Eurodollar University Season 2, Part 2

August 16, 2018

***Erik*:** Welcome to Part 6 of MacroVoices Eurodollar University with Alhambra Investments CIO Jeffrey Snider. I'm your host, Erik Townsend. There is a slide deck to accompany this podcast and we recommend that you download it before listening, as we'll be referring to the charts and graphs it contains throughout this program. You'll find the download link, along with the other parts of the series at https://www.macrovoices.com/edu (for Eurodollar University).

As you know, it was a challenge to decide in the editing room where to break Parts 5 and 6 apart, because Jeff Snider was really on a roll, talking about how the sheer panic across the industry associated with the subprime mortgage crisis was creating a liquidity crisis, even in cases where the underlying credit itself was actually sound. We cut off just before Jeff began to explain how gold would come into the story as the collateral of last resort.

Just to refresh your memory, we're going to rewind by a couple of minutes and replay the final two minutes or so of Part 5, just to keep the continuity of thought going as Jeff brings gold into the story.

Be sure to download the slide deck that accompanies this conversation. You'll find the download link at https://www.macrovoices.com/edu (for Eurodollar University).

We left off at Slide 45 in the deck. Now here is Alhambra Investments CIO, Jeffrey Snider.

***Jeff*:** Yeah, when you talk about the repo market, think of yourself as a repo counterparty. In other words, you're lending cash against collateral. You really don't care as much about the credit risk of the collateral you will receive. You only care because it's usually a short-term overnight transaction. You only care about how much price it tends to move on a daily basis, the volatility of the collateral you will receive as security for your cash.

So if these mortgage bonds and these leveraged super senior pieces start to exhibit higher than normal pricing irregularities – it doesn't matter what direction either – which raises the volatility, all of a sudden you're going to be more reluctant, regardless of credit risk, regardless of perception of subprime versus prime or whatever else. Because it exhibits more price volatility, you're going to demand a higher haircut.

And if it gets going too far, as it did in 2008, you're not going to take any mortgage bond collateral at all. It has nothing to do with credit risk. Again, it's all about liquidity and the fact that illiquid pricing is causing increase in perceived volatility. Which then presents a collateral issue across the entire repo market, in the mortgage bond part of it.

Because mortgage bonds, which used to be treated as good as Treasuries because they were all AAA-rated – they were low-risk or perceived that way – all of a sudden they are being perceived as something else entirely. And it puts tremendous strain on all of the rest of the collateral pools available, including the US Treasury market.

So that's why, in the beginning of 2007, and especially during these periods of more intense strain, you see these repo fails in the Treasury part of the repo markets because the MBS piece of the repo market was becoming more and more problematic. And, in certain parts of the MBS collateral system, these were becoming non-negotiable on any terms.

So now we're transitioning not just commercial paper, not just credit default swaps. Now we've got the repo market involved, on a basis that has nothing to do with credit risk at all.

Erik: Okay, to summarize at this point, the guys on the repo desk are hearing rumors that there may be a connection to subprime. They are not sure whether they understand what that connection is. But all they need to hear is there might be a connection and that's got people freaked out. So everybody is freaking out everywhere. Nobody trusts the liquidity of anything and things are starting to break down.

As we get to Slide 47, how do these collateral problems translate to other markets such as gold?

Jeff: Well, gold just stands in as the collateral of last resort. If you are a bank that has trouble funding repo because you have an inventory of mostly mortgage bonds, you've got to find some kind of collateral to replace the mortgage bonds. So what happened – we talked about this before in an earlier MacroVoices podcast, detailing gold or looking at the gold market. During 2008, we can line up these collateral issues with gold.

What we're really talking about – again, it's fragmenting money markets, that once operated as a monolithic whole, start falling apart. And that transmits strain across all parts of the money market. This was never just a subprime issue. It was a liquidity issue.

And when you start seeing gold get slammed at these various points in time that correspond with the repo market trouble (as you see on Slide 48), what that tells us is that this is no longer a small minor nuisance (as if we didn't know that). It's become almost a systemic run in not just commercial paper but now repo.

These are very vital and very important parts of the global funding mechanism. And, because it's not a credit issue, it's a liquidity issue, what we're really talking about is a monetary system. That's what the center of all of this stuff is. Subprime mortgages were just the label of mainstream focus and attention, but it's really the monetary structures contained in all of these various shadow parts of the Eurodollar system globally.

Erik: Since you mentioned it, Jeff, I'd like to point out to our listeners that we did do an entire

MacroVoices podcast on the connection between the precious metals market and the Eurodollar system and repo fails and so forth. That aired on March 1 of 2018 on MacroVoices episode 107. It is still available at macrovoices.com. If anyone wants to go back and listen to that full episode for more perspective on the relationship between the precious metals markets and the current discussion that we're having here today, you can find it there. Just look for Jeff's picture on our home page and find MacroVoices episode 107 from March 1, 2018.

Sorry for the interruption there, Jeff. Please continue. We left off on Slide 48.

Jeff: On Slide 49, what we're talking about is, again, contagion. Once these things start to infect certain parts, they infect everything else around them. So in the repo market, not only do we have AAA-rated subprime mortgage collateral start to be questioned. Because of the repo market and the way it works as a counterparty, again, you don't care about credit risk so much as volatility and, therefore, liquidity risk in these things. Haircuts were adjusted on everything.

Any part of it, whether it was a prime mortgage bond, even stuff that was AAA-rated US-government-agency-guaranteed stuff, started to become harder and harder to use in repo markets in terms of funding. Because these things started to get further and further out of control.

And a few days before Bear Stearns failed in March of 2008, you have all of these further notations that this was becoming not just a small and then even a large problem, but a systemic problem. That's ultimately what Bear Stearns was. It was a signal that this was far more than just subprime, far more than just mortgages, but it was a systemic issue of the entire global monetary system.

If you can't negotiate in the repo market, highly-rated government-guaranteed paper, what are we really talking about here? How does a 50-basis-point cut in the federal funds rate actually help us? It doesn't really do that.

And so these shadow components and the shadow contagion, the breakdown of the money market into fragments, was an inordinately important part of what was going on in 2008.

Erik: Jeff, I think that that conversation pretty much covers what you have on Slide 50. Moving on to Slide 51, we're back to August 9 of 2007. What's the occasion this time?

Jeff: We're looking at the spread of contagion. And how this thing progressed systemically from, seemingly, a small part of the mortgage market to the point where, by September of 2008, it took down the GSE's Fannie and Freddie and imperiled the entire mortgage system top to bottom.

Let's go back to these leveraged super senior pieces, and funding through the commercial paper, and repo, and all these other things.

What do you do if you have problems and your commercial paper is no longer negotiable because every money market fund is running for cover? They don't care why. They just know that they don't want to buy your paper anymore.

You are having trouble in the repo market because repo counterparties say, well, the pricing of your paper is going haywire. Therefore, there is too much volatility. We can't give you good terms like you normally get. Where do you go for funding?

One of the places that some of these institutions went, and some of the institutions that actually owned some of these leveraged super seniors could go, was the Federal Home Loan Banks. Because the Federal Home Loan Banks, as part of their mandate to aid the mortgage business as a whole, offered overnight term funding through advances.

As the commercial paper market broke down in August 2007, if you go to Slide 52 you can see what happened. Initially, for the rest of the panic, a lot of investors, a lot of people who were having trouble funding these mortgage structures, started taking out these advances. We're talking hundreds of billions of dollars in funding advances from the Federal Home Loan Banks, which had the effect of spreading the exposure, both liquidity and perceived credit exposure, on to federal structures now.

Federal Home Loan Banks isn't the same things as the GSEs Fannie and Freddie. But it started to be viewed in the same way. Nobody had an idea if the Federal Home Loan Banks were going to expand their advances by $400 billion. What does that say about who is exposed to what? Including the government and Fannie and Freddie.

It became a huge problem where liquidity risk was intruding upon everything, top to bottom, in the whole mortgage market – the way these things were funded, the way these things were perceived, and how they could possibly operate in such an environment?

Erik: On Slide 52, what we're looking at is the FHLB advances, the amount of money that's coming in from these government-sponsored entities to help out with the ABS mortgage securities.

As we move on to Slide 53, you're showing something completely different. You're showing the foreign holdings of these agency bonds. Why are we shifting to the amount of these that are being held by offshore foreign entities? How does that come into this story?

Jeff: One of the things that happened that in many ways exhibits these geographical fault lines that we talked about in the money markets was, as the contagion progressed through all of these funding markets, liquidity risk rose. And one of the ways that the overseas counterparties responded was by dumping agency paper as fast as they possibly could. Which then had the effect of transmitting these negative consequences onto the GSEs themselves.

The FHLB advances are a separate issue from the GSEs. But, as I said before, as the FHLB

advances showed, there was much more risk and exposure into these government entities than anybody had previously appreciated. And it wasn't credit risk so much as liquidity risk.

If the FHLB system was advancing so much emergency funding into the market, nobody knew what any of the other GSEs were probably doing similarly. Because they were doing some similar things. So the foreign counterparties that had held GSE paper before, even though it was AAA-rated, even though it was implicitly backed by the United States government, they just dumped the stuff.

And they dumped it all at once which, of course, had the effect of increasing the volatility and putting downward pressure on the prices of government paper, raising the spread there. Which had more problems in repo markets because the haircuts have to be adjusted for volatility. So it got to the point where there was nothing safe in the mortgage part of the market at all.

Not even Fannie and Freddie paper could be taken at face value, because nobody was quite sure how this thing was actually working and how it was going to possibly resolve.

And they were misperceiving credit risk for liquidity risk. Because liquidity risk was the primary element here, it caused all of these things to become, in essence, impossible to contain (to put Bernanke's phrase to work against him here). There was no way to contain it because it just got bigger and bigger and bigger because it was self-reinforcing as liquidity risk.

Erik: Since this is Eurodollar University, and we've been spending a whole lot of time here on the history of the mortgage crisis, it probably is not completely obvious to some of our listeners, why are we on the mortgage topic?

Well, of course, you're bringing that all together on Slide 54. To this day, most people remember the whole 2007–2008 event as being something that was all about subprime mortgages. That's what it was about.

And what you're really saying here is it was never just about subprime mortgages. That was the buzzword that got attached to it. But the real issue was not subprime mortgages, and, of course, some of them were prime mortgages that never had any default risk.

The issue was liquidity. And it was dollar liquidity. And it was contagiously spreading globally. Is that essentially what we're coming to on Slide 54?

Jeff: That's the major point we're trying to make here. When we look at it this way – you can understand why people focused on subprime. Because it was obvious, it was easy to understand. A bunch of people who couldn't pay their mortgages created a bunch of problems. And it's something that you can hang your hat on as an explanation for what might be going on.

It's much harder to say, well, there is all this bunch of shadow stuff going on behind all of that that we don't really understand: ABS paper from Europe that's pledged in money market funds,

and commercial paper, and correlation, and credit default swaps – that's just way beyond the ability of most people to grasp.

And I put most policy makers into that category as well. Because these are the people who should have been on top of all of this but were woefully uninformed about everything that was going on.

So it's understandable that people focused on the subprime element and that became sort of the talisman or moniker for the entire panic itself. When, in fact, it serves to obscure the real issue here, which was the Eurodollar system.

That's what we're really talking about here. Liquidity risk and the fragmentation of money markets along all of these various fault lines. It's about the money system itself and how all the stuff we talked about in Eurodollar University Season 1 started to break down in ways that people thought were impossible.

Again, we go back to the liquidity backstops. Nobody ever thought those would ever be triggered because it looked like the Eurodollar system as a whole, spread out globally across all of these various counterparties and through all of these various channels and conduits, was never going to be an issue. And how could it possibly fail? Not just how could it possibly totally fail? How could it possibly fail even just a little?

So it was just a massive shock to the system. But it was a monetary shock. Not a credit shock. A monetary shock.

Erik: Just to pull all of this together, let me summarize how it's coming together in my mind. You can tell me if I've got this right.

We learned in Parts 1 through 4 of Eurodollar University all about the 50-year history, going all the way from bankers' acceptances through the massive creation of credit in the 1960s and then the '70s, '80s, and '90s.

This allowed the commercial banking system to do things that, frankly, it was not supposed to be doing, things that are intended to be reserved for central bankers. Which is to create money supply. And they did it through all of this credit creation and securitized products. That was a major source of dollar liquidity globally, and it served the entire world's need for US dollars.

So, Jeff, what we're really saying here is that, going back to August 9, 2007, it was the realization by BNP Paribas that, hey, this subprime situation or mortgage liquidity situation potentially imperils the security of our money market funds, the securities that everybody thought were completely, totally safe.

That was just the straw that broke the camel's back. That was the catalyst that freaked the market out and everybody said, oh, my gosh, there was a major contagion. Liquidity froze up

and the Eurodollar system stopped being this unlimited source for the commercial banking system to create money supply out of thin air.

Now, the subprime crisis, this has obviously blown over and been forgotten about. But the Eurodollar system never recovered.

So my questions are, is that right? Do I have the summary correct? But, if it never recovered, why did it never recover?

Jeff: The summary is absolutely correct. And that's really what we're talking about here and what's really important.

You raised an important point here. You're right, the subprime is dead, gone, buried, and that's not an issue anymore. Yet, here we are, almost 11 years later, and we're still wondering what happened to the Eurodollar system.

Obviously, there is what happened in the shadows and what I call balance sheet capacity and the ability to manage a bank's balance sheet, all the ways in which that was done before 2007.

The straw that broke the camel's back on August 9 was, essentially, all the participants in this Eurodollar system – who before 2007 never questioned any parts of it because they thought it just worked, nobody really cared how it worked because it just seemed to work – all of a sudden started to question in very deep and very intrinsic ways what was really going on in all of these bases. And what they found was all of these things that we thought were no risk at all actually were tremendously risky.

Because the way the system was put together wasn't exactly a robust system at all. We talked about liquidity backstop, commercial paper market, repo. All of these various things were thought to be redundancies that reduced liquidity risk. Instead, they were fragmented pieces that actually transmitted liquidity risk.

What everybody thought was a safe system that operated well turned out to be a poorly designed system that, when it started to turn on itself, there was no going back. There was no way to stop it.

It's almost to the point where you look at it and you think, well, once the run started in the Eurodollar system, there was no way to stop it. It was inevitable at that point. So, once August 9 happened, there was no way to get out if it because everything started to move in against itself. Like the snowball effect, it just got bigger and bigger and bigger and bigger because there was no way to stop it once it started.

That's the sign of a fragile system, not the sign of a robust system.

Erik: To summarize where we are so far, in Season 1 of Eurodollar University, we talked

through the whole system and its history and how we got here. What we've been discussing so far in Season 2 is this big picture conceptual – what's the system really about?

I think it's become clear that the Eurodollar system, unlike what you learned in school, is not just dollars that are on deposit outside the United States. It really is about balance sheet capacity. It's the ability of the banking system to, effectively, create money supply through growing its own balance sheet.

We've talked about this at a high level. Something I remember getting feedback from in Season 1 is people found it really tied things together when you went step by step through the transactions showing how a balance sheet would be affected by the creation of Eurodollars. Let's do that again in this next series of slides.

Walk us through these topics that we've already discussed like repo markets, and liquidity, and expansion of balance sheets, and so forth. Let's walk through these things on a step-by-step basis.

Why don't we start with Slide 55? Go ahead and talk us through what's going on here.

Jeff: When we left off on Eurodollar University Season 1, we had put together a diagram of sorts, a highly stylized example of the system and all of the various components to it. The idea there was to try to give you a sense of how banks actually construct their balance sheet and how they're also interconnected in the way that they do it.

And, furthermore, in the way that they actually put together their positions. A lot of it isn't actually residing on the balance sheet. A lot of it is hidden. A lot of it's esoteric. It's complex.

So we put together this diagram in which I used four different entities: Bank A, Bank B, Bank C, Bank D. And we went through the example of how Bank B might actually add to its balance sheet on the way up.

So what we're trying to do now, in the context of 2007 and 2008 when the Eurodollar system breaks down, trying to look at it almost in reverse. What happens now that some of these things start to go wrong? And the idea is to try to identify the faults and the fragments in the system and put together the pieces of it so that we understand on a higher level exactly what went wrong and why it stayed wrong.

Building off of that on Slide 55, if we go to Slide 56, in the first part here we want to focus in on Bank B. Bank B was our analog for changes to the system. Bank A, Bank C, Bank D all played a role as a stand-in for the market and how it allowed Bank B to try to do what it wanted to do. Which is, for banks during that period, it was always about how do we get bigger as efficiently and as cost-effectively as possible?

So what we're really talking about – To start with (Slide 57), a bank has assets and it has

liabilities. The assets are the positions that it owns. Those are the things it's going to make money on. The liabilities are the way in which it funds itself so that it can do the stuff on the asset side.

We pay most of our attention to the liability side because that's where we're drawn to. That's where the money is. That's where the Federal Reserve and monetary policy all goes. You have deposits. You have these wholesale markets like repo and other things like commercial paper. And then banks have capital.

If we go to Slide 58, progressing a little further, let's break down the part that I've called "Due to Bank A", which is, again, a stand-in for Bank B's participation in, essentially, money markets globally.

And we just make some simple assumptions here. Remember, this is a stylized example. It's not drawn to scale. We're only trying to illuminate specific concepts about the banking system and how it operates globally.

So we assume that Bank B owes Bank A in money markets, these interbank markets, $80. Half of that we'll say it's overnight MBS repo, $20 in commercial paper, and $20 just unsecured between Bank A and Bank B.

That's a pretty standard approach to how banks funded themselves prior to August 2007. There was a mix of funding. They did different things in different marketplaces to take advantage of cost efficiencies and things like that.

If we go to Slide 59, as we know from what we have already discussed, one of the first things that went away, or one of the first things that became a big problem for this method of funding, especially on August 9, 2007, was the commercial paper market. All of a sudden, that avenue was blocked. It became very problematic for anybody who was using commercial paper to fund specific mortgage positions.

Okay, so what do you do if you no longer have commercial paper as an option on the liability side? Well, you can increase your exposure in the repo market and unsecured interbank.

Slide 60 now, as more and more funding was dumped into unsecured, which is what our LIBOR rates pertain to, that pressured the unsecured market, because you have more volume coming in, more demand for funds. At the same time, the suppliers of funds in those markets were starting to get a little nervous about, number one, why is there all this demand? And, number two, what's really going on in the system globally, or worldwide?

We have now one step of progressive failure where we had pressure in commercial paper. That starts to get into unsecured. And now we have limited other options for banks who normally had – at least what they thought they had was the flexibility to be able to fund in any number of these markets at will, almost, and at the best terms they could possibly find.

As they became more and more backed into the corner, getting shut off of, first commercial paper and then the unsecured conduits, they started going into these other sources that we talked about before, including these Federal Home Loan Bank advances.

If you go on to Slide 61 and then Slide 62, then the repo market starts to fall apart, especially in early 2008 in the months and weeks before Bear Stearns failed. I hope you can get a sense of what's going on on the liability side. Because all of these different methods of funding were starting to fall apart, and they fell apart progressively. S
Whenever one thing failed, and everybody thought that, okay, if we're shut out of commercial paper, for example, we'll have alternates. We talked before about where there were liquidity backstops to some of these commercial paper conduits. There was a repo option if for some reason you had trouble in the MBS market.

In early 2008, all of these things start to fail in a very big way. Culminating, of course, in March 2008 with the failure of Bear Stearns.

Erik: Jeff, I see you really tearing apart what's happening on the liability side of the balance sheet. It seems to me, if I think back to that timeframe, what was really going on in a big way was the Fed was getting involved in rescuing everybody's liabilities.

So where does the Fed fit into this story?

Jeff: Well, that was their intent. The Federal Reserve policy makers were not sitting back doing nothing. First of all, as we talked about in the beginning of Eurodollar University Season 2, they reduced the federal funds rate from 5.25% to 1% (and then eventually zero).

This was based on the idea of the old maturity transformation or carry trade that reducing the cost of funds would aid in the banking system by incentivizing other money-dealing banks to go into these various markets and add additional funds to them – because there would be more of a profit opportunity to that.

Obviously as we know in hindsight, that didn't happen, because banks that would normally be incentivized by something like a rate decrease in the policy rate were completely scared away from it because of the risks involved. So it didn't really matter that the Federal Reserve reduced the federal funds target.

Number one, because that didn't translate into the Eurodollar market, into LIBOR. And, number two, because risk perception was off the charts. And interest rate decrease doesn't actually help in that sense.

Erik: Okay, so step number one was the Fed dramatically reduced the fed funds rate. And that made the cost of borrowing much lower.

Moving on to Slide 63 where you get into the TAF and US dollar swaps. How did they play into this story?

Jeff: Later in 2007, a couple of months after the system really started to break down, in December of 2007, the Fed introduced a couple of additional techniques. One was called the term auction facility (TAF) which, in many ways, it was the discount window just taken outside of the discount window.

Because, by then, a lot of the banking system – and a lot of even internal discussion – worried about the stigma of any banks that approached the discount window, which would paint a target on their back and, basically, tell the markets to stay away from those firms.

So they tried to recreate the discount window with the TAF. But they did so, initially at least, in very limited fashion. They offered – I believe it was $15 billion in 28-day allotments. So it was a small amount of liquidity that banks could bid on, collateralized by some of the stuff they did.

They also opened up dollar swap programs with various central banks, initially just the Swiss National Bank, and the European Central Bank, and the Bank of England. That would allow the Fed, essentially, to send dollars to those other foreign central banks so that banks in their jurisdictions – in Europe or England – could bid for those dollars with their other central banks.

It was an attempt to bridge the divide between the Eurodollar system, which was offshore, and the domestic system, which – if you remember from the effective federal funds rate that was below target – they had too much funds in New York, not enough funds in the offshore components in London and elsewhere.

So the dollar swaps were a recognition that there was a global dimension to this liability problem. But, again, the way the Fed started off with them, they were very limited. They were not full allotments. And they were smaller amounts compared to the size of the problem that was developing on the liability side.

Erik: So the next step after reducing interest rates is the TAF and dollar swaps. What comes next after that?

Jeff: On Slide 64, the Fed was continuously behind the curve. The problem progressed on the liability side, in terms of global liquidity, far faster than they seemed able to be able to catch up to and then get ahead of.

So, really, from the start – December 2007 forward – they were always progressing and increasing their programs, raising the allotments, raising the limits, expanding the eligibility criteria for collateral. And they increased the TAF funding auctions in terms of absolute amount and how much any individual bank could take in. They also added another thing called the TSLF, which expanded collateral.

As it progressed on the liability side and in the liquidity parts of the system, the Fed never seemed able to catch up to it. And they never seemed able to overcome and get a handle on the system and get a handle on the crisis as it progressed.

One of the reasons for that (Slide 65) is that we're only focusing on that part of the system. We're only on the liability side. We're only into the money markets where banks are funding that specific piece of their balance sheet from that specific piece in each of these various ways.

Erik: So far, we've been entirely on the liability side of the balance sheet. What's going on on the asset side of the balance sheet?

Jeff: We're on Slide 66. And we spent a lot of time in Eurodollar University on the asset side for a reason. We want to understand what it is and what it takes for any particular banking institution to put together the asset side of the balance sheet. And the liability side is only one part of it.

As we go to Slide 67, a lot of it went into things like capital efficiency. How do we make those asset positions as efficient as possible in terms of the constraints that are placed on any kind of bank that operates inside the system?

Everybody knows about the capital ratios. And, of course, it became a huge deal in the 2008 panic. But I don't think many people really appreciated why that was. We got a sense of that in Eurodollar University Season 1, on how things were working as it was building up.

A lot of it works in the same way as things started to go in the other direction. Banks were able to package mortgage loans into mortgage securities. And then they were often pairing them with things like credit default swaps or other similar kinds of guarantees, such that they can reduce the risk weighting on any of those given MBS assets.

That allowed them to have the highest possible capital ratios that made them appear not just safe but also that they could hold more positions, or greater par value positions, with respect to the specific amount of capital that they had on their balance sheet.

Remember, capital is an expensive piece of the funding puzzle. So the less capital you hold for a given amount of assets on the asset side, the better off you are, the bigger you can become, the more money you can make, all that good stuff.

The problem with that (Slide 68) is that if you start to have problems in any of those things that allowed you to reduce your capital commitments – What do you do when that happens? What happens, for example, if you are using your credit default swap to reduce the risk weighting of any kind of MBS security and, all of a sudden, the counterparty who is on the other side writing the credit default swap for you starts to run into their own problems?

I'm talking about companies like AIG, the monoline insurers, especially in March and April of

2008. A lot of those people who were writing credit default swaps, who were issuing the guarantee for what we call regulatory capital relief, this idea that you could manipulate the risk weighting of these mortgage bonds – they started to run into their own problems.

So they were threatened with downgrades and certain other things – funding difficulties of their own. That had the effect of reducing the value of the guarantee, which meant that they weren't really guarantees anymore.

So you were counting on a credit default swap to reduce the risk weighting of any kind of mortgage bond product. And it wasn't just mortgage bonds either. You can use these in other types of assets. We're focusing on the mortgage segment because that's a big part of the crisis and that's a big part of what banks were doing. But this is kind of a universal concept.

If you have a guarantee that's allowing you to participate in regulatory capital relief that comes under any kind of scrutiny or questions, then you are at risk of this process going in reverse.

Now, if you had that $80 of MBS that was given a 20% risk weighting because of the credit default swap, if the counterparty is downgraded, all of a sudden it might have to be kicked up to the 50% bucket or the 100% bucket. What happens to your capital ratio here through no other thing than just the reduced probability or the reduced likelihood of the credit default swap being paid out? Your capital ratio falls. And it can fall dramatically.

On Slide 68, you see the capital ratio falls to 7.14%. On Slide 69, if the credit default swap becomes completely worthless you could get kicked up to the highest bucket. And all of a sudden your capital ratio falls to less than 6% through no other issue than this hedging technique, or what's supposed to be a hedging technique but it's been used for something else.

Erik: Okay, so what we're seeing, Jeff, is that in the situation you're describing we're not even seeing changing credit dynamics in the system. We're just seeing counterparty dynamics changing in a way that dramatically lowers the Tier 1 capital ratio for these banks. And, of course, that presents all kinds of knock-on problems.

What else is going on? And what other factors are encumbering the balance sheets of these banks during this period?

Jeff: That's exactly right, because we're just scratching the surface of all the problems that come about when these things start to fall apart.

Let's stop and make a larger point here. A lot of the things that we've talked about were believed to be robust systems, things that were complete with redundancy, a system that was not fragile, that was not procyclical.

And we tend to find out in analyzing these points of failure that they actually became again progressive. One thing started to become a problem, like we started on the liability side and

problems with money markets, and all of a sudden it started to be a problem everywhere.

We talked about the capital ratios of credit default swaps. But what that really led to was something called OTTI, which is "other-than-temporary impairment," which is an accounting issue.

We have to be mindful of the way in which all of this stuff is actually accounted for in terms of the accounting rules that the FASB and the international accounting bodies set forth. And the reason we have to be mindful of them is because the banks are very mindful of them. They have no choice but to follow the accounting rules.

And the accounting rules tell us how much losses actually go on the bank statement, any kind of income statement, how they flow through the income statement to the balance sheet, and any things like that. So we have to be very mindful of how all of these things are accounting.

And OTTI was a very, very important part of how it became something more than it could possibly have been handled by just focusing on the liability side of things.

Where we start with OTTI is an understanding of what it means. You have an asset that's worth X, or you bought it for X. The cost value of your asset is, say, $100. Or, in this example, it's $80. If the value of that security falls at any time – the market value of that security falls below $80 – you are required by the accounting rules to assess that kind of potential impairment. And it is potentially an impairment.

What the rules say is that, if that situation arises, but, however, you have something like a credit default swap or other kind of guarantee, then you're protected against having to recognize that loss on the accounting statements at that particular moment in time.

So let's say your $80 of MBS securities falls to $70. That's a pretty big drop. Under certain conditions, you might have to write off that $10 loss onto the income statement, which is a big problem at that time. At *that* time in particular.

However, if you have a credit default swap, or you have some kind of guarantee that reasonably assures us that you're going to get paid back the entire cost, you don't have to recognize that loss. You can continue going on so long as the credit default swap maintains all its valid tests.

There are various associated tests in the accounting rules that allow the banks to govern whether or not the situation for OTTI or not-OTTI actually appears.

Erik: So how does the FASB determine OTTI?
Jeff: On Slide 71, it's a three-step test. The first thing is the simplest one. Is the market value less than the cost basis? If it is, then you have a potential impairment. The actual FASB rules say an investment is impaired if the fair value of the investment is less than its cost. That's pretty

simple stuff. That's just an impairment.

But what we're really worried about is "other-than-temporary." Because, you know, markets drop, they come back, they drop, they come back, whatever. What we're really looking for, what the banks were most concerned about, is if the market value falls and then the likelihood of recovering back to the cost basis is very small.

That's why the guarantee, the credit default swap, was an important part of this. Because what it said was, I don't really care because if the value falls I'm protected. I have this guarantee that says I'm going to get paid back in full either way – either from the security paying off at a par value at maturity, or my credit default swap counterparty paying me the insurance that I've bought from them.

So Step 2 is really the most important part. As it says, *however, an investor shall recognize an impairment loss when the impairment is deemed other-than-temporary*. Even if the decision to sell hasn't been made.

This is an important point when we talk about things like mark to market. So the value of the security – let's say it's $80 at par value, that's the cost basis. It falls down to $70 or something even less than that, which was not unheard of at that time, but we have a credit default swap against it.

But now the credit default swap itself is questionable. We subject it to certain accounting tests and it fails those. Now we have a security that is much less than its market value. We have no protection against it. And, furthermore, we can't buy any more protection against it because, as we talked about before, nobody is writing new credit default swap policies anymore.

So now we have a problem where, because the market value is so much less than the cost basis, we have no way to hedge it. We have no way to get back that cost basis. This is now an impairment, number one.

But, number two, it's deemed other-than-temporary impairment, which means we now have to book this loss as if it's an actual loss, even though we're not selling the security. We're never going to sell the security. It doesn't matter. This is mark to market.

It's what this OTTI thing says is if the market value says X, and we have no way to hedge or get back our investment in it, then it doesn't matter whether we sell it or not. We've got a loss we have to take. And that's what Step 3 is.

Step 3 is you have to recognize the loss as equal to the difference between the cost and the fair value, which is one reason why those credit default swaps were so important. They were protection against OTTI should something like this happen.

Erik: Moving on to Slide 72, I see our good old friends at AIG are back in the picture. And, of

course, they played a pivotal role when everybody was concerned. They had written so many credit default swaps with no reserves behind them that everybody was afraid they were going to default on everything and take the entire financial system globally down with them. And that's the reason they were bailed out.

But I imagine there was a period before the bailout where things got pretty dicey. So how does AIG fit into this story?

Jeff: I think that's probably a good way to characterize it because what we're really talking about is that. How did AIG actually threaten the system? It's exactly the way that we're talking about right now.

The credit default swaps as that part of balance sheet construction and capacity were absolutely essential – banks who had really overleveraged their balance sheets before the crisis had become very dependent upon the ability to do all of this kind of stuff. Now, all of a sudden, they are faced with a situation where one of the main providers of that ability is itself facing the same sorts of problems.

If you go back to their regulatory filings in 2008 – for the second quarter of 2008 in particular, which I have included here – what you see from AIG is they were subject to these OTTI impairments too.

Another important point we need to stress here is that the system was incestuous. It wasn't just AIG that was the standalone entity, like a central bank, providing all of these guarantees. It was providing all of these guarantees at the same time it was accepting guarantees from all of these different money dealers in the system too. So everybody was connected to everybody doing the exact same kinds of things.

So AIG fell apart. It fell apart and it brought down everybody else with it. AIG was experiencing OTTI impairments itself. And these were massive, written right into their income statement, into the notes of their regulatory filings.

They note of how many billions is that? I mean there's $6.8 billion right off the bat. Then there's another one for $12.4 billion. These are huge impairments. And, again, these are accounting impairments. These are OTTI impairments where the value of their ability to lay off risk to other people was in question. Therefore, they had to start to modeling how they provided protection to everybody else very differently.

The effect of that was enormous. If you look down below on Slide 72, in the first six months of 2008 they booked $34 billion in gross revenue. But in the first six months of 2007, the year before, before everything started to fall apart, they had booked almost $62 billion in revenue.

So they had a 50% haircut in revenue, based on all these OTTI impairments. I don't know how many business out there can survive on a 50% haircut in revenue, let alone one as essential as

AIG in the middle of all of this stuff going on in terms of balance sheet construction.

It was a major blow to the system. And of course, as AIG books all of these OTTI impairments, that reduces their revenue. That only makes AIG look even worse. If you thought AIG was in trouble before, what do you think of AIG with half as much revenue the following year?

Any default swap and any other guarantees that the company has provided to other parts of the system are now – I don't want to say worthless, but they were increasingly treated throughout 2008 as worthless because the results were just tremendously negative.

Erik: On Slide 74, I see Citigroup's logo here. And, of course, for the beginning of 2008, most people thought Citi was going to be okay because they didn't think that a traditional bank like Citigroup was really going to be exposed to all this stuff that was going on. And it turns out that they were.

How did that all come down?

Jeff: I think that's another misconception too – that a bank is a bank. On one level, we do need to redefine what it means to be a bank. Because when you think of a bank – we go back to the carry trade, maturity transformation stuff – they are depository institutions that take in deposits and then lend against those deposits.

And these banks were not that. In the 1990s, they became something else. They were still a good deal a traditional depository institution. But, by and large, they had been transformed – especially at the margins where all of this growth was coming from in the middle 2000s – into what were really nothing more than hedge funds.

They were investment banks. Sure, you could call them that. But they were really taking advantage of all of the stuff we're talking about – this balance sheet construction stuff. And Citi was, perhaps, the biggest victim – victim is probably the wrong word – but they were the biggest victim of all of this stuff falling apart.

As we know, later that year in 2008, they were given the largest bailout in US history. And the reason for that was this other banking part, this shadow stuff that we've been trying to detail and go through, through this Eurodollar University series. They were subjected to OTTI impairments as much as AIG, perhaps even more than AIG.

If we look again at their regulatory filings in 2008 – this one in particular for the third quarter, just before they were handed their bailout – their impairment write-downs were absolutely phenomenal. They were just immense losses that they were forced to take.

Number one, because the market value of all this stuff had gone way below cost. But, more importantly, they had no way to guarantee or to lay off the risk of those market value changes. They couldn't buy credit default swaps. They couldn't find any other kind of guarantees that

would allow them to avoid the OTTI impairments that were being forced on these mark-to-market losses.

They were not cash losses because, in a lot of cases, Citi still held on to the securities. But, as the market value fell, they were forced to recognize losses, which of course made everything worse. Because if Citi has all of these billions and billions of dollars in losses, then what is everybody else hiding?

So it fed into the narrative that there were these massive subprime losses out there that everybody must be holding. Because if Citibank has all these, then everybody has to have them.

The fact of the matter was it wasn't really about subprime mortgages. It was about the way that balance sheets were constructed before 2007 that no longer worked. And now that everything was unwinding, it revealed all of the structural weaknesses in the liquidity part of the system, which includes managing the asset side of the balance sheet.

Erik: Jeff, you made some excellent points about the transformation of the banking system from what it used to be to what it has become. Let's go a little bit deeper on that – contrast some of the effects of the traditional system with the effects of the shadow banking system and how it played into this whole story.

Jeff: On Slide 74, we see that traditional part. It involves the Federal Reserve and monetary policy. Remember, again, the Fed reduced its federal funds targets dramatically from 5.25% down to 1% by December 2008, and then eventually zero.

That had an effect. We're not saying that the Fed can't have any effect on the system. It obviously did. And we see it right here in Citigroup's regulatory filings for the third quarter of 2008. In the first nine months of that year, they booked $40 billion in revenue versus only $33 billion in 2007.

So the effect of lowering the policy rate from the Federal Reserve was to gift Citigroup this additional $7 billion in revenue, which is about a 20% increase in net interest revenue. Which is a massive change.

On Slide 75, the effects of all these OTTI impairments and other things going on in the shadows completely overwhelmed any positive benefit from the traditional part. Non-interest revenues in the first nine months of 2008 were just $7 billion, less than $7 billion. Versus nearly $40 billion in the first nine months of 2007.

That was a huge $32 billion reduction in revenue because of these impairment losses. That $7 billion that the Fed gave you through traditional monetary policy was nothing. It was a drop in the bucket compared to the downside of the shadows.

So you start to understand why it was the Fed was always behind the curve. Because they could

never get into this other stuff that was going on in the shadows that was far more important. And at that particular moment in time, it was far bigger. The problems in the shadows were far more than traditional monetary policy could ever even hope to overcome and control.

Erik: Okay, Jeff, we've been speaking primarily to credit default swaps here, which played a big role in this story. But they are not the only derivatives that got involved in this. What else was going on in terms of derivatives that affected this story?

Jeff: There's all sorts of other derivatives out there, but the main other class is interest rate swaps. And we haven't really dealt with interest rate swaps before. I'm not going to spend a whole lot of time on it here either. The thing we need to keep in mind, and the thing we want people to understand, is that interest rate swaps act in a lot of ways like credit default swaps.

They allow banks to hedge, which means that they can control the future value, or they believe they can control the future value of their positions. And therefore that has an effect in terms of OTTI impairments. It has an effect in terms of calculating present values and things like that.

These derivatives are used so that banks can manage, and they believe in a predictable fashion, all of the assets that reside on the asset side of their balance sheet. And when those things aren't there, or they're there but they're more costly, they're harder to use. They're inflexible.

You can't do things the way you used to do them before. It becomes a big problem, because what you used to think was a predictable asset becomes more unpredictable. Which means you have to hold more capital against it. It violates other kinds of balance sheet constraints like VAR [value at risk].

So as the system breaks down, as there is lack of capacity in these derivative elements – or what I call dark leverage because of how it allows banks to more efficiently operate – as these things break down, they become massive problems because you don't have any alternative to them.

Once you've built up the asset side of the balance sheet, predicated on the idea that these things are always going to be there, you don't really know how to operate when they're not there.

In 2008 – and even after 2008 in various episodes – it wasn't just credit default swaps that were a problem. Interest rate swaps became a problem too. What I've highlighted here on Slide 76 is the aftermath of Lehman Brothers.

Lehman had a very large derivative book that wasn't easily settled. They went through an auction where $9 trillion in gross notional interest rate swap positions were auctioned off to various counterparties. You can imagine, I hope, if you are one of those people who bought an interest rate contract from Lehman Brothers, you have no idea who is going to be the counterparty after all of this.

So it injected a massive amount of uncertainty into the one place, these derivatives, that were designed to take away uncertainty. That's what we're really talking about here.

Credit default swaps and interest rate swaps and all this balance sheet construction is really about taking out uncertainty and reducing everything in a predictable fashion so that we can design our balance sheet in the way we want to design it. It's efficient, it's cost efficient, it's capital efficient in every kind of way.

Erik: So, before, we were talking about credit default swaps. Now we've moved on to interest rate swaps. I guess my question is how do we know from looking at the data when these interest rate swaps are starting to present problems the way the credit default swaps did previously?

Jeff: We have something called a swap spread. A swap spread is nothing more than the quoted fixed leg of an interest rate swap in relationship to the same maturity of a US Treasury. If you're involved in a fixed or floating swap with somebody, and you're paying X number of dollars for 10 years for example, we want to know where that fixed part price is, what interest rate that price is in relation to what you assume is the risk-free rate which is the US Treasury.

Because the US Treasury is the risk-free rate, we always assume that the fixed leg of the interest rate swap is going to be above the Treasury rate, because there is additional risk with engaging in the interest rate swap with a counterparty. You have counterparty risk. They have credit risk, they have liquidity risk, whatever.

So we can kind of gauge the health of the system, or the dynamic nature of this part of balance sheet capacity, by the swap spread. And what you find is that, starting in August of 2007, but really getting going around Bear Stearns in 2008, these swap spreads started to go haywire.

What that tells us is that this very important part of balance sheet capacity and what determines balance sheet capacity was starting to really fall apart and do so in a way that was really dramatic.

On Slide 78, by October 2008, the 30-year swap spread had actually turned negative. It had nosedived in all of the events that happened in August and September of 2008. But then October, toward the end of October, as things still kind of got worse, the 30-year spread actually became negative.

That took a lot of people by surprise. I heard stories at the time where trading machines wouldn't even accept a negative swap spread input, because it was supposed to be impossible.

And think about why that is. Everybody assumed it was impossible, because how could an interest rate swap price at a lower interest rate that the US Treasury? What does that actually tell us?

If you break down the swap spread along those lines, what it says is that the market at that particular moment in time believed that their counterparties on these interest rate swaps were less risky than the US government, which is nonsense. I mean, that's complete crap. That's not exactly what happened.

What a negative swap spread tells us is nothing about the risk of the US government. It tells us everything about the liquidity problems that were creating these capacity issues in terms of the balance sheet construction.

A negative swap spread is nothing more than the system going haywire. And that's really the way to look at it. Because it created such nonsense, it doesn't make any particular sense about the US government going bankrupt or anything like that. It tells us that the banking system was in such distress that they couldn't even arbitrage one of the most basic spreads that ever existed. This is something that should violate any kind of financial common sense, to the point where everybody believed it was financial law.

So, not just the existence of a negative swap spread, but its persistence (because the 30-year spread is still negative today) – it also proliferated. The 10-year spread went negative. And some of the shorter tenors went negative too. It was an indication that the very fundamental aspects of these derivatives, and how they play into balance sheet capacity, were just going completely haywire.

It was the system falling apart in the way that these banks put together the asset side. Not just the liability side but also the asset side. So it is very important to look at swap spreads as an indication of generic balance sheet capacity and what they tell us about it.

Erik: I think those last several comments that you made pretty much covered Slide 79 and 80. Moving on to Slide 81, it looks like we're back into our walkthrough of the balance sheet story. Pick up where we left off.

What's Slide 81 telling us?

Jeff: We want to put all of these concepts together in a way that we can visualize intuitively the progress of the failure as it moves through, not just the liability side, but also all of these interconnections about balance sheet construction on the asset side.

Starting on Slide 81, we have again Bank B highlighted as our analog for the problem parts of the market. And then Bank A, Bank C, and Bank D are the various pieces providing the resources to Bank B.

On Slide 82, we're visualizing the initial parts of the crisis where we have these mortgage securities – not just mortgage securities, but largely mortgage securities – that start to price a little bit irregularly. And that irregularity registers as a pickup in volatility, which, at the time,

nobody was expecting. Because everybody thought these were completely safe securities.

If you remember from what we went over at the beginning of Eurodollar University Season 2, these MBS structures were thought to be completely risk-free, there's no problems. But, due to things like correlation smile and the problems with the Gaussian copula, we started seeing problems where volatility picked up.

On Slide 83, the pickup in volatility registers on the liability side of Bank B – which is the liquidity and the repo market, the commercial paper, and the unsecured lending – as, okay, there is a little bit more risk than we thought existed in that part of the system.

On Slide 84, in addition to all the problems in volatility playing on the liability side, we now have a problem with our credit default swaps. Because Bank A wrote all of these default swaps (that are off-balance sheet, by the way) for Bank B so that it could reduce its capital ratio – again, regulatory capital arbitrage.

But now Bank B has these securities that are going haywire. And Bank A now has to reprice its default swap commitments because, now that they're going down in price, the probability of actually having to pay out on a default swap goes up.

Remember, Bank A wrote those default swaps never thinking for a second it would ever have to pay out a nickel on any of those. So its own capital structure, its own balance sheet construction, if you will, was predicated on that idea. So it had very thin capital to absorb even the smallest increase in probability that those default swaps would actually trigger a payout.

As we have problems in Bank B's balance sheet, it now transfers to Bank A through the default swaps because what were a zero probability of payout are now a small positive probability of payout, which reduces the asset value and actually creates a liability there.

On Slide 85, we have now where these default swaps that are off-balance sheet start to go on-balance sheet in the way that they are reversing. Because now Bank A has a liability, potentially (remember everything runs on present values), so an increase in the probability of paying out acts as an increase in liabilities and therefore drains capital from Bank A.

This is exactly the circumstances that we found for AIG, for example. AIG had its own kind of impairments that were related to this kind of structure, and it did not have the capital to absorb a change in probability of payouts on its default swap portfolio.

Erik: At this point, Bank A is impaired. How does that transmit to the rest of the system?

Jeff: Slide 86. If Bank A is AIG, then Bank C – in our Eurodollar University Season 1 construction, Bank C was one of the ways in which Bank A was funding all of its positions both on- and off-balance sheet. We have problems at Bank A. Now Bank C becomes a little bit more reluctant to fund Bank A.

Why wouldn't they be? They take a look at Bank A's results and say, these aren't good, so I don't really want to be exposed to you either. Now Bank A has a probability on its asset side and its liability side. Bank A is getting into trouble because of what's going on at Bank B.

On Slide 87, Bank C was getting its funding – the way I set it up in Eurodollar University Season 1 was that Bank C was a Japanese institution getting some of its funding in terms of currency swaps from another bank in another part of the world.

So, if Bank A is in trouble that transmits to Bank C because Bank C has some exposure to Bank A. And Bank C transmits its exposure to Bank D in a way that is hidden, off in the shadows. Because all this stuff is off into off-balance sheet arrangements, largely derivatives that are not booked in the same way as cash positions are.

What happens is we see rapid contagion where, number one, these things start to go in reverse in a way that isn't easy to identify – What exactly is the problem here? – which is one of the reasons why the myth that *this was a subprime crisis* persisted for so long.

In this kind of a system, the word "shadow" is appropriate. This is all happening off in the dark and often in a way that nobody outside of the two counterparties that engaged in any particular transaction actually know what's going on and why.

So you see all of these impairments. You see all of this risk perception rising. And outside of that, it's very hard to understand what exactly is going on here and why it's going on here. And why is it becoming a global problem in a way that no single central bank can ever seem to get a handle on?

Erik: Jeff, this feels like about the part in the story, from what I remember of living through that time, where suddenly what was a seamless system starts to come apart and not operate as a cohesive system anymore.

What happens next as we move on to Slide 88?

Jeff: I think that's the big point here. There are several big points. This is another one of those major pieces that we really want to understand, that this whole thing before August 2007 seemed to work as if it was a well-oiled machine where you couldn't determine these kinds of fault lines.

Not just because they were off in the shadows, but also because everything seemed to work in a fashion that made it appear as if this was a monolithic process. The money market was a money market, not several money markets, not different pieces operating independently. And doing so in a way that increased problems rather than decreased them.

I think that's what the panic really was, was that these various pieces started to fragment. So

that operation that used to be seamless and used to be easily done at any time in a way that banks could construct their balance sheets as they saw fit, started to not just fragment and pull apart but it became self-reinforcing in the way that it did so.

On Slide 88 what we see is that now we have liquidity problems at Bank B that register across to Bank A.

On Slide 89, those liquidity problems for Bank B cause Bank A to pull back in all of the things that it used to provide in terms of balance sheet capacity. So now, Bank A is drawn in. It reduces balance sheet.

The effect of that (Slide 90) is that it leads to further balance sheet capacity reductions on down the line in Bank C and Bank D.

And it becomes a self-reinforcing mess where balance sheet capacity reductions lead to liquidity problems. Further, the liquidity problems lead to balance sheet reduction, capacity reduction. Which leads to liquidity problems – and just on and on and on and on – because of the interaction not just on the liability side but more so the asset side of all of these various financial institutions and various banks.

On Slide 91, I've described it as a procyclical, positive monetary feedback loop. Because once it starts, it's a progressive failure. There is no way for it to stop. As each of these pieces further fragment, there is no way to put it back together again. Because everybody participating in them sees what's going on, understands what's going on, in a way that wasn't presented in the mainstream media. And the only logical result to it is to pull back even further.

Erik: Living through all of this, I remember a point where it seemed like suddenly nobody could really describe what the problem was, but it became clear that everything that was previously (supposedly) contained was not contained.

And nobody was sure what anything was worth. You couldn't get a quote on any kind of mortgage-related anything. People were suddenly getting scared that nobody knew how big this contagion could become or what could happen next.

I'm guessing that's about the point in the story where we are now. Is that right?

Jeff: Yeah. And what we're really talking about here, Erik, is that this was a bank run in every sense of the word. If you stop and think about it from a very high level, that's exactly what it looked like. Every bank run usually starts out with some form of disruption in confidence. And it usually progresses to the point where – in the traditional case – depositors start hoarding money from banks. And banks are therefore unable to fund their positions and they either have to fire-sale their assets or they go insolvent and they are shut down entirely.

The difference being that this was a bank run from inside the system. It was the shadow

capacity stuff that was being pulled back. And the stuff that you just referenced, the enormous problems at that time, were simply the indications that, yes, it was like a bank run. But we don't know really what it was because it was a bank run of only banks in these interbank shadow places.

On Slide 92, what was happening is that it was a bank run. But what was being hoarded wasn't cash, it wasn't gold, , it wasn't even really money as it's commonly defined, but bank balance sheet capacity.

AIG was withholding credit default swap capacity. They were not writing them anymore because they had their own problems. And Citigroup couldn't get their balance sheet constructed the way they wanted to because all the counterparties they had come to depend on to manage their balance sheet the way they had before, efficiently, were no longer supplying capacity.

So these banks were hoarding capacity. Which is exactly what we saw when we look at something like the swap spread, for example. They turned into nonsense because everybody was hoarding capacity. Capacity was at a premium because, largely, nobody had any really good idea of what was going on here.

Because this is a system – if you really think about it – that had never been tested before. It had developed in the '80s and the '90s. And, yeah, there was a problem with LTCM [Long Term Capital Management] and the "Asian flu" in the late '90s. But, by and large, especially with the rapid growth in the first decade of the twenty-first century, it had never been tested. So nobody really knew what to do when it started to doubt itself.

It became a self-reinforcing, procyclical process that looked in every way like a traditional bank run, except it just happened off in these shadows.

Erik: Looking ahead to Slide 93, our next topic will be where and how the Fed tried to intervene at this point, and how successful those efforts proved to be.

But this is probably a good place to wrap this episode, since your next group of slides will take more time than we have remaining. So let's leave the rest of this for the final episode in the series.

Be sure to tune in for part 7, the final episode in Eurodollar University Season 2, where we'll begin by diving in to the Fed's efforts to intervene as the Eurodollar system breaks down. Jeff will pull no punches in criticizing Fed Chairman Ben Bernanke, who, in Jeff's opinion, failed to completely understand what was actually going on and why it was occurring.

All that and much more is still to come in Eurodollar University Part 7, the final episode in the series. You can find it free of charge at https://www.macrovoices.com/edu.