UNITED STATES OF AMERICA

COMMODITY FUTURES TRADING COMMISSION

MARKET RISK ADVISORY COMMITTEE MEETING

Washington, D.C.

Tuesday, June 2, 2015

PARTICIPANTS:

Panel 1: CYBERSECURITY - CONSIDERING BANK OF ENGLAND'S CBEST PROGRAM:

Moderator:

ANDREW GRAY
Group Chief Risk Officer, DTCC

Guest Speaker:

DAVID EVANS
Senior Manager, Bank of England

Panel 2: LIQUIDITY IN THE DERIVATIVES MARKETS:

Moderator:

SUSAN MCLAUGHLIN
Senior Vice President, Federal Reserve Bank

Panelists:

ISAAC CHANG
Global Head of Fixed Income, KCG

PIERS MURRAY
Managing Director, Global Head of OTC Derivatives Clearing & Prime Brokerage, Deutsche Bank

THOMAS WIPF
Managing Director, Global Head of Bank Resource Management, Morgan Stanley
Associate Director, CFTC Division of Market Oversight

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P R O C E E D I N G S

(10:02 a.m.)

MS. WALKER: As the designated federal officer it is my pleasure to call this meeting of the Market Risk Advisory Committee to order. Before we begin this morning's panels I would like to turn to Commissioner Bowen, the sponsor of the Market Risk Advisory Committee to make some remarks.

COMMISSIONER BOWEN: Thank you Petal. Good morning everyone and welcome to the second meeting of the Market Risk Advisory Committee of which I serve as sponsor. Before discussing today's topics, I will turn the podium over to the Chairman and Commissioner Wetjen just to see if he would like to make some statements.

COMMISSIONER WETJEN: Thank you commissioner Bowen I just want to really be very brief -- we've got such a packed agenda today I don't want to take up any time away from that. But let me just say thank you to all of you for being here, particularly the members of the committee. I really appreciate your participation in these committees. They are extremely important to us -- it's a very very helpful way. Not just to get input to have a discussion of these issues. And I also want to thank in particular Andrew for moderating the first panel. I'll thank Susan in advance, I understand she's on her way down for doing the second panel. These are extremely important topics that we're taking up today -- they're big topics. And obviously we can't cover all the issues involved here but this should be a very productive session -- so again thank you. Let me also thank Commissioner Bowen and all of her staff and all of our staff for all the work in putting this event together. It's really very much appreciated.

COMMISSIONER BOWEN: Thank you Sharon, thank you Tim. I'll keep my remarks very brief as well so we can get started but obviously Commissioner Bowens identified a couple of important topics. So looking forward to the discussion this morning and thanks again to all the members for making their way to D.C. and to be with us today -- it's a real pleasure to have you here as always. And with that I'll turn back to Sharon, thank you.

COMISSIONER BOWEN: Great, I want to thank you my fellow commissioners and I just want to note it's been a great year. Tomorrow will be officially, I guess the one year anniversary of our confirmation. So it's been a great first year. I also want to thank our MRAC members for bringing your passion and expertise to these important issues. I also want to express my appreciation and thanks to Kim Taylor for being such a tremendous resource. We wish for the best and we welcome Sunil Cutinho, who will be taking her seat on the committee. I'd like to thank the members of the staff from DCR, DMO, DSLO and OCO for the support that you've given us in preparing for today's meeting. And of course this would not be possible without the help of our logistical staff who work behind the scenes to make this meeting be a success, hopefully.

As you know the purpose of MRAC is to provide the commission with market intelligence and recommendations from industry about market risk and market structure issues. Our first panel takes on an important market risk issue -- cyber security. The importance of having an effective cyber security measures cannot be overstated. Cyber-attacks on the U.S. businesses have become alarmingly increasing and it's critical that the financial industry have strong protections in place. Recently our staff held a round table at cyber security testing. After attending that discussion I became very interested in the Bank of England's use of the CBEST program to deliver targeted intelligence split cyber security tests. I wanted to have an opportunity and to present the commission with the opportunity to learn a little bit more about CBEST and also to hear our market participants' thoughts on that program. Thank you to David Evans and the Bank of England for your graciously agreeing to provide that opportunity today.

Our second panel addresses an important issue that deals with market structure -- and that's liquidity. Several market participants have noted there are significant liquidity movements in markets we oversee. It is important in order to regulate effectively that the commission get information from market participants about what is happening in our markets. MRAC offers a wonderful opportunity to do so as our membership is so diverse -- including end users, dealers, buy-side, (inaudible), exchanges, clearing houses and academics. And with our guest panelist today we also get the view of trading desks. Thus the purpose of our second panel is to answer a few questions. One is to understand what market participants are referring to exactly when they say liquidity, as they can have many different meetings. The second is to learn whether there has actually been liquidity movements and if so, which markets. The third is to determine the causes of changes in liquidity. And finally we want to know what actions if any the commission should take. I will now turn over to Ms. Walker, who will introduce our first moderator to the panel.

MS. WALKER: Thank Mr. Chairman, Commissioner Bowen, Commissioner Wetjen for your opening remarks. Before introducing our first panel moderator one note to MRAC members -- in your folders you'll find a complementary conference booklet from the Federal Reserve Bank of Chicago of the November 14th CCP resolution conference as well as a full biography of all the moderators and the guest panelists today and a copy of the Power Point. Importantly we also have a confirmation letter for your subcommittees, so if you could at some point just sign those and leave them on your desk, I'll pick up those up during the break. We can take care of that.

As noted in today's agenda our first panel discussion is on cyber-security -- considering Bank of England's CBEST program. Our moderator for the first panel is Mr. Andrew Gray. We are privileged to have Andrew Gray as our moderator who has decades of experience in these markets. Andrew currently serves as Managing Director and Group Chief Risk Officer at DTCC with global responsibility for DTCC enterprise risk management, operational risk management, and systemic risk as well as information security, technology risk management, business continuity management and global security management. Thank you.

MR. GRAY: Thank you very much Petal. It is a pleasure to have the opportunity to moderate this first panel and it's a pleasure to introduce our guest panelist -- Dave Evans from the Bank of England. You have his bio in the packet, but just a few very quick words on Dave's position and background. Mr. Evans is a senior manager in the sector and supervisory cyber support for the Bank of England. He joined the sector cyber team in the beginning of 2015 and prior to that worked as part of the bank's sector resilience team since 2010. And Mr. Evans has had a number of years of experience in various positions in business analysis and security within the bank. So what I'd like to do for this first panel is break it up into two sections. The first section, Mr. Evans, Dave will present CBEST and basically answer the first five questions that are included on the agenda and then after he's had a chance to go through the presentation we'll open it up for questions. And in particular talk about what sorts of considerations we need to make in thinking about potentially applying CBEST to CFTC registrants. So with that I'll turn it over to Dave, Dave thank you very much for being here. And he'll kick us off with his presentation.

MR. EVANS: Thank you Andrew, thank you Petal, thank you commissioners and thank you to committee members for providing me with this opportunity to come and talk to you today. So I've been involved with the CBEST program since the inception. So I could talk for far longer than the time that has been allocated, but in interests of brevity we will stick to an agenda we've laid out in the presentation. So I'll provide an overview of the CBEST program -- its origins, why we felt we needed CBEST, talk about what it is and what it does. We'll also touch on a little bit of what it doesn't do as well. The overview will then include answers to the questions we've laid out in the agenda. So what types of financial institutions are participating in the CBEST program? How is the program developed and how is it maintained? So that's maintained as process. What is the scope of testing? So what are we wanting to test and why are we wanting to test those elements of an organization. We'll answer how CBEST accommodates the evolution of threats and the changing technology landscape and we'll look at how CBEST as a program remains up to date. And then remembering that CBEST as a program is only twelve months old since we actually launched it, we'll go through some of the lessons that we've learned from the experience so far. Experience in rolling out the program and also experience in building the program as well. So that'll answer the first five questions of the agenda and then rather than me trying to list some of the costs and benefits it's probably best if we hand it back to Andrew to facilitate a Q and A session where we'll look at some of the costs and benefits of having a similar program here for CFTC registrants.

So in June 2013, the U.K.'s financial policy committee issued the following recommendation. The recommendation was made to Her Majesty's Treasury, and Her Majesty's Treasury was to work with the relevant government agencies, the prudential regulation authority, the bank's financial market infrastructure supervisors and the financial conduct authority and they should work with the with core of the U.K. financial system and its infrastructure to put in place a program of work to improve and test resilience to cyber-attack.

It's important to know that in that recommendation -- the recommendation was issued to the lead government department to the financial sector in the U.K. -- so recommendations are issued to the regulators on a complier explain basis but the financial policy committee does not have the power to issue complier explained recommendations to the non-regulatory bodies. But in there you'll also see some key points that financial policy committee acknowledged that as regulators on our own we wouldn't be able to address the issue. We needed the support of Her Majesty's Treasury but we also needed the support of the relevant government agencies and we'll touch on some of those as we go through the presentation. So following their recommendation in June 2013, the financial policy committee issued an update in September 2013. So just three months on, they issued the following public statement. And that was that it was important to ensure that the various institutions at the core of the financial system -- including banks and infrastructure providers had a high level of protection against cyber-attacks to ensure such attacks do not undermine the system. So this was the financial policy committee really saying that in order to address this we need all of those organizations that constitute the core of the U.K. financial system to have a very high level of protection indeed.

So that sent us on a journey then as to how do we measure, how do we ensure that there is a high level of protection? And so we reviewed testing practices across industry. And when we reviewed those practices we revealed that actually the variation in activities, and by that I mean the scope, the methodologies, the goals of testing, even the frequency of testing -- you know, that variation was just too large. Also we found very little insights into protective capabilities against likely attack methods. And I want to underscore that. We're talking about likely attack methods. Was enough work being done upfront for each organization to understand, or what are the threats that I need to concentrate on, not what are the threats generally to a system or to any organization. But what are the threats and likely attack methods that I might encounter and how do I need to protect myself against them.

So after we'd done this work we realized that actually without some sort of common framework it's going to be really difficult for us to answer the examination question if you like that was set by the financial policy committee. How could we assess the adequacy of cyber security capabilities for each of those institutions that were considered core? And therefore we couldn't provide assurance. If we couldn't assess the levels of protective capability then how could we provide any assurance that the core of the U.K. financial system had -- I'm putting there in brackets, or knew what it needed to do to achieve a high level of protection? There was an awful lot of testing going on, but none of them really gave us the answers to the question that had been set to us. So something needed to change and that's really where CBEST as a process started to evolve. So it's very important that we wanted to build something that was repeatable, something that was scalable, and something that would really look at the heart and the vulnerabilities within an organization. So we put in place a program that would consider all of the variables and allow the regulators to reach a judgment on the adequacy of capabilities. At the end of the day we needed to build a process that would enable our line supervisors to take on board all of that information and then have informed discussions with each of the organizations they supervise and regulate so that we can agree on what the right steps to take were.

And so we built CBEST around a number of unwritten principals if you like. But each test needed to include the same steps, no matter which organization was to be tested. So this utters our repeatable process. The test needed to be holistic in nature, ensuring that people, processes and technology were tested. We needed to move away from cyber being seen as a technology only issue. The content of each step however should be bespoke to each organization being tested. The steps are the same, the content of the steps are unique to each organization being tested. Intelligence, and that's intelligence from commercial organizations but also from the U.K. government agencies was to influence the behaviors of the penetration testers. The penetration testers must act as threat actors and not to act as penetration testers. The test should provided an accurate understanding therefore of the threats faced by each institution. So that our understanding and industry's understanding of the threats is up to date. It's up to date and it keeps being updated as each organization undertakes one of these tests.

The tests were to be conducted in partnership with the regulator. This is not something we wanted to do to industry. It's something we wanted to do with industry. There's an awful lot of learning that needs to go on in this process. That's learning for us as regulators; it's learning from the government agencies. It's learning from the institutions that are considered core. And rather than doing something to industry, we felt that doing something with industry was a much better way to improve and foster that learning and a partnership approach. And we needed openness and transparency to be at the very heart of the CBEST program. Other risks that we ask organizations to manage are perfectly visible to the regulators. We can see them, we can ask for evidence. We can be given evidence, we can reach judgments. Cyber security is all too often hidden and if something is hidden -- if the risk management processes that support that risk are hidden, then we're really going to struggle to reach any useful judgments. They should benefit, or they would benefit from GTHQ inputs. That's the government communications headquarters in the U.K. -- that is United Kingdom's Signals Intelligence Authority. The resource commitment on both the regulators side and through the involvement of GTHQ would therefore limit participation in CBEST to the core institutions only. We would love to live in a world where CBEST is available to any organization that requested it -- but it's just too resource intensive. However, and we will touch on this a little bit later on, the principals on which we built CBEST are scalable and repeatable. It stands therefore that you can tweak the scale, the size, the resource constraints -- yet still adopt CBEST methodology and roll that out to a much more wider constituency. But with some way of doing that I hasten to add.

In continuing with the partnership approach we chose not to make CBEST mandatory. At the time we felt this would undermine that partnership principle and we truly wanted to foster this partnership model. And again mandating something would put it on the wrong footing we thought at the time. And by and large we still hold to that. We don't want this to be mandatory, there's benefits to all, we want industry to see the benefits, we want industry to reach out and want to undertake this. By and large we are seeing that from the organizations being asked to undertake CBEST.

The tests should provide an assessment of where each firm's current capability is versus where it needs to be. So we're not measuring in absolute terms. They do not all face the same threats -- so they shouldn't be required to have identical capabilities. They just don't need to be the same -- but it does need to be aligned to the unique threats that they are facing.

We faced a challenge in issuing the CBEST program and not making it mandatory. How could we prove that this was a good thing. How could we demonstrate that it was a safe thing to do? So we piloted CBEST on the Bank of England itself. So the Bank of England -- not only is it a central bank but it's an operator of the U.K.'s high value payment system -- it is a piece of U.K. critical national infrastructure. We couldn't possibly -- we couldn't ask industry to undertake this new type of testing if it hadn't been proven on an organization. And of course as we were a piece of critical national infrastructure -- the easiest thing to do was to test it on ourselves.

A small industry working group was then established to take development from the pilot phase to launch. And again we saw this as a very key step -- we needed to involve industry in building CBEST because again it wasn't something we wanted to do to industry -- it was something we wanted to do with industry.

The working group included banks, it included infrastructure providers, penetration testers, threat intelligence providers, ourselves as regulators and government agencies. So everybody was in there, the list right at the beginning of who the financial policy committee asked to improve the resilience to cyber-attack. They were all represented on that working group to ensure that we built what was needed.

New accreditation standards, including examinations for penetration testers and threat intelligence providers were created. This was the first time that we're aware of that commercial threat intelligence providers have been accredited in anywhere in the world. They're maintained by the Council of Registered Ethical Security testers on behalf of the Bank of England.

Moving on to accreditation in a bit more detail -- to carry out CBEST tests, penetration testing, and threat intelligence companies must demonstrate to us, the Bank of England, by a written application process that they meet the correct criteria. They must be members of the Council of Registered Ethical Security Testers, and by that CREST will then evaluate that the company's operating procedures are sound, that they are following international standards on personnel security, on personnel development, their approach to testing is robust and secure and they are following data security, data handling, data destruction -- all of those standards are being met. And CREST has enforceable codes of conduct that it enforces on its members.

We need to ensure that personnel are qualified to the right levels. We've developed new examinations for penetration testers and for threat intelligence personnel. Personnel must have the minimum required experience. And these are extensive requirements -- for example we require penetration testers to have in the region of 14,000 verifiable hours experience before they are allowed to undertake CBEST testing on any of our core institutions. And they much have proven work history within industry, and then we, as the Bank of England will check those references to make sure that they are sound and they are as per the application process. We then undertake site visits to the penetration testing and the threat intelligence companies and this provides us -- our team an opportunity to interview the company staff. We clarify any anomalies that may have appeared in the written application form and we ensure that everything is as it should be. On the completion of the interviews we can then issue one of three recommendations. We can either recommend that a firm be accredited and they are clear to undertake CBEST testing. We can issue a recommendation that they be accredited, subject to certain requirements being met. This might be ensuring that they have the fully qualified staff. They might need to provide further references or we will reject their application. In the 12 months that we've been going with predominantly with accredited companies, but we have issued accreditations subject to requirements and we have rejected some applications as well.

Before we set off on this journey we wanted to make sure that CBEST when it was developed -- when it was in place remained at the top of penetration testing schemes. So to that end, the Bank of England reserves the right to revoke anybody's accreditation and we reserve the right without question. If qualified personnel leave, we can remove accreditation. If the process is not followed as it should be we can remove accreditation. Even if marketing rules are not followed, or they're trying to gain too much market business or mis-selling what CBEST is -- then they can lose their accreditation.

So how is CBEST as a process maintained?

That falls to our team to maintain CBEST as the process. We do this by liaising very closely with our supervisory functions to ensure that it remains relevant. And it's a really simply test -- question that we ask to supervisors -- is CBEST providing them with enough to reach a judgment of security capabilities? If it is, CBEST is working. If it's not we need to go back and make some amendments. We consult with penetration testers, the threat intelligence providers and industry on its effectiveness. We're currently in our first round of receiving feedback from all of those stakeholders. And it's imperative that we take on board feedback. We don't hide behind potential lessons that we could learn to improve this important process. We maintain very close liaison with CREST for the accreditation standards. That's absolutely essential to the future of CBEST. And we promote CBEST by industry events. They can be through large seminars, events such as these, the round table I was invited to at the CFTC the other month. It's really important that we promote what CBEST is and we improve international liaison along the way. We also maintain a webpage -- a publically available webpage and there are details at the end of this presentation. And that's where we put as much information as possible about CBEST as a process, what it is and what it does, so that everybody can learn.

So I want to touch just briefly on what the tests actually are. So threat intelligence will identify threat actors and the tactics, techniques, and procedures they would use for the test. This ensures that no matter which organization is being tested, or when its being tested, that the test is based on current threat intelligence. This also ensures that each test is being up to date -- it's not old news. It's being tested against very current threats to that organization. The scope of the test is agreed by the regulators and the financial institution that is being tested. For CBEST broadly we are looking at functions which if disrupted could have an adverse effect on U.K. financial stability. Once we've identified those functions we can then start to identify technology systems supporting those functions. They become our (inaudible). Target systems, but we also then need to discuss what are no go areas? Why should our testers not go, and we have to keep this to an absolute minimum. There should be good reason why certain things are out of scope but there is that opportunity. At the end of the day the threat actors perpetrating a real attack are not going to ask you if the certain areas they shouldn't be touching. So that's a kind of testing anomaly that we have to abide by.

The goals of the testing are predetermined. So we don't actually want to compromise target systems, we don't want to be the reason for adversely effecting financial stability in the U.K., so we need to come up with ways that everybody can agree that should the next step be taken, a compromise would occur. Once we understand what the goals are, the penetration testers and the financial institution that's being tested devise the robust control framework. It's very important that financial institution that's being tested is fully involved -- in fact leads on building that control framework. It's their network, it's their systems, it's their personnel that are all being targeted by this tester, so they need to lead on the development of this control framework.

And during the test itself, the financial institution will be informed of each day's activity, ahead of it taking place. And they will give the go ahead or ask for it to be suspended. Reasons why tests might be suspended -- perhaps if there are unexpected business requirements, perhaps it's an unexpected large training day, and doing live testing on their networks would not be best suited. Or maybe there's some unplanned change, some last minute change, management needs to take place. Then CBEST can be temporarily suspended. And some penetration testers have even gone so far as to offer up a seat within their offices for somebody from the financial institution to actually sit alongside the penetration testers.

Again valuable experience to understand what penetration testing actually is, what it looks like, how it works. But then you've also got a safe pair of hands sitting right next to the penetration testers to make sure that the test remains safe at all times.

But once the test is concluded, that's really where we start to get to the meat of why we're here and at CBEST. And it's all about the post-test activity. So we have key performance indicators on both the process and that's for the penetration testers and the threat intelligence providers and the outcome that's captured. These key performance indicators help us to ensure that the program adheres to the agreed framework and it helps us in judging appropriateness of capability. So how do we do some measurements for the test itself but also the outcomes? We then have a workshop with all stakeholders to discuss the testing activity that's conducted. And I can't stress the importance of this workshop -- moving away from previous test results which penetration testers will provide well written, well thought out reports. But there will be a list of typically red amber green issues that need to addressed. Those red, amber and green issues have no context in which people can reach a judgment. How large are the issues identified compared to other risks the regulator is asking you to manage. How can a supervisor reach a judgment whether a red issue on a penetration test is more important than say building up larger capital requirements, looking at some of the organizational change that they might have requested you to as a priority in any given year? So we have the workshop where we discuss all of the testing activity and that's where we understand, are they big fixes that are required or are there some really simple quick fixes. Are there any quick wins in there? Are they expensive -- if they are expensive, how expensive or what might the timelines be. The penetration testers offer a fantastic wealth of knowledge. We need to leverage their experience; we need to get out of them as much information as we can. If they circumvented security controls by doing the penetration test, it's pretty sure they know how you can improve your security capability to prevent them from doing it again. We need to maximize the experiences that they bring to this process.

Once we understand all of the issues then we can start building a remediation plan. And that's a remediation plan that's agreed to by both the regulators and the financial institution. And the plan will look to address the gaps identified and where they are versus where they need to be. So it's all routed in the context of what an organization actually needs versus arbitrary absolute measure.

The progress against the agreed actions is then monitored via a routine supervisory engagement. This is very much supervision one on one. There's a list of issues that need to be identified with agreed timescales. Are those timescales and measures being implemented as was agreed? And of course a retest may well be part of a remediation plan.

So we move onto the last slide before the Q and A. This is -- lessons today. And we are only one year in since launch. Some of the lessons here that you might want to be aware of is that CBEST attracted considerable media attention far more than we ever considered that it would meet. And periodically it keeps popping up again. CBEST will get a mention, we'll start press inquiries. It'll go a little bit quiet and it will rear its head again. So the media attention around the regulators taking an active engagement, an active role in cyber security was most definitely news worthy.

Each test will take approximately six months from start to finish. It is a long testing program. The actual time of the test is roughly four to six weeks. But the preparation, the procurement stages can be quite drawn out. And of course the post-test activity takes another four to six weeks. So it's not long when you start adding up the stages and we've got more information on the website that has more detail on each stage. When you start adding it all up you very quickly get to six months. I've touched on procurement, being drawn out -- especially with threat intelligence providers. We found that most organizations that we asked to undertake one of these tests have an approved penetration test already on their books. They typically won't have a commercial threat intelligence provider. So they need to go through the whole of the procurement due diligence process.

Outsourcing of the accreditation work massively reduced the burden on ourselves. We are a small team, trying to put in place -- trying to replicate the business that CREST does in the penetration testing world. We would not have launched CBEST if we couldn't have fallen back on CREST to do that burden of work on us. And ensure that those penetration testing companies and other threat intelligence companies are operating at the very highest of standards.

Working with industry to finalize the tests helped achieve important buy in. We didn't, as I said at the outset, we didn't make this mandatory. We wanted everybody to see the benefits of the process and we had to work with industry in order to get their buy in. Arguably perhaps we could have done some more there. We could have looked at how do we achieve better board buy in within those organizations. We got the good technical support to build the CBEST. We got a certain level of board buy in, but perhaps we could have done a little bit more to achieve board level buy in.

Nervousness within industry remains at some levels. We've seen this level of nervousness dissipate slowly. But we do believe that we get more organizations through the CBEST testing and as they talk to their peers about control frameworks, about how we didn't compromise their systems, we would expect this nervousness to dissipate.

It does though raise questions about what are we doing for firms that are not core, especially when there wasn't a ready-made definition of who is a core institution. But some obvious institutions that were most definitely going to be classified as core, and then of course if you work your way down the list you then start to get a little bit fuzzier. And it's a little bit blurry as to whether somebody is core or not. And of course you have to draw the line somewhere. Those that are just below the line might still consider themselves to be nearly core -- so what do we do for those? But then there's everybody else that we regulate that we just don't have the supervisors -- the number of supervisors to do something as resource hungry as a CBEST.

So we have had some inquiries and as I sit here today we have answers and what a smaller more confined testing program might look like. But we are looking to take the principals of CBEST and build something more manageable -- something smaller and less resource intensive.

So I think that kind of wraps up my bit of talking. So I'm going to hand over to Andrew.

MR. GRAY: Thank you very much Dave for that background. So we would like to open it up to general Q and A if there are any questions about anything that Dave has covered and then more specifically to get to the question on the agenda which is, what are some of the cost benefits -- challenges associated with potentially adopting the CBEST or something like CBEST for CFTC registrants.

So some logistical things. First of all if you do want to speak please push the button on your microphone so that way people who are calling in can hear, and conversely, once you're done speaking please turn it off because we can only have so many microphones on at the same time. If you do want to be recognized and I see Kristen's already figured it out, please turn your temp card on its side and I will call on you.

And then, finally there is WIFI

available for those who need longer instructions -- it's available on the publically printed agenda on the site. So with that, Kristen would you like to ask the first question?

MS. WALTERS: Sure just a quick question. Given the testing that you've done so far, could share any of the --

MR. GRAY: Can you speak up close to the mike? Thank you.

MS. WALTERS: I'm sorry. Just given the testing that you've done to date, and I understand it's early days, I was hoping that you could share some of the findings or performance metrics that you found useful when actually conducting the tests and analyzing the results.

MR. EVANS: So in terms of actual results, we haven't had sufficient organizations go through the test in order for us to publish results. It wouldn't be -- we haven't discussed the results of any the tests that have been completed so far, with other organizations. So unfortunately as I sit here today, I can't go into the specific results that have come out of it. We've received positive messages about the test as a framework. We've received positive messages about how it has revealed issues that perhaps firms weren't quite aware of. And some examples would be around -- we talk about people, processes, and technology. And understanding some of the examples we've had -- have been where people have got policies around the use of social media. And the staff will -- as seemingly just about everybody in the world is on social media these days -- organizations will have policies about how they're supposed to conduct themselves in relation to their working practices. People can't necessarily see the connection between -- if somebody's putting too much information on their social media accounts as it relates to the organization they work for. Is that really an issue -- can it be used to leverage access? And through the CBEST program, people are finding that actually social media is a rich source of information for our penetration testers. So it's a rich source of information for our penetration testers. It's a rich source of information for our threat actors. And that's something that, through the current testing practices is not always picked up. So we're learning lessons by that. As we go further through the process we want to publish as much as possible -- clearly you will have to anonymize results, so as and when they're available, we'll look to push those out on our public website.

MR. GRAY: Richard.

MR. MILLER: Just an information question -- did I hear you say the test takes six months? Is that right?

MR. EVANS: So the whole, the whole process takes six months. The actual time of testing -- so where you would consider penetration testers being active on your networks is four to six weeks. It's the planning and the preparation and the post-test activity that means the whole process takes six months.

MR. MILLER: And what do you think the

shelf life is? How long is that test good for before you have to retest again?

MR. EVANS: So we're yet to work out when it should be a repeat test. We're starting to work on some areas which would force a test sooner rather than later in a retest and that would be, are you as an organization -- have you acquired business that operates in another part of the world? Are you undertaking new business lines? Is there information either from threat intelligence providers, commercial or government -- that indicates that new threat actors with new processes on now interested in you. So the certain triggers that we could see bringing a test sooner rather than later but we haven't worked out sort of frequency and shelf life yet.

MR. MILLER: Thank you.

MR. GRAY: Joe.

MR. CITADEL: Thank you. David, were you able to comment on the level of participation that you've had in the testing? Are they the largest of firms -- buy side, sell side, exchanges, kind of parties, clearinghouses, et cetera?

MR. EVANS: Yes, so it's kind of all of the above. So we haven't limited it to just investment banks, or just retail banks or just clearing houses. Fundamentally, if as an organization you -- if you're disrupted, or if you're potentially disrupted, that would impact financial stability, then you will be considered core. And that does include wholesale banking organizations, retail banking, exchanges, clearing houses, settlement systems -- the whole range of organizations that we regulate.

MR. GRAY: Mahi? Did you want to ask a question?

MR. DONTAMSETTI: So David, a couple of questions I guess. Holistic approach is something that you mentioned that the CBEST takes. Which is --

MR. GRAY: Mahi can you move a bit closer to the mikes?

MR. DONTAMSETTI: Yeah.

MR. GRAY: Thanks.

MR. DONTAMSETTI: And holistic approach is I think what you mentioned CBEST takes which is an external view and it also takes care of -- if we're looking at technology, people and processes, which is a good positive thing and is adaptive. Right -- because you are looking at threats. Can you maybe talk about what the specific learnings for BoE were from having the test connected against your institution and also, how do we ensure that one of the things missing from this framework is an internal view, right? You're looking at it from an external perspective but sometimes you can also gain a lot of insight by looking at internal set of actors.

MR. EVANS: So much in the same way as I can answer the earlier question on specific learnings, it wouldn't be appropriate for me to discuss what the Bank of England found in terms of their own learnings. What I can say is, CBEST as a process didn't change a great deal from the pilot to launch. So as a process it was effective, so you can read into that whatever you will. But what we did against the Bank of England -- there was enough to see that there's real benefit in doing this as a testing program. In the interest of keeping a job I'm going to stop that there.

And then the second question was, external view versus internal. So the internal threat, or the insider threat is one that gains a great deal of media attention. Our view is that the biggest threat to the organizations is from the external actor. If you peel away some of the media hype we've yet to see concrete figures that suggest that insider attacks are in anyway the same magnitude of risk as external threat actors so we want to focus our activities on the external threats. Of course, should that change then there would be no reason why we couldn't adopt CBEST methodology to then begin to look at insider threats -- but at the minute there's just not the data to support it. Additionally there should be other control frameworks -- personnel vetting, access to data centers, lease privilege access, all of those sort of controls should already be in place. But if we find they're not in place on an external threat -- you can make some pretty quick assumptions that if you're at risk from externals you're going to be at risk from insiders as well.

MR. GRAY: Okay we have a number of cards up. Why don't we start with Anat, and then Andrew; then I'll go to Glen, and then Jerry.

DR. ADMATI: I have the following question -- you mentioned that partnership principle and that you wanted it to be voluntary. But this is a safety thing fundamentally and so the question is what is your expectation that it would be a reputation thing, or that eventually it would be mandatory, that you're trying because obviously we want planes to be air worthy -- we want systems to not be compromised, this is just money but if somebody can expect that the problem would be solved. What's the incentive, et cetera?

MR. EVANS: Just having a bit of a technology issue -- there we go. So will this become mandatory in the future? I honestly don't know. As we've gone through the process we've found some firms have taken more persuasion to do CBEST, but normally once we target the right person in the organization -- generally I think we're probably way over 90 percent of organizations that we want to undertake this are now fully committed to undertaking CBEST. I think the voluntary nature -- the way we released it was because it was a new step for us as regulators. We hadn't really moved into testing people's capabilities -- in what can be perceived as quite an intrusive way. Whether that change is over time -- I don't know, I suppose as we engage with more organizations if we roll out something to other institutions. The frequency of tests increase, if we have differences of opinion as to when a retest is required than that all points towards, well perhaps we do need to start looking at making this mandatory. But as I sit here today we stand by voluntary was the right decision. But yeah -- it's safety and security at its heart.

And so that's a big question if there's committee and then the commission further decided to explore something then that voluntary versus mandatory I would expect to be a key discussion that would be needed.

MR. GRAY: Andrew.

MR. LO: So I want to start by thanking Mr. Evans for sharing this incredibly interesting and valuable information. It just raises a number of questions which you may not be at liberty to answer -- but if you don't mind I'll just ask them and feel free to put it off or maybe in the second half of the session we'll get to that.

First question, can you share with us a number of firms that the Bank of England has accredited and the number that was not accredited? Second, have you, as part of the penetration testing focused on social engineering, which by many industry accounts is actually a more important and easier way to penetrate a system than through systems technology? It's really human engineering and behavior. Third, it seems like software vendors have to play a big part in this because the threats often come from gaps in software. So have the software vendors agree to collaborate? And then fourth, what is the cost of testing and is that something that is going to be an issue particularly if you're going to have smaller firms having to participate. And finally, can you talk to us about the nature of the penetration and threats that you've examined? It seems like there are two classes. One is threats to disrupt market activity. And the second is threats that attempt to extract client information for purposes of fraud and theft. So I'd be curious to know what kinds of threats you focused on. Thank you.

MR. EVANS: So in terms of the number of firms accredited -- I believe we have in the region of six penetration testing firms and four threat intelligence providers that have been accredited. And we have rejected applications from three to five organizations. Some of those organizations that were accredited benefitted from

-- I was giving what we called grandfathered rights. So they weren't quite fully where they needed to be, but they provided us with sufficient assurances that by a specific date they would have everything in place. And in the interests of having a market for our organizations to go and receive tenders from, we felt that was an important process. But we find that that's moving. We've got information on which organizations are putting personnel through the relevant examinations which are a key part in order to receiving accreditation and the list of firms putting people through the examinations is much larger. So by the end of the year we'd expect there would be far more firms accredited. Moving onto your second question -- so you asked about social engineering. So social engineering has been used in some of the CBEST engagements to date, but social engineering will only be used if that's a technique used by the threat actors identified. So it's plausible that somebody might use something different in which case social engineering would not be part of it. But social engineering -- if that used -- (inaudible) spoke about it as one of the examples that we've seen. And people see through that testing mechanism that actually including social engineering as part of a wider test enables them to take away much more than if they just did an isolated social engineering component test. Because yes, you get a body of results -- but you can't see it in the context of -- so X number of staff were either misusing social media sites or they were spear-phished successfully or whatever it is. You just end up with a bunch of data that has no context. Taking that compromise and then using it to gain further access into the networks --that's when people start sitting up and realize that actually -- as you put it, the social engineering, the human engineering is really important. So we use wherever it's appropriate to use it. Software vendors is a really good question. So at the minute we don't have the data to support the software vendors and I use it in (inaudible) are a weak link. But we've had plenty of discussions that at some point if we start building a body of evidence through the CBEST testing program or other initiatives. But if we can evidence that 50, 100, 200, 500 financial institutions in the U.K. are all suffering from software deficiencies, that's a really useful body of data to then take to those vendors. And it becomes a different conversation. We've got 500 of your largest clients are being compromised due to your software having deficiencies in it. Many we just hope the data is going to have those conversations -- but hopefully we'll reach a point where we will.

So the cost of testing -- it varies depending on the organization and the duration of the test. We think it to be broadly in line with a more sophisticated penetration test. So it's not an astronomical amount of money -- so it's in line with what organizations are already spending in their penetration testing regimes. The more people we have accredited of course market forces should come into play and costs should come down.

If we want to build something that's more accessible for smaller organizations then that's where we need to look at which bits can we trim down, so that the costs can come down without losing the effectiveness of the testing program.

And types of threats -- you're going to have to remind me what you meant by that.

MR. LO: One -- outright fact of (inaudible) information. The second is disruption market activity.

MR. EVANS: Thanks for that. One notes when comprehensive enough. So predominantly we're looking for threats that can undermine financial stabilities. That naturally takes you into the destructive types of attack, either an attack that could destroy software and hardware -- or an attack that can compromise data in such a way that you no longer trust the data source. So they're the types of attack. We have looked at other parts of industry, and beginning to explore with, away from CBEST. And particularly this placed to insurance companies where personally identifiable information is really very key to them. So while CBEST from a financial stability perspective wouldn't look at personal identifiable information, there is still a very serious potential and threat that organizations holding that type of information may need something that can act in a CBEST like fashion. And we're beginning to explore what that might look like.

MR. GRAY: Glen, did you want to ask a question?

MR. MACKEY: Thank you. David, my question then -- you answered parts of it already. It's really two- fold. One, is CBEST exclusively oriented towards penetration testing or are there other sort of controls or control categories that are considered and if so which? And then how dynamic is that testing as we see the type of threats evolving more and more often and more frequently than six months in duration?

MR. PERULLO: So CBEST is only penetration testing. In theory I suppose we could change that. We then need to look at which organizations could provide those services. But at the minute it's penetration testing. And then in terms of -- I suppose it's back to the evolution of threat really, and how do we keep up to date with the threats? It's early days. It takes us right back to the question on frequency of testing. We need a number of organizations to go through this process so that we can start to get a better handle on threat intelligence, threat information, the evolution of threats -- as we go through this first cycle and get all of the core institutions through CBEST, that should give us some indication of how can we keep on top of the threats. And maybe that's where we break the components down, and the minute we have threat intelligence and penetration testing just following each other maybe we look to break that down. It's just something we can do in the intelligence space that gives us a better indication of when the frequency of the retest needs to be. But really we just have to get through this first cycle and that will help give answers to those questions.

MR. GRAY: Jerry.

MR. PERULLO: Thanks, I'm Jerry Perullo, I'm the Chief Information Security Officer for Intercontinental Exchange. So in addition to several registrants under CFTC, my team is also responsible for information security over several U.K. subsidiaries. At least two of which have been deemed core. And so we certainly have a close relationship with the CBEST team, and are in discussions about the CBEST program. And we took off what we would call an arguably -- a CBEST light at the end of last year. Where we decided it's a great program and I still hold to that. And the methodology for a penetration test is really stellar. And the idea of incorporating threat intelligence and really gearing attacks that are modeled after those that have taken place in sectors really valuable.

We had some questions and I'll present some of the challenges with having a regulator at the table for that. And I'll throw them out there, if nothing else there's a bit of devil's advocate, not that it's an indictment of the program. But what our experience was -- so we went through this. We contracted with a private company that was at the time one of the accredited providers. And we used the folks there that had been working on CBEST projects to conduct a penetration test. And it did take the full six months and it was very valuable and we received a lot of findings out of that have really directed our controls and changes in our program. And I encourage every organization that's serious about cyber security to do that. And that didn't require direct regulatory environment -- although we do appreciate that they codified a testing methodology and we certainly benefitted from that. So some of the challenges that we identified, and the reasons why went the route that we did and challenges are still ongoing today with the bank and will be with any other regulator, include the scoping, so with vulnerability assessment you scope the targets -- you say what entities do we want to learn about or ask questions about. With penetration testing on the other hand, you really just scope the sources. What are the types of threat actors we want to model our actions after? But the destinations you cannot scope very well at all, because as Dave mentioned, if someone were to try to target any of your organizations, they're going to go through any means necessary. And that means they're going to come in perhaps on a beachfront that's under a different regulatory jurisdiction. And we as a company can empower and contractually allow a private sector company to break into say, a Singapore subsidiary or a Dutch subsidiary. But when I invite in a regulator as well, a government entity in a specific jurisdiction, that presents some challenges.

Another general issue is that, we've mentioned the holistic nature of the program. But on balance, penetration testing is not holistic. It's akin to trying to seeing what doors are unlocked in your house or what windows might be able to get jimmied open or can be broken. What you end up with as a result is not a holistic picture of the entire information security program, but rather specific issues. And so talking to the shelf life of it -- it's really an invalid concept, because it's not a blessing of the entire program. It's seriously three things that you need to fix. And then you do it again, and you'll find three different things. And you will every time. And that's a good thing but it's not meant to be a complete assessment of the security program. Then there's also some commercial challenges with this, when you have a government entity. You've heard about blessing specific private sector firms to perform this testing. I have some concerns about where that's going to head down the road. If some of the firms that are not blessed, they may have some very legitimate claims about a government endorsement of their services. And if not the actual testing providers, then what about the accreditation service itself. Why is that one better than another -- we haven't had issues of that yet and the firms that we have been working with are certainly of quality but I could project that, that could be a potential issue.

And then lastly I'll note -- and I think this is a concern that's close to home for all of the regulators. Going through this exercise, we create a very high risk asset. We will create a scoping document that lists all of the critical functions of any given critical infrastructure entity. How to get in, what the capture the flag moment is. That's part of the CBEST parlance. And exactly what we would consider success for the bad guys. And does the CFTC want to be impregnated with that document. We certainly don't want any of our vendors to have any more information than necessary. We hate bringing regulators into that. And that doesn't necessarily even exist at this point, and when it does I'd really like to keep it under lock and key.

MR. GRAY: Thanks Jerry. Any reactions to that, Dick? Before I turn to Jeremy?

MR. EVANS: So thanks Jerry. I preferred the first half of what you said to the second, (laughter) but that's fine. And the challenges are all, as Jerry has laid them out -- they are all very valid challenges. I won't address all of the points that Jerry has made, but in terms of accreditation for commercial companies. I think Jerry's point is very valid. We went with CREST, we discussed with a few of the accreditation bodies with the U.K. as to what they could provide. We're still having discussions with other accreditation bodies. So at the minute we went with CREST, they're a means to an end. We needed somebody to do the accreditation for us. If somebody else comes along and they provide a better service then we will go for them. We're all about making sure that -- or wanting to ensure that CBEST really is best of breed in terms of testing. So we won't be married to CREST if they no longer provide the service. We try and be as impartial as we can when it comes to accrediting individual organizations. As Jerry mentioned, I don't think there's any issues yet, but you can see in a world where you don't accredit somebody for whatever reason and that has a knock on effect for other parts of business they do. But maybe that's not our concern, provided we can put our hands up and say -- we have acted with full impartiality and organization X just didn't quite make the grade. Well then we need to stand by the process. But it's certainly a challenge.

And then really almost echoing what Jerry does is what Jerry said. CBEST is not holistic as in giving you a full assessment of all of your security capabilities. It's a methodology that looks at the holistic nature of an attack profile. People refer to something called the kill chain, which was coined by Lockheed Martin I think several years ago. And that is all the processes that a threat actor would undergo to carry out an attack on a system. The holistic part means just that. We're looking at the whole of an attack from start through to finish. Not holistic as in the whole of your defensive posture or the whole of your network. And then just to finish on a final point on that holistic nature, is we fully accept that many global organizations operate in areas around the world that could be used as a back door. It's the weak entry point and they won't be included in a CBEST test. That is an anomaly of the testing process. We can only engage with the subsidiaries of who we discuss with their regulators. And at the minute we just don't do that with everyone. Trying to do a global CBEST, I don't even know where you'd start. We're doing okay with U.K. U.S. relationships with some organizations. Expanding that globally, I don't know where we'd start and maybe that's a long term goal that we need to look at how to do that, but not one for the short term.

MR. MUSSAD: Thanks Andrew. The United States has certain mechanisms for sharing threat intelligence among industry participants. We've got the FSISAC I guess. We've also got a financial sector body. That sharing isn't tied to a specific testing regime, but I wonder if I could ask you David, as well as maybe David Taylor and Bob to comment on, or just contrast the sharing that goes on in those bodies versus what you're doing through CBEST. Does that make sense?

MR. EVANS: Yes, so we have similar sharing mechanisms. I think that's slightly more advanced in the U.S. than they are over in the U.K. but we have similar intelligence sharing mechanisms. And that's really peer to peer sharing of information that they've received that might be of use to somebody they've allowed to share it with or it goes into somewhere like FSISAC, is potentially anonymized and sent out to many people. And that's really invaluable and CBEST is not in any way trying to either undermine or replace or anything. This is all about looking at what information is out there in the wild, which threat actors are discussing you as an organization. What are their stated goals, their stated aims? How do they actually go about compromising entities and what would that look like if it was done against you? You could see in a world where -- I'd love for organizations to receive the threat intelligence product as part of CBEST and then decide that they're going to share some of that information through those sharing mechanisms. So I can only see that it could add to it rather than either undermine or detract from it.

MR. MUSSAD: Maybe just to clarify David -- is more going to the quality of the threat intelligence that someone who is going through the CBEST gets by virtue of CBEST versus maybe the quality of the intelligence that you get through FSISAC -- if we can make a judgment about that. I don't know.

MR. WASSERMAN: So on that point, I think I have a limited understanding of what's done on CBEST. I think on the one hand the CBEST is probably a bit more tailored to the individual organization getting the information -- whereas the FSISAC is a much more of a broad distribution. That said, one thing I should observe having been doing this now for, gosh, since 2001 -- the efforts that the US intelligence community have made to be able to get information -- actionable information in a form that it can actually be shared with the private sector, as opposed to merely shared among those with security clearances.

So the ability to process then get it out has really in the past year or so grown by leaps and bounds. And so the efforts that have been made in that regard have been truly extraordinary and I think very successful as well.

MR. WASSERMAN: I would add to that -- I think the two types of intelligence involvement would be mutually beneficial. It may be easier, Bob is quite right that getting actionable intelligence has vastly improved in just the last year. It might be still easier aimed at a single institution and the threats to that institution then trying to anonymize it enough to go more broad and another benefit of doing something like this in my view would be increasing the intelligence community's understanding of the financial sector and how it operates and the threats to it and increasing cooperation in that regard.

MR. EVANS: Thank you David. Bob did you have another question as well?

CHAIRMAN MASSAD: Yeah, I wanted to react I guess to two of Jerry's points very quickly. And the first is in terms of regulatory scope. And obviously, just because you have a number of affiliated entities does not mean that a regulator of one entity has jurisdiction over other affiliated entities.

On the other hand, regulated entities frequently engage in outsourcing and have some very critical functions that are undertaken not within the regulated entity by -- by an outsourcing firm. Sometimes that outsourcing firm is external. Other times it may be an affiliate. And certainly the regulators' interest in how well the outsourced functions are being performed does not change because they're being outsourced, and does not change because they're being outsourced to an internal versus an external firm.

And so I think there is in fact regulatory scope for understanding if penetration could be taking place through outsourced functions. And with respect to the critical functions document, that is quite important. Obviously the more -- the better it is, the more sensitive it is. That said I think it's fair to say that my colleagues who engage in examinations and other colleagues are very well aware of this. And we are here at the CFTC very well aware of the importance of security and keeping these kinds of critical information secure. Thank you.

MR. EVANS: Thanks, Bob. So I'm just looking at the time and I think we're just over the time that we had allotted so. I know we had two more questions. Perhaps, Joe, Mahi, we can follow up separately, afterwards with those questions, unless you felt there was a burning desire to share something with the group? No? Okay, all right, great. So with that, I'd like to thank everyone for their participation, I'd like to thank Dave again for being here and presenting the CBEST framework. Joe this was very very helpful, a very critical topic for the industry. And I'm sure it will generate additional dialogue beyond this meeting. Commissioner, I don't know if you had anything else you wanted to say?

COMMISSIONER: No.

MS. WALKER: At this time, in keeping with the meeting agenda, we'll take about a ten minute break and resume at 11:25 for our second panel.

(Recess)

MS. WALKER: I would like to call the MRAC meeting back to order. As noted in the agenda, our second panel is on liquidity in the derivatives markets. We are privileged to have Susan McLaughlin moderating our next panel, who is Senior Vice President at Federal Reserve Bank of New York. With decades of experience in these markets, Susan has had a variety of analytical, operational, and managerial roles in the markets group, spanning the Foreign Exchange Portfolio

Management and Open Market Desks, as well Central Bank Services. Susan has also led the Federal Reserve's Efforts on tri-party repo market reform. Thank you Susan.

MS. MCLAUGHLIN: Thank you, Petal, can you hear me okay? All right so, today's discussion on market liquidity is going to focus on understanding the state of liquidity in the derivatives markets that are overseen by the commission. Our specific focus is on commodity derivatives -- on agricultural products, metals and energy, as well as fixed- income products, and credit default swaps. However, to the extent that the developments in other markets beyond those bear on liquidity in these markets, we want to wrap those into the discussion as well.

We have three very distinguished guest panelists with us today, who bring considerable insight into this discussion. The way we will format this is, they're going to take the lead on each of the discussion questions, and then we'll open it up to the broader committee. So, first we have Isaac Chang, who is Global Head of Fixed Income at KCG Holdings, which is a large independent market-maker and provider of execution services to clients across equity, fixed-income, foreign-exchange, and commodities markets. Isaac is responsible for both the on-exchange and the client facing, fixed-income market-making business at KCG (sic). Prior to joining KCG, he held a number of senior roles in both Treasury and Derivatives trading in the interstate products group at Goldman Sachs. Welcome Isaac.

Next we have Piers Murray, Managing Director and the global head of OTC clearing in prime brokerage at Deutsche Bank Securities. Prior to joining Deutsche Bank Securities, Piers headed OTC clearing in prime brokerage at J.P. Morgan. Piers has extensive experience across prime services, FX options trading, credit risk management, and credit portfolio management including unwinding derivatives portfolios in times of market and credit stress. Welcome Piers.

And Finally we have Tom Wipf, a managing director and the global head of bank resource management at Morgan Stanley. Tom is responsible for the firms secured funding, securities lending, collateral management, and counter-party risk management businesses. Tom also serves on the firms risk committee, as well as the operating committees for the institutional securities group, and the finance division. Welcome Tom.

So thank you, all the panelists for being here today, and let's get started. As a first question, I thought maybe we could start with Piers and then Isaac, and then open it up to the committee. Could we just talk a little bit about what we mean by market liquidity?

MR. MURRAY: Certainly, first of all I'd like to thank the commission for inviting me to the panel and giving me the opportunity to present our views on this. I'm sure it will be an engaging dialogue. And as we discussed earlier I'm sure that the definition of liquidity could take many hours to finalize, but we don't have that much time so I'll try and be quick. One view of the standard definition of liquidity is to say it's the ability to transact an asset without affecting its price in a public marketplace. Another way of saying that, it's an asset with a high turnover, or a market that exhibits liquidity is a market that has high turnover of an asset within a narrow price band with a little bit offer spread. Another definition is the ability to trade blocks at discreet blocks without moving the market.

Liquidity though, is in the eye of the beholder. I would say that someone who is transacting blocks is going to have a different perspective on liquidity than somebody who's trading single size transactions. And if you look at different types of markets, the FX and equity markets for example where liquidity is materially different from interest rate markets, partially because of the duration of the assets, but also because electronic markets have enabled additional pools of capital to access the market at relatively low cost.

So you have different definitions of liquidity I think by the different types of market. I think it's probably important therefore to try and define the characteristics of a liquid market. Number one I'd say is low friction costs. And friction costs you can bundle up into a number of things. Another one is the availability of risk intermediaries to smooth timing differences between buyers and sellers. A third would be low barriers to entry. A fourth would be dispersion of positioning views in the market place. Another one which is partly topical and we'll discuss I think excessively at this meeting is the idea of a single market place for a certain type of asset. And the final one is a market that has few pricing constraints that have distorted the impacts. And I would describe those as, among those as the following -- a limit up or down, a type of feature in a market place, intervention, and of course I think again, topical is a zero-interest rate boundary. I think those are potential assets that has distorted, or potential features that have distorted impacts on liquid markets.

MS. WALKER: Thank you Piers, Isaac would you care to make some comments?

MR. CHANG: Sure, and I don't want to repeat what Piers went through. I think he certainly presented a very good conceptual framework for thinking about liquidity. Maybe let me address sort of the idea what metrics can exist to measure or monitor market liquidity. At the end of the day, the question I actually I would pose to the group is how can you make a statement about liquidity unless you can measure it in some form?

And so, I think one of the points which is maybe obvious to market participants but is worth bearing is, those metrics then change based on the market structure, maybe broadly speaking of any particular asset class. And I also think it's worth noting particularly in the fixed income space, but this is true in other -- certainly the linkage between underlying and futures market -- list of futures markets and cleared swaps markets broadly. You can't look at -- I think it's misleading to look at liquidity of these products in isolation. And so, you know -- and the example I'm going to go through is -- maybe is a compare and contrast, let's look at the treasuries future market and then let's look at the OGC cash treasury market.

So, in the listed treasury futures markets, market participants can observe and measure a variety of instantaneous quantities. You can measure the size available at the best bid and ask, the bid-ask with between those prices, the instantaneous price charged by the market for a given size, so if you wanted to trade size S, how far through the book would you need to go to transact that size? You can measure the volume traded over any given particular period of time. So, you can -- or at a particular price point. So for a given period of time, over these five minutes, how many can your contracts trade it?

You can measure that and you can measure that on an ongoing instantaneous and historical basis. You can also measure at this price level, you know between -- between 20 and 22 on ten year contracts, how many traded? So, that gives you a sense for the quantity of risk that's being transferred between buyers and sellers.

So, in contrast, and maybe this points to the challenges of actually I would say, not just defining but more accurately measuring liquidity. Let's examine the cash on the run U.S. treasury market. Which is, at least by popular media counts, and frankly I think market consensus, one of the most liquid markets out there, again, for some definition of liquidity. But let's think about the different ways that you can transact in the U.S. treasury market and how would you then gauge liquidity, depends on how you transact and what information you have access to.

So, some market participants have access to platforms in the inter dealer space, like Broker Tech or eSpeed. These platforms provide participants market data in trade executions for on-the-run treasury trading similar to say what the CME provides for treasury futures, and similar metrics can be computed. Other participants have access to platforms and there are representatives from those firms here today like Trade Web and Bloomberg either as providers or takers. These platforms provide indicative prices prior to initiating a specific trade and the execution protocol is a one sided request for quote. So as a result, I'd argue, market participants that are limited to transacting on these platforms, liquidity is -- the way to measure liquidity has to be different. You just don't have the same information available. I'd actually argue it makes it more difficult. On one hand yes, you can transfer, you potentially can transfer a specific quantity of risk at a single price at a single chosen time, which is a convenience that has some value. But on the other hand, when computing, for example how far from the prevailing market price a trade occurred, one can only approximate that market price with the given platform's indications of interest, which are not actionable prices.

Or, based on the responses from their RFQ, which are actionable prices, except that they have an embedded last look option for the liquidity provider. So, and those quotes, which are limited generally under five or under market participants, may or may not be representative of the marketplace as a whole. Then you throw in the added complexity that others may choose to deal via voice in which case they may rely on some market data feed or indicative price feed as a gauge for what the market price is, but not necessarily have the ability to trade on those platforms, and then -- and execute a trade in that manner. I think it also should be noted that those trades aren't disclosed to the broader marketplace as a whole, they're bilateral transactions. And then when you take a step back and then say ok, let's monitor the liquidity market in the treasury market -- cash U.S. treasury market as a whole, I'd say given all of this, it's at best complicated, I'd even argue potentially impossible to do given the limit --

the lack of publicly availably pricing and transaction data.

And so, while on one hand there's the treasury futures market which has a certain market structure for which there's a lot of information, on the other hand that's broadly -- strongly affected and influenced by the cash treasury market in which there's a completely different information structure. I would actually throw up my hands and say from a regulatory perspective, you're extremely challenged in being able to think about how to even measure or monitor liquidity in these marketplaces as a whole. And this is a theme I think that's going to pervade all of the questions that we'd ask. But this is you know -- I've said enough for now we should go on.

MS. WALKER: Thank you, I'd personally agree with that last statement you made. Before we move on to the next question, is there anyone on the committee that would like to add these remarks? Okay seeing none, the next question I wanted to pose is just about the current state of liquidity in the markets that the commission specifically oversees and I wonder if we could begin with remarks by Tom and then we'll go down the panel.

MR. WIPF: All right there we go, you know, I do, Susan, as well I think I would like to add in terms of the -- also in just the construct of liquidity, is I think it's very important to note that there's also from a plumbing perspective when we think about the infrastructure also on clearance and settlement as well and the financing markets and so I think as we proceed in this discussion I think we're going to see some pretty meaningful lines drawn between the effectiveness of clearance, settlement, central clearing, and the financing markets in these collateral markets as they feed upward through the assets into the cash and derivatives markets.

So one thing we would note as an element of liquidity, it's very relevant to bring this up. I think we could draw on the example of the agency mortgage back market several years where there was certainly a perception of liquidity if you just looked at price. But with the amount of settlement fails that we were seeing, it clearly was just an exchange of price for systemic credit risk or counter party exposures. And I think when we look at this in today's discussion we can take that example as really where below the surface are the things that potentially could be driving some of the things that we're seeing upstream. So for example mostly, what we're seeing in the financing markets or the SFT markets and repo and securities lending, as the market begins to transition through the aggregate of regulation around some of these products and begins to optimize around these products on their balance sheet, what really will be the outcome and what does that mean to the assets that are being financed. So, when we look at what the -- what we're seeing in terms of that, there's a general reduction, and I think heading into some of these events we would have thought that perhaps there might have been price adjustments. But I think it's been a real trade-off between price and access and I think what's happening quickly as intermediaries are adapting to this, they're seeing a general rush to meet these optimization hurdles and in so we're probably going to capacity first before prices are being adjusted. So that's what we would call up. But definitely when we think about liquidity as a measure, clearance, settlement, financing and central clearing are very very relevant points.

MS. WALKER: Thank you. Piers, any comments on this?

MR. MURRAY: Turning mine off seems to have had a permanent effect. (laughter) So, in terms of the current state of liquidity, Tom's points are very relevant. I think there are some examples that we have seen in the marketplace recently where, for example in the aftermath of the Swiss devaluation we saw a number of clients reduce their risk taking appetite across multiple assets rather than just in the FX space. And there was certainly model recalibration at that point. I do think it's important, as I mentioned earlier, to emphasize that we've seen what I'd call a seminal shift in market views on the single pricing of the interest rate markets with the broadening of the spread between CME's prices and interest rate swaps and LCH's prices and interest rate swaps. And we need to really think about why that has happened. Pricing is a function of --

MS. WALKER: Piers I'm sorry, if you could bring the mike a little closer --

MR. MURRAY: A little closer?

MS. WALKER: I think some of us are having trouble hearing, thank you.

MR. MURRAY: Pricing is a function of positions. It's also theoretically a function of margin costs including the availability of cross margining and it's a function of clearing costs. And so we see that -- we see all of those having an impact in the current differential of pricing at LCH and CME. So I think it is as-we're all learning, I think all the market makers present are learning about the cost of dislocations like the one that we've seen rise in the past couple weeks. And I think another element is really to focus on the macroeconomic differences versus the micro -- what I'd call the micro differences. So we have in the macro sense an improvement in credit market quality, which has driven spreads to lows. We have a zero interest rate which has driven the absolute market cost of financing to lows and we have supply. Those are all macro circumstances that are unique or certainly relatively unique to the current state of markets.

From a micro perspective I'd say the interest and CDS markets are still in evolution. Traders are still learning how to cope with these differential prices and that means that there will be temporary dislocations as people try to figure out the actual funding cost and whether there is an exit strategy for an existing position at a clearing house, or whether they can add new risk in a somewhat insulated fashion.

I would say, a final point is that the capital methodology which Thomas alluded to, doesn't materially differentiate at this point between bilateral and cleared activity. So the cost of clearing has increased materially against the baseline forecast that we had in the industry in 2009 and 2010. So clearing access is becoming more expensive and balance sheets as Tom mentioned are being rationed prior to the price behavior actually functioning. So I think the important thing to start trying to discuss in the context of this meeting is not just the current state of liquidity but knowing that these constraints exist. What's a future state of liquidity and what is the state of liquidity in a potential stress event, both a macro stress event from interest rates moving as well as micro stress events from clearing members and others exiting the marketplace.

MR. CHANG: So I'd like to give a perspective from a market maker to answer this question. So as Susan mentioned, KCG is a market maker in not just fixed income products but many products, which my (inaudible), but many products across the asset class spectrum and if broadly you think about what is the market making business and what effects a market making business. I think we've hit on a number of the points, but I think it becomes fairly obvious from changes in the market place what has to happen to liquidity or as -- to the extent we can actually define it. I guess which was the first question.

So as a market maker, as volatility goes up, as a market maker we bear risk. We're not long-term positional players. We're not betting that the 30 years price is going to go up or down over months, but we stand ready to buy and sell and provide instantaneous liquidity, and we take the risk of holding that transaction until the opposite side appears in the marketplace. So, what are the factors then that affect the return that we need to generate for our shareholders or for those who give us capital, as market volatility has picked up, which over the last six months it certainly has after I would argue a pretty prolonged period of very low volatility. It's natural to see that a lot of these liquidity metrics should change. You shouldn't, in a more volatile period, you should not expect to see the same size atop a book or the same effective bid ask with.

I would also say that as capital costs have gone up, and certainly, look from the perspective of banks, I understand the regulatory changes that have been going on. Consider KCG as an independent market maker. A, we're not investment grade rated and B, we depend on banks for financing, so assuming banks are rational in the way they allocate capital to their customers, there is no way our cost of funding is going to be anything but a lot more expensive than any of the banks represented at the table.

So, so then, so, certainly as the cost of capital goes up, again, liquidity as measured either by -- has to go up, because, the returns that a market maker has to generate, are constant, but the conditions have changed. Right? Fundamental liquidity is a dynamic property. It's not something that is a static number I think that we can expect to say the same over time. Anyone who has lived in the marketplace for some amount of time I think realizes that. But, and so maybe that's belaboring an obvious point. But I just wanted to make sure to mention that. It's not, liquidity when the Fed is in play, potentially in the next meeting or two, versus when the Fed was on hold for seemingly forever could not and should not be expected to be the same. That's a healthy marketplace in my view.

The last thing I'd like to kind of maybe address is just the CMELCH point that Piers brought up, because it has gotten a lot of attention in the marketplace. And as someone who started his career on the trading desk as an interest rate swap trader over 15 years ago. I find it funny actually that the CMELCH basis differential is getting so much attention now. I would only go back pre-crisis when it was that swap trading desk we're discovering that the collateralization that you had against each counter party actually determined the economic price of that swap. So rather than having two clearing houses where there were two, at least only two capital and collateral, funding differentials that you had to account for, every single bilateral collateralized trade was a bespoke instrument.

This was a huge shock to many people in the interest rate swap market who thought that swaps were fungible. Turns out, if you have a different collateral agreement between counter party A and counter party B, even if it's a ten year swap with the same maturity, and the same coupon, for you as a bank, they're different instruments and they have different values and when someone comes in to unwind that trade, you're going to give a different price.

So I'd actually argue the CMELCH differential, even though it does illustrate that the market needs to recognize and introduce, frankly is an improvement over the situation that existed pre central clearing, before the crisis. When actually, for people who really understood what was going on in the interest rate swap market, every trade with every counter party was a bespoke instrument. And so I think we've actually moved a long way and moved the market in a very positive way forward since then.

MR. WIPF: Isaac, we certainly agree with that, we think that this has actually brought to the table an issue that has always been there but has manifested itself in a meaningful enough size now to get market participants to actually look at the cost of collateral, make those determinations at the point of execution and I think what we have seen is this has actually certainly created a general sense of good hygiene around these practices that didn't exist across many many bilateral counterparties, so the fact that these imbalances are there and there's a cost factor depending on where you determine to clear, or where your clients determine to clear, we think is actually-we agree with you, it's actually something good to bring that to the surface. The impact of that potentially will find its way into pricing, and that's probably quite appropriate as you mentioned. So I think the idea that that, because of the general nature and the size and scope of that collateral mismatch has brought real focus to an issue. It's not a new issue-it's a bigger problem, it's more centralized, but certainly it will find its way into the pricing models as we move forward.

MS. WALKER: Thank you, that's really interesting and I think maybe we can open it up to the committee now, and I guess you know this kind of brings us to the issue of explainable versus less explainable sources of liquidity and I think one challenge we have as regulators is to understand the difference and to kind of know what we're seeing when we see it. So I'd be really interested in any comments or thoughts that others would like to bring, as well as the panelists. I think we have Rana.

MS. YARED: Thank you Susan. I think maybe to our starting with the comment that liquidity in all the markets is not the same, so you know in the credit market for example we've noted that in the five year on the run index point, liquidity has actually improved in the last year, largely because of the structure of that particular market, which is a market where the congregation has happened around a particular point, because the occurrence of structural hedging, which we see in say the FX or rates market have substantially lessened so the need for a particular tenure or structure is less, thereby facilitating with a more order book, ready product. On the flip side of that we have the interest rate markets where we have really a true potential for a liquidity crunch based on a couple of factors. The first is that we're seeing that liquidity is really conditional, particularly in times of high volatility, but even just in more low or normal volatility moments.

We are finding that for people who are trying to execute thematic trades, that getting size done is actually very challenging. So by way of a quantitative example, if a client or another dealer is trying to do 25k of DVL1 at any point, what we're finding is that it's between 0.2 and 0.3 basis points across the spread and that that client will have the luxury of having let's say 10 dealers in competition willing to show them a price. That could be in competition in order book. That could be in competition in RFQ.

Let's just take that one step further, client wants to do 250k of DVL1, which you know, Isaac, Piers, Tom, professional traders in this room will tell you is not that big of a size, all of the sudden our clients are relaying back to us that getting that kind of size done is actually pretty challenging. So that makes us think, what's the cause here? And certainly from a Goldman point of view, the cause has to be the capital rules, SLR, and NFSR -- alphabet soup, which are causing substantial challenges on both the executing broker side and the clearing broker side. So of course both sides of the house are going through the logic -- where is the most economically efficient place to deploy my capital?

And from our point of view one of the most inconsistent places where that decision making is taking place on the clearing side, and it's inconsistent because the treatment of the clearing -- cleared trades under all these capital and liquidity regimes are actually in contravention to the G20 desire to clear as much as possible.

So you have very punitive treatment for clear trades against a desire to clear as much as possible which is leading to liquidity crunch not only in the executing broker side, but also a liquidity crunch because people who are not direct members of clearing houses are having to rely on clearing brokers to make those same kind of economic decisions. So that kind of underpins what we think is the greatest cause of the liquidity challenges in the market, and moving away from the CFTC products, it's certainly the repo and the funding markets that are having you know the greatest challenges at this particular moment as I'm sure Tom would elaborate in greater detail, given his expertise in those particular markets.

And so against that backdrop, we're seeing a couple things happening. One the market is trying to aggressively lower the notional that we have outstanding through you know various mechanisms like those offered by tri-optima and their nascent competitor locked markets that are looking to do with multilateral risk reductions. I'm sure there will be others that come out that want to peddle those particular wares. On the broad sense, unless there's a change to the way that the capital treatment is done from any of these trades, we're going to find that it's fairly challenging and our greatest fear that two things happen -- one, that significant hedging that should happen remains undone in the market, although I'll note that a lot of substitute hedging is taking place, so if someone would traditionally hedge with an OTC product, maybe now the FY or the TY on the CME is good enough, and two a significant bifurcation in pricing between cleared and uncleared trades which could also potentially impact liquidity in the markets, so with those comments I'd leave the overarching point that I think Isaac made which is liquidity is not point in time measurable, it's -- I'm sorry it's not consistent, it's in fact point in time measurable and the greatest concern that has to exist is the ability to move risk and get trades done not only in times of normal market conditions but in times of stressed market conditions, when it is inconvenient to provide the liquidity in the balance sheets of clients and that's really kind of the overarching concerning question that we need to address.

MS. WALKER: Great. Thank you Rana. Luke did you --

MR. ZUBROD: Yes thank you. I would say bringing the perspective of end users to the discussion, you know Chatham executes about a billion and a half notional each day of interest rate FX and commodity trades. And I would say broadly our interactions with banks are marked by what one colleague indicated to me was the absence of an outright competitive drive. Whereas bank marketers often used to tout their trader's ability to deliver efficient pricing on a trade, you know have conservations that revolve around sort of banks grousing about the various reasons why they can't deliver efficient pricing.

I think the reasons for this are many fold, some of them perhaps regulatory, some of them not. I'd say the reasons tend to be more anecdotal than quantifiable. And I certainly share Isaac's point that it's difficult to quantify the issue of liquidity. But certainly I think regulatory issues do play a role. The cost of doing business for banks has increased, not just as a function of capital requirements but also as a function of things like KYC and pre-trade documentation, those sorts of things.

Now, if you're a large, corporate for example, that has established trading lines where you do that process once and don't have to do it again, it's very easy to repetitively transact. But if you're a smaller or mid-sized entity that needs to establish a relationship with a bank in order to trade, that bank has to weigh the merits of going through the process-the regulatory process, the documentation, KYC process, LEIs, et cetera. And if they think there's a reasonable likelihood that they won't win the transaction, they don't want to go through the burden of getting that relationship established only to lose, because there's a cost of establishing that relationship. And so just yesterday on our internal network, someone posted this comment. Quote -- "Just spoke with such and such a bank. They are no longer bidding on caps and other options when they aren't the lender on the underlying loan being hedged, color from the marketer is they aren't winning enough. We're making enough on those. They win to justify the internal compliance, KYC exercises the trades require. They'll let us know if this changes, but for the time being they'll be passing on any such deals we show them."

So this is fundamental. I think it's

difficult to measure liquidity, but I think we know that it's not going to be there if the number of participants willing to quote prices decreases, particularly in times where markets are more volatile or stressed. The absence of a robust pool of counterparties will certainly adversely affect pricing outcomes for end-users. So I would say certainly for small and mid-size end-users, these are issues, they're again anecdotal. You know, it's hard to put numbers to them. And that tends to -- the un-cleared market is one realm where we're experiencing that. I would also sort of jump into the discussion on cleared U.S. interest rate swaps. We also work financial end-users who are clearing their swaps. The CMELCH basis -- the impact of that for an end user is that to transact a clear USD interest rate swap, a ten year swap would cost about two basis points more today as a result of that basis if it's cleared at CME instead of LCH.

And that's a very substantial cost. It's a cost only for those who are subject to the clearing mandate and are clearing their transactions, and it's arguable whether or not the cost is necessary for all participants within the clear-who have to clear whether it's necessary that that cost should be borne. And so I think the scope of the clearing requirement is one issue that won't take the CMELCH basis away, but reducing the scope of the clearing requirement, which the CFTC has done in certain instances with central treasury centers for example and the clearing relief granted to such entities, but I think it could look more broadly at whether all entities who are subject to the clearing requirement indeed contribute meaningfully to systemic risk. Because if the conclusion is that not all of them do contribute to systemic risk, you can take that cost issue, that two basis points away for some subset of the population where arguably the clearing requirement is not necessary for carrying out the CFTC's systemic risk mitigation objectives.

MS. WALKER: John Nixon?

MR. NIXON: Thank you. First of all Sharon, I apologize for my tardiness, but one of the embedded rules in footnote 88 is that Delta doesn't fly in the rain anymore. (laughter) I'd like to make two comments. Actually the first comment I would agree with. I just make a comment with what Isaac and Rana said. You know there's no doubt that liquidity is episodic in every single market. Whether it is 1995, 2005, or 2015, you are not going to be able to come up with a single definition of what liquidity is in a marketplace. It changes every single second of the day. And so it is very hard to measure it, I think, from any quantitative perspective. But I would say one other thing. That prior to the financial crisis, I don't think that people recognized just how big the banks were in trading in the marketplace. I don't think people recognized -- and I'm not saying this was a bad thing, it was probably a good thing -- but they were a big part of the marketplace. I'm not sure we measured what that part of the marketplace was, but maybe it was 25, 30, I don't know what percentage it was. But it was a big part of the marketplace. And over the course of the last five or six years with the financial crisis and the changes that have come in place, and whether it's the cost of capital or it's the rigor around regulatory, legal and compliance, or whether it is the fact that you know the Volker rule is being implemented, or banks just do not want to take risk, because they don't feel they're getting rewarded for it. You have removed a big part of the liquidity that was in the marketplace. When I say -- the market is less liquid than it was before because there is an absence of a major player that was that there previously. If you have five men on your hockey team and you're playing against another five men, and you take two guys off the ice, and play four on four, the game changes. It gets faster. It gets more unpredictable. And I think that we have to recognize that the marketplace that you live in today is not going to be as deep and liquid as the marketplace that we lived in before, and the main reason is, the components and the ingredients that made that market liquid have gone. They've been changed. And the introduction of some market makers is very very welcome, as Isaac has said and others that are there. But they're not going to fill the void of what has been probably taken out of the marketplace. And therein will lie the problem, when you have to have hedging done over the course of the next couple of years when markets move. It will be more difficult than it was before because there will be less people that will stand in there and take the other side of the trade.

MS. MCLAUGHLIN: Bill Hale?

MR. HALE: Thank you. I can't really express the thoughts on market liquidity better than John just did, so I don't want to attempt to do that, although Delta does fly in the rain. It just takes 12 hours to make a two hour flight. I can tell you that from last night. (laughter) The area that I'm most familiar with are really the Ag markets and all I can say is, on a daily basis, from how we're able to manage our risk -- how we manage risk for our producers, or our end use customers and also provide price discoveries, I feel like the liquidity is there today in Ag markets to really do that and in a fairly good fashion. But we are becoming increasingly concerned about a number of rules and regulations that can affect liquidity of individual markets. One of them is the issue of the FCM market and Commissioner Giancarlo articulated very well -- I read his remarks this morning. I couldn't have written it better than he did. So that's a big concern. We also have lots of unknowns on the positional limits rule and some of the issues that FCMs are facing on capital regulation. So I think there's a lot of unknowns yet for the Ag market that are yet to be seen but I think today we have the price discovery and the ability to manage our risk on a fine basis at the moment now. Is that going to change? It's yet to be seen.

MS. MCLAUGHLIN: Andrew Lo? 4: So I

want to comment on a theme that's been raised by a few of the panelists as well as the committee members, which is the fact that liquidity is hard and perhaps impossible to measure. So I want to first start by agreeing with Isaac Chang that you can't manage what you don't measure. And so it's absolutely of paramount importance to measure liquidity, but where I'll push back on his and other comments is the claim that you cannot measure it. I strongly disagree with that and would be happy to volunteer the services of my students and colleages at MIT, if you send us the data. We will come up with measures of liquidity for you. The reason that I think there is a bit of a misunderstanding about the nature of liquidity is because liquidity is not a single concept. It's much like personal health. A person is healthy, is a very vague statement and it's because, from the academic perspective, there are three qualities of liquidity that really make up the definition. A security is liquid if it can be traded quickly, if it can be traded in large size and if it can be traded without moving prices. Those are the three characteristics that define liquidity -- price, time and size. That's it. And so, the reason that you have different definitions for liquidity, or so it seems, is because different markets have different characteristics of price, time and size. But it doesn't mean that it's hard to measure, it means that you have to use a three dimensional object as opposed to a one dimensional object. And it's paramount to use those three dimensions in different markets, because what we're seeing I think, is a change in the ecosystem of the financial markets with respect to liquidity, and Rana pointed that out by observing that some markets are becoming more liquid because other markets are less liquid and the capital is flying from one to the other.

So I want to first offer that we, I think, can measure liquidity if we are willing to be a little bit more expansive in how we think about it. And if we have the data to be able to apply to it, and that Tom's comment is absolutely correct, that liquidity changes over time and circumstances. It doesn't mean it's impossible to measure. It seems that we just have to do a little bit more work and I think there are a number of us in academia that would be happy to help out.

The second comment I want to make is about that eco system. I think that the characteristics of liquidity have changed. Part of it is intentional. The fact that capital requirements are higher, many would argue, is a feature, not a bug. However, there are some unintended consequences of the change in the eco-system and we've already heard some comments about how the sell side has changed thanks to Volker and the fact that now, we no longer have designated market makers. But I think a more important confluence of events is the combination of technology and how it's interacted with participants in the marketplace. It's true that we now have a larger proportion of counter parties that are trading as so-called fair weather friends. They can pull liquidity at a moment's notice. But part of the reason that that happens, is because we've got technology that really has facilitated the ability to be able to move liquidity around much more rapidly. And just like we have the flash crash, and now multiple flash crashes in different markets, that's a symptom of this fact that we can move liquidity at a moment's notice. So I think that it's important for us to study the entire ecosystem, to try to understand not only how to measure liquidity but who the participants are in the marketplace and what their incentives are for providing liquidity and how quickly they can withdraw it before we can understand whether or not liquidity is something that can be managed and what the appropriate remedies are for dealing with regulatory oversight.

MS. MCLAUGHLIN: Thanks. Just following up on the point of the need and the importance of measuring liquidity, for those of you who do think about metrics of market liquidity in the markets that you're active in, I think it would be helpful for us to hear a little bit more about just the fact pattern on the ground right now, in terms of where is liquidity, maybe decreasing from recent past, increasing, whether how you see linkages between different segments of markets. So I think I'd particularly welcome any comments on that, because I think that's a question that we have, and it's very difficult, not as a practitioner to see exactly what's happening.

MR. CUTINHO: I'm sorry, my name is Agenda for today (laughter) Because I don't have a name card. That was my joke. I don't have a Delta one. (laughter) So I don't think I -- before I answer your question very directly, I think I want to make a subtle point on two perspectives. One is we, while Professor Lo and his team are measuring liquidity, there's one thing we all can agree on, is we need to make sure that markets have a diversity of participants and access for these participants. I think to Rana's point, what has happened with some of the rules -- some are well intended, some have -- we don't understand what the intentions are. Well, what some of the rules have done is, for brokers or intermediaries that provide market participants access to markets, they have made it really expensive. In effect, some of these clients are losing their access to the markets. Now of course, we are asked questions, can you quantify it? There is news out there. There are changes in prices, one. You know there are institutions that have rejected about 100 of our hedge funds from accessing markets. That's another anecdotal evidence. Of course I think as a group we could work and we could give you a list of market participants who are rejected access, but that is one thing that we all have to worry about. If our intent is, you know, you want vibrant markets, with broad diverse participation, okay, of course you can measure these things, but we have to make sure that we don't put in rules or structures in place that limit participation. And we feel that some of the leverage ratio rules and the way it is applied for client clearing really impacts that.

The second thing, I don't know where this discussion about CME, LCH basis is going, but some of this is an outcome and everybody is looking for a cause, right? And we don't know what the cause is. We've been told in some of our discussions that there is a general imbalance in clearing between payers and pay fixed and received fixed players. So issuers of debt are natural receivers of fixed rates. And one of the theory goes that since these participants do not have to participate in clearing, it creates a bifurcated market, a cleared market and an uncleared market. I don't know if that is the cause of this, but one thing that we have to -- I want to speak to, is essentially this. Client choice is of paramount importance, okay? And it has led to transformation in this market, as Isaac pointed out. It is a much better place than it was in 2008. Even in the clearing world, things have transformed. Real time clearing is in place, and non- enmity of execution code executing counter parties to clearing members is in place, netting compression or coupon blending, and transparency in the market. So all these are good things. So I don't think this should be a reason to start discussing better client choice, is the problem. So it is important for us to note that the basis is just an outcome. It's important to understand where it's coming from. I don't have all the answers to look at it.

Now answering your question directly. I'm sorry I'm taking such a long time. As far as liquid central limit order books are concerned, there are things that Isaac mentioned that can -- that are measures. You have depth, size and prices. You can see all of them. If you look at all the three dimensions that Professor Lo pointed out -- time, size and price, you can see that very transparently in the market in real time. That, and that is basically what is attracting a lot of market participants. I think you have similar structures in non-central limit order book markets. We are not suggesting that all the same structure applies to everything. But the problem with measuring the impact is the question you're asking. The problem is, some of these impacts have taken several years to play out. So you have to go back in time and see what the implications are, the changes and trends are. It's very difficult to look on a real time basis and come up with -- this is the impact to liquidity and this is the cost.

MS. MCLAUGHLIN: Kristen Walters?

MS. WALTERS: Thanks, so just thinking about liquidity. So certainly we've seen the nature of liquidity change over time. I don't think that we've experienced as an asset manager significant changes in our ability to access markets. But certainly the way that we do it has changed. So in the context, while bid-offer spreads may not have changed as materially as we would have expected, we do have to transact in smaller lot sizes, and there are pockets of illiquidity and certainly vol a vol which is more difficult to measure as a significant issue. We've adapted our trading infrastructure and process to address this and it works largely well, but I think it's very important to talk about capacity. From our perspective I think we think of capacity as being more of an issue than liquidity.

So Andrew talked about kind of the price, time, and size factors allowing you to measure liquidity and that's true. And we use -- you know we've developed transaction cost models as have others to use that information to determine market impact of trading, size that we can move, days to liquidate and so-on and so-forth. And those measures work very well in what we've called in previous sessions kind of peace-time or normal markets. What happens is they don't work very well at all when the market is highly illiquid. So, and at those times, capacity becomes a very major and I think from my humble perspective, difficult thing to monitor.

So when markets are no longer liquid,

and they're very illiquid, capacity is something that is very difficult to quantitatively measure. So Andrew, certainly, if you have any ideas on that, we would welcome it. The other place where I think we see capacity as an issue and we talked about this in the inaugural discussion we had about you know CCP risk. So, absolutely there has been an impact on clearing members and FCMs from the capacity perspective of increased regulatory limits on liquidity, leverage, RWAs, and that impact is very real. I think Emily talked about the difficulty of a clearing member stepping in to support another clearing member in the instance of a default. Similarly, I think we believe there are similar issues around concentration of FCMs and the impact on liquidity. Absolutely, regulatory capital and other requirements impact the ability of large banks that are acting as FTMs to function in the market in a way where they actually earn sufficient return in capital to their business and have the balance sheet that is actually available and useable when there are liquidity issues. So I would welcome other's thoughts on that, but it's certainly something that we're concerned about and spend a lot of time thinking about.

MS. MCLAUGHLIN: Anat Admati?

DR. ADMATI: Thank you, there are a number of terms that have been thrown around here. So I want to try and head back a few things. I actually spent a lot of the first part of my career thinking about market liquidity, and so this word, that's thrown around and then you have other related words, needs a little bit of a clarification. Why is size mattering? Why all these things? Well, the treasury market is very different than other markets because there's more uncertainty about the value, potentially by the counterparty, there's more potential for differences in beliefs. And stress time means people might get nervous about asset or counterparty and things change because there's different information and so counter parties are not willing to -- not agreeing quite on what the thing's worth or having their own funding problems or some kind of credit crunch.

So there are many reasons why liquidity might evaporate in a market. And they go to some level underneath some exogenous sudden thing. They have an economic meaning. So liquidity is something that everybody loves to have. But you have to think about what it must be at a given time, what it is, and it is what it may have to be. So that's a little bit about market liquidity and there's more there to discuss. Then you get to the point of liquidity requirements. And there, I'm not a big fan of those requirements. There are a lot of assumptions that are made and they're quite restrictive and costly. And so I can see that they would potentially distort what can happen in markets. One of the things that is definitely wrong in this discussion is that anything to do with leverage which is something that I focused on very strong the last six or seven years and actually beyond, which has to do with capital. That if any of that interferes with liquidity at all, if anything that's done there is somehow seems difficult it's because it corrects something that was wrong before. Lots of companies in this economy work with virtually no leverage at all, but there's no reason that any company needs to work at the levels that we're talking about.

The fact that dividends are being paid, rests the case entirely. There's nothing that can't be done with equity funding, so any connection that's made here between the ability of the market to provide liquidity, and the leverage of those providing it, is wrong to the extent to the policy context. So on that, I think the connections that are made are wrong. On other things there might be some points, but I think what we must recognize is that liquidity is not something that is a birth-right, it's related to something that we can just kind of demand the world to have. It's about market participants and how they're going to interact in a situation given their information and given environment and we've got to treat it as something that does change with the situation and that's just the way it's going to have to be.

MS. MCLAUGHLIN: Jerry Jeske?

MR. JESKE: I'm here for the commodities market council which is comprised of a group of end users both in the Ag world and the energy world. The discussion thus far has focused on rates quite a bit and I know Bill mentioned the agricultural world a bit but I'd like to mention the energy world here for a moment and also speak to terms of end user participation in the liquidity pool. I think Susan, you asked a question about linkage and I think it's very important for the commission to see the linkage between of course the listed futures and that which they can't see which is our bilateral swap activities. A couple folks have commented so far. I think Isaac mentioned that linkage earlier, but certainly what took place in the over-the- counter market which today the commission still can't see, is very relevant in terms of liquidity.

Juxtaposed to what is existing in the futures and I'll point specifically to Henry Hub for as an example, you look at 2013 Henry Hub open interest, immeasurable for our academics in the world, open interest has fallen from 2013 and Henry Hub to today. And you look at -- I don't think it's any coincidence the regulatory regime that has taken place, whether it's becoming a swap dealer, whether it's becoming under the auspices of the Volcker Rule, or our friends in the Basel Committee who have now added some constraints to the entire process. But that open interest figure is reducing. There may be other reasons for it, but I think that's just a fact that we have to consider. When you couple that with the swap activity which takes place down the curve, I'm talking, 2018, 2019, 2025. It just isn't there anymore. Talk to any of the energy participants who used to make markets or otherwise were willing to commit risk capital because oftentimes when you're building a power plant or when you're investing in infrastructure from the standpoint of storage facilities, you have to make these long-term investment decisions. Certainly the liquidity or the ability of folks to take risk in that space is definitely impacted, over the last 6, 12 months.

I think a couple commenters mentioned, Luke and John, specifically spoke to the lack of bank participation. Well it's clear, many of the banks are no longer in those markets at all. So whether you're talking about long-term oil, natural gas, power markets, all of these long dated commitments that were out there aren't there anymore. So in terms of willingness of people to participate, I think the real concern then is how do we move into a cleared environment? And with the challenges and the lack of FCMs that are out there right now, and the capital constraints, there's some serious concerns I think and I think they're valid concerns when you -- you know you may have some opportunity to create access to clearing facilities that were no longer viable under the Basel Rules, sponsor principal is one, maybe we'll talk about that a little bit more, but certainly the market participants I think have a need to find different avenues in to a clearing house, and without the capital constraints.

MS. MCLAUGHLIN: Glen Mackey?

MR. MACKEY: Thank you, just to echo Jerry's thoughts a bit, and I look at it very simplistically. When and end user, whether it's a producer or an end user in a commodities space, looks at their hedging practices for example, typically you have market risk, in the form of price risk. You try to mitigate that, and historically that's been done by essentially transferring that to credit risk in a bilateral swap market or something of that nature. And then, typically if you're not comfortable with the credit risk, you mitigate that by moving into a cleared product where you essentially deploy additional capital to remove the credit risk.

That's sort of the continuum of risk mitigation from an end user's perspective. The challenge is, is when we look at liquidity, as an end user, we don't look at just time, size, and price. From a physical commodities perspective, specifically in the energies and the soft commodities, when there's a manufacturing component, we look at location, we look at time, we look at quality, because there's quality differences between the various commodities that we either produce or have to acquire as an input into another product. And then we look at the production or the production volumes.

And any time you have a reduction in the number of market participants that will participate in a market, typically what happens is you find that you have to accept, as an end user, more risk. Whether that's volumetric risk, whether that's overall locational risk, because clear products don't trade at generation nodes, or at the wellhead for producers. So typically, it's really a function of what risks are you trying to mitigate and what are you prepared to trade off against? So that's the continuum that we see.

The biggest sensitivity assets, and when we look at liquidity, it's the ability to execute a hedge in a market at the location for the proper time period and also in the proper quality.i.e., in a light suite product, potentially not a WTI or a Brent or at a physical location in nonhomogeneous products. That's what we see happening in the market is, whether it's banks or other market participants or intermediaries that wear the risk between the producer and the ultimate end user, if they go away, liquidity is harmed in some form or fashion. And you'd have to take on other risk burdens to compromise for it, or account for that.

MS. MCLAUGHLIN: Gerald Beeson?

MR. BEESON: There's actually two different points I wanted to make. One was, and in the point that John made around the fact that the game is changing, I think actually ties in a bit to Andrew's point on transparency. So first I think when you look at from the changes in the marketplace there's been a lot of discussion around what's happened with capital rules, what's happened with Basel, but the reality is there's also a change of business models afoot as well. So when you look at it in terms of the different divisions within the banks, they're going through this change from what was previously a voice brokered market, you're removing a level of opacity, spreads are compressing, and you have the cost structures that are involved with those as well. Because there's another component of rationalization of balance sheet that's made available on the back of looking at that, your return on equity.

And so ultimately you've got this seismic shift I think happening within the banking community, but at the same time, with new entrants coming to the marketplace, I think there is technology available for newer entrants who are able to quote tighter spreads, to quote risk more actively, to be able to have more reliable and efficient during tighter periods. So when I look at our market makers, and example during the monthly nonfarm payroll for civil securities, we will continue through those, those periods of information to quote tight spreads on the screen, we'll often see our future competitors either widen or disappear. And some may argue it's because of a changing market dynamic. I would argue to Andrew's point, it's actually just what used to be a more opaque happening in the marketplace, now just happens on the screens now.

And so ultimately I don't think you can just draw a necessary correlation that there's the transparency is causing different changes in the marketplace, ultimately it's just bringing light to something that was likely a historical practice in the past. The other point I think is that from a participant's perspective, we talked a lot about liquidity in terms of what's happening. I would argue liquidity still is significantly fragmented today. And so ultimately you have the dealer to customer community which largely operates in the same way it did before, just on an electronic platform. So you still have the -- in terms of multiple dealers to customers done through either

Bloomberg or Trade Web and RFQ and you still then removed from that have the dealer to dealer community such as the two pools of liquidity aren't necessarily interacting with one another. And if the rules are designed to be able to have this open access, ultimately I think they're seeing more users have the ability to be in the anonymous central limit order books, or to be more involved and choose a trading across a broader spectrum of these pools that will ultimately I think give us a better measure as to actually how liquidity can be measured in the marketplace.

I think with the current structure it would be difficult to just say, what is liquidity like when you don't have a true exchange of liquidity between all participants in the marketplace.

MS. MCLAUGHLIN: Marcus Stanley?

MR. STANLEY: Thank you, I feel like it's always my role at these kind of events to wave the bloody shirt of the financial crisis. But since no one has done it and it is in fact the reason and the motivation behind these new rules we're making I'm going to do it here. Over the period prior to the financial crisis we saw a period of very rapidly declining transacting costs and very rapidly increasing volumes. Someone mentioned vibrant markets. Markets could not have been more vibrant than they were over the period just prior to the financial crisis. Now this market vibrancy did not pay off in economic growth or investment, even in the years immediately before the financial crisis, and of course it resulted in a cataclysmic financial crisis that was marked by the very rapid disappearance of liquidity. Liquidity that people had thought was durable but was revealed as fragile. Why was it revealed as fragile? Because market makers were overleveraged and overexposed, and so they were crippled in their response to pricing changes and their ability to get into the markets and respond when markets were dislocated and in fact they had to contribute to market dislocation by selling rapidly in order to pay back and respond to the leverage pressures they were under.

And these participants were frequently major banks, and because they were major banks their effective failure had disastrous effects on our broader economy. And this is the pattern of financial crisis. Financial crisis are not historically linked to moderately higher trading costs, or additional inconveniences for some additional inconveniences for market practitioners in normal times. They're linked to overleverage, to excess leverage by key market intermediaries and they're linked to fundamental -- to issues with fundamentals.

So a number of participants actually have pointed, we just heard from Citadel and I think Isaac before that some of the things that we're seeing now are the surfacing of risks that were hidden before the crisis that the regulations are now sort of forcing people to deal with it in a more explicit manner. And I think that is going to lead to changes in market patterns, but I think it's healthy.

A couple of other quick points, people have talked about the capital costs associated with clearing, I think that's a little ironic given that our committee is so focused on the risks to clearing houses. A very significant amount, the bulk of the loss absorbency for clearing houses is always going to have to come from clearing members. The only alternative is that it comes from client customers or it comes from the public. So I think that to the degree that capital costs associated with clearing are about improving the durability and loss absorbency for clearing houses I think that too can be healthy, although we do need to look at coordination of those costs.

Another point, I think we're seeing an unfortunate sort of conflation here between the debate over electronic trading and the debate over bank capitalization and regulation of the big bank dealers. We're being presented with what I think is a false choice between the excessively leveraged over-the-counter intermediaries that we saw before the crisis, and some kind of electronic trading Wild West that we're being presented with as potential evolution of these current markets.

I think regulators have got to be able to respond to the problems revealed in the last crisis, and regulate around new emerging issues that may be coming from electronic trading and computer technology at the same time.

MS. MCLAUGHLIN: Susan O'Flynn?

MS. O'FLYNN: Whoops, thank you. I just want to tie back to you know what we've observed, especially in the dollar rates market, and the CMELCH imbalance. And I think I want to tie it back to liquidity and capacity are effectively I think absolutely, they're partners. Because ultimately a dealer wants to create as much capacity to continue transacting with clients and that capacity will come from creating resource efficiencies by how you execute your business, clearing is obviously key to that. And obviously since the mandate we've seen huge -- you know the growth in clearing and the prime example being the dollar rates fixed float situation that we've seen evolve between CME and LCH.

Now, the cost of obviously clearing are obviously different at two different CCPs and it comes back to Isaac, what you said at the very beginning, there is a different kind of price for each CCP, but historically that has probably not been passed on by the dealers to their clients or correctly assessed. So I think what you're seeing now with the emergence of the basis is, is reflecting how dealers are going to create more capacity to continue be able to trade with clients. And I think as well the market has its own way of evolving. Because we've seen the switch market evolve to effectively be able to manage and be able to understand what those margin costs are, and I think the market has a way of creating liquidity in another product, and we've seen the liquidity in that product evolve materially in the last couple of months. And I think that's an interesting thing to observe. We've also seen that clients are now looking to clear at alternatives to CCPs so you know I think it doesn't mean the shift of liquidity may be from one CCP to another, or change the price of executing swaps because there is a real liquidity price to the institutions who are on the other side of that trade.

MS. MCLAUGHLIN: Emily Portney? No? Rana Yared?

MS. YARED: You caught me off guard there. I want to pick up really on something that Susan just said which is that capacity and liquidity, they are sisters in this process. And one of the things that we have to worry about is that while liquidity, as Andrew has said is very measureable, capacity is a very private choice, right? Every bank makes a decision about the way in which they want to allocate the scarce resources which they have, and all kind of jokes aside, we're ultimately in the client servicing business, right? So we want to be servicing as many of our clients as possible and as many market conditions as exist.

But the reality of the market is that diversity of views have gone down for all the reasons John Nixon had mentioned, and finding capacity has become increasingly challenging notwithstanding the evolutions in the dollar rates markets that Susan has just mentioned. And so one of the things that we're faced with is potentially different levels of service and different pockets of client basis by the banks, and notwithstanding the point that liquidity is not a God-given right, we should as a group of market participants trouble ourselves with the questions of do we really want to be creating call it multiple tiers of access in the market?

And the independent part of GS which is our global institutional research arm, has spent some time thinking about what they're calling the tier, the two speed economy, which thinks about some of the impacts of having different types of access in different pockets of market participants.

The last comment I just want to make

before I close is that while we definitely welcome the participation of Isaac, and Citadel, and other market makers into the market because they are replacing some people who have exited. I want to emphasize that on a general basis, the compression in spread in small trades, while welcome in that particular segment of the markets, my earlier point has actually not been indicative of an increase in liquidity and greater access to markets as the size of trades get larger. So while the problem is being solved in smaller sized trades, it's not being solved in larger sized trades.

And while clients may choose to change the style in which they trade as I think Blackhawk had pointed out, trading in smaller sizes, ultimately a lot of small risk equals big risk and we need people in the markets who are willing to take on the large risk of particularly structural end users who need to hedge?

MS. MCLAUGHLIN: Thank you, Sebastiaan?

MR. KOELIG: Thank you, I wanted to echo

some points that Isaac made at the very beginning, I agree that actually I think measuring liquidity is definitely possible, I do also think it's different from a moment to moment basis. As a market maker typically you try to find the equilibrium, we're not taking positions for a very long period of time, as Isaac said as well.

So you're trying to find an equilibrium between buyers and sellers, and in a time of uncertainty, it's harder to find that equilibrium which means given the limited amount of let's say capital and limits that we're allowed to work with, we're going to have to spread that across a larger amount of prices to provide the same amount of liquidity. If we were to continue to do the same amount of size on the prices that we show, if the markets indeed have that uncertainty, we won't be able to provide that liquidity any more once the markets move further away from where we started to trade at the time. So given that, if volatility goes up, and Gerald also mentioned this on nonfarm payroll figures. If there's less certainty as to what's going to happen in the near future, it's harder to provide the same amount of liquidity given that there's a constraint on capital as well as limits that you're available to trade.

And I think to Dr. Admati's point, I do understand that maybe the leverage ratios in some of these markets might not have been where they should have been according to you, the fact that if they change, this is going to take away some of our possibilities as well. And I think Rana just pointed this out as well. If there's limited resources available to do things, if we lower those resources further it's going to be harder for us to do the same thing.

MS. MCLAUGHLIN: Thank you, Commissioner Wetjen?

COMMISSIONER WETJEN: I just wanted to follow up on a point Rana made. Is there, are there -- is there anything especially negative or disadvantageous about having to execute at a smaller size? Help us understand why that is an evolution that might not necessarily be a positive one, if I understood your remark correctly.

MS. YARED: Sure, so I think my remark was that it's not prima facia of the positive one. In certain cases, it can be. In other cases, it cannot be. So some of the cases where our clients have observed to us that that is a disadvantageous moment would be in places where execution costs are charged by numbers of times which you execute, so let's say you have to execute 100 times to get what you would have done one off, you're not only paying the bid ask but then you're paying the execution charge every time. In that kind of a market it could be disadvantageous. It could also be disadvantageous in a market where the client wishes to transact in large size because they are not actually managers of let's call them, active moving markets. So they want the peace of mind of, I've executed once, dealer, market maker, whoever, has taken that risk off of my hands and now they're the professional risk manager who's going to manage the market moving because nonfarm payrolls happened, et cetera.

So for people who aren't professional risk managers, being forced into a situation where they have to deal with the friction or the slippage as they dice up their order, could be very negative for them. So again it depends on the market participant. But we shouldn't rely on being able to chop up the order as a prima facia better way to transact, because again every client transacts and has set themselves up in a different way.

MS. MCLAUGHLIN: Thank you, I think we're going to do one more question. I'd like to give Dennis an opportunity to speak and then I'd like to try to move to the next question, so my apologies to those with their tents up, but maybe you can get in on the next round.

MR. MCLAUGHLIN: Thank you. I just might give the perspective from LCH on the liquidity. Because we have about 150 billion U.S. Dollars equivalent of margin that we have to place because people give us margin. And we operate under the Amir regulations, and the CFTC regulations, but in particular the Amir regulation says that no more than five per cent of that number can be invested unsecured. So that means, what do we do with the other 95 per cent. So that forces us to be a large repo player in the market. And we have found as well that the capacity for repo transactions is getting less and less. Obviously, this has been a theme that has reverberated around this table, but we feel it first-hand.

The other part of this is that for client margins that come into us, they have to come back every day. The cash has to come back every day. Just the one day on it. So that puts further pressure on our repo capacity within the market. And as we all know, the regulations are pretty punitive now in terms of liquidity ratios and liquidity capacity. So that's drying up.

So what we've seen is pressure now coming from end user clients to become members or to try and access clearing houses directly. And that's created a few challenges because for one you have the credit challenge that was mentioned earlier. Because maybe not all of these people are prime and that creates an issue of introducing sub-prime risk into the clearing house which is not optimal.

The second one I think is that, is a deeper one, which many of these players and many of these end users are not allowed to mutualize their risk. Now, as we know, the clearing house works on mutualized risks, which throws off a certain cash balance which is used to manage the liquidity. Should you then allow people to take advantage of that mutualized liquidity, if they're not actually mutualizing the risk -- that's a conundrum that we have to face.

And the third biggest challenge I think is that there are certain sectors which are typically one directional. For example insurance companies, where the clearing model doesn't really work that well because they have -- if you to put them in clearing just as they stand, they would have massive IM calls because they're not hedging, they're just straight IM risk. So we haven't really figured this out yet, but there are a lot of challenges to allowing the end users to operate and to try and compensate for the drying up of capacity that we're seeing.

MS. MCLAUGHLIN: Okay, thank you. Just in the interest of time I'd like to try to get to our next question which is about the imp -- how market participants have responded to the changes that we have seen so far and I think any comments on implications for market functioning and market risk would be of great interest to us. Anyone? Isaac do you want to take that?

MR. CHANG: Sure, first I'd like to actually thank Professor Lo for clarifying my comments. I hope -- perhaps it wasn't clear. My thrust wasn't that we shouldn't be trying to measure liquidity, I think absolutely we should, the point I was trying to make in the opening comment that I made is that we don't have the data today to be able to accurately to do that. I'd actually, and I'm jumping the gun a little bit towards the question towards the end of the list, but I can see how engaged and how many questions come up so I'm going to run the risk of jumping the gun slightly and saying one of the things the commission should be focused on is increasing the level of market data, both on a pre and post-trade transparency basis so that we can do things like accurately and end-monitor liquidity.

Maybe because I'm in D.C., but this analogy came to, but, echoing some of the thoughts that some maybe has come up already. Liquidity does not sit alongside life, liberty, and the pursuit of independence in the Declaration of Independence (laughter). Liquidity is, at the end of the day, liquidity provision is a service which needs to earn an economic rate of return. And as a market maker, you know it's obvious to us but sometimes when you talk about or where you hear discussions about liquidity in the marketplace, it sounds like almost as though it's somewhat of a public good. And you know there is an economic rationale to say that maybe it is a public good and then it should be just subsidized by the government, and I'm not recommending that route at all, but that's what economic theory would say if it was a public good.

I think it's worth seeing, it's worth pointing out that liquidity -- we need to understand what it is and isn't and what behavior can change and what can't change maybe to kind of get to your point of your question. And this comment hasn't come up but has come up a lot in the press. There's probably a Bloomberg story every other day about the oncoming onslaught of fixed-income selling that's going to happen once the Fed starts to raise rates. And certainly I don't underestimate the capacity issues, the size of issuance in the fixed income market, the shrinkage of dealer balance sheets, the size and asset managers. Assets and their management, that's all out there and I think pretty public information. My point is though that no amount of liquidity provision, no liquidity provider who's economically rational is going to stand there and provide continuous liquidity in the face of new information which changes the fair value of an asset and I think that needs to be recognized.

If, for example, the market prices that the Fed is not going to hike in September, and then all of the sudden new information comes out which leads the market to believe the fed is going to hike 200 basis points in September, no amount of liquidity -- I can tell you I sat pre-crisis on a bank desk. I would have gotten fired so fast if as the market was selling off all I did was sit there and buy from customers because we wanted to watch the position ride against me as the market sold off.

In the face of newer information markets re-price, you can't avoid that. That's trading. Losing money in that situation is not no liquidity, it's you have a bad trade-on. I don't know how else to put it. I don't want people to think liquidity is a panacea that banks or frankly even having spent time on a market making desk at a bank, even pre-crisis that that would have changed. The role of a market maker is not to stand in the way of a one-way freight train where you know where it's going. Your job is to make a market around where you think the fair value of the asset is, and that changes as newer information comes in the marketplace. So I just wanted to get that out there because I don't know -- I feel like sometimes I hear some of the comments and it feels like liquidity is this magical thing that's going to keep everyone from losing money. I've never traded in a market where that's the case.

I would just say, I think in terms, yeah we are seeing changes in market behavior, I think we're in a transition period in the market structure, clearly, right? You have the pre-crisis, most liquidity in the over-the-counter FIC markets were provided by a small number of highly concentrated systemically important institutions. Most of the post-crisis have been focused about reducing leverage in the system and reducing the systemic risk at the end of the day to the taxpayer. Put simply, you could argue I think, correctly that the liquidity that was observed pre- crisis was subsidized by the taxpayer. In our view it would be a mistake to roll back those reforms for the sake of re-creating the same set of issues. That doesn't mean every role's perfect, that we should be open to modifying some of them as the panelists have suggested.

But what I would say is we should be focusing on evolving market structure so that we have a broader and more diverse and a larger number of smaller liquidity providers to, in the system, where no one of them is systemically important. None of us, well, I don't think any of us want to go back to, who were active in the markets back in the fall of 2008 want to go back to what I think now is commonly referred to as another Lehman moment. And the way to do that is to encourage the development and the creation of new capital, and the way to attract new capital is to -- A, eliminate artificial, arbitrary access criteria to the extent that Sneel already brought that up. I think it's to increase pre and post-trade price transparency so that there's a more even playing field and access to information. And it's to incentivize I think experimentation in market structure. Because the American economy over time has proven to be a largely free-market system, when stripped of anti-competitive or incumbent protecting type features, has generally proven to be pretty amazing about evolving to meet the needs -- a need in the marketplace.

And we should be encouraging new models and new business models to spring up. Many of them will fail, but some won't. And it's not our job, or it's not the regulators, certainly the role of regulators to define what those new business models should be, but to set up the environment such that these new models can flourish. I'll give my other panelists a chance now, to respond.

MS. MCLAUGHLIN: Thank you, thanks Isaac.

No, I definitely think we're in a period of transition and we're definitely seeing the smaller pools of capital coming to the market. I think the point that the FCM committee is trying to make is, how do the FCMs support the market access that those smaller pools of capital need to have in order to be effective and that market access is something that for the moment has, under the current set of Basel capital rules, has some significant implications for the capital footprint of the FCM business and the ability to absorb, especially incremental activity, as a function of stress scenarios, so one of the questions later on in the discussion, if we end up having time is the concentration among the FCM community.

I think by definition as you've gone from an FCM community of over 200 to something south of 100, definition- ally that means that the absence of one will incur a greater stress risk to the remaining community. And so I think the -- and if you look at the OTC markets, generally the concentration of FCM participants is that much tighter, or narrower, than the participation in the futures markets generally. So when you're looking or planning for a stress event, as an FCM, how do you apportion the appropriate amount of capital, put that appropriate amount of capital aside for a stress event, if you're operating on a fixed amount of capital. And so, as you analyze the risks associated with future crises, if your client community's already using a good portion of your asset and balance sheet, a capacity at a time of normal market conditions, as you enter a period of stress, the availability of additional balance sheet and additional capacity to give to clients who want to bring in additional business from their at-risk clearing member, is an unpleasant circumstance to have to face. So I do think that we need to very carefully look at some of these alternative models that are being highlighted by the clearing community. I think the sponsored access model which doesn't entirely eliminate the capital footprint that the clearing members have to provide but does mitigate to some degree some of the capital issues that clearing members have. I think those broadening -- those methods of broadening access do need to be looked at in the light of current constraints.

MR. WIPF: And touching on market structure I don't think we can overemphasize the current impact on the collateral markets and how they flow through here. I think if we agree that some of the basic underpinnings of the liquid market are resilient clearance and settlement system and a durable financing market, I think that looking at the output of regulation it just means there's just a new framework. If we think that the LCR and the NSFR which do incent better asset liability management, although somewhat blunt and could be a bit more granular are absolutely fundamental to creating that durability and ensuring that there's not an over reliance on short term wholesale funding and you put that together with what the output is -- the fact is that under the SOR these intermediation activities for high quality collateral are treated very differently. And that's just a fact. And I think that's what the industry needs to think about is how do you address that particular item, particularly when we think about the need for high quality collateral. The requirements for that are going up while the intermediation capacity is going down. And I think that's just -- I think that what needs to be addressed really is in the construct of that framework what are the solutions that could get around that? And we think there's a fairly straightforward win as it relates to central clearing of securities financing transactions -- a very very reasonably vibrant interdealer market in central clearing for securities financing both repos and stock loans, and but the remainder we don't have an active participation from the buy side and that's been for a lot of reasons. That's particularly the sell side and the buy side failed to find middle ground on how to actually get into those settings. But that actually could create reasonable capacity in the current framework -- where to the benefits of netting, there will be some opportunity to replace some of the capacity that's being taken out of the system. The fact is that at the current price levels the intermediation of high quality collateral doesn't meet anyone's cost of capital. That's just a fact. But there are ways to actually recreate that capacity through things that actually are generally accepted as really good practices which is to get this activity into central clearing, free up that capacity and be able to intermediate what I think where the demand is coming from. Which is going to be continued demand for high quality collateral as it relates to the changes in money market regulation, as it relates to the demand that's going to come from the posting collateral on a cleared margin. So there's this increased demand -- it's just a reality of reduction and capacity. But there are things that are actually in the realm of the possible and there are some things well underway that could actually begin to free up some of that capacity. But I think when you take that through

-- that capacity in the clearance settlement financing markets could have very positive and profound impacts on this discussion around liquidity as it relates to the assets and the derivatives rap.

MS. MCLAUGHLIN: Thank you, Emily?

MS. PORTNEY: Hi, thank you. A couple of things around just thinking about liquidity holistically, and the way I would think about it and maybe this is very simplistic. But the first part of our conversation was very much around an ability to get a trade done at a specific price and market liquidity from that perspective. We're also touching on and talking about -- and I think it's a very important topic is the ability to get a trade cleared based on the number of FCMs and consolidation in the industry. And by the way, it's no good if you can get the trade down, but if it's mandatory that you clear it, or you can't get it cleared, or if it's too expensive to clear it doesn't matter because it all goes back to the market liquidity that you just can't get the trade done. Because you ultimately can't clear it. So it's very interconnected.

In terms of I think all of my colleagues have said it already but just at J.P. Morgan it wouldn't surprise you -- we measure market liquidity in terms of being able to get the trade done in terms of we think that you measure it in terms of inventory on dealer balance sheets and of course, you know, in terms of inventory of treasuries, inventory of corporate bonds have come down tremendously. And that's actually, especially with corporate bonds, supply has gone up by 50 percent. The inventory that's actually there for dealer activities has gone down tremendously. When you think about -- we look at market depth and that's about what the size of any trade you can do at any particular price point and I think as everyone alluded to that's come down significantly. We also look at inter-day volatility and in many markets that's gone up significantly. So those are kind of all of the different measures in terms of how efficiently can you get a trade done. In terms of clearing, I think it is without a doubt, the number of clears has drastically reduced over the course of the last several years. My colleagues have already said the numbers. When you think of clearing you basically need three things to make the clearing business make sense economically. You basically need operational scale, you need capital, and you need more capital now-a-days, especially if you're a bank holding company. As well as you need liquidity. And I think you need more of all of those things to really make it work. And yes, I do think it is more and more economically difficult to have the numbers make sense. I do think we are operating an environment that is much safer. Both dealers and clearers have more capital and one could argue that some of that was absolutely a purpose of the regulations. The regulators wanted to and frankly should have taken out some leverage in the system. And frankly I think there's a cost to liquidity that is now entering back into the system which is probably healthy. Having said that I think what everyone is just asking about is the culmination of all of the regulations at the end of the day are we going to go past the point where the markets are no longer healthy and you don't want to reach to point where end users are really -- you have to ask the question -- do I hedge at all? That's probably a pretty -- a dangerous spot to be in.

SPEAKER: Jerry?

MR. JESKE: Well that's a great segue because I couldn't completely agree on that one. But I think you mentioned operational scale, Emily just spoke of. And that's what I would like to point out. It think is an unintended consequence of -- I do keep pointing to the Basel III regs, but I think there's two issues with Basel III, as it relates to participation in a clearing facility. So if you have a choice of, pay those that are already in the arena of clearing more money. In the case of end users and I think you mentioned how does it flow down markets earlier on? It's flowing to the customers now. Four to six times is the cost. So if you want to continue to clear it's going to cost you four to six times more. Or go find some way other to do it. But the only other alternative that I'm aware of is self-clear. So if you go to self-clear, take yourself out of the bank models -- then you introduce operational risk. And if you don't have the scale to do that I think there's unintended consequences associated with it.

To get to a point of hopeful regulatory relief, sponsor principal. I think some folks are talking about sponsored access model. I think it's the same thing. And to be able to avail those that aren't used to clearing to the ability and the functional expertise of those that can clear I think is very valuable to everyone.

Sponsor principal model resolves the Basel III on balance sheet. The off balance sheet trade exposure concentration as to an FCM's guarantee -- I think is very similar to the repo market. And I think folks have commented about that and the treatment of that guarantee shouldn't be any different than the treatment of the repos. But I guess that remains to be seen. But I think there's some positives associated with that. Those that are on the European model might speak to more specifics as to how it's going on in Europe in hopes that this doesn't become a cross-border issue. But certainly it's something that might be of benefit to everyone.

Just one other comment. Commissioner Wetjen mentioned about size and ability to get off trades. I think the same is true in the energy and Ag markets as well. Slipperage is important. I can cite to a few different examples. You might have a very larger airline for instance that wants to engage in a hedging program and that airline may not have very many places to go these days in terms of dealing with their supply constraints. You have multinational organizations. You have various friends of ours to the south who have some very robust oil hedging programs, and when they have less places to go and the ability to not be able to do large size it is certainly concerning for anybody who's willing to raise their hand and get out in front of doing such a transaction with such large organizations.

MS. MCLAUGHLIN: Thanks. Go ahead, John.

MR. NIXON: I'd like just to pick up on that one point because I think there's an example of that right now in the U.S. interest rate markets and I say that in U.S. Swap markets. And I think if you speak to most of the swap dealers that are here, you would find that on large corporate issuance days, there is much more volatility and basis point slippage than there was in the past. And really, I think that boils down to, there is far less people, as you have just said, for them, and for those corporates to -- corporate issuers to go to. In the marketplace right now, there is probably a handful of five that you would really think are solid market makers to corporate institutions that will take down large size on corporate issue -- on corporate issuance. There is just not enough people in that marketplace to provide that liquidity. And while I do believe that the Getco's and the Virtues and the Citadels have done an incredible job with their organizations since coming back, it's pretty hard to replace a balance sheet of the sizes of some of these banks. I would also just make a comment that I thought Isaac was very right, that liquidity is not a God given right. And quite honestly, I would think that for a period of time in the corporate bond market, asset managers had almost too much liquidity. It was too good for too long. It's now going to be more difficult for sure. But the more market makers you have -- just because you're a market maker -- you know, if there's a light at the end of the tunnel, it could be a train. You don't just stand there and let it hit you. You get out of the way. But the more market makers you have, the more shock absorbers you're going to have of getting more people back in the marketplace, making prices, and having that rebound probably be more -- you know, better than you're going to have if there's only two market makers. And only the last point I would like to ask, and make or ask Andrew, and maybe you can tell me this, because I know you're a lot smarter than I am, and afterwards, that even if we have the data, and even if we can measure liquidity, and I don't argue with you that I'm sure the MIT graduates can measure liquidity. What I would like to understand from you and we can talk about it later is how relevant that measurement is, if it is changing all the time, every second of the day, the temperature outside today is immaterial, if it changes by 50 degrees every couple of minutes, so I'm not suggesting that if we have the data, that it can't be measured. I guess I would question is, is it relevant at any given time, and if you put on a trade with a measure of liquidity equaling X, when you get out of that trade, if it is 10 times X, you've got a different consequence to your position.

MS. MCLAUGHLIN: Andrew did you want to respond briefly or?

MR. LO: Sure. So, I guess the point is

well taken, that if liquidity changes randomly, unpredictably and erratically, it's going to be very hard to make sure of it, but actually, to respond to the question that's before the panel now, what I think a lot of buy side firms are doing and certainly what we at Alpha Simplex, my other hat, at this asset management company are doing, is, we are being much more proactive about measuring liquidity and developing algorithms to be able to trade around these air pockets of illiquidity. So I think the answer is, you can measure it. You may not be able to get the perfect measure, but you don't want the perfect to be the enemy of the good. You can actually measure pretty reasonable measures of liquidity and now, what you have to do, is to be able to navigate around these rocky shoals. It's become more difficult. And I agree with you and Isaac that liquidity is not a God given right and there are economic incentives for providing liquidity and for withdrawing liquidity. But there is one aspect of liquidity that is a public good, and that is financial stability. Financial stability is clearly a public good and liquidity is absolutely central to financial stability. So while we may not be able to say, do we have too much or too little liquidity, and maybe the lack of liquidity or the lower liquidity is a feature, not a bug, nevertheless, the fact that the ecosystem has changed in terms of who provides liquidity, how they provide it and how quickly it can be withdrawn -- those are all issues that speak directly to financial stability and that is something that's in the purview of the CFTC.

MS. MCLAUGHLIN: Thank you. Maybe I can go to Anat.

DR. ADMATI: I agreed all the way until -- the liquidity is essential to financial stability. That I think I don't follow quite. You can have an appropriate amount of liquidity at appropriate prices and the financial stability is about something else. It's about the fragility of the system, the ability of the system to provide credit to the economy and appropriate services to everybody at appropriate prices. And I don't think liquidity per se is a thing. You know, we want to be able to trade at you know, not having too much differences of information that scares people and all of that. We want to have intermediation, be priced appropriately and people trading if they need to and even if they don't trade, prices can change without trade and this is different kinds of things going on here. So I'm not sure I see the connections.

MS. MCLAUGHLIN: Marcus?

MR. STANLEY: The way I report it is that a liquidity failure -- a sudden dramatic liquidity failure is characteristic of a financial crisis, or a disruption in financial stability. But that does not at all mean that higher levels of liquidity in normal times are beneficial to financial stability or even related to financial stability. They may have a negative effect on financial stability by kind of setting the table for a liquidity failure by over extended market participants in a crisis period.

MS. MCLAUGHLIN: Thank you. Sunil?

MR. CUTINHO: Thank you. Actually I have two things to respond to. One is, I think we are talking about outcomes when we talk about liquidity, whether it's very liquid markets, some gaps in liquidity that are just outcomes. More importantly, you asked your question was how would people respond. So economics would indicate that if costs for some participants was higher and as a result they had quite a bit of, then others should be able to come in and compete those profits away. The problem we have, again going back, is access for market participants to markets. Then this is what our firms -- I'm speaking on behalf of our clearing firms and the community -- the ecosystem. This is the problem. I think we tend to confuse things. Just because we're talking about leverage issue, we seem to think that we are arguing against the intent, which is to reduce leverage in institutions. The problem is not about institutions acting as principle, the problem is institutions acting as agents. They are just a conduit. They are providing our market participants access to markets. So they are not taking on any leverage. They're essentially allowing these unlevered market participants to access markets for hedging reasons as Dennis eloquently pointed out. Take for example an insurance company who has directional risk. They are putting up margin for it but they have directional risk. We have rules now, under Basel, supplemental leverage ratio for our clearing firms that dictate that all of that insurance company's risks have to be reflected on their books for leverage calculations without giving them the benefit of offsetting that with a margin that has been collected, segregated and in the U.S., passed on to the CCP. So this is what we're talking about. So we are not speaking to the principle side of the equation. We are speaking to the agency side of the equation. So if you have rules that prevent access to the market participants, and these are market participants who bring hedging interest, that will encourage more market makers to come into the market. So this is the problem we are talking about. So in essence, we have to just take a step back and look at the set of rules that we have, and see if our clearing members can actually provide services and then hence, bring in more market participants, diverse I might add -- some being market makers and some being price takers. So, that in essence is what we are speaking to, and we seem to confuse the two things.

MS. MCLAUGHLIN: Chairman Massad?

CHAIRMAN MASSAD: Thank you. I think it's on the agenda, we're going to, I think, cover some proposed solutions, so I'm happy to -- so I can wait, actually that's what I was going to ask, so if it's better to wait, I can do that as well.

MS. MCLAUGHLIN: Yeah, you're actually anticipating what I wanted to kind of throw it open at this point to address the final two questions on the agenda, kind of collectively, since we are running out of time. The solutions to the liquidity challenges that you see, and then more specifically, are there things that you would recommend to the commission that they be thinking about looking at to address some of the challenges that we've discussed today?

CHAIRMAN WETJEN: I'll just say it quickly. I'm hearing thematically in like three different things, but before I touch on those, a lot of the discussion has been around accessibility and it relates to capital requirements, which we have no control over here at the CFTC. Chairman Massad has spoken about that. I've spoken about that publicly. I think Commissioner Bowen has probably spoken about that too, so all three of us have expressed our views on that, and meanwhile, we have staff engaged with all the various prudential regulators around the globe, engaged on the matter as well. So we're working on that in any way we can, but at the end of the day, we don't have authority over that specific issue as everyone knows. Meanwhile we have a piece of legislation that we've been implementing and basically implemented, the point being, there are some limits on what we can do in terms of any perceptions that there's perhaps more regulatory burden than is what's necessary. So instead focusing on our existing authority that we have today and what it is we should be focusing on by way of policy making, thematically I'm hearing possibly increased transparency. Maybe there are rule makings or policy makings we can do along those lines. Maybe there's more to be done on accessibility to trading menus. I'm not sure what that would be. But I'd love to hear ideas on that. And then I'm also hearing the importance of the diversity of liquidity providers, again, something else I think a number of us on the commission have spoken about, and we have a couple of open ended, I think policy makings we could continue working on. But I'm curious to hear from the others, namely on that front, by the way, that floor trader exception I think is something we could -- we should revisit. And we've talked about other market structure changes on SEFS, but I think I'd be really interested in hearing whether there's anything specifically we should be looking at that would be based on our current authority under the client exchange act to pursue.

CHAIRMAN MASSAD: Well first of all let me echo Commissioner Wetjen's comments and I think we probably need a whole 'nother program to go into the solutions. But I did just want to make a couple of general comments and reactions. First and foremost, just thanks to everyone for this very informed, intelligent discussion. We touched on quite a few topics, each, many of which could be explored for hours. You know at the same time I am reminded perhaps just to remember the context here and as Marcus reminded us earlier, you know, this is a pretty -- liquidity is a pretty esoteric discussion for most Americans. On the other hand, they experienced their own liquidity event in 2008 and thereafter, when they couldn't sell their houses. Many of course would experience what you all refer to as solvency events, meaning they were unemployed, or they were foreclosed upon. So you know, we did make a decision, not only as a country, but as a world. The G20 made a decision to implement some reforms to prevent or at least minimize the risk of a financial crisis like this happening again. And so, you know, we are now I think, engaged in a process of looking at how all that is working, trying to calibrate it. As Commissioner noted, Commissioner Wetjen noted, some of us have noted things like the SLR, where I support very much what the bank regulators are trying to so in terms of having a back stop if you will to risk waitings, but we do want to make sure we try to balance that objective with the objective of clearing. We're trying to make adjustments to address end user concerns. If you followed what I said about the whole CCP equivalence discussion with Europe, you'll know that I'm trying to get to that place without increasing costs there. I also support very much, all of these things being explored in a data driven way. I think that's critical, to try to get beyond some of the buzz words and really get into what the data suggests, and I appreciate the suggestions for the various things we should do. I am of course very conscious of our limited resources. Keep in mind for example that this crisis that is the backdrop of all this, or in that crisis rather, there we spent an amount to rescue one firm, AIG, that would have funded this agency's budget for 700 years. So you know, we have to kind of keep the perspective here. But on FCMs which was mentioned, it's a very important topic. At the same time, as I looked at the data there, this trend of decline has been happening for many many years, well prior to the crisis. If you look more deeply at those numbers, you will see that many of the firms that have disappeared didn't even hold customer money. The decline among firms that have held customer money was actually quite smaller. The concentration among firms at the top 20 has remained essentially the same over 10 years. It's about 91 percent of all customer money. Now granted customer funds have gone up. The increase among the top 10 -- there has been an increase among the top 10 firms in terms of what they hold. But it's a more complicated picture I think, and it also has to do with changes in business models, a low interest rate environment, changes in their profitability for various reasons, customer preferences perhaps, as to what kind of firms they want to deal with. So there's lots of factors, and similarly, I think it's important that we keep in mind, there's other market structure factors that Isaac and Gerald and others have mentioned, that are affecting these markets. I appreciated John Nixon's analogy of a hockey game where we've removed one or two players on each side, so it's gotten faster. I also think, you know, the growth and automatic algorithmic trading is sort of like we were playing hockey on the driveway in our sneakers, and now we've really moved to the ice. It's a faster game because of other things as well. So my point is simply that all these issues deserve exploration. We do want to try to calibrate these various policy objectives. It's important that we do it in a data driven way and I look forward to all of your help in doing that in the days ahead.

MS. MCLAUGHLIN: So I think we've run out of time. Let me just turn it back, yeah.

SPEAKER: (off mic)

MS. MCLAUGHLIN: Sure. I think there would be interest if our panelists have any ideas on suggestions or further action. We'd be interested in hearing those.

MR. MURRAY: Okay, as we've all -- as a panel and other members have said, we're definitely in a period of market transition and one of the issues for the clearing community as a provider of clearing services and then therefore indirectly as a provider of liquidity because as Emily pointed out, we are supporting the end user, the business of those liquidity providers, is really to have some more -- to continue to have certainly or have more certainly, and longer periods of time to implement change, i.e. that change has to be recognizable earlier and we have the opportunity to go through an implementation phase and for a longer point in time. So we're going through, as we've mentioned the leverage capital issues for the clearing community as agency providers as having significant consequences down the road to our ability to continue to provide this service with the amount of scale that we have done in the past, and I think that necessitates other initiatives taking a longer horizon or having a longer horizon for implementation, therefore we can create some more certainty around the ability to provide those services.

MR. CHANG: I realize I've touched on a broad number of topics. This might be a little bit frustration because of the directive I think from Commissioner Wetjen and the Chairman about what the CFTC can do under its specific mandate, but as I sit here and I reflect on what everyone said, I'm struck by the interconnectedness across not just the futures markets with and clear OTC derivatives markets with the underlying asset classes and frankly, in my mind, the need for the coordination and you know, maybe across the regulators that oversee all those markets, it's very difficult, again, like to go back to what I started, to talk about liquidity in Treasury or Euro Dollar futures, or even cleared swaps, and not talk about uncleared swaps, or not talk about the Treasury market. And figuring out a coherent way to tie all those things together, I think is, it's not an obvious -- there's no obvious, you know, change this, floor trader exemption point and there are certainly tweaks around there, but I think the bigger picture is to really address the liquidity issue. I do think we need a coherent -- a regulatory approach across all the markets and ignoring the interconnectedness is only going to lead to an incomplete solution.

MR. WIPF: You know our two areas are a great focus around this in OTC client clearing and I think it's been touched on a number of times about the principle versus agent view and that from a regulatory perspective, and I think the other part really again, is, on these financing markets and SFT's, and their impact as it relates to the overall discussion, and I think that becomes really an industry take away to look at what are the things that can be done within the current framework that can actually serve to create some new capacity, knowing that there's a big call for high quality collateral and generally a reduction in capacities. So I think the take away there is, has the industry pushed hard enough on central clearing of SFTs? I think that's a take away, and I think on the principle agent discussion, I think clearly that's been touched on here and I think that's very important as well.

MS. MCLAUGHLIN: At this point, to Commissioner Bowen, to make some closing remarks.

COMMISSIONER BOWEN: Yes, I just want to thank everyone for attending today's meeting and particularly the chairmen and Commission Wetjen for your great questions. We tackled really two important issues today -- cyber-security, liquidity and obviously we didn't solve every issue, but I wanted to thank Andrew for presenting and moderating the first panel with David Evans, who present the Bank of England CBEST program. That discussion I think gave us some food for thought in terms of what we could look at in terms of our own market regulations. Susan, thank you so much for moderating this panel and our guest speakers today -- Isaac, Piers and Thomas. I think we learned a few things. Liquidity is conditional but can be measured. Liquidity and capacity are sisters. Liquidity is in the eyes of the beholder, but not a God given right. And finally, we need innovation and we need to encourage new business models and definitely we need coordination across regulators. So thank you so much everyone.

MS. MCLAUGHLIN: The meeting is adjourned. Thank you for coming.

(Whereupon, at 1:34 p.m., the PROCEEDINGS were adjourned.)

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CERTIFICATE OF NOTARY PUBLIC

DISTRICT OF COLUMBIA

I, Mark Mahoney, notary public in and for the District of Columbia, do hereby certify that the forgoing PROCEEDING was duly recorded and thereafter reduced to print under my direction; that the witnesses were sworn to tell the truth under penalty of perjury; that said transcript is a true record of the testimony given by witnesses; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this proceeding was called; and, furthermore, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

(Signature and Seal on File)

Notary Public, in and for the District of Columbia

My Commission Expires: March 14, 2018