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CONNECTEDNESS AND CONTAGION: PROTECTING THE FINANCIAL SYSTEM FROM PANICS

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P R O C E E D I N G S

MR. BAILY: Welcome. I'm Martin Baily. I head up the Initiative on Business Economic Policy in the Economic Studies Program here at Brookings. And I'm going to start by -- we have a great session today. We're talking about connectedness and contagion, and I'm going to introduce Hal Scott, who is going to talk about his book that's available for sale at the back. And then we're going to have a panel discussion after that.

So let me start by introducing Hal Scott, who is the director of the Committee on Capital Markets Regulation. He's a past president of the International Academy of Consumer and Commercial Law and a past governor of the American Stock Exchange. Hal is the Nomura professor and director of the program on International Financial Systems at the Harvard Law School where he's taught since 1975.

So with great pleasure, I'd like to introduce Hal Scott.

(Applause.)

MR. SCOTT: Thank you all for coming today.

So let me start with the thesis of this book and summary.

The heart of the 2008 crisis and most other financial crises was systemic risk in the form of contagion. This crisis was successfully stemmed with three weapons -- lender of last resort, liability guarantees, and capital injections. Post-crisis, all of these weapons were limited or eliminated, primarily by Dodd-Frank as undesirable bailouts. Dodd-Frank purports to solve the contagion problem with what I call "two wings and a prayer" -- heightened capital and new liquidity requirements as the wings, and new resolution procedures as the prayer.

But you don't abolish the fire department even if you believe you have more fire resistant buildings. Thus, we need to restore and indeed strengthen the three powers we weakened or took away. But, the likelihood of doing so and the anti-bailout consensus is very low, so we are dangerously exposed to future crises.

The main point of financial system regulation is to prevent systemic risk of which there are three varieties, what I call the three Cs -- correlation, connectedness, and contagion.

Correlation refers to a situation where the same external event creates losses for a large number of financial institutions, such as the housing price collapse which preceded 2008.

Connectedness comes in two flavors -- asset connectedness where the losses of one financial institution cause losses of other financial institutions, causing a chain reaction, or liability connectedness where the failure of one financial institution endangers funding of others.

The third C is contagion, where the actual failure or fear of failure of the financial institution causes short-term creditors to withdraw and withhold funding from financial institutions out of lack of information or irrational panic.

Correlated losses due to failing housing prices did set the scene for the crisis of 2008 but did not itself lead to a financial panic. Contagion was the primary driver of the 2008 financial crisis. Leading up to Lehman's fall, major banks saw some deposit loans -- National City, Wachovia, IndyMac, and Washington Mutual. But the Lehman Brothers insolvency filing on September 15, 2008, put contagion into overdrive. The reserve primary fund broke the buck the next day, owing mainly to massive investor redemptions due to losses from the fund's significant direct exposure to Lehman Commercial Paper. But this run spread quickly across the money market fund industry, including to institutions with no significant exposure to Lehman and then spread more widely to all short-term liabilities.

Many believe that asset connectedness, not contagion, was the major problem during the crisis. The book examines this claim in detail. Investors in the Lehman connected reserve primary fund loss less than a penny on the dollar, and no financial institution connected to Lehman -- I underline -- no financial institution

connected to Lehman failed as a result of the failure of Lehman.

Moreover, no financial institution exposed to AIG, which was, of course, rescued, would have failed if AIG had failed. For example, Goldman Sachs would have experienced a maximum 18 percent loss of capital from its CDS collateralized positions with Lehman, less than the conventional 25 percent of loan loss secured lending limits for banks, and this does not even take account of the credit fault swaps Goldman had on AIG. Nevertheless, Dodd-Frank reforms focused on asset connectedness. SIFI designation by FSOC is largely built around concepts of connectedness, as is central clearing for OGC derivatives lets mutualized losses and bilateral exposure limits. Now, while these reforms may be desirable, in any event, connectedness was not the problem in 2008.

The book describes the three measures that were deployed during the crisis to stop the contagious runs on banks and nonbanks -- lender of last resort, liability guarantees, and capital injections into weak banks; actually also into strong banks.

First, let me start with the lender of last resort. The Fed was created in 1913 to stop financial panics, the latest of which was in 1907. Interestingly, that panic -- this is a fact I learned since writing the book -- interestingly, that panic started in the nonbank sector at the Knickerbocker Trust Company.

During the 2008 crisis, the Fed amply discharged its lender-of-last-resort responsibility on the run as it were -- no pun intended -- through a variety of means. The lower penalty rate, wider access for primary dealers, and Term Auction Facility were major changes in the administration and discount window. And a multitude of new facilities were created for nonbanks, including the commercial paper funding facility and money market investor funding facility to support the nonbank sector, primarily the money market funds.

The supply of liquidity to the financial sector doubled the Fed's balance sheet to $3 trillion by 2008. In 2007, 91 percent of its balance sheet was invested in the

U.S. Treasuries. By 2009, this was only 25 percent. Supplying liquidity to the nonbank system was very important. It provided banks -- excuse me, it provided nonbanks with $930.6 billion in loans, and on top of that, general market liquidity. More importantly, the very availability of these facilities helped stop the run.

The Fed, and in turn the taxpayer, actually benefitted from this. Balance sheet expansion generated Fed profits, and therefore, increased remittance to the treasury. In 2008, these remittances were over $40 billion. I might add, in 2015, due to QE, they're up to $117 billion.

As I said, a key part of Fed lending was to nonbanks where the contagious run was largely centered. I estimate that today there is about $7 trillion in uninsured -- that is less than 30 days --, uninsured, short-term funding in the U.S. financial system, with 60 percent of this $7 trillion in nonbanks, primarily money market funds and broker dealers. The ability to lend to nonbanks in a crisis is essential, and I would expect this percentage to increase as lending and capital market activities with short-term funding are increasingly driven out of the banking system to other entities because of the cost of regulation.

The legal authority for this lending to nonbanks was the then quite broad section 13(3) of the Federal Reserve Act. It provided that in unusual and exigent circumstances, the Board could authorize a reserve bank to make loans to any individual, partnership, or corporation, which included nonbanks, where such loans were secure to the satisfaction of the Federal Reserve Bank.

This authority to loan to nonbanks was and is quite separate from the Fed's discount window authority, which is basically for banks. After the fact, this authority was, and continues to be, widely attacked as bailing out Wall Street. This is despite the fact that taxpayers benefitted from these loans through additional Fed remittance (inaudible), and much more importantly, the country avoided what would have been a much more serious crisis.

Legitimate moral hazard concerns have been raised about this lending, but the beneficiaries of this lending were largely victims of a panic. Without panicked withdrawals from these institutions, they would have been solvent. The notable exception to this was probably AIG.

This anti-bailout concern triggered radical calls for changes in Section 13(3), Lending Authority for Nonbanks. Oddly enough, such concerns did not generally translate at the time to the Fed's use of the discount window for banks themselves. As a result, the Dodd-Frank Act placed significant restraints on the Fed's 13(3) lending authority. What are they?

First, the Federal Reserve can now only lend to nonbanks with the approval of the Secretary of Treasury under procedures adopted in consultation with the Treasury. Interestingly, this requirement for approval was first, to my knowledge, put forward by the Treasury secretary, Tim Geithner. Perhaps this was just another chapter in the Fed-Treasury turf war, or maybe Geithner thought this was a way to protect the Fed -- remember, he came to the Treasury from the Fed. He started at the Treasury though -- that this was a way to protect the Fed from even greater restrictions which indeed were then actively being discussed in the Congress.

One can argue with the importance of this restriction, though it is clearly taking independent authority away from the Fed. Some point to the fact that Paulson was Bernanke's cheerleader during the crisis, which is true, but will all secretaries of treasury in the new anti-bailout environment be such willing cheerleaders? Treasury approval will now carry very significant political risk, and the markets will know Fed support may not be assured for this reason, which itself could trigger or accelerate a run.

Second, the amendments to Section 13(3) -- Martin, you give me a sign when I'm, you know --

MR. BAILY: You're doing fine.

MR. SCOTT: Okay, thank you.

Second, the amendments to Section 13(3) provide that the Fed can no longer make one-off loans to single beneficiaries, such as it did in 2008 to AIG. It must, instead, do so under a broad program. A Fed regulation implementing this provision provides that at least five institutions must be eligible for any Fed program. If this means eligible at the time the Fed provides the first loan, it may make it harder to nip a contagious run in the bud. The Fed would have to wait for five institutions to be under attack to actually be eligible to borrow. If it means ever eligible, this is not much of a restriction and its use would generate, no doubt, cries of legality and congressional scrutiny.

Third, Dodd-Frank required that all loans must be collateralized and a lendable value assigned to all collateral. This (inaudible) the Fed's authority to buy unsecure commercial paper, which it did in the crisis, for major nonfinancial issuers, and more generally, deprives the Fed of the discretion they had before to set collateral requirements.

Fourth, the Fed can now only loan to solvent institutions, a requirement not imposed, by the way, at the same time on lending to banks. The solvency requirement is a cardinal principal in Baggio's 19th century formulation of the appropriate role of the lender of last resort. But across the world and over time, this has been honored only in the breach. One reason is that judging solvency is extremely difficult. Should assets be valued at market value, a price which might already reflect fire sale prices caused by a panic or at values they might revert to after the Fed lending was deployed.

An underlying argument for solvency requirement is lending to an insolvent institution should be a fiscal issue in which the Congress would play a major role through appropriations as it did with TARP. I completely agree with this. But, we should then provide that such fiscal power be established in advance and coordinated with the Fed's lender-of-last-resort powers so that needed action can be taken promptly.

Other countries such as the UK do follow this approach.

A fifth provision of Dodd-Frank provides for disclosure. All loans to nonbanks must be reported within seven days to the two chairmen of the House and Senate Financial Institution Committees and then must be disclosed to the public within a year. On the banking side, all discount window loans must now be publicly reported within two years. There was no requirement before the Dodd-Frank Act on that. The concern with such disclosure requirements, much more stringent by the way than those facing other major central banks, is that the prospect of disclosure, certainly within seven days, and maybe even within two years, will discourage borrowers concerned with stigma from seeking needed support, thus worsening the problem. Indeed, in the crisis, banks in need of funding avoided the discount window out of fear that their borrowing might be leaked or uncovered by analysts, thus leading the Fed to create the Term Auction Facility where all banks could obtain cheap funding.

Sixth. Dodd-Frank provides that banks can no longer pass on discount window loans to their nonbank affiliates such as broker-dealers without being subject to normal section 23A limits on inter-affiliate lending. This means the substantial borrowing by bank-affiliated broker-dealers would have to occur under the new restrictions of 13(3). Some of the Fed, including Governor Powell and ex-Chairman Bernanke, have said they can live with these Dodd-Frank restrictions, but they have taken this position, in my view, to stave off further restrictions.

On November 15th of last year, the House passed the so-called Form Act 241 to 185, largely along party lines. Republicans, for; Democrats, opposed. The bill has not been enacted into law. Under the format, the Federal Reserve could only lend to nonbanks if at least nine of the 12 Federal Reserve Bank presidents voted in the affirmative. Further, all Federal regulators of the potential borrower, which would often include the SEC or the CFPB, would have to certify that the borrower was not insolvent.

Sherry Owen correctly said, in my view at the time, that these provisions

would essentially end Federal Reserve lending to nonbanks. The format has now been incorporated into the House Financial Reform Package, the Choice Act.

These concerns with the Fed's role of lender of last resort are not recent. We talked about this. My book recounts how opposition to any role for a Federal bank, whether lending to commercial or bank borrowers goes way back in the early controversies of our history over the First and Second National Banks. Alexander Hamilton. You know that song.

Andrew Jackson vetoed the renewal of the charter of the Second National Bank in 1832, and that debate, in my view, is a major reason it took us until 1913 to even establish the Fed.

I will now turn briefly to the second weapon used to fight contagion, deposit insurance and other guarantees. In October of 2008, the FDIC removed any limits on deposit insurance for transaction accounts, which are key to the payment system; increased the insurance limit on other accounts from 100,000 to 250,000; and guaranteed certain senior debt offerings. While Dodd-Frank permanently increased deposit insurance limits to 250,000, it removed the existing authority of the FDIC to raise any limits in the future or guarantee senior debts. So they cannot do what they did in 2008.

In addition, in September 2008, following the breakout of the run on money market funds, the Treasury reused its authority under the Exchange Stabilization Fund to guarantee money market funds. This had a major impact on stopping the runs on the funds. This power was taken away even before Dodd-Frank by the TARP legislation in 2008.

TARP, the final tool used to combat contagion. We authorized the injection into the banking system of $700 billion. As most of you know, this program actually made money. Unlike the EU in Japan which have standing authority for capital injections, if the U.S. needs such injections in the future, authority may have to be

obtained in the midst of the crisis itself as it was in 2008 because TARP authority to inject capital is expiring.

That's where we stand with the limitations on the weapons. So what have we got in its place. We've got the "two wings and a prayer." So wing one is capital. Okay. And by the way, the "two wings and a prayer" idea is built on the idea of ex-anti action to make contagion unlikely.

I might observe that the recent Sarin and Summers Brookings paper, "Have banks gotten safer?" that was released on September 15th, suggests the system is not safer. If so, contagion-fighting measures are even more important. If you're not making the system safer, then you obviously need these weapons.

Let's start with capital requirements. The largest banks, based on the work of the Basel Committee, post-crisis capital has been significantly increased and new demanding stress tests have been devised. Capital requirements, very difficult to devise in practice, can, in principle reduce systemic risk by decreasing the probability of bank failure from external shock or connectedness and can generally reduce moral hazard. But no realistic level of capital can prevent a run on banks. Due to fire sales, capital is quickly eroded where funding is no longer available. Even higher capital proposals, such as Modi and Helwick's suggestion of a 20 to 30 percent of total assets ratio would not prevent bank failure in the face of contagion, and capital requirements only apply to banks, not to the ever-increasingly important nonbanks.

Liquidity, wing two. After the 2008 crisis, again based on the work of Basel, liquidity requirements have been imposed on banks. Let me focus on the liquidity coverage ratio which requires banks to hold high quality, liquid assets to cover expected funding runoffs for 30 days. As with capital requirements, there are significant methodological issues largely around runoff assumptions and what qualifies as a high quality liquid assets.

Fundamentally, the new adoption of private liquidity requirements

represents a retreat by the Fed from providing public liquidity as the lender of last resort. The Fed can now say it will only be a backup source of liquidity. Of course, this was always the case anyway. Ironically, the individual private, what I call the individual private liquidity requirements, may actually reduce collective private liquidity because they require each bank to hoard its own liquidity rather than making it available to others when needed. So JP, if it had excess liquidity, it wasn't subject to a run, couldn't use that liquidity automatically to loan to other banks because it might fall below its own liquidity requirements.

The prayer is resolution. Resolution procedures. Dodd-Frank's orderly liquidation authority gives the FDIC new powers to resolve nonbank financial banks that, upon a proper finding, post serious adverse effects to the financial stability of the United States. If such determination is not made, nonbank financial institutions will continue to be resolved in bankruptcy. Such procedures are unlikely to deter contagion. At the outset, without the requisite approvals, this new procedure may never be used. If orderly liquidation (OLA) is used, the FDIC has devised what they call a single point of entry procedure requiring restructuring at the holding company level. A major consequence is that short-term funding, which generally exist at the operating subsidiary level banks and broker-dealers would not be affected. That's part of the idea of restructuring the holding company, not endangering short-term funding of the subsidiaries so people will not have the incentives to run.

But whether such restructuring will actually work, particularly for major multinational banks is problematic and the procedure has never been tested. Thus, this is a prayer. The reality is that creditors of financial institutions will run if a large financial institution is put into resolution. Better safe than sorry. And we need to be prepared to deal with that. Indeed, the very weakness of our contagion-fighting weapons may make us more inclined to bail out a major bank for fear of the consequences of contagion if we do not.

What conclusions does this book reach? First, contagion is the major systemic risk concern, but Dodd-Frank focused primarily on dealing with connectedness and made it much harder to deal with contagion. And we will have undoubtedly new contagion episodes in the future.

Two, we know how to stop contagion through the use of lender of last resort guarantees and capital injections, but due to the fear of bailouts, these powers won't easily be restored. If these powers existed and were clearly deployed in advance, which was not the case in 2008, we would not have likely contagion in the first place. In 2008, we fought the contagion as it occurred, but if we had deployed these weapons in advance, we might have avoided the contagion to start with. Mario Draghi, do whatever it takes.

Third, capital liquidity and resolution will not safe proof the system from contagion. Even if (inaudible) are fireproof, you still need a fire department.

And fourth, I'll conclude on not an optimistic note. Let's just hope we do not have another crisis before we can move beyond the populous fears of bailing out Wall Street to deal with reality and rectify the situation.

Thank you very much.

(Applause.)

MR. BAILY: Now we're going to just do this now and then bring you up. Sorry about that. I've got a couple of questions. I'm going to give the audience a chance and then we're going to bring the panel up.

So sort of the obvious question in a way, there was a lot of hostility towards the banking system as a result of the crisis, and sort of Congress has reacted to that. So you've got both on the left and on the right, a sense that we can't do this bailout. So what you're describing, and I consider you to be sort of, you know, a reasonably conservative guy, is sort of a government solution to the problem of panic. So how do you explain that in a way that, I mean, obviously that's what your book is, but just sort of

reinforce for us how do you just philosophically make that argument that you need a government solution, as opposed to saying government has been the problem and deposit insurance and all these things that we've put on there. So how do you sort of structure this case?

MR. SCOTT: Look, in a perfect world, Martin, I'd be on the side of Andrew Jackson on this issue. Okay? But it's not a perfect world. And I think we have long experience with what has happened to the financial system and in turn the economy when government support was not used. Okay? The consequences of not having government support in crisis to me are vast, huge. Suppose you ran through 2008 and none of these things were done. Would we even be sitting here today discussing this question? It could affect not only our economy, deep recession, it could affect the stability of our polity.

So, I have to be realistic in terms of thinking, what is the proper role of government? Government has to defend us against foreign attack. I think the government has to defend us against the national panics. Now, we may one day figure out how to design a system where we don't have financial panic. I would be happy to help for that. But as long as we've got it, I think the consequences of the government not trying to prevent it, and if it happens trying to deal with it are too great to prohibit.

MR. BAILY: So let me say, by the way, I'm sympathetic to this argument but I want to challenge you in another way, too. One of the things that I raised when the Sarin-Summers paper was given and I'm raising to you now is one of the reasons I think regulators think the system is safer is because of the stress test that they set up. So these impose a pre-Draconian stress, high unemployment, crashing stock market, lots of financial restrictions and so on markets, and the banks are able to weather a situation like that. And so I think that's a lot of the reason why the people at the Fed say, and I don't want to put words in their mouth, that's why they think the system is safer, because of the stress test. So you obviously didn't mention the stress test. You don't think --

MR. SCOTT: I think I mentioned it.

MR. BAILY: You may have mentioned it.

MR. SCOTT: I didn't give it much thought.

MR. BAILY: So --

MR. SCOTT: Why isn't that the answer?

MR. BAILY: Why isn't that at least a big part of the answer?

MR. SCOTT: Well, the simple fact is it's just another way of providing adequate capital. You're doing it through a stress test versus kind of a static balance sheet test as Basel does, in probably a better way. However, I come back to those two fundamental points. In a panic run, okay, where funding is leaving the banking system, you're going to run through whatever stress test capital you've got. The stress test does not presuppose that there is going to be a run on the financial system. That is not an assumption in the stress test.

MR. BAILY: But liquidity is part of what they look at; right?

MR. SCOTT: Yes, but the stress test basically focused on capital. Now, if you said, do they have enough liquidity? If we did sort of stress testing on liquidity and there are people who think that we should do that. Being in favor of it, I think it would be useful. But again, if you look at sort of the assumptions behind how fast the run is, how great it is, and you know, it's the fire department argument. You know, maybe it'll work, but if it doesn't, we'll be in real trouble. So I think that -- and, you know, I've recently written an op-ed, a separate issue about how these stress tests are conducted, whether the assumptions make any sense, the lack of transparency of the Fed in devising them, and so forth. So I think there's also a legitimacy issue about these stress tests which should be corrected whatever we do about contagion.

MR. BAILY: I'm going to see if there are any questions. I'll take a couple of questions from the audience.

Yes, there's a question there. Please wait for the mic and identify

yourself.

MS. JACKLIN: Hi, I'm Nancy Jacklin.

You've discussed the system as it is today and said there's really no way to safely deal with systemic risk without having in a sense unlimited liquidity support for the financial system to stabilize the system if there's a run on any one. I guess there are some who say the alternative is not to have the financial system we have today; right? And not to have institutions that are so global and difficult to make subject to orderly resolution that we could handle them the way they did Washington Mutual and some of the S&Ls, where you can actually resolve them without the system falling apart. So I wonder what your response is to that alternative.

MR. SCOTT: By the way, I want to add a point on capital. It only applies to banks. And one of the primary points I'm making in this book is that we have a huge risk from contagion in the nonbanking sector.

Now, to your question, you know, I think economists are pretty comfortable with the idea, although it's pretty hard to prove, that you need a strong financial system to have a strong economy. A financial system, some people said it's the heart blood of the economy. It serves to finance the economy. So if you weaken the financial system, it's going to likely have a very big impact, okay, on the economy in general. So I don't think we could have anything close to the kind of economy we would have if we just said, hey, we've got this problem in the financial system. Let's just get rid of it. You know, get rid of it. First of all, I don't know how you would actually get rid of a financial system, but even if you could, I think it would have a huge adverse impact on the economy.

MR. BAILY: Let me take one more and then I'm going to give the panel a chance. Please identify yourself.

MR. BUTTON: Thank you. I'm Kenneth Button, a retired economist.

You described the populist opposition to bailouts, and at the time, it's my

impression, that a major source of the opposition facing bailouts of institutions was the perceived lack of a bailout for the homeowners themselves in the mortgage sector. And that had a very strong --

MR. SCOTT: For the --

MR. BUTTON: The homeowners, the mortgage holders, you know, the borrowers themselves.

And that that aspect of it fed into what I'm going to describe today as a continuing angst and opposition. Could you please comment on that and what its practical significance is in terms of dealing with Congress?

MR. SCOTT: I think that's a very good point. I think, you know, we're talking about perception. I think that's a particular point for the left, if you will, that a lot of the opposition of the democrats to the extent it exists is around just a fairness issue. It's given to some and not given to others. But there are a lot of other things like that. You know, why didn't any major corporate executives pay more of a price for being supported? You know, in Japan, when Japan bails out banks, the CEO either resigned or committee Harry Caray. And that was probably a cultural idea, but it was also kind of "I'm responsible for this." Stump getting out of Wells Fargo I think is actually -- I don't know the facts of the case but he was the head of the organization. He took responsibility for it. We didn't see a lot of that in the crisis. So I think there's the fairness issue. The fact that the people who caused these problems, responsible for the problems didn't pay enough of a price. There were a lot of things responsible.

I think also is from the more conservative wing here. It's the lawlessness of the Fed that here's this organization that's basically not, you know, it's independent, operates on its own for good reasons, but we're in a democracy here. You know? I mean, there needs to be more structure, more rule of law around what the Fed does. And I believe actually you could do that without endangering its necessary discretion. There's a balance here. But certainly from a perceptual point of view, in some elements

now, there is the idea that this is an agency that just does whatever it wants and it's not responsible as it should be in a democracy. And by the way, this isn't restricted to the lender of last resort. (Inaudible) monetary policy, supervision and regulation cuts across the board.

MR. BAILY: Thank you.

Okay. So we're going to have a panel discussion. If our panelists could start coming up and I'll introduce them.

First --

MR. SCOTT: Do you want me to stay here?

MR. BAILY: Yes, yes, please do.

So our first panelist, I'm going in alphabetical order, is Dino Falaschetti. He serves the U.S. House of Representatives as chief economist for the Committee on Financial Services. I'm going to be fairly brief in this partly because my voice is going to give out.

Secondly, Amias Gerety, who serves as the U.S. Department of the Treasury's acting assistant secretary for Financial Institutions.

And third, my colleague, Don Kohn, a senior fellow in Economic Studies and a former vice chairman of the Federal Reserve. So you can speak to some of the lawlessness there, Don.

So let's start in order with Dino.

MR. FALASCHETTI: Well, thank you, Martin, for your kind invitation. I think I'm the other reasonably conservative guy on the panel. Rebecca, thank you, too, for all your good work on the organization. And thanks to Hal for writing another great book.

How many folk are familiar with a book from Charles Calomiris and Steven Haber, Fragile by Design? A couple of hands out there. What they do, they start out the book on a powerful note that the United States, since the Fed's founding, has

experienced a major financial crisis once per generation. The Fed was created nominally to stop this from happening and it continues to happen. And their argument is basically that there's something more fundamental about our politics that keeps giving rise to these types of crises. And they note that we should not expect -- I'm quoting -- we should not expect politicians or regulators to do much to prevent the next banking crisis. I think Hal might be part of the cabal of the dismal scientist. That might be a quote from Charles, but you were a little bit dismal there as well. I'm usually not characterized as the rational optimist but I'm certainly not that pessimistic either.

Professor Scott and his colleagues on the committee have done some excellent work on this issue, and I've really enjoyed working through their taxonomy of the three Cs -- the connectedness, correlation, and contagion. And in my remarks, what I simply want to do is I want to get beneath the surface of each of those three Cs and think about is there something fundamental that gives rise to each of the three Cs? And then based on those fundamentals, what sort of institutions, institutional response might we produce to do better?

Notice that each of these three Cs in a sense is financial externality. But I wonder, you know, if you look at Calomiris and Haber, you know, once per generation since the Fed was founded, a bunch before the Fed was founded, there was a financial crisis. Each one is a little bit different. One of the things I worry about is are there only three Cs? I mean, it's a new type of crisis every time it seems, at least superficially. And so I think back to, believe it or not, Hal and I are both, in a sense, students of Ronald Coase, and so I want to start off with how Ronald Coase might have thought about this.

He was a remarkable man on a number of dimensions. A Nobel Prize winner. He created a new economic journal when he was 100 years old. A remarkable man on a number of dimensions. And he won his Noble Prize, you know, in large part due to a seminar in the 1950s where he convinced a group of Chicago economists, not the easiest people to convince. He convinced them that externalities are really a problem

that emerges from the cost of transacting. That is, without transaction costs, there is no such thing as an externality. And so maybe that's where we want to go in terms of getting to the fundamentals of systemic risk if we think that systemic risk is a type of externality. And in particular, a particular cost of transacting is the cost of producing information. The cost of producing information can tie together each of the three Cs that Professor Scott is talking about.

Think about the first, the connections. The connections between Bank A and Bank B. I think Professor Scott agrees that it's probably not the most important of the three Cs, but if I know that Bank A is connected to Bank B and I'm going to invest in Bank A as a creditor, I'm going to fully price that connection; right? That price is going to produce some governance services. It's the information on the connection that is key here. And where I'm going with this is are the regulations, are the institutions we have in place right now, do they make it easier to see those connections? Or do they make it harder to see those connections?

Let's think about the correlation. Say Bank A and Bank B are holding assets that are correlated. Well, if you know something about investment theory, you don't get paid to take on diversifiable risk. If information was costless, and I knew that two banks had correlated assets, I would also know that that's not really a risk; that's an easy to diversify risk. The question becomes, can I see the correlations? And is financial regulation making them easier to see or harder to see?

I think, and I agree with Hal here as well, and that is the most important of the three Cs is probably contagion. So contagion is I'm invested in -- or let's say I'm invested in Bank B and I see smoke billowing from Bank A. I thought I knew Bank B pretty well, but now I'm not so sure. If there's smoke over at Bank A, maybe Bank B is doing the same thing, and I have a runnable asset -- from the investor's standpoint it's an asset -- over at one of those banks, so why don't I just run on it? Well, again, if those banks really are transparent, then I'm going to be much less likely to run. And again, I

worry that what we're doing is making that information harder to see.

So what might help here? What might help here? And we're certainly not going to solve the world's problems here, but I do want to just highlight a couple of opportunities. When I was a professor of Law and Economics, me and a couple of my coauthors -- Matt Beville, who is in town now at Wilmer Hale, and Mike Orlando, who then was in the Federal Reserve System, we wrote an article for the Penn Law Review and we sketched out how an information market for systemic risk might support this institutional strategy; that is a strategy for making information or fundamentally economizing the cost of information. And what we did is we looked at some research from Raghu Rajan and Luigi Zingales, both of which are back at the University of Chicago now after Raghu got back from heading up the Bank of India. And what they did is they measured firms in different sectors, the financial dependence of firms in different sectors. And what you can do is in non-systemic times, you wouldn't expect that these firms are going to be correlated in their performance, but you know, things get correlated when there are systemic times. And Hal has a nice description of this in his book.

And so if you were to write up a contract on are these sectors going to become more correlated, say in the next six months, in the next year or whatever, the prices of which those contracts would trade would provide information, market information about, hey, are we on track to experience one of these crises that Haber and Calomiris have found we do so frequently?

Michael Abramowicz wrote a paper for the Chicago Law Review which is quite interesting. He proposed an information market for prudential regulation. So if you were to, you know, there's a lot of talk about different regulations in this town, of course, and what he would do is to say, how would, say five years out, how would a regulator score this regulation? Do the cost benefit analysis. And notice at, you know, five years out, who knows who's going to be sitting in that chair? Is it going to be a democrat? Is it going to be a republican? Is it going to be an independent? And so with that dynamic,

you can again sell an information market contract that can give you some idea of whether the regulatory response shows some efficacy. And then finally, I hear a lot of people in this town talking about the prospect of distributed ledgers to provide more transparency to fundamentally economize on those information costs.

So I'll stop there with those thoughts and look forward to our discussion.

MR. BAILY: Thank you, Dino.

Amias is next.

MR. GERETY: Thank you.

So thanks again for having me here and for this book. I think it's a really interesting and important question, the problem of contagion and the interaction between connectedness and contagion. So let me start just by making two points. One, about these two concepts and then the second about the Dodd-Frank response.

So I think the first thing that I would say about the relationship between connectedness and contagion is that I think we sometimes think about them too separately and that we really need to think of them as highly -- with very significant interaction effects. So for example, if I gave you a model of two banks, one bank with literally no counterparty exposure to the first, and also no indirect counterparty exposure, I think you would have very high confidence that problems in Bank A would have no problem in Bank B. We see this globally where certain types of financial sector problems are reflected in U.S. financial market prices; others are not. So in general, we know that the dominant channel for challenge in China are going to be economic rather than financial because we know the Chinese financial system has a very strict capital account, has very limited financial connection to the U.S. Whereas, at the other extreme, we know that in Europe, if something infects the core of the European banking system, it could have very significant effects. So the idea of contagion as separate from underlying facts about connectedness I think is something that we need to look at very carefully.

I think Dino makes a very important point about information, and I think

the second really important ingredient that we have to consider when we talk about connectedness and contagion is the role of uncertainty. And I think what we see in that is that the knowledge of a certain quantum of connectedness combined with uncertainty about the exact nature of the losses that may flow through is are both necessary before you can have a contagion event?

I think the second thing that I would say about Dodd-Frank is that, in fact, if you look at the broader sweep of Dodd-Frank, you see a focus not solely on capital and liquidity, but in fact, a series of measures that are focused on reweaving the fabric of the financial system to be on much firmer foundations and much stronger threads. So, for example, if you think about CCPs, Professor Scott talk about the role of CCPs in their breaking of connectedness. I think that's a very important role. Certainly, what CCPs try to do is they take out idiosyncratic credit risk. So instead of trade between two counterparties, you have a trade with an intermediary who is the buyer to every seller, the seller to every buyer. That is important netting effects, but it also has really important effects in terms of the regime under which those contracts operate. So pre-crisis, we saw that many derivative contracts operated on an unmargined basis. So they operated on a credit basis rather than a zero-dollar margin threshold. So that means a zero-dollar margin threshold is just a situation in which any move in the market price of the contract is then reflected by a margin payment on a daily basis. That's a very significant change in the degree to which the losses or uncertainty about losses can promulgate through.

So what CCPs do is not simply change the credit analysis; they also create a market-based firebreak where every participant in the market is subject to a similar regime of needing to daily manage the potential exposure. This doesn't eliminate the issue entirely but it does make a very significant change.

Similarly, if we think about the role of risk retention. So what risk retention does is it requires those who are creating securitized assets to be keeping a portion of the risk. So when we think about this, it has a very important effect in terms of

the incentives that get created and the role that a market-based responsibility for first loss or pro rata loss, and that has really important effects in terms of the integrity of the securitization process and the incentives that go into it. Similarly, if we think about the securitization transparency prior to the financial crisis, there was no requirement or general market practice for asset-level disclosures for securitized products. And we all know, as Dino pointed out, that the significance of that was that when people tried to understand the potential for losses in those securitized products, it became an exceptionally costly exercise, and an exercise that was not worth the risk in the midst of the financial crisis. And what we've done in Dodd-Frank is a requirement of asset-level disclosure for all securitized products. That's a pretty significant change to transparency.

Similarly, if you think about the CFPB, what is the fundamental core of the CFPB? The fundamental core is to have a body that both sets rules, supervision, and enforcement around the very nature of consumer interactions in the financial sector. And those consumer interactions are ultimately very significant in terms of the way they create financial assets later. This is certainly a process that we saw in the financial crisis.

So changing the architecture of the integrity of those financial assets, changing the architecture to lower the fraud risk associated with those assets, those are very significant changes that happened in Dodd-Frank that are not totally directly related to the issue of connectedness but really have to do with the change in terms of what is the fundamental quality or integrity of the financial system and what degree of confidence and transparency can we have around those financial transactions and how they get used to create interaction effects between large global financial institutions. So I think these are really important issues.

The last thing that I think I would highlight, and I really think that Dino's point about maybe there are more than three Cs is a really interesting one. In 2010, the Council of Economic Advisors in the White House came out with a report talking about what had happened in the crisis and trying to put some more rigor around the question of

what does it mean to have contagion? And they talked about a number of different shocks which map, in part, to the concepts in Professor Scott's book. So they talk about confidence shock, and I think this is fundamentally what Professor Scott is talking about in terms of contagion, that there's just such a significant shock to confidence that people's willingness to transact in financial markets goes away.

They also talk about a counterparty shock. So this, I think, is the connectedness concept.

But the last one which I think is important is this idea of coordinated holdings. And I think one of the things that Professor Scott talk about is this notion of fire sale risk. And I think when we think about fire sale risk, it's not just that fire sale risk matters to the capital of an individual institution, but that actually fire sale risk is a very important mechanism for losses to propagate across institutions through coordinated holdings. So if I hold a basket of treasuries and a basket of high-risk assets, if I have losses in the high-risk assets, I may try to sell the treasuries. Or if I have, you know, mortgage securities, corporate bonds and treasuries, I might sell a mixture of those. And so you can have fire sale risks even outside of the asset class which is subject to the correlated shock.

The reason this is important is it speaks to the fact that losses can propagate even if there is not firm failure. And that's a very important element for our regulatory efforts because we can't solely focus on connectedness. As long as firm B can absorb its direct counterparty loss to firm A, we can be confident because there are many other ways for losses to propagate through the financial system, especially when you put them into the context of broader market access and the real risks of uncertainty. And I think it's that framework that we try to take very seriously in the design and execution of Dodd-Frank, and I think it goes to the continuing efforts from the financial regulators to maintain focus not simply on designation authority but on the many ways in which the financial system is changing. Which aspects of the financial system are

growing? What is the structure of their liabilities? What is the structure of their activities? And making sure that we have a very forward-looking approach that's not simply about looking backwards to the last crisis but looking forward in terms of the ways that the financial system is changing. And then you put all those things together and you have a stronger fabric that I think is really important to take seriously as we talk about what we would need in the event of another financial crisis.

MR. BAILY: Thank you.

Don?

MR. KOHN: Thank you, Martin, and thank you, Hal, for writing the book.

So even if you don't agree with all of Hal's conclusions, I think you will find the book a very thorough and complete examination of issue of contagion with a lot of history. So I learned a lot reading it. I was happy to write a blurb.

I'm going to concentrate my comments mostly on the lender-of-last-resort issues, perhaps because I was a lender of last resort. I have the scars to show for it. And I'll start maybe with Martin's question about the role of government in this. I think what the Congress decided in 1913 was that there were externalities, maybe because of information asymmetries and problems, incomplete markets, et cetera, that created panics and asset sales that threatened the stability of the system, and that having a lender of last resort, the Federal Reserve in this case, was a proper governmental response to protecting the economy from some of the fragilities in the financial system.

Dino mentioned that this one crisis every generation. Before the Fed was founded there were, like in the 1890s, I think there were three recessions and panics, and of course, 1907 was a huge panic with great feedback on the economy. So Congress said there is a role for government here, and I think that was a legitimate role.

Furthermore, I agree with Hal that in the 21st century, with the increasing importance of securities and securitization in nonbank intermediation, which may become even more important as the banks are more heavily regulated, there is a role for lender of

last resort in the nonbank sector to protect financial stability and to protect mainstream from the problems that might originate on Wall Street. Inevitably, the nonbank sector will have some maturity transformation, some -- often a high degree of leverage, which leaves them open to problems and to panics. So, and fire sales, and that's an issue for the economy.

I also share some of Hal's concerns on the restrictions that Congress put on the exercise of Section 13(3), the ability of the Federal Reserve to lend to nonbank institutions and the congressional veto over FDIC guarantees.

So unlike Hal, I'm not so worried about the Treasury -- requiring Treasury approval of Federal Reserve actions. Maybe it's my experience over 30 some years interacting between the Fed and the Treasury through republican and democratic administrations, but there's always been great cooperation and communication between the two institutions, particularly about financial things. If the Fed can't convince the administration that an unusual lending facility is necessary to protect the economy, it's not going to be able to convince the public either. It's the administration and its allies and the Congress who have the most to lose from a financial panic and the subsequent recession. It provides political cover and support, lessening a potential backlash on the Federal Reserve.

So I'm not that concerned about the Treasury requirement. I think the Fed should be able to convince the secretary of the Treasury this is the right thing to do. And I'm not concerned about the restriction on individual -- lending to individual institutions because I think the order of the liquidation authority has put a way of taking care of troubled individual institutions. I'll come back to that in the end.

But I am worried about the transparency piece of Dodd-Frank. So I think we, at the Federal Reserve, found it was hard to get banks to borrow from the Federal Reserve initially in the crisis because they were worried about the stigma. They were worried people would find out. That would be a signal of weakness and that would feed

the panic. And over time, as Congress got involved, they were worried about the political backlash from being seen as borrowing from the Federal Reserve. So I'm concerned that the requirement, particularly for reporting nonbank borrowers within a week, I think, to the two banking committees with, to be sure a provision that the chairman of the Fed can request confidentiality, if I were a borrower, a nonbank borrower, I would say the chairman could request it. Whether she will get it, I think, is another, you know, real confidentiality. So there's political risk. So people will hold back from borrowing from the Federal Reserve as long as they possibly can and that will make it much more difficult to prevent a panic from building.

I also worry somewhat about the collateral requirements. I hope that Congress and people understand that in Bagehot's formulation of lender of last resort, collateral couldn't be valued at the fire sale prices; otherwise, that would just feed the panic. If you won't give value -- if you won't lend against -- if you keep marking down the value of the collateral, you won't lend, and that's just going to make the whole thing spiral out of control. So the lender has to -- the lender of last resort, the central bank, has to value the collateral as it would be valued in normal times. It's not obvious to me that this is as clear as it should be in the law, so I'm worried about the collateral, too.

I think, so I do think we need lender of last resort in reserve for nonbanks. I do worry about the Dodd-Frank, some of the Dodd-Frank restrictions, but I also think that it's necessary to recognize there is moral hazard in having liquidity insurance available. We deal with this in the banking sector by having a lot of supervision and regulation of banks. That is a way for the insurance company, the government, to restrict the behavior, the risk behavior of the banks. That's much less clear in the nonbank sector.

Now, there is a set of nonbanks that is subject to considerable regulation and supervision, capital requirements, et cetera, and those would be the nonbanking subsidiaries of bank holding companies and the broker-dealers that are the nonbanking

subsidiaries. So I guess I would like to see a three-tiered lender of last resort -- banks; regulated nonbanks, so which would have easier access to credit than is now in Dodd-Frank; and then everyone else. And because everyone else doesn't have the regulation, there is the moral hazard, I would make the hurdles very high for everyone else. I don't -- I think that would take a change in the law to do but I think it would make a safer system.

Let me finish up with just a few words on the "two wings and a prayer." So I agree with others, what others have said. I think capital is really key. Contagion takes root in the fear of insolvency, and if you have enough capital, a lot of capital in the system, there's going to be much less opportunity for contagion. And I agree with Martin's question, the stress test is really important and reassuring creditors that even under a stress situation, banks will be able to continue operating.

We had an interesting test in the United Kingdom after the referendum vote to leave the UK. Bank share prices fell 20-30 percent, but the risk spreads, CDS spreads and risk spreads on their debt barely budgeted. And we -- I'm on the Financial Policy Committee in the United Kingdom, so this was a "we." We actually released a little capital, countercyclical capital buffer in the circumstances to encourage UK banks to continue to lend under these adverse circumstances and not to make a bad situation worse by cutting back on lending. And we were able to do this because we had subjected the banks to stress tests. Markets were confident in them. So I do think capital can take care of an awful lot of problems.

And the final point is on orderly liquidation. I guess I'm not as pessimistic as Hal that this will work. I think the regulators in the U.S., the FDIC working with regulators overseas, particularly in the UK, have a good plan for dealing with this. Unsound institutions should be allowed to fail, but they have to be allowed to fail without endangering Main Street, without creating systemic panics, and I think orderly liquidation has a good chances of having that happen. The pieces are being put in place, and in particular, the piece that's still being put in place is forcing these guys to issue a lot more

credit that's explicitly credit instruments that are explicitly going to be bailed inn and converted to equity when they are liquidated. And I think when all the pieces are in place, there will be a lot more confidence that the system will work. So I guess, I'm not sure the prayer has been answered, but I think there have been some steps put in place to make it -- to have better odds than you imply, Hal. Thank you.

MR. BAILY: Thank you. And thank you, everyone.

So I'm going to give you a chance to respond to these comments. When we were planning this session -- by the way, if you'd like, if you're leaving now, there are books available to buy, so please take advantage of that.

So as we were planning this, we were looking to make sure we got people who would be quite critical of you. I think we have got some disagreement, although maybe with a lot of respect to the author here.

So Dino sort of focused more on transparency and the role of private markets as being sort of effective in dealing with these problems or these externalities that may not be as great as you're indicating if you had enough information out there.

We heard from Amias that there are a lot of other things in Dodd-Frank besides just the 13(3) that are making the system safer. "Weaving a new fabric," I think, was the phrase he used.

And Don sort of agrees with you about restrictions of 13(3) but maybe takes a little bit of a different cut at it. So why don't you give us your sort of response to the comments we've had so far.

MR. SCOTT: I think there's kind of across the board, I would say there's a more rational approach to contagion than an irrational understanding of that. There are some economists who said sunspots could cause contagion. The idea is you never quite know what is going to cause contagion. And by the way, it may have nothing, absolutely nothing to do with the financial system. Terrorism, Brexit, okay, just recent examples. So when focusing on the need to fight contagion and the outbreak of it, if you only focus on

the financial system, you're kind of missing the wider.

Second, I agree a lot -- for instance, our committee did put out a statement encouraging much more disclosure by banks of their positions. And analysts, we had meetings about this and analysts expressed a need to know more. But you know, that is going to lag reality. You're going to have, you know, even if it's a monthly disclosure, things can change very rapidly. Values can change very rapidly. So I think there's always going to be uncertainty about the truth. And that uncertainty, better safe than sorry. I have uncertainty. I'm getting out. Maybe it's okay, but I don't want to take the risk.

So I think, you know, there's sort of a behavioral finance versus a rational understanding of contagion. And by the way, that is run through the economic literature. Charlie Calomiris would say, oh, you know, if they knew more about all these connections with all these banks, we wouldn't have contagion. And then Diamond would say, oh, you can know everything you think you would know but you're not going to know everything. And you're still going to have contagion. I'm sort of in the Diamond camp on that, but I must say that I agree that more disclosure would be better.

You know, I come down to the point that we're always going to need a fire department. We may have a lot better prevention techniques. Some I mentioned, some you mentioned. But in the end, isn't a, you know, don't we need a fire department? And the fact is, you know, I think we have a much less capable one.

On Don's point -- and Don and I have talked about this before -- you know, in terms of the details of Dodd-Frank restrictions, I think Don is a product of the time that Don was at the Federal Reserve, and through the crisis where there was no, as I said, Paulson was Bernanke's cheerleader. I think if anything, the histories of this crisis have indicated Bernanke sort of wanting to do less than what Paulson wanted him to do, and Paulson was saying I can't get the money from Congress. Ben, you've got to do it. And there was a dynamic. They worked together on the thing.

Don, I think we're in an entirely different political environment today. If the secretary of Treasury must authorize the Fed to do something, okay, that I think is a potential license for his demise because, you know, there's no counterfactual here. You know, when you do it, and we did it in 2008, people paid tremendous prices for doing that. And they couldn't, you know, they said, look, if I didn't do it we wouldn't have a country. Prove it. How do you know that? You don't know.

So, you know, I think it's very important that the Fed be able to act independently of a firm and public authorization of the secretary of Treasury. Sure, (inaudible), and if the Treasury secretary actually convinced you this was not a good idea, you shouldn't do it. But at the end of the day, I think you shouldn't have a system where he is forced to make a public declaration that it's okay. Why don't we do it for banks if this is so important? Would you say if I were here today, you know, this is a great concept? Let's extend it to banks. I don't think you would say that.

So I am very worried about it, and I think, more important, the market is going to have a contingency there. Will he approve it? Will he do this? I don't know. I think it fundamentally changes the situation.

Finally, I'll say, particularly on capital, I just come back to I think we need more capital, actually, because of definitely correlated risks. I mean, think of a system in which we had a major hit to many, many large banks. No contagion. What we announced tomorrow is that the 20 largest banks in the world fail because they're all insolvent. This is not good. This would take the financial system out of play without any contagion. We need to resist that. It's in our interest to make it much less likely that a bank fails. But if you ask the question, has this increased capital really protected us from contagion, I would say no because of the risk of, you know, the fact is that people are going to leave, liquidity dries up, the fire sales as you point out are not only to the institutions; it's across the system. So I think if there's anything that we've done that's more directly addressed to the run risk it's liquidity and I've expressed some concerns

about that.

You know, I think that Don, you suggest that we -- to coin a phrase sometimes regulators use, “expand the perimeter.” If we really have problems in this nonbank sector, we have to have better controls over that sector or at least better knowledge. By the way, I would say, you know, you left out the money market funds. They are actually regulated by the SEC. Now, maybe you don’t think they’re an adult, but they are a regulated entity.

I think the nature of finance is that whoever you regulate, people go elsewhere to get higher yield. And we have a very good example of this right now with the money market funds because the SEC has imposed a floating NAV on prime institutional money market funds and given them, the board of directors, powers to charge fees for withdrawals or to prohibit redemption. Those funds have lost an investment of a trillion dollars, I think, over the time since the SEC promulgated this rule. Some of that money, which is good, I guess, for the stability of the system, has gone to the Treasury. Other of that money has gone into ultra-bond funds. So short-term ultra-bond funds not regulated by the SEC. Has gone into special accounts. So if Xerox wanted its own money market fund without mixing its funds with other people’s investments of fidelity can say, here’s your own little private fund. Okay. I want to have a fixed NAV and no redemption restructures. That’s okay. Some of the money has gone into uninsured bank deposits. Short-term, uninsured bank deposits. So I think this is just an example of it’s always going to be moving someplace. You expand the perimeter, they’ll expand the opportunities. I haven’t even talked about the global dimension of this as we regulate here what goes on elsewhere.

At the end of the day, all these things may be good but you need a strong fire department. In the event that there is contagion in the nonbank as well as the bank sector, we have to have a way to put it out. And I would argue we should deploy these weapons in advance, not do it on the run because if we do “say we’ll do whatever it

takes," and we've got those weapons out there, the risk of contagion, okay, will be much less.

MR. BAILY: Thank you.

I'd like to take some questions from the audience. So please raise your hand if you have a question.

Yes? Please identify yourself.

MS. FEINEBERG: My name is Victoria Feinberg. I don't have any affiliation but I have a question.

I have thought about another C, which is cyber. And just like we have high frequency trading, can we have a high frequency contagion? What I mean is as the computer systems become faster, more connected, more complex, it's much more difficult to understand them, wouldn't the fire become faster and less controllable?

MR. BAILY: Okay. Would someone like to take on that? So the question is about cyber. There's obviously cybersecurity. And then there was a sort of high-speed trading question, I think, buried in there as well.

MS. FEINBERG: High-speed contagion.

MR. BAILY: High-speed contagion. Okay.

MR. GERETY: So let me give a little bit of context and then try and address sort of answer the question.

So one of the things that we do at Treasury is we have an office focused on critical infrastructure. And that word really means that if you think about the entities and systems that are necessary for the proper functioning of our economy and our society, many of them are owned by the private sector. So when we think about how the U.S. economy works, we, of course, need telecommunications. We need energy. There are hospitals, et cetera. And when you think about that also, the financial sector is part of what we consider by the Department of Homeland Security, the nation's critical infrastructure.

Within that context, the dominant policy discussion around the protection of the U.S. critical infrastructure is around cybersecurity. So I think you're absolutely right to pick up on that.

So what are we doing this and how are we thinking about that? So first off, this is something that financial regulators are taking extremely seriously. The Financial Stability Oversight Council, so the group of regulators tasked with trying to think about financial stability has identified cyber as one of its really most important risks from a financial stability perspective. So I think, again, taking this risk seriously is very important. At the same time, we have very significant investment and cooperation across the U.S. intelligence community, the Department of Homeland Security, and industry in terms of where can we invest to make sure that we have the ability to respond and recover in the event of a cyberattack. So I think from that perspective there are some dynamics which are pretty significantly different. There are different types of uncertainty. And one of the things that we've seen as we've done exercises with groups around the country on this, is that actually some of the attitudes on contagion, at least as expressed in these tabletops, are slightly different. They're much more focused on direct computer connection and actually much more willing to find mutual assistance or other ways to satisfy customers. So these are the types of things that we're talking about. It's a very significant risk and one that we spend a really significant amount of time talking about and working across the entirety of government and with the private sector on it.

MR. BAILY: So let me ask, Dino, just to follow up on that. So do you think changes in the technology and the high-speed trading, do you think those have somehow made these externalities less important or more important? Or how is that view from your perspective?

MR. FALASCHETTI: I don't have a strong opinion other than the institutions matter. I mean, so in principle, the technology can certainly increase the transparency. But the rules that govern the use of those technologies really do matter,

and that's where, I think, the distributional politics have an opening. I mean, there's always this tension between policies for efficiency gains versus those for political gains. And you know, the Econ 101 book provides some real, I think, sound, firmly grounded productive guidance for where you want to go with policy. But if you find yourself being on the short end of that efficiency gain, you have a voice, too, and that's politics and, you know, working through both those at the same time is actually quite difficult. Amias is doing good work. Everybody on this panel his done good work in that arena. And I think that's where the real tension lies.

MR. BAILY: Hal?

MR. SCOTT: One of the regrets of -- I'm sorry, thank you.

One of the regrets I have about my book is I didn't spend more time on technology, because maybe that is a solution in the future. When I was starting off my career, I specialized in the payment system. And this was in the late '70s and '80s. And if you had a conference then about what was the big problem with systemic risk in the United States, it was the payment system. Why? We had this interbank payment system called CHIPS -- it still exists today -- in which people sent wire transfers to each other during the day. They were not settled until the end of the day, and the balances of the debtors' positions were huge. Like billions of dollars. And if one of those net debtors failed to settle that position, there would be a chain reaction of failures because other people wouldn't get paid, they would fail. And so at the heart of our financial system was this net settlement payment system, which was a time bomb waiting to go off for systemic risk.

So how do we approach it? You know, we regulate it. We try to control the exposures and so forth. Then came a technology development. In Euroclear, which was a security settlement system in Europe run by JPMorgan at the time, they figured out a way to settle transactions on an ongoing basis basically with an algorithm that set the sequencing of which these transactions would be processed. And because they did that,

for security settlement over there, the CHIP system said, hey, if we adopt this technology and we have constant settlement -- we net off, we sequence, we do all these things -- the balance at the end of the day will go way down and we won't have the systemic risk, and that happened.

So that is a kind of nice tale in which technology came to the rescue. Now, who knows? Maybe block chaining and all this kind of stuff, maybe there is a technology solution to this.

You know, I can't look into the future and guarantee it. By the way, I think this is more than a prayer; this is a hope. But I think it would behoove us if we did not at least pay some attention to what technology changes could help improve this program.

MR. KOHN: Just one brief point, Martin. I think on the -- perhaps not directly related to contagion, but this issue of high-frequency trading, algorithmic trading, one of these intersects with the liquidity of the markets, and one of the issues that FSOC, the Financial Policy Committee at the Bank of England, other things I worried about, is whether the liquidity of some of these markets has been affected by regulation or technology, and/or technology. And I think one of the things we need to spend some time on and some resources on is trying to figure out the effects of the developing technology, the trading technology on financial stability, which a lot of people are working on. But there's an intersection there, so.

MR. PESTRON: Bobby Pestron. Just an interested person.

Is Dodd-Frank imperfect because the nature of our congressional system to produce law required comprise between inherently conflicted economic theories and solutions and inadequate consensus on the science of solution? Is the best solution therefore in the mind of the beholder or is there actually a best solution to minimizing any of the C risks?

MR. BAILY: Were you quoting someone in particular or was that your

own --

MR. PESTON: It's my own.

MR. BAILY: Okay.

MR. SCOTT: We're in a democracy, legislative process is full of compromises for politics, so we don't always reach the perfect solution or the rational -- perfectly rational solution. But, you know, it's been the genius of our country that this democracy has often produced the best answers to problems.

I don't fault Dodd-Frank because of the political process. I think, you know, political processes work pretty well in the Dodd-Frank. And I think there were differences of opinion, but I think the political process, you know, as I observed it in the House and in the Senate, there was a lot of discussion on both sides with each other. Of course, there were differences amongst people. You know, the only issue -- the issue where there was the greatest consensus was my issue. This was a bailout of Wall Street. We can't have that happen again. And that's, you know, in some ways why we're here today. So even when you get consensus, that might not be the right solution. So I think it's an interesting question but I don't think it has a good answer.

MR. BAILY: Well, I want to throw in a quick comment and then we'll need to wind up. I think it was unfortunate that Dodd-Frank was not in the end a bipartisan bill. I think it would have been -- we would have all been better served and maybe to the extent that Dodd-Frank needs amendments or needs improvements, I think if it had been bipartisan to start with that would have been an easier process than the one we're facing now which is sort of more polarized.

MR. GERETY: If you open up your Econ book, you'll read something called the First Welfare Theorem. And it essentially says that ignoring the information costs that I've been discussing, things work out. Well, as we know, the cost of information, the cost of transacting more generally don't rely on the textbook; they rely on politics. And so when you go to your political science class, there's no such thing as a

first welfare theorem of politics. In fact, what you learn is that it's usually just chaos. And you look at our own history and you look at the history of humankind, and that's a model that finds, I think, strong rationalization in those data.

And let me say just one more thing on capital requirements that I don't think we've touched upon enough here, and that is on the politics. If you look at the data that FDIC Vice Chair Hoenig has put together, a very nice dataset, and it correlates failures with capital. And you ask yourself, if you're Calomiris and Haber, you know, their theory is that this is due to the unique populist politics in the United States. Where is this populism coming from? What's fueling this populism? Well, one is the bailouts that we saw. And what you see in Hoenig's data is that the level of liabilities that failed -- notice I'm saying liabilities; not assets that failed. We usually focus on the left-hand side of the balance sheet. The liabilities that failed at high levels of capital were inconsequential not on the economics but no the politics. The failures of those liabilities weren't of such a size that you heard big screams that the world is going to catch on fire if we don't bail these guys out. And so I think that's an important thing that we could probably all agree upon on this panel that, you know, in principle, the economics of capital works out but it may also have a political benefit.

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