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DO WE HAVE A LIQUIDITY PROBLEM POST-CRISIS?

FEATURING KEYNOTE REMARKS BY
FEDERAL RESERVE VICE CHAIRMAN STANLEY FISCHER

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PARTICIPANTS:

Opening Remarks:

MARTIN BAILY
Senior Fellow, Economic Studies
The Brookings Institution

Keynote Remarks:

STANLEY FISCHER
Vice Chairman
Board of Governors of the Federal Reserve System

Panel One:

HAL S. SCOTT, Moderator
President and Director, Committee on Capital Markets Regulation
Nomura Professor and Director, Program on International Financial Systems
Harvard Law School

BARBARA NOVICK
Vice Chairman, BlackRock

DEBBIE TOENNIES
Head of Regulatory Affairs, Corporate and Investment Bank
JPMorgan Chase

JOSEPH TRACY
Executive Vice President and Senior Advisor to the President
Federal Reserve Bank of New York

Panel Two:

AARON KLEIN, Moderator
Fellow and Policy Director, Initiative on Business and Public Policy
The Brookings Institution

GREG BAER
President of the Association, Executive Vice President and General Counsel,
Payments Company
The Clearing House

JASON CARROLL
Managing Director
Hudson River Trading

ANDREW GREEN
Managing Director, Economic Policy
Center for American Progress

Closing Remarks:

MARTIN BAILY
Senior Fellow, Economic Studies
The Brookings Institution

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P R O C E E D I N G S

MR. BAILY: So welcome to Brookings. I'm Martin Baily, the head of the Initiative on Business and Public Policy. We have a session today on is there a liquidity problem? And we're going to start with a speech from Stan Fischer.

When I entered MIT as a first-year Ph.D. student, Stan Fischer was in his final year. I guess that's a way of saying he's a little bit older than I am. He already had a reputation for a future leader in economics. He went on to the University of Chicago after MIT and he quickly established himself as one of the best young macroeconomists around. MIT brought him back and, as you know, Stan became a legendary teacher, a star researcher, and someone that has influenced generations through his textbooks. He supervised such graduate students as Ben Bernanke, Olivier Blanchard, Greg Mankiw, and many others. They must have been tough to get through their Ph.D. programs.

Important policy positions he's held include first deputy managing director of the IMF, governor of the Bank of Israel, and now his current position as vice chair of the Federal Reserve Board here in Washington, where he was confirmed by the Senate in May of 2014.

It's my great pleasure to welcome Stan Fischer. (Applause)

MR. FISCHER: Good afternoon, and thanks, Martin, for that. The one you left out was the World Bank where I started in this business. Anyway, it's always a pleasure to be here at Brookings. This topic is one which is around and about which people have different views which are related somewhat with how much liquidity matters to them, to their business, and to their profits. I'm going to talk about liquidity first, what people say, what market participants primarily say about it and what the evidence they bring is. So, let me begin.

Market liquidity is the ability to rapidly execute sizable securities transactions at a low cost and with a small price impact. Well, I've been looking for that definition because, I think if I'm correct about Martin Baily, we learned that from Tobin but

couldn't find that in Tobin, however, so I had to searching around to find it and I found it in the IMF Global Financial Stability Report.

The high degree of liquidity in U.S. capital markets historically has contributed to the efficient allocation of capital through lower costs and a mix of bank and market-based finance that supports the flexibility of these markets. That combination is relatively rare. Europe is very much bank-finance nominated.

Now, regulatory changes may have altered the financial institutions' incentive to provide liquidity, raising concerns which have been brought into sharp relief by several flash events -- people even call them flash crashes -- over the past few years. At the same time, any changes in observed liquidity are also likely accompanied by other related changes such as in technology. A more complete assessment of these shifts is important when we think about the effects of liquidity on changes in financial regulations that were induced by the global financial crisis.

I'm first going to review some of the concerns raised by market participants and others about market liquidity as well as highlight the challenges associated with finding clear evidence that substantiates these concerns. Somebody said as we were sitting next door that all the presentations seemed to use the same graphs, but people draw different conclusions from them because they're not entirely self-evident.

I'll then discuss whether the potential impairment of liquidity might exacerbate problems related to fire sales and leverage. And finally, I'll make the case that any changes in market liquidity resulting from regulatory changes should be analyzed in the broader context for the overall safety of the financial system. This perspective naturally emphasizes the potential tradeoffs between the possibly adverse effect regulations may have on market liquidity and their positive effect on the stability of the financial system. What I'm saying is, this is going to be -- I'm clearly saying that this is not a discussion where as far as I can see there is an absolutely clear conclusion that

everybody who looks at the numbers is bound to reach. Those are things -- the nature of papers in which you're discussing things where it's not entirely clear is that they're much more difficult to exposit, but exposit we will.

So, what is it that market participants complain about? Well, there are four things. The first is the decline in dealers' inventory. Market participants talk about the decline in dealers' inventories as a possible source to decrease liquidity. What you see in figure one is that primary dealers' inventories are fixed income securities which they use predominantly for market-making, declined very sharply after Lehman Brothers' failure from about $1.3 trillion to about $800 billion, and they've since fallen further to about $700 billion. So, it's about half of what it was at the peak.

Now, this decline might be due in part to regulations such as the Volcker Rule and the Supplementary Leverage Ratio, which aimed at making the financial system safer and sounder. But they could also be caused by the changes firms may have made on their own perhaps in reaction to having been involved in the financial crisis. Whatever the cause of the change, market participants have expressed a concern that the decline in inventories reflects in part a reduced willingness or capacity of the primary dealers to make markets which may in turn lead to lower liquidity. But whether markets are in fact less liquid because of the fact shown in Figure 1, depends on the degree to which the decrease in their inventories affects their willingness to provide liquidity. And not more important, probably, the extent to which non-bank firms such as hedge funds and insurance companies (inaudible) any lost market-making capacity.

Second fact: the decline in trade size and turnover. Now, market participants often site the decline in average trade size and in turnover -- turnover is a volume of trades relative to the total amount of bonds outstanding -- as evidence of reduced liquidity. Figure 2 shows that the average trade size in the corporate bond market has indeed declined since 2006, but has been relatively stable in the past four years. This is one of those charts that experts see much more in that I do but that must

be because I'm astigmatic or something (laughter).

The average trade size has declined since 2006 but this decrease may reflect a number of factors including changes in technology or the types and preferences of institutions engaged in trades. So, it may not indicate a reduction in market liquidity. Certainly, the length of this trend, which is a decade, seems on its face as more consistent with a secular trend such as technological change than with something caused by regulations which started coming into effect in 2008-2009 and later. Now, there is also an interest in turnover that's not shown there. Turnover in the corporate bond market has declined as well, though this evidence is definitely not a definitive sign of reduced market liquidity because the decline is not driven by a reduction in trading volume but is a result of the robust growth of the denominator which is debt outstanding.

Third: liquidity during times of stress. Market participants further express concern about the potential for market liquidity to become less resilient during times of stress when it is needed the most. I think that's what frightens everybody. But evidence on this front is difficult to gather. Some argue that market liquidity is resilient because financial markets appear to function fairly well during recent episodes of high market volatility, such as following the Brexit vote or earlier this year when oil prices were low and stock market volatility was high in the first few weeks of the year.

Others argue that market liquidity is not resilient. According to a recent study, the cost of trading distressed corporate bonds appears to be higher now than in the recent past. There is a paper by (inaudible) -- you can find references on the FED website. So, we're talking about the cost of trading distressed corporate bonds. The authors find that before the crisis the cost of a $1 million bond transaction increased about 0.7 percent following a downgrade. But after the Volcker Rule the cost following a downgrade rose by 2.4 percent. That's quite a significant difference, 0.7 percent versus 2.4 percent. But this analysis is limited to episodes of distressed borrowers rather than to system-wide stress.

And then the last thing that people point to is flash events. Recent flash events such as the most famous, the sharp movement in Treasury prices on October the 15th, 2014, the rapid rise in decline of the euro dollar exchange rate on March 19th, 2015, and the swing in sterling on October 7th, 2016, have led some to assert that market liquidity has become less resilient. Researchers at the FED in New York have argued that spikes in volatility and sudden declines in liquidity have become more frequent in both Treasury and equitiy markets. The Commodities Futures Trading Commission also points out that flash events are more common.

Now, market participants suggest that the rapid growth in high frequency trading, in equity foreign exchange in U.S. Treasury markets along with broader concerns about less resilient liquidity potentially explains these flash events. Nevertheless, a report on the October 15th, 2014 event by the combined staff of the Treasury Department, the Federal Reserve, and market regulatory agencies found no single factor that caused the sharp swing in prices. So, the evidence -- the connection between flash events, I'm going to come back to this, between flash events and market liquidity is not straight forward.

So, let me review the evidence that we've started talking about. First, trading costs are low and remain low even though flash events appear more common it's much too soon to say that a broad reduction in market liquidity has occurred. Figure 3 plots realized bid-ask spreads for investment-grade corporate bonds over time, that's the black line, the black dash line, and speculative-grade corporate bonds which is the red solid line. I think you wouldn't really find it very easy to say that liquidity is measured by the bid-ask spreads is lower now than it was in 2006 before the financial crisis. And we're practically back, and we've been back, we were actually a bit lower in 2012-2013. Alternative measures of trading costs such as price impact measures, which attempt to capture the effect of transactions on market prices, follow a chart that looks very much like that. So, transaction costs seem to suggest that liquidity has either improved or not

deteriorated.

There is some work currently not quite complete but that people are talking about which suggests that measures of aggregate transaction costs in the corporate bond market may underestimate embedded liquidity costs. Two researchers, (inaudible) who is at the University of -- well, a Midwestern university (laughter) and (inaudible) who is at the FED, they looked at transactions in which dealers act as brokers rather than as intermediaries that hold assets on their balance sheets. So, they're looking at people who are just basically the brokers rather than broker dealers. And they argue that what one sees in the decline in the bid-ask spread is in fact that dealers change prices to entice others' counterparties into the other side of a trade so that the dealers don't have to hold the traded assets, and they make price concessions which wouldn't have been made if it were purely a broker dealer who was doing it. These lower the traditional measures of trading cost, making trading seem inexpensive when in reality these concessions have (inaudible) the dealer's pay to some investors for providing liquidity. And they argue that as dealer inventories have declined, this downward distortion to aggregate trading cost measures may have increased.

Now, I can't quite figure out what to make of this argument because in almost every transaction where you're paying something for doing something for you there are factors like this. The one we are all aware of is if you held a larger bank account you are less likely to be charged for checks, and things like that. This is something of that sort. So, I don't know what to make of it, but they've looked very hard and they've found this result and they do suggest that transaction costs may have improved somewhat in recent years.

The second result, which I think is pretty impressive as opposed to that, is trading volume. Trading volume has risen remarkably. Trading volume for bonds. You may ask why is it that my slide moves first to the side and then comes back. The answer is that actually I have a blank sheet -- oh, you don't see it. I see it on the screen.

I have a blank sheet between slides because I don't like talking about something when the relevant slide isn't on the screen. So here is a relevant slide for trading volume.

Trading volume in the corporate bond market has gone up remarkably after going down during the crisis. In 2006 investors traded in an average of $12 billion a day. During the height of the financial crisis trading volume decreased to $8 billion a day. But by 2009 already volumes came back to the $12 billion a day, and they're now at $19 billion a day. That is a very substantial increase in transactions. So, this suggests that to the extent that liquidity matters for the volume of transactions at least what has happened to the aggregate can't have been due solely to a deterioration of liquidity.

This slide is only for the corporate bond market but there are similar patterns in the equity and Treasury markets, which is to say that to the extent that this is relevant to liquidity this is evidence against the view that liquidity has declined markedly in the financial markets in which assets are traded.

Now, what are the policy issues related to market liquidity? To date, I think, on average we have to say that observed changes in liquidity do not suggest that shifts in liquidity are having a notable effect on the cost of trading. Nonetheless, the potential for liquidity to evaporate in times of stress deserve careful scrutiny and that's what seems to me the most important of the aspects of the claim that liquidity has declined or concern that liquidity may have declined.

One area where policy concerns have arisen is related to the potential for fire sales in bond markets which should compound the risks associated with the leverage in the financial sector. Bond markets have grown considerably and market-based finance has intensified over the past years making market liquidity more important.

Now, here we're getting to more complicated stuff. In addition, mutual funds that offer daily redemption rights hold a greater share of bonds than investors who buy and hold. As you see in Figure 5, the share of investment grade and high yield corporate bonds held at mutual funds, which is the solid blue area, has hovered around

25-30 percent in recent years up from about 15 percent before the crisis.

Now, reduced market liquidity might exacerbate fire sale risks from leverage at financial institutions or from first mover advantage at mutual funds. Leverage institutions are more sensitive to changes in asset prices. Adverse movement in asset prices, margin calls, and higher haircuts may force them to sell assets to obtain cash and de-lever affecting other market participants through declining asset prices and increased margin calls.

In addition, leverage may closely interact with liquidity risk at mutual funds. Open end mutual funds are characterized by the so-called first mover advantage. Investors can redeem daily from the funds that hold assets that are less liquid, while liquidation costs are born by investors remaining in the fund. If a decline in bond prices leads to sizable fund withdrawals, the first mover advantage could accelerate redemptions in second round price declines. In addition, investors may perceive leverage funds that experience stress as riskier, possibly becoming more inclined to redeem from those funds.

This situation could be worse than in the past if market liquidity deteriorates and dealers are less willing to buy and hold bonds in inventory to cushion the price decline induced by fire sales. However, thanks to recent regulation and supervisory changes including higher capital requirements and stress tests, leverage at the largest intermediaries is much reduced relative to pre-crisis norms. And as a result, vulnerability from potential fire sales risks are less significant. From this perspective if a small reduction in liquidity from regulatory changes even if present, which is not obvious, may be a reasonable price to pay for greater safety.

I'll now place changes in liquidity into the broader context of financial stability. It is possible that regulations aimed at correcting vulnerabilities in the financial system like the supplementary leverage ratio together with other factors have altered the business model of dealer firms and thus have altered liquidity. While the evidence for the

reduction in market liquidity is far from clear, let us for the moment accept this possibility and consider the potential effects on financial stability.

Regulatory changes, even those that may have reduced market liquidity, likely have enhanced financial stability on balance. Recent evidence indeed points in favor of an enhanced financial stability. Regulatory capital ratios from banks and insurance companies remain high, which is previously mentioned, would mitigate fire sales and their effect on the solvency and functioning of these institutions. Leverage at intermediaries is much reduced relative to pre-crisis norms and growth leverage at hedge funds based on the partial information available has not changed much in recent years.

Research from economists at the New York FED shows that the decline in leverage among other factors has substantially reduced potential fire sale externalities in the banking and broker dealer sectors. Thus, the regulatory changes appear to be having a positive effect on financial systems' stability, and these benefits may outweigh the potential cost of a possible reduction in liquidity.

Regulatory changes are in train for the asset management industry whose vulnerabilities have been under examination by the Financial Stability Oversight Council, the FSOC, and the FSB, the Financial Stability Board. The SEC has recently approved rules to modernize and enhance the reporting and disclosure of information by registered investment companies and to enhance liquidity risk management by open-end funds, including mutual funds and certain exchange rated funds. The SEC has also proposed rules that would put new limits on registered funds, gross national and derivative exposures, enhance the requirement for asset segregation and derivatives transactions, and include new risk management requirements for the use of derivatives.

So, what do we conclude? Well, for my conclusion I'd like to quote my colleague Jay Powell with this sentence: "Overall, liquidity is adequate by most measures in most markets most of the time." Bid-ask spreads and price impact measures point towards liquidity that is good by historical standards and we have not observed declines

in market liquidity in recent episodes of high market volatility. Nevertheless, the market's structure is changing and trades in certain situations and in certain market segments might have become costlier. Also, flash events have become more frequent; they're almost certainly a result of changes in technology. And the dynamics of a system with frequent flash events are likely to become complicated. Moreover, some regulatory changes, for example, the Basil III liquidity requirements and the supplemental liquidity ratio are only being phased in at this stage, so we don't know what their impact will be on liquidity.

In light of these changes and the evolving structure of financial markets, it will be important to monitor and continue to analyze this data market liquidity. That's one of the reasons why central banks all over the place are setting up financial stability groups which, among other, things report on the state of liquidity. As we monitor, we should continue to emphasize how the evolution of market liquidity interacts with broader changes to affect the efficient allocation of capital and financial stability. As regulators, we should always bear in mind the possibility that new financial developments could change the dynamics of market responses to unanticipated economic developments.

Thank you, very much.

(Applause)

MR. BAILY: Thank you, Stan. That was terrific. Let me ask you the first question and then I'll hand off to Hal. Do you as a part of the fair reserve system feel you have all the data that you need? I mean, obviously one could imagine, but do you think you have enough data or the data you need to determine whether there is a liquidity problem? And if not, is there data that you would really like to have that for some reason you can't get access to?

MS. FISCHER: Well, you would always like to have more data, so there is that. So, if you ask what is it that I'd really like to know it's whether in a seriously stressful situation we'll find ourselves with liquidity shortages which we wouldn't have

found in the past because -- and I'm looking at Don Cohen, among others, we don't have same lender of last resort facilities that we used to have. So, that seems to me to be the point at which this issue becomes quite critical. I don't think we'll know until we go through that.

MR. BAILY: So, we don't want to wish ourselves in that situation.

MR. FISCHER: We have to do everything we can to try to make sure that that won't happen. That's why this exposition switched from liquidity to how stable the system is as I went along. You know, if the system is stable and if liquidity is a problem and it's not a problem that is anything other than a result of institutional changes since the financial crisis, then you could rely on market participants to find ways of dealing with the liquidity problem. So, that part, I mean, we don't see anything drastic that's happened to liquidity in the present situation; whether it's slightly better or slightly worse is difficult to say at least. We find it difficult to say. So, you turn then to how do we avoid having to do the real-life test of whether we've suffered a large loss in liquidity.

MR. BAILY: I think that feeds into your bailiwick.

MR. SCOTT: I could go there, but I'd like to sort of back up to the whole purpose of this conference, which is to discuss liquidity. Why is it important? So, let's talk about that subject in normal times and in crisis.

In normal times, why do we care about the liquidity of these markets? Why is it important?

MR. FISCHER: You want the markets basically for the convenience of individuals who need to find themselves needing to rearrange their portfolios and because the markets provide price discovery and other amenities that people need at any given time. So, I think if you didn't have much liquidity you'd have, you know, two trades a day. You go to a much smaller country you realize that the size of the market matters because in smaller countries the prices are much more sensitive to individual transactors and simply don't work as well as prices typically work in great markets like those we have

or the British have, some few other countries have.

MR. SCOTT: So, if we didn't have liquidity, let's say, in our own markets and the higher credit-risk offerings like junk bonds, would this affect capital formation? And we worry about this in the equity markets, that we don't have enough liquidity in smaller enterprises and that, therefore, that affects their ability to issue the cost of issuance. Do we have the same concern in the fixed income market?

MR. FISCHER: Well, yes, we would have. It's just another way of raising funds. If you worry about it in the equity market you can worry about it here, just as much. So, yes.

MR. BAILY: You mentioned -- since Don Cohen is in the room I won't call it the shatter banking sector since he doesn't like that term, but the non-bank sector, the shadow sector if you like, that is providing some of the liquidity. So, it's not all being provided within banks or within broker dealers, conventional broker dealers. So, is that a dependable way to provide liquidity or is there a sense in which because we are relying on the shadow sector that it's more likely that that liquidity will disappear if things are stressed?

MR. FISCHER: Well, I mean, you sort of need to have a particular view of life to say that if we're -- it's a sort of Murphy's Law or something -- because we are relying on it that it could disappear. I think that our failures to deal with the shadow banking or the non-bank financial system is problematic in the sense that we don't know enough about it and we don't know quite how it's going to behave under stress. And in the end, we're relying on that.

When we had the Asian crisis in the 1990s, the FED in the form of its chairman was explaining to everybody the benefits of the spare tire theory of the financial system, which, you know, the banks went down, okay, somebody else, some other non-regulated institution would take over that function and so forth, and we were supposed to encourage all these other countries to have many different types of institutions. Well, the

trouble with that is you don't really know how it works. You can sort of go around trying to plug gaps, trying to fix squeaks, and things that make you nervous, but we don't have the data and we don't have the knowledge. Now, you might say what don't we have the data about. Well, hedge funds are one thing and that's quite a few trillion dollars so it's not nothing.

MR. SCOTT: So, let me turn to the FED's role in this process. What's the proper role of the FED in providing liquidity to the markets or to the transactors in markets, and divide that into normal times and crisis times.

MR. FISCHER: Well, in normal times the FED is using the supply of credit mainly for macroeconomic goals and the markets are working fine and you don't have to think about them very much. Then you get to the situation what do you do with individual institutions, and there the central bank has substantial difficulties in sort of trying to decide what to do with a small firm that's going to go down. If it's a small firm that's going to go down with no systemic consequences, I don't think the central banks should intervene. I mean, I do believe in moral hazard because I've had lots of people come up and tell me, you were going to intervene, we know that. We didn't know that but they knew that. So, those are difficult. And then if it's a systemic risk I think the central bank has to get in in a serious way.

MR. SCOTT: Do you think there is a moral hazard when somebody is a victim of a panic run?

MR. FISCHER: To some extent. But if panic runs were a new phenomenon you'd say of course. But they're not a new phenomenon and that should be one of the risky events that people take into account in figuring out how much liquidity they need, how much capital they need and so forth. So, it has to be something really very bad to say, well, this is just the sort of thing the central bank does. It should not be doing the sort of thing central banks do in that regard every three weeks. That's a bad way of running the system.

MR. SCOTT: Let me just follow up on the normal times. We've been in this QE expansion mode and there are some people that concerns or think that all this liquidity that's out there is partially due to QE, okay, and that there would be concern about the contraction of liquidity if the FED were to shrink its balance sheet as getting out of QE. How do you think about those issues?

MR. FISCHER: All these things are matters of the speed at which you do things and the transparency with which you do them. If the world is being told that we will roll over our securities in our portfolio until the process of normalizing interest rates is well established then they need to know that that is coming, presuming we will normalize which I do presume. So, I can understand that and you've seen in the taper tantrum the fact that people must have known something was coming. They took positions in which when it came they were damaged. So, that happens.

But we've really got to be careful not to jump into every market disturbance of some size. We've really got to watch out and not let companies fail -- not save companies just because otherwise they would have failed. You need to do it because there's much more reason from the point of the system for that to happen.

MR. BAILY: It seems possible that there are a set of shocks that could come across the horizon that might be quite substantial. You know, Brexit was somewhat of a shock. We could get another round of concerns about the euro and a euro crisis. We could get some surprising results in elections, and we've had one or two that have happened already.

So, given these unexpected events of potentially quite large magnitude, the importance that the U.S. markets play in the global market, would there be a case for saying, actually we don't just need the same amount of liquidity, we need more liquidity in our markets than we used to have because we've got the problems that these shocks may come along and we want to get through them, we certainly don't want to go into another crisis.

MR. FISCHER: Well, in all these things you have to ask whether a situation has gotten worse, and I think it's very hard to make a strong case that the situation has gotten worse. So, if we're asking should we be having as much certainty as we used to have given that we've tightened up the system considerably at least on the banking side and we have a much more stable part of the financial system -- I wish it applied to the whole financial system, which is more relevant to where Don applies his trade these days and accept that. But we've got this unknown of what the shadow does for us. We need to think very hard.

And, by the way, you don't have to give everybody more liquidity, you could just stand ready and know what your plans are dealing with such a situation.

MR. BAILY: Let's see if we have some questions from the audience. We have a microphone. Would you please identify yourself? Please make sure it's a short and to the point question and not -- yes, so the gentleman on the aisle there.

MR. BROWN: Stuart Brown with Warrant Capital. Since July the long-term rates have risen 100 basis points, short term rates are high enough now all of a sudden where we were used to negative rates we're now looking at positive rates. Is that a slow-moving liquidity crisis? Is that the beginning of liquidity when the institutions all want to sell and there is nobody standing on the other side of the trade?

MR. FISCHER: If that was literally true you'd think about it. At the moment prices are moving. Somewhere on that disc I've got the data. We basically had a decline in short rates, a lot of rates, about the magnitude we're seeing being reversed right now. So, I don't see us -- anyway, I'm not going to comment on when we will be ready to intervene, if we'll be ready to intervene and things like that. So, yeah, we have to take into account the sort of phenomenon you are pointing to but I don't want to give more quantitative information than that, in part because I don't know what the answer to the question of when are you going to change policy is, and if I did know I wouldn't tell you (laughter). But, I mean, what you say is something that we obviously have to look at

the moment. I don't see it as yet something that is terribly worrying.

MR. BAILY: Yes, that lady in the back there, whom I recognize but I'm not able to grab your name out of my head (laughter).

MS. JACKLIN: It's Nancy Jacklin, hi. You've talked a little bit about liquidity in the cash markets and what I keep hearing form the professionals is that the liquidity and the derivatives market is much deeper, and that it's much easier to hedge positions quickly or to take positions through the derivatives market than through the cash markets. I wonder how you look at those two together in trying to assess whether we have a marketplace that's viable and won't be subject to some kind of emergency response.

MR. FISCHER: Well, what happened in the derivative -- everything goes back to day one, which is September the 15th, 2008. If you go back to that date, there were a lot of things in the derivative markets which had to be fixed and which are being fixed. When they get fixed -- and we're making progress in that regard -- and if the system continues to operate more or less as it seems to be at present, you never say anything is, yeah, we fixed that problem. I always say when somebody tells you that about the financial markets, we've solved that problem, too big to fail is solved, you fire them because they don't know whether they've done it and you'll never know until you have to deal with these crises. So, it's a very tough situation, but does it look reasonable at the moment? Or will it look reasonable within another six months? Yes, I think so. Will I regret that I ever said this? There is some probability (laughter). There is some probability that that is true.

MR. SCOTT: But I think you're raising sort of a question about whether (inaudible) liquidity here, that we're looking at these cash markets and there is liquidity in the derivative markets that doesn't seem to be integrated much to people's analysis; maybe that's a data gap we could try to close.

MR. FISCHER: It could be, yes.

MR. BAILY: Yes, the gentleman there.

MR. BOER: Thank you. Martin Boer from the IMF. From the industry perspective, I was encouraged to see that the spreads are improving and the volume. We do often also hear that locks are much smaller. We also hear that it takes much longer to trade. We also know that there are many fewer market-makers now. So, maybe also just building on Hal Scott's comment, when the QE slows down, when the rates normalize, we do wonder what that's going to mean and we do wonder if we're going into a period which is going to be more dangerous.

MR. FISCHER: You're entitled to wonder; we're entitled to try to be prepared for dealing with such situations if they were to arise and that's about as much as I want to say.

MR. BAILY: Yes, there is a question here. Again, please identify yourself.

MR. FISHBACK: Good afternoon. James Fishback with Macrovoyant Partners. Mr. Vice Chair, are you at all surprised by the traumatic repricing of longer terms yields in the U.S. over the last week and what that may mean for the FED over the next 8-12 months.

MR. FISCHMAN: Were you saying we were all surprised?

MR. FISHBACK: Were you at all surprised.

MR. FISCHMAN: Well, if you take the event -- if the question is, were you surprised by the situation in the world on Wednesday, the 8th of November versus where it was the day before the answer is yes. (laughter) If the question is, am I surprised that the interest rates arose that quickly, if you gave me the conditions under which it happened, not especially. But if you were to tell me -- I can't separate that from was I surprised by the election results.

MR. FISHBACK: No, it's not a political question.

MR. FISCHER: No, no. I don't think it's political.

I'm just telling you that there is a bigger -- I'm surprised by something that happened. There is no point in having an argument with the markets when this is their reaction to a set of events which they could turn out to be right and they could turn out to be wrong. I mean, if you'd asked me this question about Brexit three days after or a week after I would have said, well, that seems like a reasonable adjustment and then, boom, back it came. So, I can't tell you.

MR. BAILY: Well, I think we've taken a lot of your time. Do you have one last question you want to fit it? I think we've got a lot of great answers and a lot of great questions from the audience. Thank you so much for coming.

MR. FISCHMAN: Thank you, Martin.

(Applause)

MR. BAILY: We're going to now have two panels. I actually didn't introduce panelist Scott from Harvard, so I apologize for that. But everybody knows Hal and his recent book *Connectedness and Contagion.* So, we're going to have two panels now. I want to make a quick comment before we do that. The first one is moderated by Hal Scott, the second will be moderated by my colleague Aaron Klein. I do want to mention that BlackRock and JP Morgan Chase both provide generous support to Brookings which helps make the work we do possible. And I'd like to reiterate Brookings Commitment to independence and underscore that the views expressed today are solely those of the speakers.

So, I think the way things will work since people have got slides they want to present is maybe they will speak from the lectern and then we'll put the slides up. And then when the slide presentations are over then we'll have a panel with questions.

So, our first speaker is Barbara Novick from BlackRock.

MS. NOVICK: Thank you. I have to apologize in advance, you might have guessed from my coughing I have a little bit of a cold. So, Rebecca is going to kindly keep refilling the tea. It seems hot liquids to better than cold liquids. And I'm sorry,

Stan, I was coughing.

So, not surprisingly given the topic is liquidity, I think you're going to find there is some overlap but also some different perspective on what you just heard from Vice Chair Fischer. Today what I want to do is talk about both bond market liquidity and fund redemption risk and the linkage between them. Given, obviously, the time constraints I'm' going to just hit a few highlights. I'm happy to engage with anybody afterwards if they are interested in more.

So, I think what you heard today and what you've seen over the last few years is the bond market liquidity discussions began with two very important data points. One was data that showed that bond funds were holding higher and higher percentages of outstanding bonds, and the second was that turnover was declining in bond markets. This actually generated quite a bit of research and reports. I want to start by talking about those because I had this gnawing feeling every time I'd read one of those reports I'd say I just don't understand. We're seeing record volume. Our traders tell us that they never go home at night with unfinished business, so how could there be that disparity?

So, it turns out, in fact, the first assumption that bond funds were this ever-increasing percentage turned out not to be quite what it looked like. So, you can see there is a green line and a blue line. The green line is the original FED Z.1 data showing this very rapid rise. The blue line is the restated data as of this summer, which shows more muted growth. Yes, it's growing but actually in the last couple of years it's kind of flattened out. So, we were kind of surprised by that because it's a very important underlying assumption to the dialogue.

The second one is long turnover, and as you just heard, the denominator is extremely important. So, turnover turns out to be a ratio. It's the ratio of the trading to the outstanding bonds. So, if you have record issuance and increasing outstandings what you see here is the volume is increasing, the outstanding is increasing and the line for turnover is going down. You see the same pattern, investment grade and then high

yield. So, the original assumption, I think people heard the word turnover and they thought that was trading volume and I don't think they completely understood that differential.

In addition, if you look at recent earnings reports, Goldman Sachs, Morgan Stanley in particular, in their company earnings talked about the increase in trading. They were talking about fixed-income trading in particular. So, clearly there is a lot of volume going on and as you saw in Vice Chair Fischer's data that is very mixed signals to people.

One of the things that's not talked about very often is the overall ecosystem. So, this idea that everyone is selling. Who is everyone? It turns out there are different kinds of asset owners and we summarize here some of the bigger categories. In terms of these categories what's important to understand is that different asset owners have very different investment objectives and constraints. So, for example, an insurer very often holds fixed-income. Rates go up, they still hold fixed-income. Fixed-income can go out of favor in general, they still hold fixed-income. When you look at their capital requirements, when you look at their liabilities, they have a built-in incentive to hold fixed-income. In fact, if rates go up, they have an incentive to buy fixed-income bonds because they need that yield. So, this idea that everyone is going to act in concert is a flawed concept.

Another category not broken out here is within pension funds -- you've got several different kinds, you have defined benefit, you have defined contribution, you have public funds, corporate funds, and they have some very important differences. Again, I'll give one example. In the defined contribution market in the last 10 years the take-up of target date funds has been acanthotic. In those funds is an automatic rebalancing back to a target amount. So, they are actually counter-cyclical. If bonds do poorly, they buy more of them; if stocks do poorly, they buy more of those. So, those kinds of factors are very important when we're thinking about the ecosystem, when we're

thinking about liquidity, what different types of asset-owners do have a huge impact on that exact question.

The other thing that doesn't get talked about a lot is the impact of asset owners on the overall asset allocation decision. I picked just a few headlines here so that you can have a sense of, you know, some of the big moves that a pension plan, or, again, public or private or insurance company, they make a huge shift in their portfolio and that then trickles through. It's not the asset managers that they are choosing that are making those decisions, but it's the asset owners themselves, and then their choice of asset manager might change if they decide to change their asset allocation. So, looking at who controls those asset flows and understanding, again, starting with the motivations and then who makes which decisions.

So, I'm going to give two examples of significant market shifts and what I'll call idiosyncratic events. It really reinforces the importance of understanding this ecosystem. So, the first example is we all know Bill Gross left rather suddenly from PIMCO, so what happened? Well, you saw the first day a bit of outflows, and then you saw over the next year continuing outflows. Where did the money go? What happened to the money? Well, it turns out that a lot of that money stayed in bonds, some of it went into other people's bond funds. Some of it went into ETFs, some of it went to direct ownership, but it stayed in bonds. So, this idiosyncratic event of a single firm actually doesn't change demand for the asset class, it changes demand for the asset manager, which is a very different idea.

In addition, there was a really interesting phenomenon. We wrote this up as a case study at the time because we'd been talking about bond ETFs and the importance, and we're going to talk a little bit about this redemption risk and how much the market has changed. What we saw here is bond funds on the ETF side spiked in volume. Of course, I joke with people, I say exchange traded funds, the E stands for exchange. They trade on exchange, they don't trade in a primary market, they trade in

the exchange market. So, it's more of an agency type of experience. And this actually adds liquidity to the bond markets. Some people say, well, how can an ETF be more liquid than the underlying, and the reason is the presence of the exchange. So, you see here, not only was it more than one fund, and we can find others that had similar patterns, but you can also see in that environment they continued to track their benchmark incredibly well.

So, just to show that that is not a fluke because always one data point is not enough, right? So, we looked again. Third Avenue. They closed a fund there suddenly, very unexpected. So, what happened? High-yield ETFs. The volume spiked. People wanted to stay in that sector or maybe they wanted to leave, but they wanted to express it quickly and they could do it through that secondary trading in the exchange trade. So, very interesting impact, very different -- and as Vice Chair Fischer said, there is always evolutionary development but you have to really think about the markets as they are today, not as they were 10 years ago. Sometimes I say it's not my grandmother's bond market.

So, another thing we started to look at is there is a scenario where some policymakers have expressed concern that mutual (off mic). Sorry, turns out I have to cough to turn it on. There we go. So, it turns out there is no historical data to support the hypothesis and in fact it's interesting that all the data shows the opposite.

So, we started looking at bond funds and trying to understand how would bond funds act. So, I started with the data about bond funds themselves. Here is the fascinating part: Morningstar has 49 categories of bond funds and you can see here the top 10. They are diverse on multiple dimensions from investment strategies to benchmarks to the underlying asset owners. And when we look back into various periods, whether it was the taper tantrum, the 1994 Federal Reserve rate hikes, the high-yield selloff in Third Avenue, what we found was there were no funds that had -- or no categories of funds that had this massive outflow. We saw some funds

had inflows, some funds had outflows, it was really all over the map. And it sort of argues towards the diversity of the sector being an important modifier and stabilizer of the system. By the way, I call it market finance, not shadow banking if anyone is wondering (laughter).

And of course, as I showed you before, you have the bond funds spiking in volume, here you actually see where that corporate bond dealer inventory is going down. This is one of the most interesting charts I've seen where bond fund ETFs are going up by almost the exact same rate. Now, maybe it's a coincidence. I don't believe in so many coincidences in financial markets, but it could be a coincidence.

Let me end with this slide. And, again, forgive me for being a little under the weather here. So, I would say this is not meant to say that there are no risks or we should all become complacent, that's certainly not my reputation. In fact, markets are very much changing and we all need to evolve. So, we look at things like enhancing trading capabilities, using more electronic trading. If you looked at trading at BlackRock today and compared it to 10 years ago it's lightyears different: happy to do demos, market structure, the modernization, evolution of new products such as bond ETFs, all these things are changing. It's not a static market.

Likewise, the portfolio managers themselves are changing how they structure a portfolio. They're thinking about liquidity risk management differently. If I think back to the roots of our firm, we identified five key risks in fixed-income. This is 28 years ago in the marketing materials. And we talked about duration and convexity and credit, and you know what? Currency and the last one was liquidity. So, it's not a new risk, it's a more important risk in these markets, but it's not a new risk. It's something we've been measuring and other people have as well.

So, I would say, yes, we applaud various policymakers for turning the focus on products and activities which is looking at that ecosystem. In particular, Vice Chair Fischer mentioned a number of new measures. We have been very happy to see

an expansion of the toolkit for liquidity measures that are available to fund managers. The raising of the bar in liquidity risk management across the system. These are very positive developments.

If you look at last year, IOSCO reiterated the importance of liquidity risk management tools and compared the tools available in different jurisdictions around the world. You've seen the SEC with their new rules. Things like identifying and eliminating illiquid assets not just at the time of purchase but through the life of that fund. And doing things like that I think at the end of the day protects all of us.

But we also need to be cautious. So, there have been recent calls for liquidity buffers, in some markets for central bank liquidity for mutual funds, for the introduction of macro-prudential tools in the markets. We think each of these are interesting to study and to learn, but they do introduce new risks and we have to have eyes open about what are the tradeoffs.

So, I would end by saying mutual funds are fundamentally different than bank deposits, which I think everybody would agree. And policymaking in this space needs to start with that premise. And, again, thank you very much for inviting me today.

(Applause)

MR. TRACY: Good afternoon. Let me just start with a mention of the disclaimer that my comments will be my own and not necessarily those of the Federal Reserve Bank of New York or the Federal Reserve system.

The advantage of following a terrific keynote talk is that all the important points have already been covered, so I can be somewhat brief in some of my remarks.

So, at the New York Fed for the last couple of years we've had a fairly significant project around liquidity. And the major objective of this project was to understand the importance of the debate and the discussion that we're having, but to try to make sure that in the assessment of things that we can bring as comprehensive and as evidence-based measures to bear. A lot of our work has been really around sort of

collecting evidence and also looking at where the gaps are. We can come back to a discussion of some of the gaps.

Stan offered a definition of market liquidity. Mine was very similar. One of the challenges, obviously, if we're thinking about measuring liquidity is its very nature. So, it doesn't stand still, it's a dynamic sort of concept. It's fundamentally unobserved. It has many different dimensions to it. So, in the end really we can only measure it kind of indirectly, and that means we'll probably need several different types of measures. The most common ones -- and Stan hit on these -- are bid-ask spreads, price impact, and trade size. And, again, I'll focus just on the Treasury incorporate bond markets.

So, here are four measures and we'll start in the northwest corner. The most sort of traditional -- the cost-based measure is the bid-ask spread. So, here we show data for the two-year, five-year, and ten-year. Now, this is on the run securities from the inner dealer maker. And, again, we measure this at five minute increments and then average the rest of the day, and then we have a 21-trading day sort of moving average. And that's true of most of these charts. You can see the dramatic increase in the bid-ask spreads during the financial crisis, and then as Stan pointed out, basically things reverted back and we're essentially really at pre-crisis levels. So, on this very basic measure, again, there is nothing that stands out in terms of any deterioration. In terms of average liquidity in the trade market from the bid-ask spreads.

If we look at the depths of the market, we see that the market depth is rising up to the onset of the financial crisis and then we had a significant deterioration in this particular measure of market liquidity. And then sort of a slow recovery, and then actually reached prior to sort of the taper tantrums market depths levels that exceeded what we had prior to the onset of the financial crisis. And then the flash rally event following the taper tantrum we saw sort of two steps down in market depth. And it's, again, been sort of slightly trending down even since then, certainly at levels much lower than we saw prior to 2013, but by historical levels one might again argue that market

depth doesn't look exceedingly low.

Trade size follows a very similar time pattern to the market depth. And, again, we see the dramatic decline in trade size, particularly really concentrated in the two-year treasuries. This recovery -- we didn't get back to the prior peak, and then it sort of declines with the events of 2013 and 2014 some diminution of trade size. Although here, again, our folks said look at this. They might argue that this might reflect as much changes in the market structure as opposed to just fundamental liquidity. And Stan talked about some of those issues.

And then we have in the southeast corner price impact. So, this is how trades of certain sizes might impact market prices. And you can, again, see a sharp rise in sensitivity of prices to trading at the financial crisis. The sort of recovery in terms of price impact has been more gradual, certainly more volatile and choppy along the way, but we're back down to levels in terms of price impact in the Treasury market looked very similar to the pre-crisis levels.

If we turn and now look at the corporate bond market. So, Stan, in his, gave you a split of the -- here we have to construct, we don't observe bid-ask spreads so we construct what we call a sort of realized bid-ask spread. Stan showed you a broken out by credit quality. Here it's broken out by the size of trades. It's a very similar pattern to Stan's chart. Across all of the trade sizes, again, we see sort of this kind of downward progression in bid-ask spreads. I don't have the chart here but if we broke it down by frequently traded bonds and infrequently traded bonds, again, same time series pattern. So, again, across both the Treasury and corporate we're not seeing any sort of evidence of significant problems when viewed from the perspective of the traditional bid-ask spread.

We don't have a market depth measure but we have the trading volume. And Stan mentioned this increase in trading volume. So, again, in the southwest corner we can see trading volume. It's been rising. It's not been growing as fast as the

underlying outstandings, and we'll see later on I'll show you a chart just on turnover.

Price impact, again, a very similar time pattern in corporates as we saw in treasuries on price impact. And, again, in trade size we see the decline during the crisis and the sort of slow, steady recovery in the trade size. We're still -- we're really sort of just now getting back to levels that we saw around 2005 ahead of the financial crisis.

So, another thing, these were measures really of average and there is concern potentially around this idea of will liquidity be available to me in the future if I want to trade. And so, we've been trying to come up with measures of liquidity risk. What our folks have done here is we've created -- we took all of the standard measures that we showed you earlier, those four, combined them using principle components into an index. And here we just invert to scale, so think of it as an illiquidity index, that's in red. And then we look for days where there was a two-plus standard deviation change in the illiquidity index relative to a recent history of the volatility of it. And think of these as sort of illiquidity events.

And you can see that in the treasuries these events were fairly uncommon until we got into the financial crisis where they started to happen much more frequently. But you can also see that they remain much more frequent now than they did prior to, though we don't have a long history prior to the financial crisis. So, there is some evidence, again, of maybe an increase in this liquidity risk in the Treasury market.

If we do something similar in the corporate market, there is probably less evidence of a significant increase in this liquidity risk. But we want to offer the caveat here that this is really a first pass at trying to get at this concept of not the average of liquidity but sort of the risk of liquidity events in the future. A lot more work is probably going to go into refining these kinds of concepts going forward.

So, again, my overall summary was very consistent with what Stan has already told us, that traditional measures provide only limited evidence of any decline in liquidity in Treasury and corporate markets. There are gaps in our knowledge in terms of

the data and there are certainly important structural changes happening in the market. I mention in the Treasury market we are focusing on the inner dealer, so not the dealer customer off the run market. In the corporate market the liquidity is measured based on trades that took place. We're trying to also think about how we would look at liquidity based on trades that don't take place in the market. I think that still we'd want to say that there is a lot of work that has to be continued to be done in this area to continue to fill in the picture.

Let me just show you -- this is another view of the dealer balance sheets and you see the rapid deleveraging. What's interesting -- and this is different than if we look at the deleveraging in, say, mortgage finances. We're not seeing much of a recovery since the end of the deleveraging. Perhaps a different view into this is looking at a pre- and post-crisis UBS trading floor.

And let me end -- this is the dealer turnover. So, again, the volume is growing though not as fast as the underlying. On the treasuries, we have indirect measures looking at these yield curves' spline errors. So, again, if you think liquidity isn't as prevalent, it's going to be more expensive to do arbitrage, you might think that that would show up on average as larger yield curve fitting errors. We're not seeing any evidence, but, again, this is a much more indirect sort of measure at Treasury liquidity. And I'll stop there.

(Applause)

MS. TOENNIS: Hi. My name is Debbie Toennis and I am head of Regulatory Affairs for JP Morgan's Corporate and Investment Bank. First of all, I'd like to thank Brookings Institute for having me included in this debate because we spend a lot of time thinking about how liquidity impacts the markets and how all of these changes -- and I know that Vice Chair Fischer said this morning that he thinks technology is driving it, and I guess what I'm going to tell you is that I think technology is part of it. Regulations are part of it. New participants and old participants leaving are all part of it. So it's a

complex problem we think and we're pleased that the industries public and private sector have been spending a great deal of time discussing.

Here is my disclaimer: these are my views, not JP Morgan's.

So maybe if we start with what's changed. We talk about all these pieces. We've got a monetary policy -- we've got record low interest rates, we have quantitative easing going on, and central bank actions unlike any that I certainly am aware of in the history of time. In particular, we've got in the U.S. the Federal Reserve Board, in Europe we've got the ECB and Bank of England taking active steps, and in Japan we have them taking active steps. That obviously is creating a market environment that is supporting market liquidity.

We see shares changes in terms of the funds that owning more and the ETFs growing. We see, again, central banks, more algorithmic and high frequency trading, mandatory clearing of CCPs. And that becomes important because it's tying up Treasury securities, so when we talk about Treasury liquidity and having much of it just held on balance sheets that becomes important.

And then we've got the dealers. So, it's been discussed already. We've got dealers changing their inventory positions and backing out of certain markets. We have behavioral changes both because of banks' risk appetites post-crisis as well as banks accumulating high quality liquid assets pursuant to some of the rules that have been put in place on liquidity. On the buy side, again, central banks are taking a very big role in this. We have more homogenous investor strategies. And we have an ability to deal with some of these fund issues, as Barbara told us, through the ETFs. But that doesn't mean that we don't have problems still in the underlying liquidity. And, finally, we've got the regulatory change and there it is impacting as we saw with UBS picture that Joe showed us, it is impacting what dealers are willing to do.

So, this is a study that was done by Oliver Wyman and is supported by Morgan Stanley, but it basically looked at the percentage across products that broker

dealers were decreasing their inventories by and a projection of what they're going to continue to do. And I would actually say this was done, I think, last year but I think it's almost accelerated since then, in particular in the European region where we see banks who are not earning their cost of capital and who are actively looking across their balance sheets and figuring out which businesses to be in and which ones to exit. And that obviously is going to have an impact on liquidity.

So, first let's just take a few moments and look at the credit side. This is the corporate bond side. And as Barbara pointed out, we have a growth in trading volume. That's a good thing. But what the line above it shows, what the green line shows is we're not growing our trading volume as fast as we're growing the things that are being traded. And so, I think we just need to look at this relative to the size of the market.

Here we have a situation where we have materially more growth in the market versus what we're willing to trade. Again, Barbara has shown us that we have a decline in turnover as a result of the that. And it's okay; it's not declining dramatically, but it's also indicative of what's going on the other side in terms of not supporting the growth in the market.

Now, IOSCO recently did a study on corporate bond liquidity as did the FED and they both found, at least as preliminary results, that they had not seen material evidence in a reduction in liquidity across markets. But importantly both pointed out that they didn't have full information. Here, I think it's important to realize that in particular -- well, in the U.S. market for corporate bonds we have TRACE and that's actually pretty good information to be using to analyze liquidity in that market. But in Europe and in Asia we don't have similar programs so we don't have the quality of data in those.

So, trading volume and market breadth are both at levels over the past year that are the best we've seen in 10 years. That's good news for market liquidity and corporate bonds. But let's think for a moment about what's going on that is causing that

to be true. We have newly issued bonds at a record pace because of the low interest rate environment and that's going to trade more actively than these seasoned bonds in the corporate bond market.

We also have the size of issuance going up and larger bonds trade more actively than smaller bonds. Likewise, we have issuers taking on more debt than they have in the past. Again, issuers with more debt trade more than those with less debt. And finally, when we have event risk in the market -- and if you think about the commodities piece of the market in particular in high yield that increases the amount of volume. So not terribly surprising that we have that kind of activity in that market. We should remember that we're in an unusual time in the market. Again, we have low interest rates, we have unprecedented amount of support.

Another observation that was made in at least the IOSCO report was that this decline in trade sizes is actually investors deciding to trade in smaller sizes. Now, Barbara has told us, and the same is true for JP Morgan, their traders go home when trades are done and they get their trades done. And that's not surprising to me that at BlackRock and JP Morgan can get their trades done.

One interesting piece of information that we haven't been able to put our hands on is what trades aren't getting done? So, we have smaller trade sizes but nobody has been able to capture what can't get done, or which asset managers can't do their trades in full. And I think the trading platforms are actually a good place to look to see what is missing. What trades got cancelled, which ones aren't getting done.

So, in corporate bonds we've got a bifurcation of liquidity. If you're a large issuer, if you've got a lot of debt, if you're prominent, you're going to have liquidity. If you're smaller, have less debt, you're going to have less liquidity. We've got market heterogeneity where we're having size of investors increasing and more of a concentration there. We're also seeing bifurcation between different parts of the market and the way people are viewing the illiquidity in those.

And, finally, in the corporate bond market we are continuing to see more and more transparency that is being brought into the market. In particular, when this happens in Europe we're watching carefully to see what effect this has on liquidity and the market when the MIFID II comes into effect there.

So, corporate bonds -- there may be some liquidity issues there. But investors can react to that. They can charge more if there is a liquidity premium needed, if it takes them longer to unwind positions. That same thing is not as true though for the U.S. Treasury market. So, here we have an asset that is used to fund our government as the benchmark for global standards. We have liquidity and capital frameworks that were built based on this being a liquid asset. So arguably the flexibility we have in the corporate bond market we don't necessarily have in the Treasury market if we want all of these pieces to fit together and make sense.

So, first let's just look at what's going on in the Treasury market. We've got liquidity rules, the liquidity coverage ratio, which requires that banks take on high quality liquid assets and hold them unencumbered on their balance sheet. This is a good thing, but it takes up a large amount of U.S. treasuries out of the market. Banks are holding those and using that for their liquidity purposes. We've got the NFSR that favors long-term funding. We have leverage rules that disincentive banks from wanting to hold U.S. treasuries. If I have to hold 5 or 6 percent capital for the treasuries that I hold on balance sheet -- and let's remember the liquidity rules that require me to hold those out on balance sheet -- then I'm not going to want to trade a lot of that. It gets more expensive to trade those assets because of the cost of doing the leverage on those. And, then as I've said, we've got increased demand from the CCPs and the margin for U.S. Treasury.

So, there are a lot of moving pieces around this market and we've talked about already today some of the flash crash rally and several of the volatility events that have resulted because of all the stress in this market.

So, let's look at a few pieces of data on the U.S. treasuries. First, we've got the one on the left which is trading volumes. We've seen those kind of go up and down. Turnover on the right has been declining, also as it was in the corporate bond market. And the green line on the top just reflects U.S. Fed owns a significant amount of Treasury securities. So, that just tells us that if we take those out because those aren't really in the market to be traded because they're held in the SOMA portfolio -- those.

Why is this all happening? Let's look at it, again, as Barbara indicated, who owns these treasuries. So, we've got foreign investors 60 percent of which are central banks, we've got the Federal Reserve. Between them they are only two-thirds of the Treasury market. Banks have increased what they're owning, asset managers have actually increased their allocation of this and are participating in the auction process now where they did not in the past. So, we have thematically more buy and hold investors who are holding this.

Ten-year market depth declines now by $38 million for each 1 basis point increase in volatility. That's compared to $25 million previously. That's a material increase. This is the big theme that we see in treasuries, is the increase in volatility relative to where we were. Now, I'm going to show you on the next one that market depth is back at its ten-year average. So, it largely has recovered before the election and then we'll talk about what happened after that election when the rates kind of blew up.

But it's not consistent across the tenors. We've got two years where we've seen a 56 percent decline and that has a lot to do with expectations of what is going to happen with rates. But for the others it's relatively flat. So, we see we've got the moving around of the market depth, but it's roughly at the same level. And then we've got six-month and three-month on this chart showing you what it looks like.

So, what happened when we had the election? In four days, we lost 60 percent of our market depth. We went from 240 billion on average on market depth to just over 100 billion. Again, for this asset class that is the safety and soundness of our

system. The framework has been built on it. It's not just that, but it funds our government, it funds foreign governments. This is a cause for concern for us and one that we think needs to be paid close attention to.

So, in summary, there are lots of moving pieces across the market. We acknowledge that regulation is a part of what's changing but it's not the entirety of what's changing. But let's be aware that there are still more regulation coming our way that will have an impact on liquidity. So, again, we think it's a good thing that people are having the dialogue about market liquidity and the impact of all of these changes on it and we hope that this is not just a point in time where people have decided that there is not a material change. But it's something that we continue to discuss over the next coming years as all these changes come into effect.

Thank you.

MR. SCOTT: So, let me turn it over the audience. Let me briefly introduce everybody again. To my left is Barbara Novick, she is the Vice Chairman of BlackRock. To my right Joe Tracy, Executive Vice President and Senior Advisor to the President of the Federal Reserve Bank of New York. To my further right is Debbie Toennis, the Managing Director, Head of Regulatory Affairs at JP Morgan.

So, maybe the best thing to do is kind of start by figuring out whether our panelists agree or disagree about whether there is a concern about liquidity at all. And I might start with you, Debbie, because you spoke last and I kind of read in your presentation that you do have a concern in the Treasury market about the current liquidity. But maybe we'll come back to you to express why you believe that. Let me turn to Joe first and then to Barbara. Do you agree with this? Do you think we do have a liquidity problem in the Treasury market?

MR. TRACY: Well, of course, we have a large market group staff that are tasked with sort of following markets and interacting with them. And in reporting back to us what they're hearing and consistently over the last couple of years we've been

hearing lots of reports from market participants about various concerns in market liquidity. I think that was one of the reasons we kicked off this initiative to try to start to systematically pull together the data and come up with the measurements, at least as a first pass.

And, again, as I summarized, the traditional measures don't seem to validate the level of concern that we hear from a lot of our market participants. Possibly it's because of some of these gaps in what we're measuring, or inadequacies in the measures, but we haven't yet sort of reconciled what we hear from a lot of participants and what we see in some of the measures.

MR. SCOTT: I don't want to pin you down but if you had to say, yes, I have a concern, no, I have no concern, or I don't know, which of those three categories would you be in.

MR. TRACY: I think right now based on the evidence --

MR. SCOTT: The treasuries.

MR. TRACY: -- that we're not seeing a lot of evidence supporting a significant concern. And then I think the next question is even if we saw more of a deterioration, it's certainly unclear to us what we would want to attribute it to. There are so many factors that could be contributing to that and to jump to a conclusion that perhaps it is due to some of the regulations post-crisis I think would also be premature. And then Stan mentioned that even if we got to that point in the consideration we'd have to be thinking about the tradeoff between a safer more resilient banking system and if there was some cost in terms of --

MR. SCOTT: I haven't gotten to the measures yet. I'm just trying to figure out right now whether we have a problem.

So, Barbara, treasuries. Do we have a problem?

MS. NOVICK: I think one of the things we saw after the Treasury flash rally is the U.S. Treasury got involved and did a whole study on the Treasury market.

One of the most amazing things was many of the big market participants, major market participants, were firms that people at Treasury and most people in America had never heard of. So, there has been a huge shift from sort of household names as market-makers to whether you want to call them high-frequency or principle trading firms, or whatever name we want to give it, there has been a significant shift in that market.

And just like I talked about evolution of bond ETFs and bond markets in general, I think you have to look at what are the markets today and what are the different components. One of the things that they recommended going forward is the collection of data through TRACE which I think will help us understand on the look forward. But I think it's very hard to have a definitive answer to your question. Are you concerned? I think it's always worth looking and understanding and having more data to make better decisions. It's hard to ignore that we've had a week of amazing volatility.

MR. SCOTT: So, would you put yourself in the don't know or?

MS. NOVICK: I'm going to say don't know for now.

MR. SCOTT: Don't know for now. Okay.

So, Debbie, I read your presentation as you do know we've got a problem. You might want to reiterate that.

MS. TOENNIS: Let me clarify. I don't think that selling the newly issued securities because of the fact that much of the market is bought and held on balance sheets is not a problem right now. We can find investors to buy treasuries. Our concern is about the volatility.

We're at a situation now where we have four or five times the amount of volatility that we had before these changes went into effect, pre-crisis. Again, for such an important asset class, having this amount of volatility in value and a question mark on whether if we had to use these assets to liquidate them in a time of stress in the market it's not entirely clear to us that we know as an industry who are the investors of these going to be. There is an enormous amount that would have to be liquidated and there

just isn't that much trading out there right now. So, yes, I am concerned because I think there is a big question mark there and there is volatility that has built up in the market that I don't think is healthy.

MR. SCOTT: Sure. So, let's turn to the corporate bond market. Same question. Again, I'll start with you, Joe. Corporate bond market. Do we have a problem? No problem? Or you don't know.

MR. TRACY: So, here I think our evidence was a little more mixed than for Treasury. The traditional bid-ask, again, very similar, no evidence, but we did see there is lower turnover, volumes have not kept up with sort of the underlying outstanding. Trade size is lower.

But, again, it's difficult to know yet what is driving that given all of the significant changes in the structure of the market. So, again, maybe a little bit more of a yellow flag but certainly not yet a red flag from what we're seeing in the data.

MR. SCOTT: So, a little bit of a problem kind of. You're a little bit more uncomfortable about the corporate bond market than the Treasury market?

MR. TRACY: With the exception that those tentative measures that we put up on the risk where we saw a little bit more evidence of that in the Treasury than in the corporate.

MR. SCOTT: Barbara? Corporate problem or?

MS. NOVICK: I'm going to say I think this is one of the most overhyped issues in the literature. So, it's not a new phenomenon that high-yield bonds are more liquid or less liquid than investment grade bonds. It's not a new phenomenon that newly issued bonds are more liquid than seasoned bonds. It's not a new phenomenon that on the run treasuries are more liquid than off the run treasuries. I'm not quite sure why we've woken up recently and had a little bit of gait about it. That's been true for my entire career and I guess I'm older than I look (laughter). But for several decades we'll just say.

So, I come back to the comments I made, the market has already

evolved and participants, the market structure itself, how you build a portfolio, the tools you use. A lot of these things have moved on. Looking at my grandmother's bond markets versus today it's not a relevant way to look at it.

MR. SCOTT: So, I read you as saying you're not particularly concerned with the liquidity of the corporate bond market? Is that a fair statement?

MS. NOVICK: It's not that I'm not concerned but what's the fall on? What's the problem? It's not that there is not less liquidity but it's the question of is it a problem. I would say, yes, there is less liquidity but does that translate into a problem? I'm not convinced.

MR. SCOTT: Okay. Debbie, you concentrated more on the Treasury market in your presentation you might want to tell us what your views are on the corporate bond market.

MS. TOENNIS: I agree to a great extent with what Barbara just said. I think new issuance doesn't have a problem with liquidity. There are plenty of investors there to buy it. Secondary is a little more challenged and we hear from our clients that they have a harder time getting rid of them.

Having said that, as I pointed out, it's different from U.S. treasuries. If it takes people longer, if they have to pay a premium for it, that's probably okay in the market. I mean, that's the way markets operate. Maybe we don't have to have -- we don't have an inalienable right to liquidity in every asset class equivalently. So, I think that there may be challenges in liquidity that weren't there before, but I think in the corporate bond market that's not such a big deal.

MR. SCOTT: Let me just focus on a segment of the corporate bond market, the poor credits, junk bonds, lower-grade. I don't know, I used to say junk bonds, I guess that's out of fashion, but lower credit bonds. So, Barbara, clearly there has always been somewhat less liquidity in that market than in high credit markets. But also, there is a question of the relative liquidity in that market today versus what that liquidity

was in the past. And, you know, maybe we could have more liquidity than in the past and that would make it even better for that market. And that filters back to the issuers raising capital and all that. So, if you looked at the high-yield market from not just a differential (inaudible) high-credit market, but kind of where it is historically and where it should be, what do you think of that?

MS. NOVICK: Obviously, the turnover rates for high-yield are higher than they are for high-grade. And so, from that perspective it's liquid. But you have to -- I haven't looked at the relative spreads that high-yield issuers pay now versus what they paid pre-crisis. Perhaps we could do something to improve for corporate issuers and I don't know that we wouldn't want to do that for high-grade as well if we're looking at it from that perspective. I'm not terribly bothered by the increase in what they have to pay for that other than, yes, it would be good for America if we were to get the corporate cost of issuing debt to be lower.

MR. SCOTT: Joe?

MR. TRACY: So, again, if we go back to that traditional bid-ask spread, the time series pattern for the investment-grade and the higher yield were very similar. Where we do see a little bit of a relative change was in the trade size measure where really in the last several years there has been slightly more of a decline in that for the high-yield than the investment. I don't know if it's a significant sort of gap that has emerged between the two, but in many dimensions, we're not seeing any important difference between those two markets.

MR. SCOTT: Barbara?

MS. NOVICK: I don't have anything extra to add.

MR. SCOTT: So, let me come back to how it was talked about a 21-day moving average for the calculation of a lot of your data here. I guess in a crisis we'd be more interested in a 21 second moving average and probably that's too long. So, the last slide you had you were sort of wrestling with how we could get a better feeling about

what I'd call intraday liquidity or some measures of intraday liquidity. Maybe you could elaborate more on that. And then if there is no concern -- this goes really to Stan's issue, too, because in a crisis we're going to be much more worried about this intraday liquidity than what we have that's on a 21-day moving average. If we could just go back over that territory.

And then I'm going to ask our other panelists about what they see in this sort of very intraday issue about possible liquidity problems in either the Treasury or the corporate problem.

MR. TRACY: To reiterate, the charts I put up were meant to try to capture this notion of a kind of average liquidity, quite different from the perspective that you'd like to see. So, even though we started with very high frequency, we're looking at five minute increments and what's happening within these increments, then we'd take a daily average of that and then smooth that over essentially a month of trading days. What one could do is one could instead of trying to basically show these smoothed averages is look at more of the distribution of even those five-minute increments. Then you would get a lot more detail, not at the average, but what was going on in terms of the tails of these daily distributions of these high-frequency changes. That would be a different way of organizing the data. I think it might be very interesting, and I could ask our guys to look at that.

MS. NOVICK: This is one of the ironies of data. It turns out that TRACE data is reported on corporate bonds quote real time, so within 15 minutes. It turns out that volumes by CUSIP is reported with an 18-month delay. So, we've actually started asking if we could maybe make the first one longer because it actually negatively impacts market liquidity, and make the second one shorter because there seems to be a little room to improve from 18 months. And that is one of the ironies of the data.

MR. SCOTT: So, we really don't have good data on those. We might design a system to get better data.

MS. NOVICK: It might be in there somewhere but it hasn't come out.

MR. SCOTT: I have some other questions, but I want to make sure that we involve the audience here. So, I'm going to open up the questions and comments to the audience for our panelists. Please identify yourself. We have a person back there.

MR. KYLE: Hi, I'm Peter Kyle from the University of Maryland. A couple you showed us pictures of the corporate bond market and showed that the spreads for small retail transactions are about 100 times bigger than what they would be for a corresponding transaction in the stock market, and many times bigger than what institutional investors pay. So, is there a problem of liquidity in the corporate bond market for retail investors and can it be fixed by having different order handling rules that would allow retail investors to place limit orders that would have time and price priority?

MR. SCOTT: Anyone want to address that or comment on that?

MS. NOVICK: We're in the institutional market so we don't actually do any trading with retail. I think it is a reason why bond funds, whether they're in ETF or open-end fund format are attractive to retail investors. I'm not sure how you could get that bid-ask spread for very small lots down to an institutional level without being in institutional trade. So, again, it's not a business that we're in but that would be my observation. It's a different question.

MR. PATRONCK: Bobby Patronck, resident of the local area. If the data are equivocal at this point about whether there is a post-crisis liquidity problem or there are legitimate differences in how the data should be interpreted, then in whose interest would it be to convince policymakers that there is a crisis?

MS. TOENNIS: I don't know that we need to convince policymakers that it's a crisis. I think we need to have an honest discussion about the state of liquidity in the various pieces of the market. Arguably, there was probably too much liquidity pre-crisis and so there had to be changes. It's a question of how do we feel about what we've done to the various markets, and obviously from my comments you know that

we're concerned about the Treasury market. But I don't know that -- I think having an ongoing dialogue which has been occurring, and that this is a very productive and good thing that IOSCO is looking at it, that the FED is looking at it, that we're talking between the industry and the public sector about it.

I think they're all very productive discussions to have so that we can come up with the new equilibrium of what should look like in the future. But at least from my perspective, I don't think we need to go say that there is a crisis. There are changes and we have to decide if we're okay with what's the new system.

MS. NOVICK: I would also say it's a healthy process to step back and look at the cumulative impact of reforms that have been done. In Europe, they did something they called a call for evidence to understand exactly that. Each rule that gets done in our system and in theirs might be done by a different entity or under a different directive or piece of legislation or regulation. Sometimes when you put all those together there are unintended consequences. So, I think there is definitely value of stepping back at some point in this process and saying, okay, regulatory reform, look at all the pieces, you know, starting with money market funds and working all the way out, look at all the different bank regulations and understand the dynamics between all that. I think that's worthwhile. But that's not saying there is a crisis.

MS. TOENNIS: And I do agree with that. The call for evidence in Europe was a really good idea. I wish that it were done more globally because it is important to look at the cumulative impact of all of this.

MR. SCOTT: One last question.

MR. BAILY: In empirical work done by Goldman Sachs and Steve Strong, and in particular he's found evidence or suggested there is evidence that small and medium sized companies are paying more to borrow that large companies, so the spread has widened in some sense. So, do you find that evidence to be persuasive and do you think some of that could be a sign of liquidity issues in the market for small and

medium sized enterprise bonds?

MS. NOVICK: I'm going to guess that a small auto company pays more for parts than a big auto company (laughter). And I'm going to guess --

MR. SCOTT: The spread is widened I think is what he's saying.

MS. NOVICK: Right, but they're paying more, right? I'm going to guess that a hotel chain that is small pays more for the lightbulbs and the linens than a gigantic hotel chain. Scale comes down to more efficient prices.

MR. TRACY: It may be more indirect by trade size and you can see the ordering of the levels, but the time series patterns looked very similar so it wasn't so evident that there was some pronounced widening out by sort of average trade size.

MR. SCOTT: I might raise the question that we haven't discussed yet but you touched on, which is the adjustment to QE. I asked Stan Fischer this question but I think maybe it would be good if we could all discuss it. Is there a concern if the FED would adjust its balance sheet to come out of QE that the liquidity that they've been generally providing to the entire system would have -- if that were to contract would have an important negative impact on the issues we're looking at right now?

Debbie?

MS. TOENNIS: I think as long as it's done in a careful and orderly way it shouldn't be a big problem. I don't think it has any effect on corporates because the FED wasn't buying corporates. For treasuries, I fully trust that the FED will not take their huge pile of treasuries and dump them in the market. As long as that doesn't happen we're not terribly concerned about that. We just want people to pay attention, though, when we look at the data at a point in time that that exists. That doesn't mean when it's unwound it's going to be a problem, it just means we need to evaluate the data for what the market looks like at the time.

MS. SCOTT: Well, if we look at this period where liquidity seems to be doing okay by different measures after the crisis, this is the same period, okay, in which

we've had an expansion of the balance sheets of central banks. Now, I'm all for doing everything in a reasonable way and doing it in an organized way, but if the end of this process is that we have less than $2 trillion balance sheets at the Federal Reserve and other central banks contract the same way is it conceivable that in that situation that all these other factors which would otherwise have been decreasing liquidity overall now are in play in a much more significant way such as regulation?

MS. NOVICK: It depends on what measure you're going to have. So, for example, the turnover measure. Anything that is bought and put in the vault, it's now in bond heaven and it doesn't contribute to bond trading volume, right? So, I always believed -- and I'm sure we're not allowed to ask directly -- but I've always believe that the unwind, if you will, would be a runoff portfolio, not an outright sale portfolio. And that the whole purpose of QE was part of lowering rates and encouraging risk-taking and encouraging certain allocations of capital, and that in seeing that runoff we'd also see a return to more normal conditions. So, I'm not going to say I'm totally realized about it because you're never supposed to be realized about anything, but be vigilant, be watching. I would assume that that's the scenario.

MS. TOENNIS: I agree. You'll see what true market liquidity looks like when that happens. I think there have been so many changes, like I said, electronification and types of investors, and I don't think we know without all this quantitative easing support what our market is going to look like

MR. TRACY: I will defer to Stan's excellent answer to the same question earlier (laughter).

MR. SCOTT: One last question. So, we've been focusing basically -- so now I'm going to talk about something I'm very self-interested in in my own writing. We've been talking about market liquidity here. Stan made the point that obviously, there is some connection between the market liquidity and the liquidity of the participants in that market. So, if we were to come into another real stressful environment like 2008, we

kind of had a little flirtation with Brexit but it went away. We had less of a flirtation Deutsche Bank, it's gone away. We had almost a mini second flirtation during the recent election. But are you worried about liquidity in the markets in the future due to the possibility that the FED's lender of last resort function would be more difficult to exercise. And, you know, there are further proposals to limit it that are pending out there. So, is this a concern that there be less liquidity for the American participants in a crisis that would affect not only them but would affect the general markets?

Barbara?

MS. NOVICK: So --

MR. SCOTT: If you say no I'll go to war with you (laughter).

MS. NOVICK: Well, according to Hal Scott's book (laughter) --

MR. SCOTT: No, but what is your feeling?

MS. NOVICK: I think lender of last resort to whom is part of the question, right? So, lender of last resort to banks obviously, I mean, that's part of the contract I'll say in the system between the FED and banks.

MR. SCOTT: They also went directly to money market funds during the crisis through the banks.

MS. NOVICK: Yes, money markets have subsequently been reformed in a way that I would find that highly unlikely as a scenario going forward. Under the Dodd-Frank you've got the financial market utilities that have been designated, they have access. So, I think lender of last resort to whom and how has that changed, and obviously in the new congress if all that's changed. I think it's too soon to know.

MR. SCOTT: Debbie?

MS. TOENNIS: Yes, I agree with that. I think Vice Chair Fischer said nobody can say whether we solve the too big to fail, and that's probably true. I hope that we as a society can let a bank fail and that that will be okay, and that its shareholders will take that risk. If it were widespread and there were multiple banks failing it would be

concerning perhaps is the FED could not play a supportive role to that. But I guess I had always thought that that was kind of the role of the FED to stabilize markets. Now, I don't think it's to save every bank as they're going under though. It just depends, like you said, save whom?

MR. SCOTT: I always call resolution a prayer so when your boss, Jamie Dimon, called Jack Lew and said, heads up, we're going to go into bankruptcy tomorrow I don't think that Jack Lew's response will be, oh, great, we have a resolution procedure (laughter). I still think we have a problem out there.

Well, I want to thank all of our panelists and the audience. Thank you very much.

(Applause)

MR. BAILY: Next we're going to do the second panel, so I'm going to hand it over to you.

MR. KLEIN: Thank you, Martin.

I'm Aaron Klein, Director of Policy at the Institute on Business and Public Policy. It's a great pleasure. I think everybody, just stay seated. Greg, you'll go first so you can be on deck right there.

I'm going to introduce everybody. And you know, we're all here and staying here late on an afternoon because we're kind of in on the secret, which is that while the equity markets make the headlines, the debt markets and capital markets make the economy. And concerns about liquidity in those markets are really paramount to the functioning of our financial system and ultimately our entirely capita-based economy.

I'm also going to let you in on another secret, which is I've seen the decks and the slide presentations you're about to see are excellent. So I'm going to challenge everybody who is here who is on social media to pick out your favorite slide, take a picture of it, tweet your thought about it with hashtag liquidity, and stay engaged here because what you're going to have is fantastic diversity of thought. All three people

I'm about to introduce are Harvard graduates, and I found this out reading their bios. But what they do is they come with three very different world views, very different chairs and experience in how our capital markets work and how liquidity and liquidity-based regulation can make things better or worse. And so I'm going to go in order of their direction of how they're going to speak.

First, we're going to start off with Greg Baer. Greg, to my right, is the president of the Clearing House Association and executive vice president and general counsel of the Clearing House Payments Company, which is the oldest private sector payment operator in the U.S. In fact, the Clearing House really was America's central bank during the long period in American history between the second and third central bank. We heard from the vice chairman, Mr. Fischer, of the Federal Reserve, which is really America's third central bank, and there was a long period where we didn't have one and the Clearing House filled that role. Previously, Mr. Baer had a distinguished career in government where he served as assistant secretary for financial institutions and the U.S. Treasury Department. He has also served in the private sector at JPMorgan Chase and Bank of America. And also was at the Federal Reserve. So Greg, you're going to go first.

Second, we're going to hear from Andy Green. Andy is a managing director of Economic Policy at the Center for American Progress. Previously, he served as counsel at the SEC where he worked closely with Commissioner Kara Stein, and many of us in the room know Andy from his tireless work in helping really draft the Dodd-Frank Wall Street Reform and Consumer Protection Act during his perch as a senior financial advisor for Senator Merkley, where Andy was intimately involved in lots of parts of Dodd-Frank, including one small provision known as the Volcker Rule, which many of us have spent a lot of time thinking about.

And then finally, we're going to hear from Jason Carroll. Jason is the managing director at Hudson River Trading, and he helped found the firm in 2002 and is

still there. And not only is he running one of the largest trading firms -- so you have somebody who runs banks and settlement, somebody who worked on The Hill and at the SEC as a regulator, somebody who works in high frequency trading actually making markets, as I think Barbara Novick alluded to, one of those companies that you don't know their name but really is the large participant now in that world, and he's also actually been a contributor to the architecture of many other software systems throughout, not just Hudson River Trading but throughout the industry.

So with that I'm going to take it away and let Greg tee us off.

MR. BAER: Thanks, Aaron, very much.

So let me see if I can make this work. I can make this work.

It's always a pleasure to be at the Brookings Institution. It's also a pleasure to see so many familiar faces out there. It's a real privilege to be here.

It's funny. I was going to start with the definition of market liquidity, and it's funny, a year or two ago when I used to give talks like this, everyone felt the need to begin by saying market liquidity is very hard to define and everyone has a different definition. We've now reached the point where everyone has the same definition. I think this may be verbatim what Vice Chair Fischer said this morning, perhaps (inaudible) added, but I think that's at least some progress.

The other thing I'd note here is that if you think about dealer liquidity, there's really two forms of it. First is the traditional market-making role, which I think has been discussed a lot today. And the other is actually providing balance sheet to other firms that want to buy or sell. You know, asset managers, hedge funds. And I think that gets a lot less attention, but as we talk about regulation in the minutes to come, I think you've seen just as much impact on that function as you have on the market-making function.

Speaking of sort of dealer functions, I did want to stop at this point and sort of address what I call the "catch a falling knife" canard, which is this notion that

dealers don't make markets in stress, they only make markets in good times, so why do we need dealers? And I think that's worth a moment to discuss. I mean, liquidity is always pro-cyclical. If you think about a dealer sitting on a desk with a risk limit, if there are troubled times, the bar goes up. It's tougher to stay under those limits, so either you have to ask somebody to raise your risk limit or you have to trade a little less. And, of course, they don't ask for their limits to be raised in pressure; they trade a little less. So there's nothing sort of surprising or mysterious about that.

But it is the case that dealers make markets in stressful situations. They made markets throughout the financial crisis. They made markets through Brexit. They made markets last Wednesday. And it's important to understand for purposes of this discussion, why do they do that?

First, mostly, they do it to make money. It's actually profitable to buy when everyone is selling, and sell when everyone is buying. Volatile markets are more profitable for market makers than placid markets. I think that's one reason you've seen high profits the last couple of quarters is because they were actually -- if you want to use the analogy, they were catching knives. You don't make any money by leaving them on the floor.

The other important thing is the other reason they continue to trade in stress is because of client relationships. Dealer liquidity is liquidity with a name attached to it. So if you're running an electronic trading firm or a hedge fund and things get tough, you can turn off the machine, you know, you can go to the Hamptons, and you can come back the next week and you can start your business again. If you're a dealer and you do that, well, your customers won't deal with you the next week because you let them down when they needed you and they will deal with someone who did deal with them.

I actually think the much better analogy is Uber in the rain, which I was thinking about the other day. If you've noticed, you know, if you're trying to catch an Uber and it's raining outside, you will find that there are fewer available, there's a longer wait

time, and also that there's surge pricing. Now, when that happens, I think that's pretty smart. That's pretty cool. I don't say, "Why won't Uber catch a falling raindrop?" I think that's sort of the way it works and it makes me sort of wish there were more Ubers. More Ubers in good times and more Ubers in bad times.

I think this is a fairly self-explanatory, you know, explanation of consequences of illiquidity. I'll skip that. And I think we've had a fair amount of discussion today about how complex -- I know Debbie did a good job of this -- about how complex the environment is. So it is kind of a hard and noisy environment to assess market liquidity.

This takes a little more time. And again, I think we've had some discussion during the day. While I think there is a common understanding of the definition of market liquidity, there is no common understanding of the best way to measure it. I think Vice Chair Fisher actually walked through dealer inventory turnover ratios, block trade size as potential indicators of less liquidity. And then volume of issuance and bid-ask spreads as evidence of stable liquidity.

I have two caveats on volume of issuance and bid-ask. First on volume, and obviously, this has been discussed today already, is that, you know, in the current historically-low interest rates there is going to be a major incentive to issue. There's also sort of switching hats to the other side of the bank, it's become more difficult to get bank funding. So there's a further incentive to issue.

And then on bid-ask spread, I think it's important to note, and this is sort of a conundrum, the bid-ask spreads are actually narrowest in completely illiquid markets, in an agency market. Because there the bid-ask spread is not compensation for market risk, it's just for operational risk. So if you take it to its extreme, you will see very narrow bid-ask spreads in markets without liquidity.

And there's also -- and this gets to the "to be determined" part. There's also, using a Fed analogy, there is a discouraged worker problem. If you call your dealer

and ask to trade $10 million and they say, well, we're never going to trade $10 with you. We did in 2007 but now the most we'll do is a million, well, you'll stop calling and asking to trade $10 million. And the spread on the million-dollar trade will obviously be much narrower than the spread on the $10 million trade. So these are noisy measures. It's not to say that one is terribly imperfect and one is absolutely perfect, but there is certainly room for argument on each of them.

I think this is where I think the bifurcation point becomes important because, again, as I note at the end, what you see may depend on where you look, and I think Debbie introduced this concept well. We are seeing liquidity clustering in the largest issuances. So if you look at the largest issuance, you will see more liquidity. Liquidity clustering in "on the run" versus "off the run."

And then two others that I think are worth noting. One I think she noted with respect to BlackRock, which is balance sheet more frequently provided to the best and biggest customers, the largest asset managers, less to others. And then a kind of bifurcation which is -- and I think it's one of the most dramatic, you know, demonstrations that there is in regulatory effect going on here, is the number of exits from these businesses, from fixing currency trading. You could actually used to carry around a list but couldn't keep it updated fast enough in terms of the number of banks, mainly European but also U.S. banks or broker-dealers, getting out of all or some, or scaling back appreciably in these businesses, which appears to indicate a problem.

And then I also think it's important not to underrate the anecdotal evidence for the example I just gave where, you know, the data can sometimes be confused by people's changes in behavior. Certainly, if you talk to sell side or buy side participants, they will tell you they can't get trades done in the size they used to be able to do them. If you read analyst reports, they're talking about how do you trade now in an environment where we're moving from principal to agency markets? They're not complaining about it; they're just saying here's how you trade those markets. Again, I

think to the extent that the Europeans did a call for evidence, they heard about this in spades, and so my analogy here, I don't know if anybody understands the reference, you know, there were in the 1960s and '70s a lot of academic studies oddly about whether one could climb Mount Everest without oxygen. Could you get enough in your lungs at 29,000 feet in order to survive? And the general conclusion of the scientist-doctors was that you could not climb Everest without oxygen. And then in 1978, Reinhold Messner climbed Everest without oxygen. At that point, they stopped studying it. They didn't say he didn't really do that or you shouldn't listen to Reinhold, or he's a complainer or anything like that.

So I think the other version of this is the Chico Marx version, which is I think frequently what at least I heard from dealers and asset managers, which is what the academics are saying to them is what are you going to believe, me or your own eyes? So kudos to Chico on that.

So I do think there has been an unfortunance or divergence in views between sort of pure academics and pure dealers. That's one reason I commend the Brookings Institution for bringing people together to think about this.

Let me go on to the next.

Just some touchtones. I won't dwell on these.

The CFA Survey, actually, if you look at items three and four really reports, I think what, you know, at least I hear from dealers and asset managers, the Bank of England, that's self-explanatory. There are certain aspects of the market where we have seen peculiarities, which do seem to be attributable to regulation. If you look at GCF Treasury Repo versus tri-party, there are differences that really shouldn't be explained by credit quality. It's very complicated. But the BIS has actually been very focused on violations of the covered interest rate parity rule, which is basically the idea of -- I hope I can get this right -- that if you borrow in dollars, you should be able to buy yen, borrow in yen, and use a forward transaction to come back to dollars at exactly the same

price, and any difference should be arbitraged away. It's currently not being arbitraged away. I think it's an interesting question why. It's certainly one they're quite focused on.

I will skip charts that everyone else has already shown you.

This I wanted to flag because this is actually the one Martin referred to earlier which I think is actually quite interesting. And you know, it's easy to say is there a crisis in liquidity? I don't think anyone said there's a current crisis, but this certainly is an indication there might be something wrong that's having real effects.

So this is looking at corporate debt issuance by firm size. And what this appears to indicate is that again, to the extent that there is clustering and bifurcation, that there is a lot more liquidity if you are a large issuer issuing in size and issuing regularly. And so you'll see firms with assets over $50 billion. Their issuance has gone u significantly since 2010. Again, another reason for them to want to do this, again, bank credit lending has become more expensive, so capital markets are a cheaper alternative. And, of course, historically low interest rates.

So the tougher question is why are firms below $5 billion actually issuing less debt? And that's not one I think has gotten enough attention, but certainly may be indicative of some of the problems that we've been discussing today.

So this now gets to the question of, you know, what's the role of regulation in all of this? Which I'm impolite enough to bring up. I certainly say at the beginning, of course, things other than regulation are at work here, people who lost a great deal of money in the financial crisis, we adjusted their models as they took in events that they had not previously considered and, of course, their appetite for risk was going to be lower. Absolutely. But it's also the case that things like the US SLR, the G-SIB surcharge where I think four and a half of the five factors go to market making and capital markets activities. The LCR are all reducing dealer appetite to hold inventory and make markets and fund others' transactions.

And then we still have pending the NSFR, which one analyst I think

cleverly dubbed “not suitable for repo.” The NSFR I think has morphed in terms of its purpose a lot since it was originally proposed, and I think actually candidly now really has no purpose. But the one purpose you hear most offered for it is we need the NSFR to get to matchbook repo. And in particular, I think you hear from U.S. policymakers that we need this for the Europeans to get to matchbook repo.

Unfortunately, the Europeans have recently made clear that when they implement the NSFR, they’re going to exempt matchbook repo. So then we consider that in the U.S. we have already addressed matchbook repo through a change to the G-SIB surcharge, which is actually kind of sensible, which was to have a short-term, wholesale funding component, which penalizes, you know, matchbook repo. And then also the ESLR also punishes matchbook repo. So we are now on the verge of solving for the third time a problem that the rest of the world has not solved at all.

The next, of course, is CCAR plus G-SIB. If you add a capital markets tax in the form of the G-SIB surcharge to CCAR, which is already the binding constraint for most, that will give further incentives to diminish activity in this area. And basically, the affects you see there are higher cost of holding, hedging, funding, and so it’s not all together surprising that you would see less dealer activity in this area.

I won’t talk too much about electronic trading as the solution. I do think it’s fair to note though that electronic trading lowers transaction cost but it does not bring any additional principal to the markets. So we can facilitate an agency market but it doesn’t necessarily recreate a principal market to the extent that those who had principal at-risk businesses exit them.

Last page. Second to last page.

So I’m going to, just as a quick aside, and I was talking about this with Aaron, and I think maybe it’s a subject of a future Brookings conference, and it has come up a little bit today, these regulations, these incredibly high capital liquidity regulations, some of which are justified, and at some levels, are really imposed on non-bank affiliates

of banks at full levels. They are not imposed at all on nonbanks that aren't affiliates of banks. And I think it's a great question now that we're sort of reimaging bank relations, why is that? Is it really because we believe that Goldman Sachs' broker-dealer is going to bring down its relatively small bank and cause a loss to deposit insurance fund that isn't going to be replenished by TLAC and selling assets and doing an assessment on the rest of the industry? That can't be. I sense that the reason we're regulating that broker-dealer is because of concerns about systemic risk and financial stability. And if you're doing that, why aren't you regulating other firms that pose the same risks in at least roughly the same way? But that's, I hope, maybe a future conference.

What I really think I want to emphasize here is that it comes down to policy choices and tradeoffs I think someone mentioned earlier, and what's the cost of doing more in terms of capital rate and liquidity regulation in particular? And what's the benefit? And the choices we have now, again, no one would say we're in a current crisis, but I think we've seen reasons for concern. We've seen the flash events, which I know have been much studied. And I think it's important not to study them so much that we end up concluding they never happened. They actually did happen.

So there does seem to be some room for nervousness, and I think you saw a range of nervousness on the previous panel. So the options here are we can continue to study and we can see what happens when rates rise and the balance sheets unwind and take that into account. We could take actions to restore market liquidity or replenish it, you know, along the lines of ESLR and other things. We could regulate the buy side on the assumption that there isn't a liquidity. There's a little bit of a cognitive dissidence because some of the people who are saying there isn't a market liquidity problem are actually saying we need to regulate asset managers on the assumption that there is. And then we could take further actions to reduce market liquidity. And that's the NSFR, G-SIB, and then potentially fundamental review of the trading book.

And right now we appear, or we were, sort of on the path to the last

option, and perhaps combined with the third. To me it's a class cost-benefit analysis. And it comes down to what do we think -- what are we worried about more in terms of the next financial crisis? Are we more worried that there's going to be a problem with liquidity generally? Or are we more worried that nonbank affiliates of banks are not going to have sufficient capital and liquidity to weather that crisis? And I think that in turn leads to the question which really hasn't been asked much today or anywhere, what's the evidence that large broker-dealers that are affiliated with banks have insufficient capital and liquidity to weather current and future events? And so that's sort of my last slide.

That would be crickets chirping. It's actually a tribute to Vivian Liu on our research term who was the first person to tell me that PowerPoint actually has audio. So I wanted to thank her for that. But with that, I will step down. Thanks.

(Applause)

MR. CARROLL: Good afternoon. Thank you, Hal. Thank you, Martin, who I met today, for having me here today. I'm learning a lot. Hopefully, as a practitioner, I can share some information about liquidity that comes from a slightly different perspective.

I founded Hudson River Trading in 2002 on the premise that a computer algorithm could connect the dots between technical market data and managed risk more efficiently than humans. At that time, we called ourselves an automated trading company. Since then, obviously we have become high-frequency trading companies. While we accept the term high-frequency trader, our goal was not to make vastly different decisions than human intermediaries but to automate that service and in so doing provide it much more cheaply. Today, our company trades about 10,000 financial products around the world with a team of 160, and we make about 100,000 trades per person a day. If you look only at the people who are actually engineering strategies, it's more like a quarter of a million trades per day per person.

Our topic today is liquidity in a post-crisis world, and in particular, one of

the things I wanted to speak to was whether or not flash crashes are a sign of poor liquidity in today's markets. So I wanted to walk you through a recent flash crash and discuss whether or not it should be viewed as an indication of weakening liquidity.

Two events happened this year. Vice Chair Fisher referred to both of them. On June 23, Great Britain voted to leave the EU. It was widely -- sorry, these are both events in the British pound currency market. On June 23rd, Great Britain voted to leave the EU. It was a widely anticipated event. Everyone knew it was coming for weeks in advance. The vote was assumed to go one way but it was not set in stone. Everybody was paying attention. So while the outcome was not what people expected, largely people were paying attention.

Prices moved substantially. The prices stood up to the qualitative story of what happened. You know, largely economists viewed this as a bad decision for GBPN. There was a sell-off in the pound. Because we had substantial notice, because the price didn't really surprise us in the direction it moved, and because we have this story about everything that happened, we don't really view this as a flash crash.

On October 6th, we have a different story. It happened at almost the same time of day, in the evening, just after 7 p.m., sorry, East Coast Time. There was no notice that anyone was going to do a lot of trading at that time. When you look at the price history, the pound way overshoots where it ends the day, and the price is quite stable both before and after the sudden move. Afterward, we're left asking the question, what happened? Why was there a five percent move in the pound? This doesn't make any sense. We're going to call this a flash crash.

So I have a little bit of data. This is not professionally produced. This is price history, and on June 23rd in blue and on October 6th in orange. And unfortunately, that lines up almost perfectly with the crease in the display here. But I guess you can measure by the narrowness of the margin between the TVs, how quickly the price fell on

October 6th.

So on the 23rd, you can see that there is substantial price action. In fact, you know, there is a similar drop right around 9:20. Sorry, 7:20. But it has a story behind it. We're not surprised. On October 6th, on the other hand, the market is relatively stable before, and recovers after about 11 minutes and is again stable again. And again, this is what we call a flash crash and leaves people a little nervous.

Here is a volume chart, and I'm sorry I don't have this overlaid on top of the price chart, but generally, the peaks in volume correspond to big price moves. So the blue columns are, again, for June 23rd. This is grouped in millions of pounds traded per 15-minute interval with times across the bottom. And so you'll see some very high peaks on June 23rd around some of the price moves. On October 6th, the market is quiet before 7:07 when the crash starts. There is no action at all. And if you look at every other day in the British pound, other than June 23rd, from 2016, you will see a very similar market. This is what the market looks like at 7 p.m. The U.S. markets are closed. European markets are closed. Asian markets are barely opening. There's usually not a lot of action here, and when there's not a lot of action, there's not a lot of attention paid to it by liquidity providers, such as ourselves.

So a couple of points. Zero market activity before October 6th. The other thing I would point out is that while this looks like a market in freefall at 7:07 on October 6th, there's actually a considerable amount of volume that happens very close to the price that the currency opened at. About $500 million of GBP trades before that price moves down very much. Over the course of the next 11 minutes, an additional billion dollars of GBP trade, but the first third of that volume happened before the price dropped below the eventual closing price.

And the last point I'd make is that even though there is a five percent dip immediately, and ultimately, the price goes down about two and a half percent, the average price during that moment of chaos really is only one percent below the steady

stay price towards the end of the day. So you see very low prices that you're not excited about, but not a lot of volume trades down there. The average price is a lot higher. So maybe the people involved here weren't as significantly impacted as we seem to think.

We still don't like this. You know, we have computers now that are supposed to be always on. Why don't computers, automated traders, like myself, do a better job of protecting us against immediate price moves like this?

Don't worry. There's not a "Here's how HFT slide coming on."

So I wanted to talk a little bit about what is typical of HFT strategies. Most people seem to think that HFT is very good at understanding news. Artificial intelligence lines up, you know, people assume that we're using machine-learning techniques that are very good at processing text. That is not true. While there are HFT firms that do respond to news events, those are mostly news events where the formula of the news release is very well understood. It is a jobs announcement that come out Friday at 8:30 and you know exactly what field to look in the news article to say here's the number, I'm going to pop it into my formula, and out comes a price. Reading general news that might have an impact on macro -- your macro opinion is a lot harder to do, and that is years, if not decades away.

So our value opinion is based mostly on a prior macro view that we have put into it by humans as well as quantitative inputs that it drives the market in real time. If a macro opinion changes, the strategy can't really update itself.

Automated strategies are also optimized to perform well at scale. It takes a huge initial investment to put together a strategy that is going to trade, and the idea behind that investment is you do it one time and then you can mass produce a product. You don't build an assembly line to build one car; you build an assembly line to build millions of cars. And so I would argue that a flash crash -- and most flash crashes are a little bit different -- is a very kind of isolated incident that is difficult to imagine building an automated solution to because it is not a "one size fits all" scenario.

Most automated strategies also are trained and tested on past data. Luckily, we do not have a large sample set of flash crashes to train on. But the reason is largely that we put together parameters. We know we're going to trade, you know, millions of the times over the course of the life of our strategy. We can look back over the last six months and just make sure that those parameters make sense, the strategy behaves as expected, and train on past data is a huge part of what goes into strategy.

Risk management in a trading strategy often involves de-risking a related product. So that could be -- the most obvious product to choose here with the British pound is the futures product 6B, which is the British pound future. This trades on the CME in Chicago, and I'm sure that many automated trading strategies out there will make a market around the FX product knowing that they can de-risk in the futures product. The next best product would probably be some other currencies. Stat arb funds I'm sure have ideas about what other things are related to GBP.

Unfortunately, on October 6th, 6B halted for -- I guess it was limit offer for two minutes and then it outright halted for two minutes. So about 30 seconds after the crash started, 6B was halted, unavailable for market makers, which means that the market makers that depend on 6B are probably going to stop if they're smart because otherwise they're taking risks that they don't know. They might be exposing themselves beyond what their credit allows them to. And they're certainly trading in unknown ground. So they might stop.

And the last thing that's most important is that because computers can do as much work as quickly as they can, we almost always have a plethora of limits that we set in our algorithms that make sure that they are not operating outside of a known box of kind of expected inputs. So I wanted to walk through some of those lines.

Some of these aren't going to be surprising if you have ever worked on Wall Street because they are not surprising. Someone mentioned loss limits. If you lose too much money, you stop trading.

How do we set the loss limit? The question is, well, we often will look at historical trading patterns and say, you know what? Ninety percent of the time -- sorry, our 10 percent worst loss is X million dollars. We'll set our loss limit to that number and then we'll stop trading. We also have position limits, which is also very closely tied to our credit limits with our counterparties or brokers. If our position reaches a determined amount, we're not going to take a bigger position. If we're already buying at -- if we're already buying as the pound goes down, we get the max position, we're not going to take any more.

Market term limits, this one is a little bit more surprising. I was just told I have two minutes left. I have to rush along here a little bit quickly. This is a little bit surprising. If our strategy ends up taking up a relatively larger market share than we would expect, normally we're trading five percent, suddenly we find ourselves making up 50 percent of the market, we're going to ask ourselves, something might be wrong. If that many people want to trade with us, we might be offering the wrong price. We will decide probably to scale back or stop our trading. If our data looks incorrect, if we usually get prices from two different markets that tell us what the pound is worth and suddenly those two markets are telling us vastly different prices, we don't know which one is right. Our automatic reaction is let's slow down.

Risk management limits. Again, if you can't trade 6B, you might stop trading.

Capital limits. We have regulatory requirements we have to meet. If we get close to them, we have to start winding down our position.

So I think the other thing that is important to talk about here is how big is the opportunity?

I'm going to fast forward a little bit here.

Only about -- I'm going to glaze over this kind of quickly. I think that what happened here is a large trader intentionally or unintentionally sold somewhere between

$200 and $500 million worth of GBP. I would say that they probably chose a pretty poor time to do that given this is one of the lowest liquidity times of the day, but either an error or some intent on their part, some emergency on their part caused them to do this. The market reacted not that poorly. I think they probably maybe lost one or two percent of the notional value of their trade to their counterparties, which is -- if it's $200 to $500 million, we're talking about a $2 million to $10 million loss on a $500 million trade. That's not a huge loss to somebody who is in an emergency situation, if they keep 98 percent of what they're trying to trade.

And secondarily, it's also not a huge opportunity for market makers. If we need to invest a huge amount to build an entire infrastructure to identify these events, there's not a lot of opportunity there, especially if you're going to have to share it with five or 10 other market participants. You're looking at collateral you have to set aside, infrastructure you have to build, people you have to hire and watch this, all for an event that might happen once a year. And if you get it wrong, you might be January 15, 2015, when the Swiss depegged our currency and the price didn't drop two percent; it dropped 10 percent. This could catch us off guard. We're not looking at the news. We can't automatically read the news and say, oh, there's a macro reason for this. We should back away. And so this is difficult for us to distinguish between.

So I guess I will try and wrap up quickly. Electronic markets define the clearing price with ruthless efficiency. Once they get an order, they are going to execute every single order they know about until your order is filled -- sorry, your order is completed. They're not going to give you a chance to cancel, and they're also not going to give anyone else a chance to say, hey, you know what? I'll buy a little bit at that price. Most of them operate that way. There are some markets that will pause momentarily and switch to an auction model.

So I guess you have to ask the question, is a flash crash where you get liquidity better than an old market where probably you would not be able to get any

liquidity at all until time passes. Maybe the broker would not answer the phone.

You also have to ask is the cost of the dislocation, maybe $2 to $10 million, worth jeopardizing the execution cost of maybe $2.5 trillion of GBP alone that trade every year, or if you look at all currencies, far more than that?

HFTs. I walked through some of our risk limits. HFTs are at risk in every flash crash, and we have developed a lot of automated limits that we use to protect ourselves. I think most likely institutions are behind on this front. Algorithms that people used to execute large trades probably do not have appropriate limits in place. I'm not recommending regulatory intervention here but I do think that it would behoove institutions to look at how they choose to do their executions and think about putting in responsible limits.

The last point I would make is that there is liquidity in the market. It looks like there is not liquidity, but there is just no instantaneous liquidity. Eleven minutes later liquidity returns to the market. That comes from automated trading firms who have hit limits, have required human intervention to go and review trading, check macro conditions, make a decision about whether or not we can continue trading. That took 11 minutes to happen. Also, it probably took 11 minutes for other large traders, who are ultimately the liquidity providers of a $500 million trade, to wake up, look at the price and say, man, that's a deal. I'm going to buy pounds.

And so there is an instantaneous lack of liquidity, but it comes back. The liquidity is there and we call it latent liquidity. It might not be expressed in an order book. A matching engine doesn't know it's there. It can't execute against it, but as soon as the price reflects an opportunity, the market comes to the rescue.

I'm out? Okay. All right. Well, maybe we'll get a chance to talk about some of these during the panel discussion. But thank you for having me here today. Largely, my answer is I do not think we should be very scared about flash crashes. They happen. They cost just a little bit of money. They look scary. They undermine market

confidence. But they actually don't cost us that much money.

(Applause)

MR. GREEN: Good afternoon. I'll be quick because I feel like most of my points have been made by everyone else and there's so much that we can talk about on the panel.

You know, the generic illiquidity argument has been made but I think we want to look at the facts and the data and we simply don't have problems in this space. The dealer behavior during periods of market stress, and I'm also going to talk about future priorities.

As has been well presented today, the bid-ask spreads, record lows, and frankly the times when we had illiquidity and these spreads blew out were during the periods of the financial crisis and great recession.

The corporate bond market, similar circumstances. I think the argument, and frankly the facts suggest that we have better liquidity now post Dodd-Frank, post Volcker Rule. Post Basel IV than we did prior to all of that. And of course, again, the most illiquid period that we saw during the markets was during the financial crisis.

The argument about the dealer behavior, whether the dealer will catch the falling knife is a rather interesting one, and I hope to continue to debate it. The point I would make on this one is during the taper tantrum in 2013, the New York Fed found that dealers who were Tier 1 tended to reduce their positions even more than dealers with lower capital ratio, which is the opposite of what we'd expect to see if higher capital was to blame for reduced market making during stress.

So I think these are interesting questions that we need to think about, and these points down here on the left-hand side suggest the change in the short positions and the change in the long positions during financial stress. Dealer are both reducing their short and their long position during these instances of market stress -- 2013, 2008, 1998 with long-term capital management. 1994 with what was going on with

Mexico, et cetera.

So I think we have to be very careful to -- I think we need dealers. We need dealers making markets, but we do need to be very realistic about trying to not create a story that says dealers are going to be the ones that will step in during periods of financial -- periods of market stress when the reality is markets need to adjust on their own and we don't want to have periods of market stress. We're far better, as Vice Chair Fisher, thinking about the tradeoffs between financial stability and what will create market stress versus, you know, trying to create this vision of liquidity that is not going to be there when we actually need it to be there.

I do think that going forward we need to be strengthening financial reform rather than reducing it, whether it's continuing to finish the rules of Dodd-Frank that I hope we can get done before the end of the year. And frankly, there were parts of Dodd-Frank and parts of financial reform that will have to be finished next year. And if they're not finished, those who don't finish it will have to be responsible for those decisions.

I also think that the trend towards increasing market transparency is really very, very important. I think we heard today a lot of instances of insufficient data leading to a hard time analyzing what's really going on in the markets, so new Treasury market data reporting is extraordinarily important. The same is true with data in our bilateral and trilateral repo markets. I would argue that we need greater transparency regarding Volcker Rule compliance than we have had in the past, and that will allow us to better debate the questions of is the Volcker Rule working? Is it too tight? Is it too loose? Is it doing enough to enable real market making in times of when we need it, and how is it -- how are the markets responding to it? I think that is a debate that we can have with sufficient transparency and in ways that does not endanger the actual, you know, minute-by- minute, hour-by-hour trading positions of the firms that are actually collecting that data. I think there are multiple ways to do that, whether it's aggregated, whether it's time delayed, et cetera, et cetera.

I do want to talk about -- I want to mention three things that have not been brought up at this -- I'll stop here.

I'll mention three things that we haven't talked about today that I would like to put on the table as very, very important parts of the conversation, and this is not in the presentation. One is the importance of investors as investors. You know, we're talking about dealers. We're talking about trading. We're talking about abstract ideas like market liquidity, but when we step back at the end of the day, we want our capital markets to deploy capital to efficient long-term returns to the economy, to society. And that means investors engaging in real due diligence about where they should put their money that's going to lead to returns for them and we hope, according to, you know, how the economy works and how the capital markets are supposed to work, for the economy and society.

But the problem is, and this is what Paul Volcker calls the liquidity illusion, when there is a belief that you can get out too quickly at any price, at any amount, in any circumstance, then you have far less incentive to conduct the real due diligence into the quality of the asset you're investing in. And this is particularly true and particularly important here in the fixed income markets where debt is debt. Where, you know, equity is supposed to adjust to the value of the company and it goes up and down and you're supposed to trade that and investors win and lose. But debt, we have a far greater economic and socioeconomic cost to things like bankruptcy than in the equity markets. And hence, whether it's folks like Paul Volcker who said this, Chairman Volcker, or Sheila Bair, who have said that had we had better due diligence by investors acting as investors, they might have gone and looked at what was actually behind all the RMBs and the CDOs and maybe today behind some of the CLOs, and found out what are these companies? What are these homeowners? What are these assets that we are deploying our money into rather than looking, oh, what's the last, you know, 15-day VAR on it and the price, where's it going to go in the next 20 days? And I'm going to be in and

out before there's a problem. Let's not have a market liquidity system that incentivizes that casino-esque aspect to the markets. We need obviously arbitrage. We need liquidity in the markets. But I think we also need to look very carefully to make sure that investors are empowered and incentivized to truly be investors.

A second point I'd like to highlight and put on the table is the importance of competition or concentration. You know, the conversation has been -- there was one interesting slide about smaller issuers having less liquidity. I think there's been talk about smaller, you know, block trade sizes, a number of these other factors. A number of these factors may reflect greater concentration, whether it's in the corporate sector, via the significant reduction in anti-trust enforcement over the past 20 years, the large number of mergers and acquisitions that some of our largest companies are bigger than they ever have been before, and hence, one starts to wonder -- you start to think about why is there less trading in these? Well, perhaps it's because the prices are all moving in the same direction or there is less arbitrage available, or there is less difference in management between companies. Or there is simply, if there are fewer entities trading in a market, you start to see a different behavior in just the capital trading markets itself and that may itself lead to some reduction in liquidity.

Another angle to that is, just thinking about the Volcker Rule for a second, and I think it applies to Basel III3 as well, these rules don't apply in large measures to the nonbank market makers that are completely welcome to step in and make markets and make money and serve customers that need it. Are there obstacles to them getting in the market? Some might argue it's regulation but we should take a look at all these aspects. We need to make sure that we have diverse, healthy, competitive capital markets, and frankly, a diverse, healthy, competitive economy. So I'd like to put that topic on the table. And anti-trust may not be the right way to think about it in the securities or in the capital markets from what tools we use, but that's where you do start to look at other anti-concentration tools that are out there, everything from Glass-Steagall

to other aspects of, you know, Section 622, et cetera, from Dodd-Frank.

And then the last point I would raise is we need to remember basic principles. Real market making is about serving customers. It's about serving clients. It's about making sure that the real economy is working. And in a world where folks like Thomas Philippon and others have noted how the financial system, as it has grown in size, has increased the amount of rents that it extracts from the real economy, we need to think very carefully and very honestly about the extent to which we want to incentivize that type of behavior. I'm not saying we shouldn't have finance. I'm not saying we shouldn't have profits in finance, but I'm saying that we should be honest and straightforward about what is the appropriate role of finance in the real economy? And this is particularly true in a world where the financial crisis has had very large and continuing impacts on our economy, on our society, and on our politics.

Last Tuesday's event, you know, I don't want to opine on every aspect of it, but I think it is hard to ignore the fact that between 2001 and 2010, the average middle-class family saw 49 percent of its wealth collapse. Forty-nine percent of its wealth. And while it's come back about 16 percent from 2010 to 2013, maybe another 16 percent, we are still probably 35 to 40 percent off of where we were in 2001 for the middle-class, and that doesn't even count the height of the bubble from 2004 to 2006. So in other words, folk are generally hurting out there. And we need to be very, very careful about making sure that we don't go back into a world where we are empowering those very large, very well off and very successful entities to be betting against their customers, betting against investors, betting against the real economy, and creating a system, creating a culture, creating a capital market in a financial system that causes the kind of crash that happened in 2008. We simply cannot afford it. Thank you.

(Applause)

MR. KLEIN: (Inaudible) kind of a point Jason made about flash crashes. Right? As I read the Constitution, I don't see life, liberty, and liquidity as a constitutional

right, and I'm somewhat reminded of an event early on in my tenure in the Obama Administration when there was a giant blackout that affected Cleveland all the way to New York, and we all huddled for an emergency. And somebody said, you know, what's going on, and what the problem is, and one of the economists in the room said, well, you know, the optimal number of blackouts is greater than zero. And I think one of the media people in the room said we're not going with that talking point.

Is the goal of regulation to eliminate flash crashes? Or should we expect one or two of these a year because the economics of the market justify that and the costs of that regulation don't equal the benefits according to kind of the cost benefit? I don't know, Greg, what do you think?

MR. BAER: Well, I'll start with a note of humility because everything I know about high frequency trading I learned from leading Flash Boys, which is a very dangerous place to start.

I think -- I thought it was very interesting the numbers that even the person who was the victim of the flash crash did not lose that much of his or her principal. And certainly, and this gets to the larger picture we've been talking about, there are a lot of very big, structural changes going on in our markets right now. Equity markets, fixed income markets. I can't say that the flash crashes periodically are the worst thing that's going on, or necessarily that they're causing long-term harm. I mean, I think I would look at them the same way that I would look at some of the events, you know, flash rallies, Swiss franc, as is there something about this flash crash that make me think that in the next financial crisis something really bad is going to happen that will exacerbate things? And I think that's certainly worth study, just as these other events are worth study. But I take the point that we have not seen something from that episode that would lead you there.

MR. GREEN: You know, I think we have to take this in a very measured approach. I don't think all flash crashes are the same. I always thought it was very

interesting that it does appear that the short changes in prices appear to be -- reflect a new market structure that we have, and if that's a reality of it, then maybe that's something that we need to adjust to, but I think we also need to look very carefully and understand the operational details of events that appear to have no real economic consequence and making sure that we've got all the logistics, the operational, the back-end parts of the market working well because we don't want these to occur by accident or in greater frequency than necessary. But I think we have to just take a very measured approach.

MR. KLEIN: I mean, would you guys agree, Jason, the optimal number of flash crashes per zero -- per year is greater than zero? Would you say so?

MR. CARROLL: I would say the cost of having zero flash crashes is higher than having one, so --

MR. GREEN: I'm not going to deliver an economic analysis because I think that, you know, nobody wants flash crashes, so you know, where the optimal number is may depend upon how much we can deepen our knowledge and understand it and really figure out can we fix it. Because if we don't understand it, we can't optimize it.

MR. GREEN: I don't want a blackout but I'm prepared to accept that the odds of a blackout this winter with Pepco are far greater than zero and generators are expensive.

MR. BAER: Yeah. Really what it comes down to, what's the cost of driving the number of flash crashes down to zero? And it's buying backup generators, effectively, and it's how much does the backup generator or restricting trading by a precipitous amount, what's the cost of that? So it's all cost benefit.

MR. GREEN: But I guess my point is we don't even know necessarily what the cost is. There are a lot of aspects of flash crashes in the market that we're still trying to understand. It took a long time, and I don't know that even there's a full understanding of what happened in the May 10th flash crash across multiple markets.

We have two different regulators collecting different pieces of information that are not talking to each other. We don't have a CAT in place at the SEC, a consolidated audit trail, to really break down to understand what's going on in the market. So, you know, we don't have transparency in the Treasury markets. I just think when we understand what's really going on and when we can accurately evaluate the cost, then we could have this debate. But until then there's a lot of work to be done.

MR. KLEIN: So let's kind of stick on this theme here for a second. I want to pick up something that Debbie said kind of earlier which was she said, you know, arguably there was too much liquidity pre-crisis, and so you know, I've often thought about this thing. In economics, we tend to think that most goods have declining marginal value. Not everything but most goods. But sometimes when it comes to liquidity, there's a belief that it seems to have constant marginal value; that kind of moral liquidity is always good or is equally good going forward. And some people even kind of argue that it has increasingly marginal. The tighter you can drive bid-ask spreads, you know, even delivers more and more value. So I want to kind of ask simply to everybody, does liquidity have, in your opinion, declining marginal value?

MR. GREEN: I'm happy to say yes, and I'll just basically restate the Volcker analysis and the principal of you need some liquidity. You need a capital market where people can move in and out. That's the point of it. But when there is too much liquidity, not only do I think there is declining marginal value but I think you actually incentivize some of the bubbles and inappropriate behavior by investors who are not acting as appropriate investors engaged in the due diligence that they need to of their investments, particularly in places like the fixed income markets.

MR. BAER: I think clearly there's declining marginal value. That's not to say it ever becomes negative; I'm not sure I would agree to that. I mean, if you have an instrument that trades every two weeks, it's probably better that it trade every week or every day or 10 times a day, but clearly, when you go from 100 times a day to 105 times

a day, the benefit of that is less than when you move from once a week to once every five days. So almost by definition I think it's declining.

I don't, and maybe Debbie can help out, I think a lot of this defines on how you define liquidity. I think liquidity in markets, I think it's generally always going to be positive value to having another market maker, someone else offering a bid and an ask. I think a lot of the problems with liquidity in the crisis were people, particularly not a lot of investments banks, were assuming they could get liquidity for securities that, in fact, maybe that's an illusion of liquidity, that they'd always gotten before by rolling over repo and then they couldn't. So maybe in that sense the market was delivering them too much liquidity for what they had.

MR. KLEIN: Jason?

MR. CARROLL: I would say I agree that generally marginal liquidity loses value. I think the bigger problem that you had said was it can give you a false sense of confidence that that liquidity will be there forever. And it's not about there being too much liquidity at any given time, but if you expect that liquidity to always be there, you might be surprised one day.

MR. GREEN: And if I can add also that I think the nature of the asset itself matters. If we're talking about level three, complex, hard to understand assets, you know, maybe that's the type of thing that you need to have a different type of liquidity for, a different approach to understanding and investing that asset than a very simple, you know, corporate bond, whether it's a high grade or even a lower grade corporate bond. I think the complexity of the asset and all those things start to matter as well.

MR. KLEIN: So do I hear you, Andy, slightly agreeing with Barbara Novick that the ETFs, by kind of creating more liquidity into that type of thing and making the asset a little bit more understandable and diverse provides value?

MR. GREEN: I do think there's value in that. And I think that -- I mean, that in some ways was the promise of securitization. I think we always have to be careful

to make sure that, you know, simplicity and understandability and functionality are there and will stay there but that's, I think, one of the things why the ETF market has been so successful and why I think we need to continue to make sure it's successful.

MR. BAER: I think ETFs are a complicated question that we looked at a fair amount. I mean, it sounds counterintuitive to think that you would have an asset that's more liquid than all the underlying assets it holds. On the other hand, it is true that ETFs do not have the same redemption risk as an open-end mutual fund in the sense that if someone redeems from an open-end fund, the underlying assets have to be sold to fund that redemption. Again, unless you're holding a lot of liquidity, which they wouldn't want to do, whereas, with an ETF, simply the price changes and it has to do with the structure and the authorized participants and how they're created and retired. So they do seem to be more resilient to market shifts.

MR. CARROLL: Can I make one comment on ETFs?

MR. KLEIN: Yeah.

MR. CARROLL: ETFs are often traded by automated traders who are trading at kind of the efficient boundaries. So you buy the product, you make a market in the product and you convert it, or you create (inaudible) ETF. But a lot of ETF trading also happens well inside those boundaries. So to your point about the spreads being lower, a lot of it is simply supply and demand between people who are more interested in buying the ETF than trying to buy the basket of underlies. They're bidding more than it would cost to create the ETF, but they're met by somebody else on the other side.

MR. KLEIN: So we're going to turn to the audience after I do one final, put everybody on the spot to something somebody else said. I'm going to start with Andy.

Could you answer Greg's question about why we should apply one set of rules to nonbank affiliates, broker-dealers of banks, as opposed to broker-dealers of nonbank affiliates?

MR. GREEN: Well, we saw during the financial crisis that the nonbank affiliates of banks, when they failed, caused the Federal Reserve and the Treasury to bail out the entire entity, and there's multiple examples of that; whereas, we saw in MFG Global or a number of other failures nonbank firms that are standing alone can and will go down. Now, it's not to say that nonbank firms that are big enough and important enough, that they, too, will be rescued, whether it's Lehman or Bear or whatnot. So that's why I actually don't think it's about bank versus nonbank. I think it's about is this a really big, important, economically-important entity and how do we regulate that? You know, but we do have a little bit of a contract that I think Vice Chair Fisher talked about between banks which is why that's the starting point for this form of regulation.

MR. BAER: I'm going to have to disagree with that. I lived through a different financial crisis where the biggest systemic events were the failure of Lehman Brothers, which is not affiliated with a bank. Failure of AIG, which is not affiliated with a bank. Failure of Bear Stearns, which is not affiliated with a bank. And really, the busting of the buck at the Reserve Fund which triggered perhaps the biggest systemic consequences, and it was nowhere near a bank.

So I would have thought the lesson from that is that we really need to focus on the systemic risk presented by nonbanks that actually don't have the diversification benefit of actually being affiliated with a bank. I don't recall, I mean, if you think about who bought these failed nonbanks? Well, it was JPMorgan. It was Bank of America. It was diversified banks who bought them, saving the government and the taxpayers a fortune. So I think it's a hard lesson to learn from the crisis that we don't worry about nonbanks causing financial stability problems.

MR. GREEN: We'll have to keep debating this later.

MR. KLEIN: So let me, Greg, let me ask you to respond to something that Vice Chair Fisher said, which was regulation may have impacted liquidity. You know, you were at one point a lawyer's lawyer. There's a big difference between may,

and did, and shall. Would you agree that it's "may"? Or would you say it has? One. And two, he put up a framework of systemic safety justifying liquidity costs. And I always get nervous in that framework because the only way to achieve financial stability that I'm aware of is to not have lending or fractional banking. Everything else is instability.

So let me ask you, how do you respond to those, one and two?

MR. BAER: Well, let me start with two and then you remind me what one was.

I think all the assessment of regulation has to be at the margin. Right? I mean, there's no question we don't want to have another financial crisis. The question is do we need the NSFR to not have another financial crisis? Or is the LCR and the ESLR and the G-SIB surcharge and Basel III and CLAR and CCAR testing, quantitative and qualitative, are those sufficient to avoid a financial crisis like the last one? And so what is the marginal benefit?

And then you actually have to think about marginal cost, too, which is if the marginal cost of adopting the NSFR is to further drive down, you know, repo, is that putting at risk a financial crisis unlike the next one? And so that's why I think he say it may have had an impact. I do remember the first question. I mean, it's hard to imagine it not because a lot of these regulations were intended to have that impact. The goal was, and it was a good goal, they wanted to have less repo regulators. I think the markets understood there should be less repo. So it's hard to say that a regulation that has had that effect and had that intent didn't, you know, have an effect on the market.

I mean, you can argue, and I think with regard to a lot of these regulations, I would say the LCR with very small, maybe a couple of exceptions, the LCR passes the marginal benefit-to-cost test well. I mean, it says for 30 days in a severe stress event you look at the outflow assumptions around your liabilities and you look at the stickiness of your assets and you have to be able to survive that. That's a cogent rule with a well thought through rational and one where there was actually a lot of data

applied to figuring out what those assumptions were. So yes, that passes.

Our questions are more around things like the NSFR or, you know, an addition of hundreds of basis points to the CCAR exit ratios. You know, will that in and of itself prevent a financial crisis? Of course not. It's all the other things that will, and how much value does that add versus the cost?

MR. KLEIN: So Jason, final question. You talked in your slide deck about your regulatory capital, which kind of surprised me a little bit because I'm trying to understand what regulation is binding to you. So could you expand on what that is, one? And two, would you be okay applying all the litany of alphabet soup to your end because you're nonaffiliated with a bank if you were systemically important, if you fit this household name test in a keen market like Treasuries?

MR. CARROLL: Okay. So question number one, we're a regulated broker-dealer in the United States. We are a regulated broker-dealer in the UK as well, which passports us into Europe. And so --

MR. GREEN: For now.

MR. CARROLL: For now. For now. Probably for a couple more years.

So, you know, that comes with requirements. Some of our, for example, one of the issues at stake right now is whether or not Treasury trading should be part of -- should be required to be under the umbrella of a broker-dealer. Right now it's not required. So, you know, we're familiar with that regime. Obviously, the broker-dealer requirements are like miniscule compared to what the banking requirements are. I don't know half the acronyms you've talked about. So I guess it would be premature for me to say yes or no I would be okay with accepting some burden in that respect.

MR. KLEIN: Burt, and then Seth?

MR. LEE: Burt Lee, banking consultant. Thank you all very much for your comments.

As you all know, we had a certain event occur last Tuesday, and I was

wondering what your speculations might be as to how regulations might change for the markets that we've been talking about here given some pretty strong pronouncements by the president-elect with regard to financial regulation?

MR. KLEIN: Does anybody want to say how we're going to make regulation great again?

MR. BAER: I'll say one thing that may sound a little counterintuitive. I mean, clearly there's a lot of talk about Dodd-Frank is now in more danger and Dodd-Frank had a bad last Tuesday. What's striking to me though is if we look at the rules, and we've talked about a lot of them today, that are having, I believe, effects on market liquidity, it's things like, you know, the ESLR. There's no ESLR in Dodd-Frank. There's no Collins Amendment. You know, extra cushion in there. There's no -- there's nothing in Dodd-Frank that requires the U.S. to have a significantly higher G-SIB surcharge than the rest of the world for the Basel process. So I think there's been a lot of focus on provisions of Dodd-Frank, and maybe that's appropriate, but I think when it comes to sort of the plumbing of the economy, you know, things that could actually stimulate economic growth, things that could reliquify to some extent capital markets, a lot of those are going to take a little more digging and a lot of thought.

MR. GREEN: I'll comment two things. One is I think, you know, whoever ends up leading the team is going to have to look very carefully and think very carefully about what the underlying substance of Dodd-Frank means. It's easy to say I don't like Dodd-Frank because I don't like that word. It doesn't sound so good. But do you really not like loss absorbing capitals that firms can absorb the risk that they take if they mess up? Do they really not like the ability to wind down a firm so that it can fail in an orderly way? Do they really not like greater transparency and asset-backed securities? Do they really not like the principle of, you know, big important firms are supposed to be market makers and not betting against their customers and clients? Do they really not like, you know, you go on and on. Counterparty derivatives, is that going

to be a daisy chain of risk if one entity goes down and you have the rest of them go down, et cetera? So, you know, I heard Donald Trump a year ago on Bloomberg Radio talking about how, you know, "The Volcker Rule, good enough for Paul Volcker, good enough for me." So I'll take that. On the other hand, you know, we're going to have to see what they do and as I said before, if the new leadership takes actions that are really about concentrating wealth and power in the hands of a very small number of individuals, that's not what -- that's not what I think their voters sought, and I think there's going to be practical economic consequences, and I think ultimately political consequences.

MR. CARROLL: I can't speak too specifically to the general direction of the next administration, but I would say that I have seen the cost to get into our business rise dramatically since I started the company in 2002. And I think one of the aspects that is most beneficial to a healthy market is having diverse market participants. And to the extent that it is harder for new entrants to get involved, I think that leads to a decrease in diversity in the market, and generally that means more expensive use of the market.

MR. KLEIN: So I'll just say that I just put up a post-it ran on Bloomberg.gov and it also cross-posted at Brookings on this. I've been very confused by the president-elect when he was candidate. One minute it was Dodd-Frank and regulations are killing banks. The next minute it was "Bring back Glass-Steagall." He said that he's for -- in the Senate that was Senator Warren and McCain. He said he was for "Audit the Fed," which is the support of Senator Bernie Sanders and Rand Paul. And which Trump are we going to get? Are we going to get the one that is kind of classic simple deregulatory? Or are we going to get the kind of, you know, one that, you know, takes these kind of things that had bipartisan support but are kind of very opposite direction of how we responded on the crisis? I don't know. That's my piece in a nutshell but it's more eloquent if you read it.

But the one other point I'd add to you is we're a little bit used to, I would argue, the last time most of the regulators were on the same page roughly speaking.

There weren't quite as many fights, or if there were they kept them a little more internal. You know, if this week the transition team has already turned over once if not twice, you may have a situation where you have each of these different viewpoints articulated at a different regulator. So you have a lot more of an inconsistent warring kind of framework within, and lord knows, if you didn't know all the acronyms, Greg talked about rules, the acronyms on the number of regulators we have is astounding and I think a source of financial weakness. Systemic weakness.

Seth?

MR. CARPENTER: Thanks. Seth Carpenter from Rokos Capital.

Aaron, if you thought they were all on the same page you haven't been to recent FSOC meetings.

So most of the comment is for Greg but if other people have opinions, I'd like to hear it too. The first was about the bank affiliated versus the nonbank affiliated. I personally thought that part was a little bit of a strum in because all of the non, the sort of SIFI designation for nonbanking institutions clearly takes that seriously and the Money Fund Reform Act clearly takes it seriously. So I'm sympathetic to the notion that one needs to look at where the problem is, not just simply look at banks because it's easy to pick on banks, but I don't think that's where the problem is.

More specifically to your commentary, you said one needs to take anecdotes more seriously. I'm very sympathetic to that. When I was assistant secretary for Financial Markets, I had a whole parade of people in from the markets telling me all the problems going on with liquidity, so this conference has been near and dear to my heart. On the other hand, I spend a lot of time on a trading floor now and I know that traders have massive amounts of cognitive bias. And so anecdotes are not in my view small bits of data. So I would think if the anecdotes actually do have the value that I personally believe they do -- I don't think these people were lying to me about what they were experiencing -- then the illiquidity that they're talking about should show up

somewhere. So where in the data should we look to demonstrate that there is this illiquidity? In my view, we can't have a meaningful discussion about what's wrong with markets and whether or not it's regulation that's causing it and whether or not it's anything else that's causing it unless we're actually seeing the same things. In all of the charts that were put up before, I create slide decks like that when I was at Treasury. I don't personally think of it as dispositive because I hear all these anecdotes, but I'm left wanting a little bit more. I want to have a better argument about it. I want to be able to say yes, there is some decline in liquidity. Here is where it is. But because the system is safer, because the system is more resilient, it's worth it. So how do you bridge that contention?

MR. BAER: So on your first point, I think the problem with the FSOC designation is it's all or nothing. You know, and there may be institutions that you would not say are systemically important, but 10 of them combined would be systemically important. Sort of like mortgage companies or things like that. And so you have institutions now that are the leading market makers, and I think somebody was referring to the fact that when they did the Treasury study they didn't know who half these people were. So those people together might actually be systemically important.

So I think maybe that's a problem with the law, is that you either have to get the full treatment as a nonbank, as a nonbank that is not affiliated with a bank, or if you're a nonbank that is affiliated, you get the whole bank regulatory regime. And you know, I'm old enough to remember back when you actually regulated nonbank affiliates very differently from banks on the theory of the F23A that protects the nonbank from the bank. And so you wouldn't have the same standards. You would let them do more things. You would let them do things with less capital. And so we've just sort of morphed and there's now this sort of porridge of why we're regulating that I don't think really has been thought through.

On the anecdotal point, I take that very seriously. And if I, and I think

others were only hearing this from traders, of course; they're a unique breed. But I sat with asset managers who are the end-users here and say I can't get my trades done in size. I'm holding more liquidity. I'm holding smaller positions. I take a lot more from -- it was only up there briefly because we were in a hurry, but the CFA Survey of users I put a lot more stock in that then I would in a survey of dealers who can certainly talk their own book. And I think a lot of it, and I think Debbie got to this, too, the real problem with the data I think is it's the discouraged worker problem. And to the extent that the buy side has gotten sort of accustomed to not seeking large amounts of liquidity -- I mean, I'm sorry, large trades, and doing large block trades, and doing them over a longer period of time, so not expecting immediacy and not expecting size, there are sort of long-term costs for that in the economy. Those are very difficult to measure but that doesn't mean they don't exist.

And then the other, and that gets to the slide that I think several people referred to from Goldman is what are the effects for smaller issuers who don't have the benefit of being the liquid issuer? And then also for I think somebody mentioned, you know, BlackRock is always going to get its trades done. So is Fidelity; right? But are you concentrating, you know, assets in large asset managers who are the only ones with the market power to get their trades done? So I think there are a ton of issues around that. I'm not saying that there is a crisis and something needs immediately to be done to fix all that. I do sort of ascribe to the first rule of holes, which is if you think you're in a hole -- I'll modify it slightly -- stop digging. And I think NSFR, G-SIB, Basel IV can constitute still digging, and then thinking about something Aaron was saying, I mean, not only do you have a lot of diversity of using U.S. agencies now, I mean, you have an open revolt now in Europe against Basel IV. Finance ministries -- and Asia never bought in. So between European and Asian finance ministries, they have said no. We did the call of evidence. We understand there's an impact on economic growth and market liquidity. We can't do capital markets union, you know, with this level of capital. And so they're going the other

way. And so the question is are we going to keep going in the opposite direction?

MR. KLEIN: Great. I want to thank the panel.

Martin?

MR. BAILY: Thank you very much, everybody. And thank you to the audience. And appreciate everybody that's here. Thank you for coming.