ultimately does evolve in this way, it would be hard to argue that the underlying fire-sales problem has been addressed.

## **2. Modified liquidity regulation**

A conceptually similar way to get at matched-book repo would be to modify liquidity regulation so as to introduce an asymmetry between the assumed liquidity properties of repo loans made by a broker-dealer, and its own repo borrowing. For example, in the context of the Net Stable Funding Ratio (NSFR), one could assume that a dealer's repo loans to a hedge fund roll off more slowly than do its own repo borrowings from the triparty market. This assumption would create a net liquidity exposure for a matched repo book, and would thereby force the dealer to hold some long-term debt or other stable funding against it. Although the implementation is different, the end result is quite close to that obtained with the capital-surcharge approach I just described: in one case, there is a broad stable funding requirement for intermediaries against a matched repo book; in the other case, there is an equity requirement. It follows that, whatever its other advantages, going the modified-NSFR route does not eliminate concerns about disintermediation and regulatory arbitrage.

## **3. Universal margin requirements**

These sorts of regulatory-arbitrage concerns have motivated some academics and policymakers to think about a system of universal margin requirements for SFTs.<sup>12</sup> In its simplest form, the idea would be to impose a minimum haircut, or down payment requirement, on any party – be it a hedge fund or a broker-dealer – that uses short-term collateralized funding to finance its securities holdings. Because the requirement now lives at the security level, rather than at the level of an intermediary in the SFT market, it cannot be as easily evaded by, say, a hedge fund going outside the broker-dealer sector to obtain its repo funding.<sup>13</sup> This is the strong conceptual appeal of universal margin from the perspective of a fire-sales framework.

In this regard, it is worth noting that the Financial Stability Board (FSB) has recently released a proposal to establish minimum haircut requirements for certain SFTs.<sup>14</sup> However, the FSB proposal stops well short of being a universal margin requirement. Rather, the minimum haircuts envisioned by the FSB would apply only to SFTs in which entities not subject to capital and liquidity regulation (e.g., hedge funds) receive financing from entities that are subject to regulation (i.e., banks and broker-dealers), and only to transactions in which the collateral is something other than government or agency securities. In this sense, there is a close relationship between the FSB minimum-haircut proposal and the specific variant of the capital-surcharge idea that I mentioned a moment ago. Both have the potential to act as a restraint on those SFTs that are intermediated by regulated broker-dealer firms, but both are vulnerable to an evolution of the business away from this intermediated mode. The minimum margin levels in the FSB proposal are also quite small, so it is unclear how much of an effect, if any, they will have on market behavior. For example, the minimums for long-term corporate

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<sup>12</sup> A closely related motivation for universal margin requirements is that they might be able to limit procyclicality by leaning against increases in leverage during boom times.

<sup>13</sup> Of course, there is always the potential for other forms of regulatory arbitrage. For example, a hedge fund that faces a minimum margin requirement when it uses repo borrowing to fund a corporate-bond position may instead seek to take a leveraged position in the corporate bond through other means by, for example, engaging in a total-return swap with its prime broker. This is the growing business of “synthetic” prime brokerage. Properly harmonized initial margin requirements on uncleared derivatives may help to level the playing field between traditional and synthetic prime brokerage activities.

<sup>14</sup> Financial Stability Board (2013), [Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos \(PDF\)](#), August 29.

bonds, securitized products, and equities are 2 percent, 4 percent, and 4 percent, respectively.

## **Conclusions**

Let me wrap up. My aim here has been to survey the landscape – to give a sense of the possible tools that can be used to address the fire-sales problem in SFTs – without making any particularly pointed recommendations. I would guess that a sensible path forward might involve drawing on some mix of the latter set of instruments that I discussed: namely, capital surcharges, modifications to the liquidity regulation framework, and universal margin requirements. As we go down this path, conceptual purity may have to be sacrificed in some places to deliver pragmatic and institutionally feasible results. It is unlikely that we will find singular and completely satisfactory fixes.

With this observation in mind, I would be remiss if I did not remind you of another, highly complementary area where reform is necessary: the money market fund sector. Money funds are among the most significant repo lenders to broker-dealer firms, and an important source of fire-sale risk comes from the fragility of the current money fund model. This fragility stems in part from their capital structures – the fact that they issue stable-value demandable liabilities with no capital buffer or other explicit loss-absorption capacity – which make them highly vulnerable to runs by their depositors. I welcome the work of the Securities and Exchange Commission on this front, particularly its focus on floating net asset values, and look forward to concrete action. Another source of fragility arises from money funds investing in repo loans collateralized by assets that they are unwilling or unable to hold if things go bad. This feature creates an incentive for them to withdraw repo financing from broker-dealers at the first sign of counterparty risk, even if the underlying collateral is in good shape.

I'm sure we will hear much more about this last set of issues over the remainder of the conference today. I look forward to the discussions. Thank you.