

THE BROOKINGS INSTITUTION

SAUL/ZILKHA ROOM

UNDERSTANDING THE ROLE OF COLLATERAL
IN FINANCIAL MARKETS

Washington, D.C.

Monday, February 23, 2015

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P R O C E E D I N G S

MR. ELLIOTT: Okay. Good afternoon, everyone. I'm Doug Elliott from the Economics Studies Program here at Brookings. Thank you for coming despite the continued cold weather which, I, at least, am getting very sick of.

So as you know, we are here this afternoon, to talk about The Role of Collateral in the Financial System, particularly in what is often called, The Plumbing of the System. And we are fortunate to have Manmohan Singh, he is one of great experts in this area, and there's also a superb Panel which will follow.

He is a Senior Economist at the IMF here in Washington, and you have a copy of his detailed bio in your material, so I won't go on at great length about him. But I was impressed to realize that he's making absolutely no money off his new book, because apparently being at the IMF, the royalties have to go to the IMF Widows Fund, if I got the name right.

Anyways we are going to start with Manmohan. He'll talk for about 25 minutes, or so, about some themes from his excellent new book, *Collateral and Financial Plumbing*. I must say, the book is great source of information on a topic that has received far too little attention. And for those who are interested copies will be available for purchase outside the room afterwards. But apparently, and this is the first time I've done this at Brookings, we are going to do a drawing, and three of you will get free books, which, since it's actually slightly pricey, it's not such a bad deal.

So, if you haven't, there is a bucket outside, in which you can drop your business card, and basically at the end of this whole shindig, I will draw three of these. I wonder if I have anything up my sleeve at the moment. I should have thought of that. Anyway, so, we'll start with Dr. Singh; and then after he speaks I'll ask him a few follow up questions, and then we'll give you a chance, from the audience, to quiz him.

Following that Q&A period, we'll then leave the stage and have a Panel of three people follow. Each of them will talk for about 10 minutes, on a topic of their

choice related to collateral and financial markets, which this is an expert-enough crowd, I'm sure you all realize, it's a very wide topic. So you are going to get three fairly takes on things which we thought will be a nice diversity of views.

The three experts that we have are in the order they are going to speak. There is Sandra O'Connor; Sandy O'Connor, who is the Chief Regulatory Affairs Officer at JPMorgan -- I keep forgetting to say Chase. I grew up in the old JPMorgan; so JPMorgan Chase, will lead off. Followed by Darrell Duffie who will be appearing here, long distance, on our screen, and I can see him, but none of the rest of you can, he's there, he looks good. Okay. There he is. So you have a brief look at him, he'll come back later. Then we have Sayee Srinivasan, who is the Chief Economist at the Commodity Futures Trading Commission.

Their full bios are also in your materials, so I won't take more time now to explain their illustrious careers. So, with that, let us start off with the main event.

MR. SINGH: Thanks to Doug, and to Brookings for this opportunity. I'll go straight into this because more slides than number of minutes here. This is a snapshot of the key messages which I have in my book, basically financial collateral, these are like U.S. treasuries, German bonds, which can move cross border.

The numbers associated with this collateral are huge, and at par with money metrics, so when we learn about money, M-zero, M1, M2, these numbers are an integral part of financial lubrication which involves either collateral, you can settle account with collateral or with money, and the numbers are large enough that we cannot be dismissive about that. That's a key point which I'll try to describe to data, that these are large volumes which we cannot ignore.

And I'll apply it, at least today, to two themes. One is monetary policy, where, with the QEs central banks have interplayed or interfered with the financial plumbing. Markets used to do the plumbing, now with QE, basically what that means is, you take collateral from the market in exchange, you print money and pass that to the

market.

So huge amount of collaterals have been taken in by some central banks. So far, it has been the Feds, it has been the United Kingdom, and we'll see ECB doing something next month. And the second thing which I'll try to get my hands on today will be the proposed regulation of moving OTC derivatives to CCPs, or central counterparties.

There are other themes over here, which I'll just try to give you a flavor upfront. I may not get into that. That shadow-banking should not be a pejorative term, it's always viewed with a negative connotation, there is capital even within shadow banking. You know, when shadow banking actors move, there are margins, there are haircuts, and that's the capital. Unfortunately, nobody has compiled a study on what is the capital associated in the shadow banking world.

We Basel VIII, but we do not know what the corresponding number would be in the shadow banking world. However, my take from the book is, it's not a pejorative term, it's not a negative, and chances are, given the way we are going to trim the banking sector, by default, shadow banking sector will grow. QE and regulations have overlapped in the changing collateral space.

As we look forward, we cannot look at regulations independent of QE, there is an overlap, and I'll try to see how much I can get that, but please be cognizant, you cannot look at regulations without the flip side, which has been QE, and it's still happening. One central bank will start QE next month.

Safe asset, is that really a shortage? And here I'll try to bring in the concept of the reuse of collateral, because there is 70 trillion-plus of AAA, AA securities, only a small fraction of that actually gets reused. A lot of it gets siloed, and it doesn't see the light of the day.

If you do want to make -- some country wants to be in the business of public good, there have been issues out here. Which country? Why? Isn't that a

fiduciary duty from a tech management angle? Also, as to what type of collateral should be coming out. So, the safe assets side story, has to be cognizant of something called the reuse rate, or what I call the collateral velocity.

So, let's jump into the first thing, the monetary policy side. If you look at the last Lehman annual report, 2007, November-December. The yellow ink here is cut and pasted from the annual report footnotes. As of November 30, 2007, the fair value of securities, that was received by Lehman, that was permitted to sell or re-pledged in Lehman's name, was about 800 billion, of which, about 725 was actually used by Lehman; 800 billion.

The balance sheet size of Lehman, this annual report, was 700 billion. So clearly a lot which shows up in the footnotes of these balance sheets do not make it to the balance sheet. That's an important point. Yes, things are changing, yes Basel III Rules will push a lot off-balance sheet items on balance sheet. It will be difficult to keep things off balance sheet. There's leverage issue, there are all sorts of other issues coming up, and it will be difficult to be in a world where Lehman was, but this is a very large number, bigger than the balance sheet, and this number is not easily found in call reports. Most of the flow of fund is done on balance sheet data.

So things beyond the balance sheet data don't get picked up. You know, a lot of studies we see, including from the (inaudible) on flow of funds, but this is where it comes in, and I will try to show you this is not isolated to Lehman. So look at these charts very carefully. It took a while to make this chart because you actually have to read the report. If you look at that -- you actually have to read this, yes.

If you look at the light-blue columns, 800 billion for Lehman, right, as I said, bigger than the balance sheet size of Lehman, and if you add up all the light-blue columns on the key banks; Bear Stearns, Lehman, Morgan, Goldman, this is a bit tricky but you have to deal with an investment relations officer to figure out what's going on between Merrill and BoA, largely it was Merrill Lynch, but they are combined, so to show

continuity I had to call them. JPMorgan, Citibank, and it doesn't stop here.

The Europeans are also pretty good at this game. Société Générale, BNP, Deutsche Bank, Credit Suisse, UBS, Barclays, RBS, HSBC, Nomura. I looked at the top 13, 14 banks, of course there are some smaller ones, but if they are below 50 billion I did not care. So I picked up roughly 90 percent of the market.

If you add up all these light-blue columns I talk about, off-balance sheet, pledged collateral which can be used in the name of this bank, is 10 trillion. I've counted them a million times by now. That light-blue number if you add up it's, 10 trillion. Now, if you look at the most recent number, the orange bar, which will be 2013 ending, because 2014 annual reports are still in the making. Deutsche Bank will have this ready until the middle of April.

The latest numbers, that's the orange bar, if you add them up, it's about 6 trillion, actually 5.8 to 6 trillion. The numbers have not bounded back since the euphoria in 2007. So, 10 trillion to 6 trillion is a margin call on collateral. Something went out here, between 10 trillion and 6 trillion, and these numbers are not bouncing back from 6 trillion in the last three years. This is an important fact, which you don't find in balance sheet data.

Okay. Now, where does this collateral come from, where do the banks get this collateral, in order to keep in the spirit of one slide a minute, hedge funds. Hedge funds are the largest supplier of this pledged collateral, because hedge fund needs to get funded. Hedge funds take leverage, hedge funds goes to banks, and hedge fund is in lieu of the collateral, will get leveraged or, say, cash in advance. There are many ways, rehypothecation, et cetera.

There is one quirk out here, in the U.S. it's very difficult to extract too much out of rehypothecation which is to the prime broker, because you have strict rules under SEC's Rule of 15-3-Ca and Regulation T. You cannot go beyond 140 percent of a client's collateral. However, in U.K. there are no such rules. So oftentimes if somebody

is seeking leverage, and wants to have a mark-to-market price of leverage, you are better off in U.K.

So, all the rulings so far, Basel III, et cetera, has not removed this sort of a gap. If you have an affinity towards high leverage, and you are willing to deal with the prime broker, U.K. may offer a softer platform, or less constraints than the U.K. [sic] Hedge funds also borrow from repo has to show raw numbers, this requires some arithmetic, but the leverage in the hedge funds space. Hedge funds used to -- should be about 1.7 trillion, the numbers went down because everything sort of collapsed; assets under management leverage, now they've been bouncing back up, and the numbers are back around 1.8, 1.9 trillion. This is raw collateral coming from hedge funds.

There's another bucket, the known hedge fund bucket, just to keep it simple, where you have the sovereign wealth funds, the central banks, the pension funds, the insurers; they also supply collateral. And one good data source is RMA, but they don't double-count, there are other data vendors like Data Explorers that are double counting, but long and short is about 1.7 was also contributed by this non-hedge fund, okay, but they have not bounced back from the number of 1 trillion.

So in the last two, three years, they are stuck at 1 trillion, there are many reasons over here, one of the main reasons, is counterparty risk, you have seen since 2008, first you had the stress test on U.S. banks, then you had the Europeans getting into a tail spin, et cetera, et cetera, but the bucket, this bucket has shrunk significantly since about 1.7 trillion, around the time of Lehman.

We have 10 trillion of collateral which I showed you, those light-blue columns, this came in, in 2007. The raw sources were 1.7 and 1.7. Okay. So think about it, if the raw sources are about 3.4 or 3.3 trillion, and the total amount of pledged collateral available to the large bank is around 10 trillion, how do we explain this?

Or, to look at it more recently, say about 6 trillion in recent years, and hedge funds have bounced back to 1.8 trillion, the other bucket is about 1. That's about

2.8, how do you get to about 6 trillion. This is where collateral gets reused, and this is important to understand because this defeats all the logic of flow of funds. This is cross border, so if a hedge in Hong Kong had Indonesian Bonds, and wants leverage, it goes to UBS, its prime broker, and say; okay, you can have this portfolio of, say, 500 million of Indonesian bonds, it gets leveraged.

UBS books into UBS London. But there may be demands for these bonds, either as an outright sale or a repo, say a Chilean Pension Fund in Santiago, which is dealing with Santander, which deals with, say, a Citibank London, that that's how the market connects itself. The bonds, these collateral gets reused, it's not idle, some of -- between these 10, 15 banks we have a global footprint, collateral moves across jurisdiction, this does not make it to the balance sheet.

In other words, you could have a hedge fund wanting leverage, it wants cash, it passes collateral to Goldman, Goldman can use the same collateral with similar account to Credit Suisse, it has leveraged for this every day. Credit Suisse then pass on the collateral to a money market fund, which I learnt is 287, may use that collateral for three months, six months. That's how collateral gets connected.

When I talk about these numbers like 10 trillion, it is the reuse rate of the intentional double or triple counting in the system, and this moves collateral from one point of supply to where it's demanded, and then it can move again after a three-month, six-month repo, or whatever. That's the logic and intrusion of collateral reuse, collateral, like money like when you put a dollar of deposit at Citibank, it finds a way to the guy who needs it more than the guy who is putting there for savings, at say, 1 percent, and somebody else could make more than 1 percent off that dollar.

Intuitively what I've said so far, in a summary. We have sources of collateral, we have the total amount. This is the lubrication which is a very large number and I just compared it to money metrics; that these numbers, in order for you to make 3.4 to 10, there's an intrusion of a reused rate, and the reused rate has gone down from

about 3 to 2. I'll come back to this. But this, some people collateral velocity, but the reuse of collateral is declining, and I'll link QE over here.

When you take very good collateral, like U.S. Treasuries and MBS, and it cannot move because it's at the Fed, and so far the changes from 2007, to about 3 trillion of new collateral, is on the asset side of the Fed. It doesn't rehypothecate, it doesn't get reused, it makes an impact in the market, because for the market, to move a portfolio of security, those Indonesian bonds I talked about.

The AAA, or BB, or single-A collateral will move along with AAA. The portfolio should include some good collateral so you can move the bad collateral. Bad collateral doesn't move on its own. So when you take away the good pieces, it makes the whole collateral hard to move in the global financial system.

So, intuitively, and I think this is as sort of a extreme I'll go in terms of being analytical, that gap between green line and the red line in the (inaudible) of 2007, that's the 10 trillion, that's between like 22 and 32 trillion. Intuitively even if I -- Okay, so let me explain the line. This is the U.S. broad money and the red line includes the U.S. broad money plus the European broad money, plus the U.K. broad money. And if you see some things it's because of QE.

But I'm pointing to Japan because Japanese collateral is -- it stays within this border, it's not cross border. Now, if you throw in above the red line, if you throw in less collateral, all those blue columns I showed you, that gap was 10 trillion between the top of the green line, and the starting point of the red line. That gap is not 6 trillion. The number I showed that market has collapsed, and there's a lot more money lubrication in the system, relative to collateral lubrication.

Intuitively, if this was 10 over 33, that's about one-third lubrication. Now you are down to one-fifth of lubrication. Collateral being siloed, collateral being less reused in exchange of money, you'll find more monetary stimulus, more money lubrication relative to collateral lubrication. Okay. Now, this is something we all learned

in economics about IS/LM, we have real interest rates, we have output, LM is supposed to pick up money, nothing else but money, and on the IS, we capture things like C-plus, I-plus, in consumption and investment (inaudible).

I'm going over here, I was never taught, let's say 10 trillion, is it borrowed money, LM, otherwise, I don't know. At the time we had internal discussions with the research department, and he said, no, LM is strictly money, that's the monetary side. So intuitively you can use collateral as an investment, good, which gets reused and you can show the same analytics, as it is a part of IS, so there was a significant move in a collapse of collateral around Lehman's time of 10 trillion to 6 trillion, you can show the dynamics to SEC, which we see today about the negative interest rate, how the output has changes, and this shift of LM, is intrusion rate, the money matters.

So if you have a collapse in lubrication, which you are compensating for money. You cannot get it, but this was never taught, and I still think in many text books, you don't have a room to show lubrication outside of money. That's the only part I want leave (inaudible). I'm applying it to monetary policy. You see, most collateral and a moderate policy, was almost exactly the same before Lehman, and you can pick it up through the Fed funds rate, which is the U.S. monetary policy rate, and the GC rate, which would in normal times that would pick up what's happening in the repo market, in normal times.

And we had a monetary policy rate which was in sync with the GC repo rate, if it was not with the collateral rate, but the SOMA desk at the New York Fed would make sure it is not more than plus-minus 3 basis points of the GC rate. So, basically it's saying that an overnight credit, whether secure or unsecure of a country like U.S., the AAA, was in sync. So the collateral lubrication type, or the money part was in sync.

Things have changed a lot since those days. Now we do not have the repo market in sync with the money markets. There's a lot going on since 2008 October. We have had banks have 25 BPS, which is the green line, called interest on excessive

reserves. I did not show the Fed Funds rate, no. You say why? I did not show it because Fed Funds rate is, in many way, people say it's broken.

It's nothing else but the rate at which non-banks' cash, Fannie, Freddie, large hedge funds, (inaudible) for extra cash, who don't have access to it, for this is only for banks. Only for depository institutions. If you don't have access to this, you can go to a JPMorgan, you can go to a Citi, and say, let's negotiate. It may be 10 years, 12 years, and I get 10, and you get 15, that's how we are going to dip in the (inaudible).

So, I don't show the Fed Funds rate, but it's basically around 10, 12 basis points. That's a split between a bank and a non-bank on how to invest the cash. There are many -- many issues over here regarding large bank having to pay FDS, and then you set up, but the long and short is Fed Funds rate doesn't have much economic content. We have a few interesting things. This is the repo rate. It's not in sync with the Fed Funds. This will be very interesting as we lift off. It's not in sync. As I said, Fed Funds rate is stuck at 10, 12, and largely a lot of the foreign banks that it has to pay, because foreign banks don't pay (inaudible) --

(Inaudible) banker due to the balance sheet, a lot of this money is made through the Fed, or (inaudible) by the Swedish Bank. Now we have come up with something called the reversed repo program, the reverse repo program, started with a flow of 3 BPS moved to 5 BPS, around the quarterly ending there is more demand so they have even raised it to 10 basis points. This provides a flow to the repo rate.

I think it's the flipside of -- since the U.S. monetary policy could not go below zero, it made a choice, maybe because of the fall in (inaudible) or the money market funds. Reverse repo also made sure that the repo rate could not go below zero. You see, because in intraday trading, it shows signs of going below zero. So this is a flow, and chances are this will be a very important tool as the Fed wants to get the Fed Funds rate somewhere up.

So when you talk about a lift up, these rates will be very important.

Remember when we lift off, we don't have the Fed Funds policy rate, or whatever the policy rate is, to be very different than the purple line. Repo markets, the price of collateral, the money markets filter where funds should be in sync with normal markets. You cannot have liftoff with a wedge over you.

Just to show those who are not from here, the Europeans did not think of zero as a magic lower bound, they went below zero, and right now the deposit rates at ECB are minus 20, and the Fed Fund rate is called EONIA, that's gone below zero, and its repo rates, if you look at the German bond repo, or the French, also goes below zero. For them, there's nothing magic about zero. However, in the U.S., we have had some peculiar movements, north of zero, because of our -- I'm a U.S. Citizen -- because of our hard constraint at zero. Okay.

Now, what's the practical implication of all of this? Where's my 10 trillion registered? The QE, look at the change in deposits. The top four banks, Wells Fargo, Citi, Bank of A, JP, now have almost 4 trillion as deposits. Back to the 3 trillion in deposits at the top 50 holding companies. There was a very nice paper by Karl Prati et al, 2003, when they showed that most of the theory was done by non-banks selling to the (inaudible). Not banks, but these are inventories you may even have seen.

So, non-banks, sovereign wealth and pension funds, insurers with hedge funds; they sold to the Fed, but the banks, it's important. But when non-banks get this cash, seated in wealth of cash, what do they do? They don't -- they have to put it in a bank. When they put this cash in the bank it takes away bank balance sheet space, and if you talk to any bank, or regulator, or anybody on the risk side of bank they'll tell you what the bank balance sheet space has done.

There's something called excess reserves, the reserves you don't need to put with the Fed, that's just required reserves. Excess reserves are so large now that for banks which had pretty their number at zero, excess reserves, now about a quarter of the balance sheet, reserves to total asset is reserves. And many large banks will admit

that as the leverage issue comes in, this bank balance sheet space is getting scarcer and scarcer for us to do other activities.

They would like the reserves to be up, but if the reserves are okay, or this, because you were getting 20 BPS in a zero-rate environment. As the yield curve goes up in normal times, you will not want the balance sheet cluttered with deposits. So QE has taken away bank balance sheet space, and this remains to be seen, how it's addressed.

There was recently a meeting in London where they may be soft on the leverage issue, which might allow some movement of this bank balance sheet space, in exchange for not using clients' collateral in the OTC market, but that's getting very technical.

The bottom line is, bank balance sheet space at some of the top banks have been taken away by these deposits due to QE. This was, if you look at the blue area out here, that's the plumbing, that's how markets would take collateral and money would be exchanged. This is before central banks at QE, if you just focus on, there's money coming, the short-term money, there's long-term money which comes from this side, and the hedge fund side, and the dealer banks would move it in a way where, you know, the money market funds would get collateralize funding so they would get a better game than JPMorgan than, say, a small hedge fund. That's how the bilateral repo market work.

Now, I want to make a point clear, the bilateral repo market for which we still don't have very data, we still don't, in our estimates, is a market for collateral, it's a general market for collateral between those blue boxes. The tri-party repo market is a market funding, collateral which, overnight, you can get funding based on that inventory which did not get used in a bilateral repo market.

The point I want to make, because many people extrapolate one to the other. This is what's happening with the new Fed's reverse repo program. If you see that

green area, the green area is -- now green area is taking away the blue, the blue boxes, that's the plumbing going on in the blue boxes. No interference from the central bank. But when the central bank comes in and takes away collateral, de facto, it has interfered and will interfere as the collateral unwinds over time, 5, 10 years.

Until then, the reverse repo program, the reading of the blue boxes is showing that the plumbing is being affected. In a sense if you have this reverse repo program, allow to everybody, including hedge funds, and there will be no plumbing. There is a rusting of plumbing happening with the RRP people, and the Fed is very accurate in keeping this lid on the rusting, because the RRP's got to 300 billion, recently they added another 300 billion for the term RRP, but the bottom line is, from the shadow banking literature, one would construe this to be a put. You are giving -- guarantee collateralized funding to money market funds, and the Fannie-Freddie's, because you didn't need to.

The bilateral plumbing they were brought down, bilateral plumbing always worked, we just don't have a good handle on the data, the size, et cetera, et cetera, the weights, the data, but it worked. This RRP is necessary for other issues, monetary policy issues, but if you make as say practically available to everybody, then you break down a plumbing, bilateral plumbing, which works, has always worked, and still works, and you increase the put, the word "put" is for giving guarantees to money market funds, et cetera. That's another way of saying that.

Now, people talk about the reverse repo program. It's getting technical, but basically, if non-banks use the reverse repo program, like I showed the way, if the money market funds, the GSEs, some of the AAA like BlackRock accounts which are (inaudible) they are eligible. The collateral at the Fed doesn't come out to the market. There's a difference between ownership and possession of collateral.

Basically it's a change in name in the Fed balance sheet, excess reserves for non bank the money market fund will go with JPMorgan's 800 million, but in

RRP it's different. Takes the deposit, JPMorgan is happy because it gets banked by the (inaudible), but it's just an accounting change in the line item of the Feds, from excess reserve will drop down, and RRP that collateral cannot -- hypothetically it doesn't move into the system. If it's done to the banks, banks are eligible, banks have no incentive because they can get 25 BPS so why would they bid for 10?

Well assuming that (inaudible), assuming this revenue from rehypothecation, it's very difficult, but if you see the light, and the term RRP gets very low, that rehypothecation of collateral is only within the tri-party which is also not going truly to the market domain. So what I'm saying is, there's about 3 trillion, roughly 3 trillion change from QE, which has gone to the asset side of Fed balance sheet, and that collateral used to interface with the full financial system, banks and non-banks.

Now, the results which have been created, is mostly with the banking domain. In other words -- this is from Mr. (inaudible), I'll come back to this. What I'm going to show here is in this world, this is the mapping of financial system where short-term money come in, long-term monies come in, the dealer banks, and then they are (Inaudible) banks and non-banks, in this world, you have -- so now it's moving full on the system, and now the reserve which are there as a lubricant are less -- are of lesser quality than collateral in the market only.

I'll switch gears but I want to go back to a quote from President Dudley of New York Fed. Let's read the sentence. "Also with an exceptionally large balance sheet there will be considerable attention on the methods with the FOMC will use, in order to exert control over the level of short-term rates." And we go back to a very timely topic, about the liftoff, and what I'm showing you over here, and I find what I've said in the last 10, 15 slides, from an overall, old lubrication perspective, the financial system, money plus collateral. If collateral velocity has already reduced from three to two, there may be less tightening needed.

If you already held this collateral as a lubricant, it's less of a lubricant, but

when we go out into the New World, and this is, again, from President Dudley's speech, this green line is what we see today, but had we not changed the balance sheet and buying -- and associated QE we would see the blue line. There is a gap of about 200 basis points. Typically when you go from a recession to a peak, there's 400 BPS type, tightening (inaudible).

You don't have to tighten so much, because we are at a much lower position, it's being sort of hidden, because of the changes in rates bound at zero, and the composition of balance sheet. If I go back to this, there has been tightening done on one part of lubrication collateral. So on the money part, we may not go back 400 basis points, the new normal for 200 basis points, simply because of -- unless the balance sheet changes, and I don't see that happening any time.

I'm going to switch gears, I have four minutes, and I'm going to talk about the theme (inaudible). This is what's going on, there is some risks in the large banks, here are some of key CCPs; ICE, LCH, ICE clear and UBS (inaudible) and CME, and then one more coming up in Germany called Eurex. Basically there was a risk where large banks had something called residual liabilities, we could have (inaudible), but we did, so we shift the full spectrum of OTC derivatives, into the large CCP. And on top of the full five of them, because clearly they are too big to fail.

(Inaudible) it is a manifestation of overnight asking Pittsburg 2009 Summit, full (inaudible), and it is a slow process, it's a difficult process, and I think some people ought to be able to stick to this. But this, in a sense, is what's going on in the OTC system, standard economy, not everything. And one place that's easier than standard can (inaudible) move through this market, and we don't estimate that maybe one-third of what was in the market cannot be cleared by the (inaudible).

This is the amount of under-collateralization, these are the BIS data, that's the only place, the data which shows numbers, what is the under-collateralization in this market? This is after netting, all the benefits of netting, which is 3 trillion and 5 trillion

worked up under-collateralization, somebody is a piggy bank in the system, relatively new; somebody is not posting his or her share of the issue margin -- of the issue margin. The point is, even the most latest number, 2014, was about 3 trillion, 2.9.

The fundamental thing is, this number has to be covered, because regulation is what it's called (inaudible) trouble, but it doesn't say there's about 3.8 trillion of collateral. And then they'll say in the annex well, that about half of it, because he double talk and he (inaudible). It is they are saying, it's about 2 trillion, that collateral is after being reused. Even if you take a lower number a 2, or 3 for collateral reuse, in effect the amount of collateral in the system is not more than 1 trillion today, that's still -- to reach 3 trillion. That gap of 2 trillion has to come from somewhere.

A lot of these regulations now you have to understand how to find the collateral which is needed for bank capital, leverage issue, you have all sorts of constraints on the banking side, and then a serious amount on the OTC derivatives, and it make it too expensive, even, to cover this. But it remains to be seen how we reach the under-collateralization, given that the amount in the system today is not more than 1 trillion.

There's one last thing, because in -- this is my last -- well, if I do talk about something called VMGH, variation, margin gains --

MR. ELLIOTT: This is your last one?

MR. SINGH: This is my last -- So, there is a proposal which is now, at least in the regulated circles now to find the handle of JPMorgan all (inaudible), what happened if a non-bank gets into trouble? If indeed we have done a good job in shrinking the banks, with all this leverage issue, and holding them responsible and off-balance sheet, constrain, if we push the risk to non-banks, and some of them are giving the SIFI stamp now. We'll see what means, but CCP is one of the non-banks which interest me a lot.

We have proposals which are bailing proposals, like this one, where, to

make a long story short, the system can't take care of any risk to a CCP you just take more rate cuts. It's -- I mean, there's a lot written on this, and there's a recent study from Reserve Bank of Australia, which analytically shows that the contagion from such haircuts will not be extensive, it will be minimal. A very clear study, I've not see other study, which is like this.

So if you have clean, bailing proposal, and yet, people don't embrace the proposals, and it is very likely that that although we may contain banks with all this plethora of regulations we may end up bailing a non-bank, like a CCP. Thank you.

MR. ELLIOTT: It would be easy to look at all this that you've shown us, and say this seems incredibly technical, you've more or less said, almost nobody understands it yet, and we need to know more. Do we want to be doing this stuff? I mean, what is the economic and social advantage of having this way of doing what you call lubrication?

MR. SINGH: Well for some real reasons if we do not get a grasp of what is outside the flow of funds metric, which is used extensively, most of the studies, don't go below flow of fund. We'll never get a handle on this non-bank, bank nexus, and banks are small in terms of capital, say, 13 trillion around Lehman's time, however, their footprint, the way the system goes to the banking system is immense.

So to focus, and we have focused correctly at equity and leverage of banks, but increasingly I think Basel, FSB, et cetera, are correctly trying to understand the blind non-bank nexus. How does -- I mean look at the number of working groups, from shadow banking to OTC derivatives, to the resolution of CCP, there's at least 6 to 10 working groups trying to better understand the full picture rather than, you know, beefing up equity at banks, or reducing the leverage of banks.

So I think somewhere at the G20 level, there is -- they have been cognizant that we need to go beyond what lens we use to look at things, and I think this is just trying to show that that lens is bigger and it --

MR. ELLIOTT: I can certainly see that point. My point was a little bit different, in your book, at least implicitly part of your argument, is that shadow bank is too pejorative a term, perhaps collateralization is viewed as bringing more risks than benefits, and perhaps it's not considering the benefits appropriately. That there has maybe been too big a shrinkage in this area. I may be reading too much into that, but if part of what I'm saying is your correct view, what is your counter argument when somebody says; nobody understands this crap, why should we let people do it?

MR. SINGH: Because an understanding is myopic right now. Unless we expand it, and acknowledge that there are some real issues in the plumbing, monetary policy, the regulations will remain, not correct in my -- For example, if you are looking at the Fed's policy rate, okay, and I mentioned, the policy rate -- Fed's policy rate, the policy rate of the world doesn't have complete economic meaning.

Now, there are reasons why we didn't go below zero, and why the Europeans went below zero, but there are some fundamental issues out here, I'm trying to bring out, which will be addressed over time. It may take 2, 3, 5 years, but if we don't get the financial landscape, for example, I talked about the bank balance sheet space, we may be chasing the bank, we may be shrinking them, and five years down the road, we are sort of -- you sort of start bailing out a CCP. This is not very difficult to see, given the way the numbers are sort of lining up today.

MR. ELLIOTT: Okay. Now, you've made a good and strong point about collateral velocity, and how a decrease in collateral velocity, is equivalent to a tightening that has occurred, and therefore there might not be -- need to be as much conventional tightening, possibly, what is your view as to what will happen, going forward, to collateral velocity? Can we tell at this point whether that will go up or down?

MR. SINGH: Collateral is scarce, number one, we can see that from as far as Reserve Bank of Australia's issues, including Fed's RRP that they are addressing this issue. They are also fine-tuning the regulations. If you look at the timetable, it's

being postponed, deferred, some concessions made, however I feel collateral velocity will not bounce back, we have a large central bank in Europe, who will start QE next month. Fed is unlikely, as I tried to explain, to let go the collateral very quickly.

Whenever the policy rate will move, you will release collateral so that the repo rate and collateral -- and the policy rate are in sync. I do not see collateral will also be coming back. So being -- If we accept that premise, we do understand that perhaps there has been some tightening, and it is very likely that this tightening cycle, and not trying to model with the strength of the dollar, et cetera, that this tightening cycle may not be the level of tightening we have seen in the last three cycles.

So if this arithmetic and this logic has some bearing, you may see a new -- we may see a policy rate which is not as the usual 3.8, 4.0 percent, but more like 2 percent because we are starting from a negative number, and that is why I showed the chart from Mr. Dudley's speech, that the blue line is the line which would have been true had we not done this balance sheet movement.

MR. ELLIOTT: Okay. Now, let me give the audience a chance; and Manmohan will be coming back during the second Q&A period with the Panel as well, this is not your only chance, which is good, because we don't have a lot of minutes to go.

So, let me just lay out the ground rules, please wait for the microphone, identify yourself by name and affiliation, if you have an affiliation. And remember that a question is actually a question, something that he can then answer, and that should probably do it. So, sure.

MR. ROLAND: Thank you. Neil Roland with Demlex News. I'm just a simple Journalist, so please forgive the rudimentariness of this question. Is there a problem here? Are there policy implications to what you are saying?

MR. SINGH: I wouldn't say problems. I would say it gives some light to this whole regulatory debate, monetary policy, and the many issues which I talk about, I just chose two over here. It's just trying to give you another angle which has been

missed so far. So, no; there's not a problem, but I think it augments the work being done, number one. And number two, what was the second about?

MR. ROLAND: Policy (inaudible).

MR. SINGH: I have tried to show that, for example, monetary policy may be cognizant that there has been tightening done, from the OTC derivatives space if you see what I've shown, people are cutting corners. They go to ETS, et cetera, because the collateral demands for using derivatives may change. If everybody has to put an initial margin, variation margin, they may look at other avenues, and you've seen the regulators flag some other areas, where you may be cutting corners, on this collateral.

If collateral gets expensive and you really need to pitch in collateral for OTC derivatives, they'll go to a place where you can cut that corner. And yes, this does tell you area in which people might score because, you know, collateral is required for certain products.

MR. ELLIOTT: If I could follow on that excellent question. Is it fair to paraphrase what you've just been saying as; you think it's really important to understand these aspects, understanding it may lead you to a somewhat different policy decisions, but it's not that you think there's a massive problem. It's that you think a better understanding will lead to better technical answers.

MR. SINGH: Absolutely! Absolutely! I think the problem was with banks, they focused on the banks. This system is wide and went beyond the usual of fund analysis as we understand the system. We can see. We can see the working groups in progress, they take time. You know, you have a lot of countries agree on certain issues, but these are on the table, they are just -- I think it's important that they are on the table, and they are -- and I think they will lead to some results in the -- in a new picture that the bank, non-bank-relationships will be addressed. It's just showing that these numbers are not trivial, and they should be incorporated somewhere.

MR. ELLIOTT: Martin?

MR. DALEY: I'm Martin Daley. I'm here at Brookings. I can't claim to be a simple Journalist, but I still am struggling to understand some --

MR. ELLIOTT: The Think Tank.

MR. DALEY: I'm a simple Think Tank. It's a little bit of a follow up to the previous question. So we brought interest rates down as far as we could. Obviously, we can't go negative, so that's perhaps been one reason why the recovery has been more sluggish. Other people have pointed to maybe regulatory changes, which have gone with increased risk aversion, made lending more difficult.

So my question is, is this lack of collateral limiting lending in some way. How is it affecting the real economy? Who is it affecting? Is it affecting household lending, small business lending? Where is it showing up? How is it creating more tightening than you would otherwise imagine were there?

MR. SINGH: That's a difficult question to answer, but let me give it a shot. If you believe the Fed tightens from 4 percent to 1 percent is tightening, this is no different than that, except the examples are new. So, for example, if say you could have IBM issue a bond, which could be bought by pension fund, insurers, et cetera; and for reason the collateral market doesn't allow the pension fund, or the hedge fund to, sort of, make augmented returns, or to move the collateral, chances that that IBM bond which IBM will issue, will be at a higher price than had the collateral market been functioning more efficiently?

Long and short is, it makes an impact in borrowing cost, because collateralized lending is less, because there's less collateral in the system. So on the margin, yes, real sector household will be impacted the same way, except that we are very used to the monetary side of lubrication. In reality, besides M-zero, M1, M2; you also have some C-zero, C1, C2, which we have not documented. That's the intuition behind your question.

Which is hard to describe, because you don't see real sector numbers.

Most of the data is associated with monetary policy, M-zero, M1, M2. In fact, the Fed doesn't produce M3 numbers since 2005, and the M3 world is what I'm trying to untangle, as far as I can.

MR. ELLIOTT: If I catch the implication, it sounds like part of what you are saying is that the distributional consequences of a tightening through interest rates, is similar to the distribution consequences of a tightening through collateral?

MR. SINGH: Yes.

MR. ELLIOTT: Okay.

MR. SINGH: Now, I just want to put a little caveat that the distributional tightening through monetary metrics seems to be broader, because that sort of encompasses everyone. When you have QE and collateral tightening, and a smaller spectrum of players, like non-bank pockets, et cetera, the distribution is initially the first round is towards the smaller circle, then the bigger circle, because it's much more sophisticated.

MR. ELLIOTT: Yeah. Fair enough. Dale?

SPEAKER: Dale Medimar, at Reuters. I'm also a simple Journalist. You've talked about monetary policy a lot, but are there any consequences for financial stability, where perhaps regulators may look at this market, and not perceive a problem that's actually looming?

MR. SINGH: We have to very careful with journalists. For journalists, if you do quote -- I don't mind double-checking. No, I don't see a problem, because I think they are all very cognizant of these issues, we have ways to engage with them, they are just trying to formalize this in the various umbrellas. You know, FSB is an umbrella organization, BIS's working groups. So, no, they are very much alone. In fact, I do cite to some of them in the beginning of my book.

Like Professor Shim, he is not the Head of Research, so no, they are not oblivious. They very much know this, but it takes time to formalize and pick and choose

what's more on the regulatory agenda.

MR. ELLIOTT: On the aisle, there? And just so you know, all the way at the back there's been a very patient guy.

MR. THOMAS: Very quick. Charlie Thomas from the Federal Reserve Board. In your diagram, it was very nice, it had the funds starting on the right, and going through several people to the ultimate borrow on the left, and the collateral moving to the right through. My question is similar to the first one. What difference does it make if you have the three guys in the middle, who were just funds through them, while the collateral go the other direction.

Unlike in banks, where we think they are actually doing something, checking credit, that sort of thing, it's not in this part of the system that those guys in the middle are actually doing anything. So, why would I care if they disappear, and your velocity goes down?

MR. SINGH: This goes back to what I made a remark on shadow banking, that there is capital within this type of movement from, say, the hedge fund to ultimately the money market funds. The money market fund now is getting a better credit, so when you talk about there are credit checks in the banking literature, similarly the money market fund is now getting a better credit of Credit Suisse in this particular example.

And there are haircuts between the movement from the hedge fund whose collateral or portfolio of securities is checked at the Goldman Sachs level, and then there may be less checking between dealers, but also between Credit Suisse and the money market fund. So I would not put it very differently from the banking system, the sad part is, the level of haircuts and the way the collateral move within the non-bank, bank nexus, we don't know the extent of capital.

My understanding, my intuition will tell me it's less than 8 percent, what's at Basel, hence people prefer to do activities under the shadow, and expect to get a put

down the road, but there is level of haircuts and margins, which may not be convincing with eight persons, but I've never seen any calculation about what is the level of capital which is going from point A to point B.

Now, the other angel I want to say is, this volume of 10 trillion, which sort of comes up between the demand and supply, it has to factor somewhere on this IS/LM mapping. Because if you have a concept of base money in M2, you similarly need to put that that 10 trillion somewhere. It's not a small number to say; well, you know, what difference does it make, if you take out the dealers, and you have less, so you collapse everything down by one-third; I think it's the same intuition you have if you say my deposit goes to Citi, goes somewhere to an ultimate user.

And that 10 trillion is what really sort of got me moving, it was -- the M2 for U.S. around Lehman, was 7.5 trillion, and the number over here, between the 10 and 15 banks was 10 trillion, I could not ignore it.

MR. ELLIOTT: So, all the way in the back? Yeah.

MR. SAVAGE: Thank you. Hi. My name is Jay Savage, I'm an, Economist. I'm from (Inaudible) CP. My question for you with just -- if you could address the question of flight to quality flows, particularly the issue with flow cyclicalities, and with the uncertainty that comes with the economic uncertainties, and how that affects the variations. And the amount of clearing that's required in margin.

MR. SINGH: There are three questions over here. I don't think I can comment on flight to quality if this is related to some of the issues we've seen in the news today. Coming back to flow cyclicalities, I think the proposals from Basel, et cetera, on flow cyclicalities, there is always some room to maneuver, there is always some room to maneuver by central banks, haircut level.

However, pro-cyclicalities or margin haircuts associated with global repo market agreement, or global sect-learning, market agreement; I think you will agree with Heads of the BIS Markets Committee that won't be impacted because that's bilateral. So

GMRA, GSLA, I don't think will be impacted, and I actually agree with that. There's a certain bilateral plumbing which is done and I don't think official would want to go there. So this pro-cyclicality literature, is not very clear, but to the best of my knowledge I doubt if it would be able to permeate a bilateral contract.

Your last question is about collateral and clearing. Yes, there is a large amount to be cleared. As I said, there's a clearing angle and non-clear, banks will still keep non-cleared OTC derivatives, and that has not been discussed too much. We have a Panel after this, and I think somebody will address the issue of un-cleared OTC derivatives.

On the cleared side, whether it's half the market or two-third of market, you cannot short-change that. You know, IM and VM will be posted, but what's un-cleared is the residual risk which will still be with the banks. What's the side of the market, is that a real risk, will there be netting, or destruction of netting? I think the Panel might be able to address that better.

MR. ELLIOTT: That's sounds like a good segue. We are running a little over anyway. So let's move to the Panel. So we'll start with Sandy O'Connor.

MS. O'CONNOR: Well thank you, first of all, Doug and Brookings for inviting me to speak here today. And Manmohan for what you've just walked us through. A little bit, some crazy spaghetti charts, but that's sort of what the world is that we live in. Right?

You know, I definitely want to take a couple minutes here, I know, just to reference some of your remarks, you talked about quantitative easing, and slowing down the velocity of collateral, and RRP is opening up the system. I would add to that, beyond those two factors, clearly the Basel III regulation on the regulated financial sector, has had an impact, because when you think about the requirements under high quality liquid assets for LCR and NSFR; that requires cash for liquid securities to be held on balance sheet, to support system risks that our organization -- financial organization can bring to

bear, and if that is sitting in inventory and not going through the collateral velocity, which is exactly what's happening, that is also a contributor to the reduction in collateral velocity.

And in answer a little bit to the question of; why is it valuable to lend against collateral? I think you should consider it as; when thinking about the universe of lending on an unsecured basis, so lending your cash against -- to a counterparty. That is of a higher risk order. You need to understand your counterparty, you need to fully understand what they'll be using to deploy that cash against.

When you are lending on a collateralized basis, the collateral becomes front and center, will you get your money back, and if you don't, do you own that collateral and what level of cash can you get back out of it? So the reality, you probably expand the universe of counterparties that can participate in financial markets, and counterparties who can contribute to economic growth, through collateralized lending.

So those are sort of the way you might want to think about that. And by the way, velocity of collateral coming down is not necessarily a bad thing, because there's less risk in the system. And that's probably appropriate given what we saw in the 2008 financial crisis.

But now, back to the topic that I'm supposed to cover. So CCP, central counterparty clearing and collateral. Firstly as a product of new regulation, as Manmohan mentioned, that standardized derivatives need to be cleared centrally, that is now a regulatory fiat, means there's a lot of growth and activity that's occurring across CCPs, and I think the most recent CFTC report in January said that 64 percent of interest rate swaps are now centrally cleared. So we are talking a lot of activity going through.

And they are becoming centers of concentrated risk. Now CCP is on the positive, clearly, are reducing systemic risk because they bring together loss mutualization of tail risk, may also create some transparency. Well all get to in my remarks a little bit later, there's some unfinished business here, because we haven't

closed down what could be the beginning of building systemic risk, and we can close it down. And regulators, and policymakers around the world are thinking about that.

But back to the fundamentals of collateral. If collateral is going to be used as a building block for financial infrastructure and financial stability, it needs to really important characteristics that we haven't really spoken about. One, not all collateral is created equal, important for everybody to remember. While all collateral is good, it's all equal.

Two, having the right amount that you might need under stress really, really matters. And if it all goes wrong, regardless of whether or not you have collateral you better have a backup plan, particularly we are talking systemically important CCPs and that's some of the discussion to have here.

So what are the right characteristics of collateral? Firstly, you have to be able to liquefy it, turn it into cash under all circumstances. Not just the nice, fair-weather economies that we deal in, but also when we are dealing under duress, in stress, and if this collateral is being used to underpin financial stability, like it will do in CCPs, it better have those characteristics, and it's really, really important.

It needs to have reasonably transparent and availability of pricing, and reliable market depth again, through whatever cycle we are talking about. Also important is that it carries the appropriate haircuts, because when you are going through economic stress, you have a change in fluctuation and pricing, and if you are going to go back to that collateral to make you whole, you really need to make sure you have enough of it, that you don't end up with a gap, and that's really what haircutting should be about.

And back to the points about velocity, is it had better be readily available. If I need to take possession of it, can I get my hands on it, or has it been rehypothecated away. And I think an important point to know here, not all collateral is allowed to be rehypothecated, and certainly it depends on what you are using it for.

So don't think of all collateral running through the system and being

rehypothecated and you don't where it is. There are quite a few restrictions around that as is appropriate. But if you are going to rely on it for liquidity risk management, you'd better be able to get your hands on it, and know where it is, and that you actually own it.

For CCPs, you know, a couple things to note here. Again, all those characteristics of collateral, super important, particularly when it's being pledged in support of initial margin or guarantee funds, which are the key components that enable the CCPs to function as core infrastructure for standardized derivatives clearing.

A couple things here. One, really important to note, as we see the evolution of CCPs becoming more systemic, governance around the types of collateral that should be eligible, what's accepted, the margin it's at, probably needs to undergo a more consistent approach to governance.

What do I mean by that? Right now the CCP management teams determine what's acceptable collateral, determine what the margin that's appropriate, and the clearing members who ultimately could become the owners of that collateral under duress, don't necessarily engage in determining the risk appetite for that collateral. So over time, I think it will be really important for policymakers to consider, and clearing members and CCPs collectively, to ensure that, in fact, we agree on what's the right collateral.

That can add liquidity under duress if there's a stress in the marketplace. Similarly, you know, there might be a place for a prudential approach to what are the minimum haircuts, and the minimum eligibility criteria that should be required. Because, again, CCPs in its functioning will be paramount, because they are now systemic by regulatory fiat. And what does that mean ultimately? As more activity goes through them, if there is a bump or if there is a market stress, the approach can't be switched off and liquidate.

Think about the massive amounts of collateral we'll be talking about. Therefore critical operations will need to stay open. And to keep critical operations open,

you need to be able to have good collateral that may or may not be used to re-lubricate the system, but you certainly will need some ability to recapitalize those CCPs.

So what can I tell you a little bit more about the CCPs? Really important besides, as I said, having the right collateral, having enough. Having enough of it really matters again on CCPs. What do I mean there? Okay. CCPs currently do undergo a good amount of stress testing, and that stress testing is used to determine how to cover one, or cover two clearing member defaults, because you want to make sure you have enough resources to hand, so that if something goes wrong, and a default member -- a current member defaults, you are able to take control of that liquidity, liquidate it and allow the CCP to continue in an appropriate operating manner.

Now stress testing is good, but guess what? Right now it's not standardized, it's not overseen by, you know, sort of a prudential overseer, and in fact, while the resource is currently allocated for initial margin and default funds may be adequate, the transparency is not yet there. And for the clearing members it will be really, really important that they can validated that there are sufficient resources.

It's super important, super important here, that not only do you get the number right, but also that all of the requirements are pre-funded. And I will say that here because right now, while there are recovery plans in place, should there not be enough resources if a clearing member defaults, the reality is, a good portion of those recovery plans, rely on assessment authority.

And assessment authority, means you call up the clearing members who provide support for the CCP through liquidity in securities and you ask them for more money. During systemic stress, that probably is not the most important thing that we should be relying on. We should be trying to get the right numbers up front, and get them fully funded upfront.

And what I will leave you with, since I know I'm at the last little bit of time, is that recovery planning is absolutely essential, but items like tear-ups, and initial margin

haircutting are probably not the best solutions, particularly if you think about tear-ups. A tear-up means, there aren't enough resources, so let's pretend the trade didn't happen, you can end up with unexpected risks, unexpected positions, and items that end up with an open hedge.

The reality is, when you are the tear-up point, you've hit the non-viability of a CCP, and in fact, rather than prolonging that CCP in its existing framework, you probably should a resolution plan, which means you really keep that CCP open for business, all of their critical operations stay in production. Why? Because you can't afford for the pipes to come to a screeching halt.

But ownership changers, recap resources which have been anted up, likely by a combination of clearing members will then ultimately become the new owners, and you'll move again from to a more mutualized risk model, and a mutualized ownership model. But again, if I could leave you with a few things, the collateral amount matters. If it's supporting financial infrastructure, it had better be liquid through all markets.

You need to make sure you have absolutely enough of it, if you don't enough of it, you have to make sure there are a couple recovery plans that could work, like VMGH, as Manmohan mentioned, could work to some extent. I'm not as enthusiastic about it in the bigger picture because I don't think it should be without limit, because again, you don't then up know what you end up with.

And when you hit the point of viability, you should have a backup plan like any systemically important organization, and you probably need to do it through recap, because liquidating a CCP is not going to be appropriate, because it's a permanent fixture in the infrastructure of the global economy. So with that, I will leave you. (Applause)

MR. ELLIOTT: We'll have Darrell next, as soon as they do the magic.

MR. DUFFIE: Douglas, I just unmuted, can you hear me.

MR. ELLIOTT: Yes. Yes, we can.

MR. DUFFIE: Terrific. How about video, are you looking at me?

MR. ELLIOTT: We've got everything.

MR. DUFFIE: Fantastic. Okay. Thanks for inviting me to do this Doug. And thanks to Sayee and Sandy, Manmohan. It's great to be here. I want to talk about some of the same issues, but from a slightly different angle. I'm going to focus especially on how to economize on the amount of collateral that we need to do a certain amount of financial services. So, as we've discussed -- by the way, could you advance to the -- streaming the issues slide on my slide deck?

As we go through this, I want to discuss not just the tradeoffs between adding collateral to make the system safer, and the cost associated with that; I want to also talk about cases in which we don't have to have a tradeoff, we can do the same or nearly the same amount of financial services, meaning risk transfer, in wholesale capital markets, with significantly less use of collateral. That's going to be core discussion.

But there is no doubt, as the others have emphasized, that the more collateral we use, the safer our counterparties, that's good, financial stability, and generally speaking, the more that we use there are costs. There are two kinds of costs, I want to make a distinction. One of those kinds of costs is basically as has been emphasized, by Manmohan in particular, which is slowing down the circulation of financial assets that you might want to have access to.

So things like treasuries; if they are tied up in a certain place, in a segregated collateral pool, then they are less available to serve the needs of investors generally, and that has a cost. The other kind of cost is not really a dead-weight loss to the system, it's a transfer from -- it turns out, empirically, the dealers are mainly bearing the cost in terms of their shareholders providing more effective capital buffer, or liquidity buffer, to their creditors, so it amounts to a transfer. I'm going to come back to that.

So all of these new regulations, Dodd-Frank and MiFID in the case of derivatives and capital regulations, have been, generally speaking, increasing collateral

demands, although the capital regulations are causing the dealers to try to economize on the use of collateral, because that often reduces their regulatory capital requirements, which is what they are anxious to do.

And what we are seeing right now, is a very significant shift by the dealers, the dealer community, to economize on the use of collateral by doing things like trade compression. Just to give you an example, one firm, TriOptima, has now effectively eliminated about \$200 trillion of notional positions in the interest rate swap market -- I'll come back to that -- simply by eliminating unnecessary circles of exposures.

And other method that's being used, is central clearing. Now, we've all been brought to believe that central clearing actually increases the amount of collateral in the system. Well that's true because central clearing parties require initial margin from all participants, but under the new regulation dealers, in particular, would be required to provide initial margin anyway. And I'll show you that central clearing actually reduces collateral needs once you assume that the dealers are going to put up initial margins for all of their positions anyway.

Something new you haven't seen yet, probably, but it's coming up over the horizon, is the central clearing of repurchase agreements, and also central clearing of securities lending. And that is likely to economize on the amount of these securities that are tied up in one place or another by shortening those themes of transactions that Manmohan spoke about, so that we can do more -- we can provide more services with those securities at lower velocity, without really impairing the usefulness of those securities to the system.

If you go to the next slide, I have a table of numbers that shows a rough estimate from the dealers themselves of how much it's costing them to collateralize their swaps. I'm not going to go into technical details, but if you scan the table for the top dealers, Goldman hasn't disclosed, but the other major dealers have, is on the order of \$5 billion, or so, of what we can call cost to the shareholders of dealers by being forced to

provide collateral for swap positions that -- where the collateral is not being provided by then -- by one counterparty, but they are required to provide it to another.

These are called funding value adjustments. This give us kind of an idea, but this not a deadweight loss to the system. In some research I'm doing with Mike Anderson and Young Tsung, we are showing that this is, effectively, a transfer from the shareholders of these dealers to creditors in other claimants.

By the way, it's showing -- it's not showing up that way in the accounts of dealer, that's kind of a side story. We are also showing in our paper that these numbers seem to be inappropriately showing up in the accounts of the major dealers as a cost in the valuation of their swap positions, it's not bad, and I'm not going to go into that today, because it's a different story, but it's kind of an important point that's being missed in a lot of cases.

If you go to the next slide, you'll see a highly stylized schematic of an OTC market, where we had dealers, D1, D2, D3 in the center, and we have their clients which are not completely connected to each other, they are all connected to dealers. This is sometimes called a core periphery network, it shows up in all of the statistics on any major over-the-counter market. The actual number of dealers in the world is about 14 or 15 major dealers that are handling most wholesale markets that involve collateral.

And what we are seeing in this market, and have been seeing over the past few years, is a very dramatic reduction in collateral required by eliminating unnecessary circles of swap positions among the dealers. So if you think, imagine in your mind, a clockwise circle of exposures or of swaps between dealers one, two and three, that essentially are cancelling each other in terms of market risk, but they are leaving open the counterparty risk and require collateral.

The dealers have figured out, with assistance of a firm called TriOptima, that if you merely introduce and artificial but important counterclockwise circular swap positions, called a compression trade, you can crush down the amount of swaps in the

system, and therefore the amount of collateral required.

The total number of these transactions since inception is about 500 trillion, with a T; that's 500,000 billion notional of swaps that have simply been eliminated over time. With a current -- in the interest rate market alone, the current remaining amount of compressed trades is about 200 trillion.

If you go to the next slide, you'll see a CCP in the middle. As I mentioned earlier, that does two things, it adds to the collateral requirements of dealers because now they must post initial margins to the CCP for every swap that they clear and they do most clear most of them; but if they were to be required, as they would be under new regulations to post initial margin anyway, the data in a paper that I've done recently with Guillaume, Guillaume Vuilleme, and Marine Scheicher at the European Central Bank, shows that the act of central clearing nets down the total amount of swaps dramatically, reducing the amount of collateral correspondingly.

On the slide, you can see what the swap market looks like with and without the effects of central clearing, and with without the effects of compression trades. The highest curve, these are the figures that just came out three weeks ago, is what the interest rate swap market alone would look like before considering the effects of central clearing and collateral. It would be, we are getting the effect of financial services in that sector, of about 800 trillion notional of interest rate swaps.

If you go all the way to the bottom curve, after you take out the effects of compression trades and central clearing the net effective amount of collateral in the system is that associated with about half that much in OTC derivatives. Now again, I'm assuming here that the centrally-cleared swaps, if they were not cleared, you'd have to post collateral on them anyway.

The next slide actually shows the amount of compression trade that's occurring. And I'm not going to go through the last slide, which explains the calculations in my paper with Guillaume and Scheicher. But trust me, on the CDS market which

we've analyzed all the bilateral swap positions other than sovereigns and financials, you've got a dramatic reduction in the amount of collateral in the system, through central clearing if you assume that centrally-cleared swaps would need to have collateral whether or not they were cleared.

So, let me simply close by saying with the benefit of new repo CCPs which are coming into play, securities lending CCPs, the use of central clearing and the use of trade compression, the dealers have figured out how to compensate for dramatic increase of collateral requirements, by more efficient use of the plumbing of the financial system. And it's a very natural response, and there's no reason to believe, in answer to your question, I think Manmohan had handled earlier, that these kinds of activities are dangerous or are somehow in end run on the intent of Congress, with Dodd-Frank or foreign regulators.

These are actually legitimate methods of keeping counterparties safe with collateral, but by doing it with less collateral than you might need if you didn't have all the financial engineering and plumbing that we've been discussion. So I think I'll stop here. Thanks very much, Doug. (Applause)

MR. SRINIVASAN: Thanks, Doug. And thanks to Brookings for inviting me here. The usual caveat. I work with the Federal Government, so the comments that I make here are my own, and don't represent that of the Commodity Futures Trading Commission.

Following Darrell is always a hard act, I guess. So he spoke a lot about portfolio compression, and it just struck me that that I have this joke in the CFTC that maybe there are two-and-a-half people in the building who know anything about portfolio compression; the swaps market and developments that are happening in the swaps markets and the derivatives markets is just fascinating. And the regulations are driving a crazy amount of innovation, especially in the post-trade aspect of the whole sort of transaction business, and one of the issues we have is that the -- one of the things that

the G20 mandated, and Dodd-Frank, and other rules have required us to do is collect data about activity in the swap markets.

And interestingly, when the rules were finalized here in the U.S., and I understand in Europe also, we didn't do a good enough job of requiring firms to report compression activity in a very systematic manner. So we have to sort of rely on information put out by TriOptima and LCH. LCH mentioned about a month ago that over a two period, just in the interest rate swap space, they were looking to compress -- this is in addition to what TriOptima is doing. LCH is compressing about \$235 trillion worth of interest rate swaps, so we've spoken to the other CCPs, and a huge sort of cottage industry that's evolving just looking at portfolio compression and figuring out interesting ways of reducing the notional risk that's residing in the books.

What I said for -- the sort of -- gotten to know Manmohan well the past couple of years, lots of industry and conversations about his book, (inaudible) was still working on that. And just sitting here listening to the previous speakers, all sorts of different issues that are being discussed here. And sort of going through them and doing justice to them over a two-hour-period never made sense.

And we are sort of doing some more here, and the SEC and, sort of, the CFTC has organized a day-long seminar, so it's a roundtable on March 5th, so those of you who are interested are sort of welcome. It's open to the public anybody can come. And the issues they are going to be discussing at the roundtable are sort of relevant to what others have spoken. The session on variation, margin, gains haircutting, reestablishing a matchbook, so a session on winding down of CCPs, and lucrative risk management.

So, the general approach has been that the G20 mandated clearing, and also to Route 1 cleared swaps, the rules have been finalized. The CFTC directly regulates three of the largest clearinghouses in the world, LCH, ICE and CME, and we have rules in place regulating -- directly regulating the clearinghouses.

And as Sandy mention, and others have mentioned, it's still sort of work in progress, a lot of work is being done. There are lots and lots of different acronyms thrown around; BCBS and IOSCO and FSB, a whole spectrum of initiatives, looking at all these different aspect of clearing, and trying to figure out ways to sort of get us closer to a point wherein we, sort of, reducing the overall risk in the system.

So sort of, still, work in progress. So as an Economist, sort of looking at this, the strong interest in sort of data. So, maybe it's helpful for the audience here to understand what the staffers at CFTC do, I guess. So there are rules in place that mandate what the clearinghouses should be doing, the clearinghouses also have rules, so it's a bit of rule-driven process. Which is good in the sense that it gives some certainty about what will happen when default and other situations happening.

With the Commission, the Commission also has a set of rules requiring the clearinghouses to directly report to us, expose their information, collateral information by clearing member and also customers of clearing members. So we get daily reports from the clearinghouses, by asset class, basically rates and (inaudible), so there's a wealth of information that's coming into the -- to CFTC.

And staff is spending -- (inaudible) interesting a lot of resources in terms of our ability to analyze the data, and just actually very hands-on monitoring that happens. Staff will get on the phone with the CCPs, we get on the phones with the FCMs, and in some cases they can also jump on the plane or whatever and go to clearing members' offices, if something crazy happens.

It's all a very hands-on approach that is being taken, but the sort of -- this is just in the case of the cleared swaps, and with un-cleared swaps, and Manmahon was mentioning that one -- the latest figures he's going to be talking about it, and which is what I'll sort of spend a couple of minutes talking about. That once the G20 mandated that certain sort of swaps should be -- (inaudible) swaps should be subject to mandated clearing, and everything else should also be subject to margins.

So the regulators, the financial regulators, the banking regulators in the U.S., the SEC and the CFTC have proposed rules for margins around cleared swaps, and so while we know that folks -- the dealers have been sort of posting margins and collecting margins there was a view that wasn't done in a sort of systematic manner.

So we proposed rules and we are in the process of finalizing those rules. And interestingly, a lot of time is being spent on collateral. It's amazing to sit in these meetings and see how granular staff are getting into the -- the granular issues that we are getting into in terms of types of collaterals, setting the cycles for collaterals and haircuts, and what types of collaterals. And this is not just in the U.S., we are also sort of coordinating here with the global authorities, and the global regulatory authorities.

It's painful, it takes a lot of time, but the various markets, it's a global market, and we have to make sure that we get it right. It's still sort of work in progress, it's sort of a fascinating time to be in the markets and especially in the regulatory space. There's a lot more work to be done on the cleared space, working on the -- and the un-cleared, and from my own perspective as an Economist, sort of, very interested in getting better data.

The regulatory reports that we require firms to submit, in the un-cleared space we didn't do a good job of getting for -- on sort of defining the information that we need from them on collateral, so that's something that we intend spending some time in the coming years as to sort of -- while there's a lot of -- on the cleared space we get information on collateral, in the un-cleared space we don't get enough information.

So it's important to work with the industry so that we get better information, so that we can monitor the risk in the un-cleared space. So that's it for me, and sort of will take questions here. Thanks. (Applause)

MR. ELLIOTT: Darrell, can you hear as well?

MR. DUFFIE: Yes. I can hear you perfectly, Doug. Thanks.

MR. ELLIOTT: Excellent. Okay. Again, thank you all. I thought those

were great, great comments, and Manmohan I'll give you advance warning. Think a little bit, I'd just be curious, when we get to you, as to what your thoughts are and what the three panelists said, because I'm sure -- I'm sure you have thoughts on those subjects.

But in the meantime, let me go through the others, and since Sayee was advertising his own event, it occurred to me, I should advertise one we are doing on Wednesday, if are not already aware of it. We have Lord Hill, who is the new European Commissioner for Financial Regulation, et cetera, and he'll be here on Wednesday, and he will be talking probably about some of these same issues though, broader than that.

But that also sparked a thought, Sandy, for me, on what would you like to see in the way of international coordinating in this area? Because I know that there are a lot of different bodies involved, dealing with even just CCPs. Do you have any suggestions for how that might work better?

MS. O'CONNOR: Well, that's a loaded question. I do think, if there was something that would be good to see, and I'll keep my comments around CCPs since that was the topic that I was talking about. Clearly, since we are moving the standardized derivatives onto CCPs, what had been typically, solely market-regulated, it's probably really important that now that these are systemic entities, that there's a combination of both market regulator, oversight, as we'll as prudential regulator oversight, or systemic regulator oversight.

Because, again, you come back to the points of, doing business as usual you want to keep the markets robust and functioning, but because these are such fundamental parts of infrastructure now, again, they must ensure, that if, you know, a default actually occurs, they don't cause any market contagion, and they certainly don't bring the market place to a screeching halt. And that's typically a different look, that's typically a systemic regulator looking again, at quality of underlying collateral protocols for recovery protocols for resolution.

So I would say, let's start with, firstly, getting within jurisdictions,

prudential, and market-based regulators coordinating. And then secondly, there is no such thing as a British derivative, or a Japanese derivative, it's a global derivatives markets, and as such the coordination in thinking about minimum standards around acceptable collateral, minimum standards around haircutting and protocols around the (inaudible) waterfalls, there should be some level of consistency.

I think for CCPs we should ensure that these independent, for-profit organizations are hugely valuable, but they should not compete on risk management, they should compete on efficiencies in their operating models. And I do think that level of coordination, you know, across global regulators will be important to have the right discussions, and crisis management process.

MR. ELLIOTT: Thank you. A question or you, Darrell, actually two questions. First, given all of the wondrous things you've described that are being done, do you think there is a shortage of collateral, or of high quality collateral?

MR. DUFFIE: No. There's a cost to providing the amount of collateral that regulators have asked for, but supply and demand are going to cross at a price, and I think I've indicated in one set of numbers. The number of billions of dollars that the dealers -- it's costing the dealers to provide that. Some of it is just to transfer payments to creditors, in the swaps market you don't see a lot of frictional cost to the system because almost all of the collateral in the swaps market is cash.

But you are seeing it in some of the examples that Manmohan went into, where there's rehypothecation of securities that are trapped or not trapped. Various kinds of slowdowns, that is a real cost to the system. And it's a tradeoff, and I think we've got to keep working on those efficiencies.

MR. ELLIOTT: Okay. And then my second question for you is; you've indicated that you are broadly comfortable with the compression trades, and the similar benefits that you get from using the CCPs. If you are wrong, how would you be wrong?

MR. DUFFIE: Well, let me focus on Sandy's remarks. And by the way,

I've asked -- Sandy to come to the Chicago Fed on April 10th, and elaborate on what she spoke of here, because it's very important. If we are wrong about doing central clearing, because regulators don't get together on minimum safety standards, and coordinate so that we don't get a race to the bottom, then we'll be plowing a lot of risk into new special purpose financial institutions, that if, God forbid, they ever were to come apart would cause a very serious problem.

This is kind of like, preventing a nuclear accident. You don't design a nuclear power plant so that it only fails with a 1 percent probability, you do your darned best to make sure it doesn't fail. And we need to do that in the central clearing space, or this whole G20 effort will have -- will go wrong some day. How many years, and how many decades I don't know, we just need to avoid that, and there's plenty of time to do it right, to get the financial engineering right, and the regulations right.

So I'm pretty optimistic that it will get done right, and I think the cost benefit justifies the effort. But if there were something to have gone wrong, if we don't do it right, that's where we would show up in the part of the financial plumbing that requires collateral.

MR. ELLIOTT: Do you see any similar type of risk with the compression trades, or is that just a very straightforward thing from our point of view?

MR. DUFFIE: There is a little bit of financial engineering where there's some risk management that's not absolutely crushing the swaps, but the vast majority of it, is literally just eliminating effective swap positions, just lowering unnecessary, redundant swaps. I've looked at it pretty carefully, it's very, very good stuff.

MR. ELLIOTT: Okay. Thank you. Then, Sayee; from the position of working in an agency, where you are trying to get the best thinking, and help to formulate the best rules, what would you like to see academics and others looking at? I mean what kind of research do you need to be done that's not being done so far?

MR. SRINIVASAN: It's a good question. So, the issue with the

academic research is that a lot -- so there are two types of research. There's, you know, a theoretical work that gets done, the theoretical modeling, and then empirical research. So, my reading a lot of theoretical and empirical work, in the context of sort of systemic type risk issues, and has been done in the context of banking.

And it's only now in the past few years that you've sort seen people venture into CCP issues. And even there, barring a few exceptions, a lot of academicians might not understand sort of the institutional framework of CCPs, and sort of the -- and various sort of intricacies and idiosyncrasies of CCPs, I guess. So on paper I see where they just get the details wrong. And even there, a lot of the work is just -- initially was theoretical modeling and because people didn't get access through data.

Darrell was mentioning some of the work in the context that's been done, in the context of CDS because that's the market for which data has been available. The data that folks haven't had access to is on the rates side, which sort of sits with the CCPs and this is with folks like us. So Darrell and I have had a lot of conversations, and also we are talking to other folks saying -- encouraging folks to sort of come to us, and with ideas on; we have the data, and we are sort of interested in folks getting access, too, to do the research.

So, once again, and a lot of the work has been in the context of banking, but there's a lot more work that can be done in the context of CCPs also.

MR. ELLIOTT: Maybe a loaded question, but do you have any sense of how long it will be before we have an equivalent level of understanding of CCPs, collateral, et cetera?

MR. SRINIVASAN: It's full employment guarantee for economists, so this is a very dynamic marketplace, and the markets are, so while the -- the interesting is while there is a new regulatory framework in place, there is strong interest among the regulators to ensure that we really don't kill the market, that we want to encourage innovation. And so the rulemaking -- so at some level, it's said, the G20 mandated

clearing, but when we've gone about finalizing the rules, it's been a very consultative process.

So, what's going to happen is that the markets will keep evolving, right, driven by what the markets want. And new sources of risk will come up and the issues will come up, new products will come up, which people will want to submit to clearing. So it's still early days, clearly, but even in the case of banking there are issues that we are still trying to figure out, I guess, so.

MR. ELLIOTT: That is certainly true.

MR. SRINIVASAN: Yeah.

MR. ELLIOTT: Got it. Manmohan, now I've given you advanced warning, what comments do you have based on what the others have said?

MR. SINGH: I think I'll combine the general point which Darrell and Sandy have made. We need to get this design process of CCP correct. It's very fragmented across jurisdictions. For example, you will find Europeans, and we learn more in time about the haircutting on how to save CCP, et cetera, the recovery and resolution, there is a serious gap of understanding. In fact, in some jurisdictions they are happy to have CCPs get more business.

So there is a business hat, and there is -- I mean, a business hat which, say, U.K. would like to wear so that it doesn't lose the inertia of its LCH being sort of the monopoly on rate swaps. And there is also another hat which the Europeans would like to wear to get some of the business, because they'll get into the issue, if something went wrong, will Bank of England have the euros to support?

Do you know what I mean? There are many game (inaudible) even you can think about. Something happening in Europe, et cetera, but the bottom line is, there are still large gaps and VMGH is one issue where a U.K. CCP has limited VMGH cuts, and if you really don't like that, say, a Dutch pension fund, you can go to Eurex, or you can go to Continental Europe where they don't have that. The would actually like to have

some business.

So, between the business hat, which is worn by all four private CCPs; LCH, CME, ICE, Eurex, are all private CCPs, and ironically, they are also having niche markets which they would like to keep a handle on. It's a niche market business, else if -- you know, if all CCPs were in sync, we would have constant -- interoperability, more netting, et cetera, et cetera. So it's very ironic that the major four, five CCPs kind of like to do things their own way, to get businesses, over there the regulatory effort of synchronizing it is being lost.

And I think it can become dangerous, as Professor Duffie mentioned, if we get this wrong, if a CCP blows off, Lehman would be miniscule. These are three big to fail, not 'two' big to fail, and one --

MR. ELLIOTT: I'm surprised you are not up to four big to fail by now.

MR. SINGH: We'll see but I think this one technical point I mentioned because there are some people on the central banking side, that, yes, collateral will -- any shortage can amend a price, demand supply, and at a price you can always find something. However, I don't want to miss out on the fact that if, let's say, in this part of the world, U.S., if 3 trillion of siloed treasuries at MBS since Lehman, that's HQLA, what we call in regulation, high-quality liquid collateral.

There's also reserves which haven't come out, call HQLA, but both are very different. And this, the point which I tried to make from a financial lubrication angle. What we have taken away and what we have replaced both qualifies as HQLA, both are equal credit, but in terms of the lubrication, one was more familiar in that bank, non-bank nexus, while the other remains only in banks, so there's a serious difference in the lubrication of the financial system, where we replace one HQLA with another, and yet there is a subtle difference which gets lost in most of this regulated debate.

Let's say we have given you an HQLA, and I personally believe that some of the work that that HQLA qualifies, in all terms, but as a lubricant is different than

what you have siloed.

MR. ELLIOTT: Okay. Thank you. So let's give the audience a chance, again, to ask some questions. The same ground rules as before. Sorry, further in the back there. Yeah, about there.

MS. MILLER: Hi. I'm Rena Miller with Congressional Research Service. I have two questions. One, I think is a little simple; but a lot of people talk about, you know, the cataclysmic possibility of a CCP having a problem or failing. Just to clarify, do you -- Professor Duffie, and others, are you referring pretty much to operational risk whether it's cyber security event, or just a software glitch, or the trade compression, algorithm being wrong?

And my question, I think is a little more complicated. There's been a lot of anecdotal sort of talk about OTC derivatives trades moving overseas to affiliates that have implied guarantees, but aren't explicitly guaranteed. And I'm just wondering how prevalent is that practice, and how is that impacting the need to post collateral, if it's extremely widespread then maybe it's, you know, leaving a lot of things unchanged. So those are my questions.

MR. ELLIOTT: Okay. Darrell, you were mentioned, why don't you start, but then anyone else can jump in.

MR. DUFFIE: Okay. I'll start that one. Your question is very perceptive there are -- there is the opportunity for an operational risk. CCPs for swaps are not quite as a short a time fuse as a CCP for, say, securities, settlement, or repo, which -- where you need, overnight, at latest, performance. In the case of a swap CCP, these instruments are very long-term; 3, 4, 5, 10, 30 years.

So if you were to have a several-hour outage, while it might cause connection fits, it's not going to bring the system down. The kinds of risks that I believe that we've all been speaking about for the last few minutes, are where one of the -- one or more of the clearing members is unable to meet its obligations in terms of payments to

CCP, and when the CCP tries to unwind the swaps of that failed clearing member or members, it doesn't have enough resources to do that.

There has been a lot of discussion about how much initial margin is necessary. Sandy mentioned how much is appropriate in terms of the default guarantee fund contributions of the banks, and when you should stop drawing on that because you don't want to bring them down too, and there's an important additional issue, which is called skin in the game, meaning, how much capital should be thrown in by the operator of the CCP. So that entire waterfall of default management resources needs to be very robust. It shouldn't be, as I mentioned earlier, designed to fail once a decade. It should just be enough.

The second part of your question was; what if isn't? Is there some sort of guarantee coming from other authorities? First of all, the central banks of the world don't do that, they only take liquidity -- they only provide liquidity to the CCPs, they don't provide capital.

If, God forbid, with everything that we've discussed in terms of the waterfall plus the central bank liquidity, there were still a shortfall, it actually happened in Hong Kong in 1987, the government and banks ended up sharing the cost of restarting that CCP, and nobody wants to say they would do it, but I think -- plus in Sandy's remarks says, you've got to have it. It's required by regulation that we restart these CCPs, you need a pool of capital to do it. Actually JPMorgan made a proposal on how to do that.

The other panelists may have different views about where that capital comes from, but somebody has to suffer the losses, and somebody has to recapitalize the CCPs.

MS. O'CONNOR: I would think just to add on, and thanks for the mention of the paper, Darrell. It's available actually in the back for those of you who might be interested in reading it. You know, again, particularly in the United States, it's very, very important that if there is a cataclysmic event, and I agree completely with

Darrell; we are not talking about the operational risk, let's put that to the side. We are talking about default members fail and the resources that are available, through initial margin, and guarantee funds are inadequate to cover the losses that have been taken.

Then, in fact, as you look through to, how to keep the operating entity open for business; remember these CCPs are no longer user-owned, so in that context, the recapitalization is not going to be coming from private sector or clearing members into a for-profit-run failed institution. And that's what we talk about the recap for resolution. So if there are not adequate resources, the CCP actually is closed in its existing management forum, but the pipes remain open for business.

And what the paper talks about, is a capitalization that exists right now in an escrowed fund that is available to restart that CCP, because the organization, the industry cannot bear a complete unwind of something that's so critical to systemic infrastructure. So, it's interesting, because will that cost more? Yeah, it will cost more. But again, the obligation for systemically important CCP should be no different than that for a systemically important financial institution.

On the day of demise, it cannot disrupt the financial markets. And it goes to my earlier comments, therefore it can't be a switch off and liquidate, it has to stay open. In what construct can it stay open? You can only stay open for business and financial services if you have adequate capital and adequate liquidity, and therefore it has to be prefunded and prepared for today. And the question is; there's lots of talk about what's the size? Who should be the major contributors? But that is what that paper discusses.

With regard to skin in the game, it has two components. CCPs, in and of themselves, are reasonably thinly capitalized, right, because a lot of that shock absorber cushion that Manmohan was referring to, is really invest -- the initial margin, as well as the default fund. That is the equivalent of capital. Right?

Now, one talks about very frequently in the default waterfall, how do you

align interest? And there's a lot of discussion in the industry is, are the CCPs' interest of growing revenues, adding new products, bringing on new clearing members, really aligned to the underlying clearing members who actually bear the risk if it all goes wrong. And therefore, it probably makes some level of sense, to have a higher level of skin in the game, for CCPs, because by the way, it's inconsistent across CCPs.

And secondly, you know, once you have the skin in the game, do you also have a protocol for governance? So that clearing members who, again, bear the end risk of it going wrong, have a say in the risk as its being brought onto the CCP. That's really super important. Alignment of risks really matters here, and I think that's where we have some work to do.

MR. ELLIOTT: Okay. Either of you have a burning desire this, or shall we move to another question?

MR. SINGH: Next one.

MR. ELLIOTT: We'll go for another question then. Up front, here.

MR. SHARMA: So this is a question about -- it's a macro prudential question. We've seen the evolution of a system, in which we have banks connected to markets, derivatives, money market, capital market; and what we are trying to do now is understand the system. Obviously the system existed, as of 2007, when we discovered how we were not looking at certain aspects of it. So we have the central bank which is a provider of liquidity for last resort; the question is; in this new system, do we need a market maker of last resort, before we, say, hit the systemic wall?

Does the role of the central bank in some sense now more become more expanded, or do we need another organization to be a market maker of last resort in this, sort of, newly evolving system? And by the way, I'm Sunil Sharma, I work for the IMF.

MR. ELLIOTT: Okay. Thank you. Well, that's a nice, easy question, would one of you like to take it?

MR. DUFFIE: I'll take a shot at it.

MR. ELLIOTT: Go ahead, Darrell. Go on, Darrell.

MR. DUFFIE: The central banks of the world will never say that they will step in as a market maker of last resort. But they know, since the time of budget that when the event happens, that the system will be better if they do. When that happened in the last financial crisis, some central banks, particularly the one in this country, took a hit from Congress, or from the legislators, over the degree to which they did act as a market maker of last resort.

That inhibited the independence of the Fed, and I personally, and in fact we've spoken at this -- Doug and I have at the Brookings Institution before -- hoped that the Fed will, again, be given enough discretion to become a market maker of last resort if, God forbid, it's necessary. However, having said, that, in no way should the central bank say, explicitly, that it will do that and under what circumstances, because the moral hazard implicit in that is very severe.

So I think the central banks are doing the right thing by not offering to serve in that role, except as indicated in their normal policies, where they are already doing that for certain types of securities, and in certain circumstances, with a very limited set of counterparties, namely the banks.

MS. O'CONNOR: And I would just add. Look, the first line of defense in the default waterfalls, are actually the clearing members who are going to be auctioning off the securities. And to bring it around to where it all started, at the very beginning, what collateral we are talking about, will have a fundamental impact. And I think with regard to these CCPs, you know, a probably more stringent lens around what will be acceptable collateral should occur.

And just to give you some frame of reference. Presently, depending on which CCP you are talking about, it can range from U.S. treasuries to physical gold, to corporate bonds. All of those behave extremely differently in stressed market. Some are right-way assets, some are wrong-way assets. Some will maintain market depth, some

won't maintain market depth. And a haircut, while it can adjust for a lot of price volatility, can't necessarily adjust for liquidity.

So, again, it goes back to, first -- the first line of defense are those clearing members who are going to be auctioning off the securities. If that option fails, I agree with you, Darrell, it's very likely that, you know, central banks will need to step in, but it should only be to provide liquidity against good assets.

SPEAKER: Absolutely!

MS. O'CONNOR: It shouldn't be to subsidize losses of capital. And I think particularly in this country, which is quite different than in other areas of the world; that is really important. We cannot put forth, you know, as an industry, or an infrastructure framework, anything that would be reliant on a bailout. That's just not acceptable. Hence the ideas for prefunding any potential assessments, and prefunding a recapitalization fund.

MR. ELLIOTT: Comments?

MR. SRINIVASAN: So, just sort of an insider view, I guess. So we have a division of clearing of risk, which spends a lot of time with oversight OD of the CCPs, and you talk to them and they would say, it's like; yes, we have all the default fund process, and all the waterfalls, but they define the job as ensuring that we never, ever have to rely on those things.

And this sort of linking back to some of the comments being made over the role of the central. Where we are today is, because of the regulations and because the CCPs are considered as extremely important, the Board of Governors of the Fed and us, we have joint oversight over the CCPs. And we spend a lot of time talking to our colleagues at the Fed, and working with them on very, very specific, highly technical issues are related to all aspects of CCPs.

So the Fed is already involved with the process, and the regulator and the prudential regulator are sort of working closely with them. And not just in the U.S.,

even in Europe. So here is a lot of work that's already being done, work very collaboratively with the market regulator and the prudential regulators.

MR. ELLIOTT: And how different are the views from the two sides on a typical issue?

MR. SRINIVASAN: As a joke, you get two human beings that are three political parties. So, no that is -- and I think it's very healthy, and Manmohan, and I were sort of, chatting with them earlier saying that there is a market regulator, my background is, you know, in market microstructure. So as a market regulator you have object to function, so banking regulator you have a different object to function, and that's a fact of life.

But what I see as that it's all good coming out of it, it's very painful, when your sort of see -- sort of when you start off the debate, I guess, but at the end of it, I think that is shared interest. The common interest, the goals are the same, and once again, you know, as Darrell was saying, it's like, central banks don't want to be the market maker of last resort.

They want to ensure that we never get to the point, and as a market regulator, we have sort -- while we'll never be -- we are not in the place to be the market maker of last resort, but we don't want the default processes and everything else. Market integrity and the continuation of the markets, the fact that the CCPs should always be in operation, can't shut down. The score to us. Because for us, a CCP not opening the next day for business is catastrophic because; what happens to the markets? What happens with trading?

And the CCPs that we are talking about are not just doing swaps, they are clearing futures also. And if you go to Europe, they are also clearing on the cash market side. So everything is linked, so those zero tolerance in some sense. So it doesn't really matter that we are different (inaudible) to functions with just sort of work our way through it.

MS. O'CONNOR: And, again, just going back too, I think we are going in the right direction, but presently CCPs, for example, they bring the risks onto the CCP itself. They own the risk management decision, and they don't have the skin the game, nor the scalable skin in the game, that occurs as they bring on new products, for example. So I think getting to the right thresholds, of what's appropriate to be cleared in a standardized way, is going to be absolutely critical because, again, as a member of CCPs and sitting on risk committees; you sit on risk committees in a fiduciary seat, which is, you think about risks in terms of your fiduciary responsibility to the CCP.

There is not a framework or a forum where there is a formal risk appetite assessment of, yes, we think this is an appropriate new product to come on, or this is an appropriate piece of collateral that should be accepted. And given that clearing members, and I said a few times, end up owning that risk, that has to be formalized, it has to be formalized on global CCPs, because until that really occurs someone else is making that risk-on decision, someone else owns the risk-off result. And those two things need to be aligned to be effective.

MR. ELLIOTT: Okay. We've run out of time. So we are going to do this little drawing to see which three of you have won a book. I'm not exactly sure why we are doing this, but since we are willing to give it away, let's see. All right, the first one is -- the name is on -- Alessandra Cipriani. Okay. And Cleopatra Nikolaou; I'm sorry I probably got that wrong. And then; let's see, Rena Miller from the Congressional Research Service.

MS. MILLER: That was a good one.

MR. ELLIOTT: It was a very good question. So, thank you all. And thanks, everyone. Thank you, Darrell. (Applause)

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