Transcript on "Causes"

Chaired by John Cochrane
Opening Presentations by John Taylor and Monika Piazzesi
General Discussion

October 19, 2018
12:00 noon to 1:30 pm

Session 1
"Workshop Series on the 2008 Financial Crisis: Causes, The Panic, The Recession, Lessons"
Hoover Institution, Stanford University

John Cochrane: Welcome everyone to the first of our series of discussions on the financial crisis and great recession. It's been 10 years – what have we learned?

Our aim is to have a lively discussion. Our presenters will lead off, and I hope will keep the discussion going.

Today's topic is the runup to the crisis. How did things get to the stage where we had a crisis? We'll focus on housing and Federal Reserve policy, but we're open to anything anyone wants to talk about.

It's also fair game to ask whether we are repeating some of the things that caused the crisis? Have the right lessons been learned? What do we see going forward from the lessons of the runup to the last crisis? John Taylor, is there anything I should add?

John Taylor: Let me just mention one thing. We would like to record this session and produce a written transcript. That doesn't mean you don't get to correct or change anything that you say. We won't circulate anything that's recorded without checking with you. So, feel free to speak out and don't hold back. What I've found, and George Shultz has mentioned this too, is that this is an issue about which people really need to speak frankly, especially since it's ten years ago, and we tend to forget.

We are having several of these meetings in this series, as you know, spread out over a few weeks. Not everybody is able to come to every meeting. Niall Ferguson, for example, can't come today, but he would very much like to understand what happened in this discussion to better prepare for the next session where he will present. The transcript of the meeting is useful for that purpose too.

John Cochrane: Okay. So, today we have John Taylor and Monika Piazzesi. John obviously has thought a lot about Fed policy, and Monika about housing. Who wants to go first?

John Taylor: Monika and I discussed that that we decided that I'll start.

So, what I've done for this presentation is to go back and look at research that I did and reported at the time before the crisis blew up; I thought that would be a nice way to address the question: what have we learned since then? Of course, I'm looking at, like everybody else, the history through my own eyes and thinking about it that way. But nonetheless, I think from what I've seen in the last ten years or so,

there's a lot of confirmation to what I originally thought, at least on this particular issue – not on every issue, of course.

So, let me just present my findings that way. I will refer to the charts on the handout of slides. The first one is actually from *The Economist* magazine, but it's lifted from my research. It just shows what things looked like back in the years preceding the crisis—

George Shultz: They just lifted it?

John Taylor: Yes, but they gave me credit! How about that? I don't care if they steal it, as long as they give us credit. [Laughter] In fact, it's better to have another source, right?

Anyway, so they published this picture, and they showed how the interest rate of the Fed was quite a bit lower than the so-called Taylor Rule, which is just one way of many to characterize reasonably good monetary policy. This is a rule that fit pretty well in the two decades before this time, and so the idea was interest rates were too low. And that's what I wrote about. I presented this in the Jackson Hole Conference in the summer of 2017; all the central bankers were there, and I was quite reticent about presenting it, because it was quite a criticism. They didn't expect this, and it didn't go over that well.

[Laughter]

Around the same time – and I'll come back to this in a minute – I also noted that there seemed to be a relationship between central bank policies around the world. And that same summer, I wrote a paper for an NBER Conference in Girona Spain showing how the ECB had actually followed the Fed and held interest rates, by this definition, too low for too long, and so there was a connection which I found. Both of those research findings were presented in 2007.

The second chart illustrates the rationale that I had. It wasn't just that the rates were too low compared to some rule, it was that the low rates seemed to make a difference. In the chart on the top of page two, I took a model, which I estimated for that conference in Jackson Hole, relating housing starts to the interest rate. It's the federal funds rate. It's actually pretty simple. And I simulated it with a counterfactual in which the rate was actually higher as the policy rule suggested, and that's what the chart on top of page two suggests, that the higher interest rate would have prevented this boom, at least much of the boom and, therefore, much of the bust. So, this is kind of empirical proof, so to speak, based on a model, that the low interest rate did some damage. It actually led to the housing boom, and, therefore, the bust.

The other thing which I wanted to show at that time was that a lot of the regulatory activity was influenced by this macro policy. And the chart on the bottom of page two shows you how delinquency rates and foreclosure rates were declining quite a bit as housing prices rose faster. Obviously, at least from my perspective, the rising prices gave an incentive for people to make the extra effort of making their payments to prevent delinquency, and even more, to prevent foreclosure, maybe saving a little bit, making sure they didn't miss their payments as those housing prices were rising. I think those lower and falling delinquency rates and foreclosure rates affected the assessments by the regulators. Looking at these rates, they're remarkably low. But, of course, they turned up as soon as housing price inflation turned down. So, there's a relationship between the monetary policy and housing prices and, therefore, the regulatory activity. Monika is going to follow up with much more on housing prices and incentives that could have affected things like delinquency rates and foreclosure rates.

Josh Rauh: Can I ask, in the top graph, how much of the difference between the counterfactual and the actual housing starts do you attribute to monetary policy explicitly, as opposed to structural changes in the loan market, like increasing securitization, changes in Fannie and Freddy's…

John Taylor: It's basically by the amount shown by the equation, which is estimated historically. It takes into account that there are some lags and other variables. But it's mainly the interest rate, and the equation actually fits quite well. And so I do not a have a specific answer to your question about measuring the size of the other things. There definitely seems to have been some exuberance, so to speak, and maybe that extra blip at the end is just a Shiller swoosh or something like that, but I don't have any idea. So this is just the equation and the counterfactual, and there could be other things. And of course, there's a huge debate about this.

Darrell Duffie: Could what's going on in the bottom chart on page two, have caused the credit rating agencies to underestimate the risks in the housing market? And there was a lot of reliance on AAA credit ratings.

John Taylor: Yes, I think so. They were looking at that delinquency rate, but their models didn't relate that to the housing price acceleration. So, I think you are right.

John Gunn: The S&P 500 from the end of '99 to 2007 went up one percent a year, and so it made even residential housing more attractive.

John Taylor: Yeah. Good point. We're going to hear a lot more about that from Monika in a minute.

Michael Boskin: I want to hear more from Monika in a minute, but you mentioned historical data. I thought that one big problem was a lot of the actors in this thing used historical data that did not go back to the last deep recession. You have investment banks and other value at risk models where they have a pricing kernel that didn't include the 1982 recession. So, they were estimating the risk in a world where there was no possibility where almost all assets values would collapse, and it's not just people in the investment banks, but when you ask the regulators what the typical age of their examiners was, they hadn't lived through a deep recession either. So, it's related to something George Shultz always likes to say. When you experience something, you understand it in your gut, not just your head. So, I'm not quite sure how you get anything like that in a statistical model. But I currently believe that after talking to hundreds of people deeply involved in this, that something like just ignoring the history of that recession is a very big issue.

John Cochrane: Pricing kernels are supposed to not allow arbitrage opportunities. Perhaps if they had noticed theirs did, that might have set some bells off.

Darrell Duffie: Nicola Gennaioli and Andrei Shleifer, have a book [*A Crisis of Beliefs Investor Psychology and Financial Fragility*, Princeton 2018] that basically pursues the hypothesis that you just described.

Michael Boskin: What do they conclude?

Darrell Duffie: That regulators and market participants didn't internalize the tail risks that were actually there, a behavioral mistake. That's their main hypothesis.

Michael Boskin: And widespread?

Darrell Duffie: Very widespread, among regulators and others.

John Cochrane: To defend rationality for just a minute, lots of economists were writing papers on "The Great Moderation" and how the Fed had solved all problems, and there was never going to be big recessions again.

Darrell Duffie: We were sucked in too.

[Laughter}

John Cochrane: What's this ``*we*?'' But anyway, yes.

John Taylor: But this is all before the recession that hadn't even been declared yet. That was in December 2007. So, this is prior to that. My explanation for the Great Moderation was a change in monetary policy in the late 1970s; there was no guarantee that the Great Moderation would continue if the good monetary policy didn't continue, and I was noting in 2007 a shift back to pre-Great Moderation ways.

Page three of the handout shows you what other people were doing roughly at this same time. These were economists at the OECD. I was not aware of this, or it happened slightly after, but they basically showed the same thing was happening in the countries in the eurozone. Both of these pictures have the deviations of the eurozone rate from the Taylor Rule – that's what they used at the time – over the period 2001-2006. That's on the horizontal axis. And the vertical axis is housing investment or housing loans. And so, there's quite a strong correlation between those. And, in particular, it's interesting that the countries that really ran into trouble in the eurozone, Spain, Greece, and Ireland, are up in the area where there was really too little constraint in monetary policy. So, big deviations. It's really the same story, just shown in a scatter diagram, in many other countries besides the US.

John Cochrane: All countries in Europe have the same monetary policy, so this is what the Taylor Rule should have been in Ireland if they had a separate monetary policy?

John Taylor: Exactly. The OECD took the single eurozone rate that the ECB set, and compared that to what it should be based on inflation and output considerations, in each country. So, it was too low for Ireland based on Ireland's inflation and GDP. This actually is a repeated theme, which has been more and more discussed and discovered.

Amit Seru: Just to echo what Josh said earlier, so this is completely abstracting from the fact that we constructed this monster called GSEs, who were sort of doing a bunch of stuff. We had shadow banks like New Century, who were doing all sorts of things and getting subsidized funding. All of that is out here. Loose regulation, supervision, all of that happened at the same time too.

John Taylor: Absolutely. And so, I'm focusing on this one thing. I've written about the other stuff. But many other people have written a lot more. I've always thought it's both… I call it deviation from the monetary policy rule here, but there was a deviation from prudential safety regulation rules as well. So, and I don't want to say that's not important. It's just that I'm not focusing on it here. And we're going to come back to a bit of that.

Josh Rauh: Not to belabor it, but to put it another way, there would have been periods, if we do this graph, of the first graph you showed, over a longer period of time going back, where there were probably similar deviations between the Taylor Rule and rates. They may have had other consequences. In this particular case, the consequences, you know, it does seem that there was some relationship

between this… some interaction between this and the regulation, that may have pushed the effect into the housing market, as opposed to other markets.

John Taylor: Yeah. The reason I did that chart with delinquency and foreclosure rates is to say there may have been some connection between the two. But I think it's a separate issue as well. Also, the model that was fit, part of it was the so-called Great Moderation period. There's no question the housing volatility was much lower during the Great Moderation. And to some extent, that's – as I have argued – because policy was better. But if you go back to the sixties and seventies, you had lots of volatility in housing. Not quite like this, but you did have big volatility.

John Cochrane: But the 1970s also had interest rates that were too low relative to the Taylor Rule, and we didn't have a house boom. In the 1950s, before the Fed-Treasury accord, and in the late forties and fifties, interest rates were too low too without a housing boom. What's the difference?

John Taylor: We did have housing booms and busts—there was definitely more volatility. I reported that in the 2007 Jackson Hole paper, and I could show you that there was definitely more volatility of housing in the pre-Great Moderation period, in the bad old days of the late sixties and seventies. I could bring that in, and we could look at it more carefully. It may not have been as bad as this, but it was there though. Here is a quote from the 2007 paper: "compare two periods, the first before the early 1980s and the second since the 1980s. In the earlier period the standard deviation of residential investment relative to trend was around 13 percent; in the later period it was 5 percent, and this includes the most recent fluctuation which is much larger than the average since the early 1980s."

So, let me go more quickly now. On page four I show that other people had later found the same things: George Kahn, from the Kansas City Fed, showed that the price increase in US relative to rents is explained by this so-called Taylor Rule deviation. The chart at the bottom is very recent work by Jorda, Schularick and Taylor, Alan Taylor. Sorry you can't see the labels better, but it's basically showing the so-called, they're using the Taylor Rule again, the Taylor Rule Deviation in Ireland and Spain in the top chart. And then you look at the bottom charts, and that's where you've got mortgage lending exploding and house prices exploding. And you didn't see that in Germany, which is the rate slightly below the ECB rate. So it's the same kind of thing. It's almost the same period as in the OECD charts, but the research is done many years later.

Moving quickly, the chart at the top of page five, which shows recent work by Mian, Sufi and Verner, looks at many countries, thirty countries, over a longer span of time. And they're tracing this mortgage lending shock, they also consider interest rate shocks. And what's interesting to me is they find not only this boom effect, but they see this succeeding slump. All this shows the impact on real GDP of a too-low for too-long period in all these countries, which includes the period I'm talking about, but others as well. The reason I think this is very important to model better, is that this boom-bust process actually is still not understood very well. And it seems to be a common feature of lots of countries. It's consistent with what I was showing, but there's more to it. I didn't really explain the bust part very well. Just that bust follows booms.

The chart on the bottom of page five shows the relationship between the federal funds rate and the term spread. Basically, a higher federal funds rate reduces the spread, and the idea is that's supposed to make housing lending less attractive, and so that's possibly more of the details of the connection between the actions by the Fed, the federal funds rate decisions, and the term spread. So that's quite

striking, and this is not in many models at this point. It's really a supply-side explanation for the ups and downs in loans.

Okay, now to go back in history a little bit so we don't forget, on page six I put in the chart, from the *Wall Street Journal* in 2010, which asked a bunch of economists whether they thought excessively easy Fed policy in the first half of the decade helped cause a bubble in housing prices. I'd forgotten this myself, but the survey of business economists was pretty overwhelmingly *yes*, and it's pretty even with the academic economists. So, I think these polls are the best way to remember what people thought. I'm reminded that in Darrell's paper, which he's going to present later in this series, that you have a more recent University of Chicago poll of economists showing that they thought, even though it's not on this particular issue, that regulatory stuff was the main thing. So I show this poll here mainly so we don't forget. This was how people thought of it at the time. If we don't hear much about it now, it's because people have forgotten. But certainly, if you add all the people in the survey together, you understand the headline and why they say "Doubting Ben." Ben Bernanke had just given a paper at the American Economic Association a week before—this is why they did the survey--saying that it wasn't easy monetary policy, that monetary policy was just fine, it was other things. And he's still saying that.

Robert Hodrick: But the bubble… The word "bubble" has a certain connotation in formal economics that I wouldn't think… If I were to answer this, I would say, *no*. Because bubbles tend to be associated with unexplained rises. And if you think that there's a tight link between monetary policy and housing, then you would say, "No, I don't think there was a bubble."

John Cochrane: The survey was also taken 2010, after it burst. And uses of the word "bubble" rise dramatically after prices go down. "Bubble" seems to mean: "I wish I'd sold it yesterday."

John Taylor: But I think the point is a very good point. Because, I might say *no* too. It's not a bubble. It's reality. It's the equation.

Robert Hodrick: There is an economic explanation that's sensible.

John Taylor: Yeah.

Josh Rauh: I think perhaps your best evidence that monetary policy perhaps played such a large role and that your best response sort of to the regulation people is the international evidence that you showed. Did the regulations and institutions change in Spain, you know the way that they did in the US? No, they didn't. In fact, if I recall, in Spain, there's a lot of securitization, and so, that evidence I think probably goes in your direction.

John Cochrane: And Fanny and Freddie and the Community Reinvestment Act and all the things that many of us love to bemoan in the US, well, the fact is, they didn't exist in Spain or Ireland.

Josh Rauh: It could have been different factors sort of causing what was happening there and what was happening in the US, and some interactions among them, this interaction, capital markets kind of brought together possibly.

John Taylor: Yes. To move on, the other thing which I wrote about in 2007, was the contagion across countries of policy. The chart on the bottom of page six is a chart of mine from that time , which shows you that the low interest rates in Europe, the deviations from the eurozone policy rule, were strongly correlated, with the US. I can't prove causation, and in fact the ECB policymakers denied this – but the

two seem to be quite related. And in recent years, that correlation has actually been documented in so many different ways in so many different countries, that it almost goes without saying.

The chart on the top of page seven is from the BIS. It was just recently produced. Again, they're using the Taylor Rule, and they show that in all the countries in the world that they keep track of, both advanced and the emerging markets, you can see a deviation beginning around the same period. Then policy got on track during the crisis, and then has deviated again.

This is a very important question for monetary policy internationally. It also may suggest that there's something else going on here that causes the connection between countries. I think what's happening, from talking to central bankers and watching, is that they're concerned about exchange rates. And so low interest rate of the Fed will tend to make their interest rate lower, to prevent their exchange rate from appreciating. I remember asking Mervin King about this, maybe back in 2010, and he said, "Well, of course! That's what we do. We have to worry about the pound. And so, we do that." So, it almost goes without saying, but it's still out there. It's out there very much now. As the Fed starts to normalize, it affects what many emerging market countries are doing.

And now, I'll just finish. To make a long story short, you have to include quantitative easing now if you really want to update this. The BIS charts just look at the interest rate.

So, what I've done very recently is extended this analysis to include another instrument of policy. That is, the size of the balance sheet. And I use "reserve balances" to measure the size of the balance sheet. The correlation matrix at the bottom of page seven looks at the US, Japan, the Eurozone, and Switzerland. The reserve balances measure how big the balance sheet is. The matrix looks at the policy interest rates, I_U, I_J, I_E, I_S. You already know there's a strong correlation, as shown in red, from the interest rates. But note that there's also a very high correlation of the reserve balances.

And then finally, the reason for the correlation is the exchange rate. I tried to illustrate it on page eight. It's a busy chart, but you can see through it pretty quickly. It shows the last ten years, and the solid line shows the yen-dollar exchange rate. So, you see appreciation of the yen, depreciation of the dollar, and a reversal. So R_U is the first one to rise; that shows the size of the balance sheet by the Fed, the quantitative easing of the Fed. And then you see the quantitative easing of Japan following, and the quantitative easing the eurozone, following that. And each one has an impact on the exchange rate, which is quite large. And I documented that with regressions.

So, that would be the mechanism which causes this deviation, as I call it, from good monetary policy to be correlated across countries. The point here, just to finish up, is that the stuff that we thought was going on in 2007, by my reading of the literature, has been largely confirmed. There are differences of opinion, but that's where I think we are now. And I think our models still don't capture this boom-bust thing very well, and it's important that they do.

John Cochrane: John, I think if you ask the Fed now, they would say, "Oh, of course, we're exactly on the Taylor Rule right now, it's just that r-star [the natural rate of interest] has gone down." Do you have a quick reaction to that?

John Taylor: Well, they actually don't say that. They say they are still in the process of normalizing, because if r-star has gone down by the amount by which the average FOMC member thinks, the federal funds rate still has a percentage point to go. It should be three-and-a-quarter, rather than two-and-a-

quarter. So, their dots, their dot-plots, which show you where they're going, have the rate increasing to around three, or three-and-a-quarter. And that's really where they think… r-star is: one, plus the inflation target is two, which is about three. So, by their definition, they are still behind the curve, but they're catching up, and they're describing how they're doing it. I don't have much to complain about at this point, though there are people on the other side of the debate.

John Cochrane: The other feature of contemporary monetary policy is that they react slowly to changes in inflation and unemployment. There is a big lagged coefficient in the Fed's Taylor Rule. Do you have a comment about how fast the Fed should move towards the simple Taylor rule target?

John Taylor: Well, I think first that they should have started earlier, so they'd already be at three. But they didn't start earlier. There are debates about it. Given that they started late, I think slower movements are ok. You know, you don't want to shock the markets. It's pretty well telegraphed. It's also, as I just showed you, a global issue. So, as the Fed begins to normalize, you now hear Mario Draghi, talk about normalizing; they're at least stopping their purchases. I just read something this morning, the the BOJ seems to be thinking of a change, and then, of course, there are the emerging markets. I was just in Bali, and the emerging market central bankers know that this normalization is happening, and some of them are pointing to the Fed as one of their problems. But there's a global normalization that I think is happening. It has to happen. So, that's another reason to be deliberate about it or predictable, and say it is normalization, it's not a tightening. Anyway, the global thing is really very important right now.

Any other questions or comments?

Tom Stephenson: Yeah, let me make an observation. That was based on the fact that I was serving in Europe in 2008 in Portugal. And the point here is that there really wasn't a unified response or set of occurrences in Europe. It was very much individual countries. I kept looking in Portugal for signs of real estate issues. I used to get the commercial and investment bankers together every six or eight weeks around the breakfast table to talk about what was going on, and I kept looking for what… Because this was happening in Spain, it happened in Great Britain, and really was spreading south in many ways. And it turned out as I dug deeper, that Portugal's challenges economically had absolutely nothing to do with real estate and everything to do with sovereign debt. Portugal probably benefited more than any other country in Europe from the formation of the EU and the euro currency, and they had borrowed heavily, because there was no infrastructure there, back in the late eighties and nineties. And so there had been initially a lot of economic benefit from the installation of that infrastructure, but they way overspent on things that had nothing to do… that had no significant economic return. And so, by the end of 2007, 2008, they were in big trouble. But it was all related to sovereign debt, and absolutely nothing to do with real estate debt. Just as I said, a way of saying that what was going on in one part of Europe, wasn't necessarily representative of what was happening elsewhere.

John Taylor: Yeah. I'm trying to remember where Portugal is in my chart, in the OECD's chart. They're not unusual. So, it's consistent with what you're saying. To me the most remarkable thing on the chart is the location of countries that had housing problems and were overdoing it; they are the ones that show up on this chart. Germany is on the other end, which suggests that a somewhat higher rate in Europe wouldn't have been perfect, but it would have been better.

John Cochrane: Tom Stephenson has a point. We are being a little parochial. The global crisis was a mortgage crisis in the US, but it turned into a sovereign debt crisis in Europe. And there is a whole other set of buildups to the sovereign debt crisis – Greece gets low interest rate loans, they use it to go on a spending binge, the government numbers are cooked, and so on. Maybe we should come back to that.

But first, let's move on to Monika? Tell us about housing, and then we'll come back to these issues.

Monika Piazzesi: I thought I'd start with just reviewing what happened during the years 2006. Just as John showed, housing prices and price rent ratios increased. By how much depends on how you measure them, by which index you look at. But it's clear they increased by almost 50%. Household debt to GDP increases discreetly. This is the chart on the next slide, showing you household debt to GDP. Mortgage debt is in red, so what you see in 2000 is that mortgage debt divided by GDP basically takes a discrete step up. So, it's not the other debt that households have that increased, but it's really mortgage debt that takes a discrete step up.

And so, going back, the other thing that we observed is that home ownership rates increased from 65% in 2000 to almost 70% in 2006. During the years after 2006, all these trends get reversed. House prices and price-rent ratios fall. Households reduce their debt, in part through default. And the home ownership rate is now below what it was before the boom.

Let me show you some evidence for what happened within regional areas. So one feature of this crisis was different areas experienced very different house price increases. It's instructive to look within metro areas, what happened. And so the chart that says San Diego Country shows you blue dots. These are houses that sold once in the year 2000 and then sold again in the year 2005. On the vertical axis, you see the capital gain that you would have made by buying these houses. And on the X axis you see how much these houses sold for in the year 2000. So, basically, it's initial values of these homes, and then subsequent capital gains on the vertical axis. By looking at the cloud, you already see that the capital gains on cheaper homes tended to be higher. And you can confirm this visual eyeballing by running a regression of subsequent capital gains on the initial logged house values, and you get this black line, which shows you that you would have made more money by buying a cheaper home. It's roughly 17% per year capital gains by buying a home that was $200,000 worth, as opposed to a house that was let's say, $600,000 worth, where you would have made roughly a 7% capital gain per year. So, these are differences within San Diego county.

Now, you may wonder, am I just showing you San Diego, and this is not what happened in other places? On the next slide, what you see is the tiered price indices that Zillow puts together for various metro areas in California – so, San Francisco, LA, San Jose, and Sacramento. And it's hard to actually see the capital gains in this graph. So here, the vertical axis measures dollars in thousands. And so, it's hard to see the capital gains from the year 2000 to the year 2006, so what I'm doing on the right next to the panel is I'm computing the ratio of prices in 2006 divided by prices in 2000 for each of these metro areas, for each of these tiers: the top tier, middle tier, and bottom tier. And if you look at what happens in San Francisco, the price ratio from the year 2000 to the year 2006 is roughly 1.8 for the top tier, 2.1 for the middle tier, and then 2.5 for the bottom tier. So, that means increasing capital gains as you move to lower tiers. In LA, same pattern. You start with a 2.3 ratio for the top tier and you move up to 2.9 for the bottom tier. And it's virtually everywhere. So, it's not just on the coast, which is San Francisco, LA, and San Jose, but also in Sacramento, which is inland, you see this pattern. You have stronger capital gains in the lower tiers.

And so, what's interesting and informative is to look at what's happening within these commuting zones, such as metro areas, areas where you can reasonably argue that people compare different homes when they buy them. And the differential price developments within these areas is informative, because also, it's different from what we saw previously. The last big national housing boom-bust happened – and this goes back to what John referred to earlier – basically during the Great Inflation in the late seventies/early eighties, that was the last time we had a big, national housing boom and then bust cycle. During that boom, the cheaper segments experienced a weaker boom. The leading explanation at the time was that mortgage rates were nominally higher, because of the high inflation during that time. And Jim Poterba wrote a paper that documented that you can explain how these higher-end homes appreciated more, because richer people are in higher income-tax brackets, and so, these higher nominal interest rates led to larger deductions. And that can quantitatively account for the stronger boom in the more expensive segments. The same thing about the California boom-bust in the early 1990s, that was again a weaker boom in the cheaper segments. And so, that's the opposite pattern of what we just saw in this boom-bust episode, where the cheaper segments experienced the stronger boom.

John Cochrane: Monika, can you refresh my memory on how San Diego real estate works. It's hard to build, even in the lower-cost areas, right?

Monika Piazzesi: Yes.

John Cochrane: And people are moving in. Is that right?

Monika Piazzesi: There was very little in-migration during those years. So, San Diego is not a market where during those years experienced many purchases from out-of-town buyers.

John Cochrane: This is an interesting question then. Why does the low-end of the housing market go up, if there aren't more people moving in? I can see people wanting to move into bigger houses, but where are they coming from?

Monika: So, what do you need to understand these patterns within a metro area? What we did was wanted to have a quantitative study of causes for this boom. In the model that looks at how market prices assign houses to buyers within a metro area. Basically, you have a distribution of these homes that are indivisible goods, and you need market prices to basically clear markets, so that these houses meet the buyers. In this study, what we do is we measure the distribution of income, wealth and age of buyers. It's important to figure out what is the distribution of what they have when they're buying. The American Communities Survey asks whether a household just bought. And so, we have that distribution for San Diego county. We also measure the distribution of homes that were bought from deeds data. And then, we solve this assignment model. And in terms of the expectations that we feed in, that we assume that these households have expectations that we measure from household surveys. When you look at survey expectations of future real interest rates, there was a very strong sense that interest rates were unusually low, and so, in the survey, households answer that they expect interest rates to increase. And so, that would go against finding high house prices in 2005, because rising interest rates typically lead to lower house prices in the future, so that lowers the incentive of households to buy a home, so this goes against any story that would generate a boom.

Darrell Duffie: Suppose I want to think interest rates are going way up, and I need to finance a home? Wouldn't I want to do it right away, rather than wait?

Monika Piazzesi: If you care at all about the resale price of your house, the fact that you expect interest rates to go up in the future, that would counteract that. In our model, this was a conservative assumption. The other assumption we make, which is a conservative assumption, I think, is that we assume that they think that house prices will just continue to grow as rent will grow, which is a conservative, if you look at California rents versus house-price appreciation.

So, this is the baseline. And so what helps us account for the boom in house prices? The cause number one that we considered is easier credit. And this follows up on what John was saying about low interest rates. So, interest rates were low to begin with in 2005. If you look at treasury interest rates and subtract off expected inflation, the longer-term treasuries, they were around three percent in 2000 and dropped to around one percent in 2005. So, at the peak, interest rates were low and spreads also somewhat narrow, between borrowing and lending rates. So if you take the treasury yield as a lending rate, the borrowing rate was roughly two percent different from the treasuries in 2000. And that spread dropped in 2005.

And the other key component to easier credit during the boom years was households made lower down payments. And so, if you incorporate this into the model as a constraint, households have to put down some amount of money in 2000 and 2005, that number goes down from roughly 20% in 2000 and it goes down to almost zero in 2005, and so we took estimates by Amit Seru and his co-authors of what average cumulative loan to value ratios were, and these are the numbers that I'm showing here.

And so, part of the story clearly is that poor households were able during the boom to borrow more. And they bid up prices of cheap homes, which are the homes that they were buying. And so those home values appreciated more. And so, that's consistent with the – if you want – the subprime narrative that Mian and Sufi established in their work in several papers. Basically, the narrative is that poorer, low-credit-worthy households were able to get mortgages with teaser rates, the famous 2-28 mortgages, where you didn't pay any interest in the first two years, and then you started paying interest rates later, or no-doc loans, or no-income, no-job and no-assets mortgages. Those, all combined, enabled poorer households to borrow more and push up house values in the cheaper segments. Of course, the question is, what's the cause of that?

John Cochrane: How do you avoid the prediction that the rents and the price of rental housing should crash, if everybody's trying to move from rental to owned housing?

Monika Piazzesi: So, rents were stable throughout this period. And so, the question is, why were people willing to pay such higher prices relative to rents?

John Cochrane: Yes. Credit's cheaper. The cost to you of a high-priced home is cheaper. You try to buy a house, but that means you're moving out of the apartment. You would think everything that goes up here has to go down there.

Darrell Duffie: The same stock of housing can be converted from rental to home ownership. So, there wouldn't be the excess supply available to renters.

John Cochrane: But that wouldn't change the price of the house, because you're just changing who owns it. The same number of people, same number of houses. And then the landlord sells it to the renter.

Josh Rauh: I thought there was some argument that there's imperfect substitutability between the types of properties that are rented and the types of properties that are owned. I mean—

John Cochrane: The rented ones should have lower prices.

Darrell Duffie: Well, you could do it on the demand side. The people that Monika just spoke about are not the landlords, but they're the low-income homeowners. So the demand is increasing. The landlords, let's say they're flat. So, you're going to get people moving out of rental into—

John Cochrane: The only way we can do it is if you're getting less people per house.

[Crosstalk]

Martin Schneider: …another thing, which is the way the housing services are provided through owner-occupied housing versus rental housing can be different. In particular, with owner-occupied housing, you can sort of customize your house and so on. And there's less of a moral hazard problem between the owner and the person who lives in it. Which means that the dividend, if the house is owner-occupied, is higher.

John Cochrane: I get it.

Martin Schneider: That means that that can take care of this issue.

John Cochrane: I guess what you're saying is, if we've got the same number of houses and apartments, and the same number of people, then for everyone who moves this way, someone moves that way. But prices can change. More people want to move to houses, and the price of houses go up until the net number of movers is zero.

Martin Schneider: [inaudible] created is higher, because you don't—

John Cochrane: Yes, you don't need volume of transactions. I should have figured that out.

Monika Piazzesi: The key here was low real interest rates and low down-payment constraints. And so, the question is, why were lenders willing to lower down-payment constraints? That's the key question. And so, the part of the narrative is that either it's securitization, as Josh was saying, or the general push towards the ownership society encouraged the GSEs to guarantee mortgages that they didn't use to guarantee. Various reasons lead to lower down-payment constraints and this increase in lending.

Overall, this easy credit mechanism explains roughly half of the push toward higher house prices. But it's not enough alone to explain the entire increase in house prices in cheaper segments. So, let's move to the second cause, which is—

Josh Rauh: What are the limits on its ability to explain the entire increase in house prices? I know you guys have constructed a model that has all of these causes in it, but I guess when I think about it – okay, what is the elasticity of somebody's demand for housing with respect to whether they have to provide documentation or not, I mean, it seems like there's a set of assumptions that could lead you to explain the entire increase with regulation and with securitization… deregulation—

Monika Piazzesi: In terms of what you can generate in a model where you're just relaxed on payment constraints is that poor households, they have a certain amount of money that they can spend on housing, but they're not able alone to push up the house prices all the way. And so, the second cost that is going to come in is that what you see during these boom years is richer households buying in the cheaper segments. And without the money or the wealth that these guys contribute to pushing up house prices in the cheap segments, you wouldn't be able to sustain the entire increase in house prices. That's what we find. That's what's missing, is basically poor people don't have enough money to increase house prices all the way.

Amit Seru: And these are speculators?

Monika Piazzesi: No, this is their primary home.

Amit Seru: So, richer people move to poorer neighborhoods for the primary home?

Monika Piazzesi: Into cheaper homes, not necessarily into cheaper overall neighborhoods. But they buy houses that are cheap. And that may be a supply story, that during that time, just the type of homes that were available to purchase we out of synch with their income and wealth. You can measure, so what we did, let me move to the next slide.

This composition effect is key. That if you measure the distribution of buyers in the years 2000 and the years 2005, the distribution of income and wealth didn't really change much between those years. What did change is that you have many more transactions in the cheap segments in the year 2005 compared to the year 2000. And so what that means is that as these two distributions meet, it means that middle class buyers bid up prices in the cheap segments. And so, part of that must be a supply story, that in a place like San Diego, where as John Cochrane said, it's hard to construct more homes, buyers ended up buying homes that were cheap relative to the amount of income and wealth they had, and that bid up prices.

And that sort of story, this mechanism in the model, is consistent with what is in the housing literature called the New Narrative. A whole bunch of papers document that there wasn't just more originations of mortgages to subprime borrowers, but this increase in origination happened across the entire income spectrum. If you look then at the default years, during the foreclosure crisis, what happened during those years is that a lot of high-income borrowers also defaulted. So it wasn't just poor people defaulting on their mortgages. In fact, a lot of higher-income borrowers defaulted on their mortgages. And that's sort of the new narrative I would characterize as just saying there was more credit, but it wasn't discriminately just to poor people. It was to everybody -- everybody was borrowing a lot.

John Cochrane: So, Monika, were these people moving out of mom's basement into a house? Or were they house flippers? One big story was, you could see higher-income people flipping homes in poor neighborhoods and that because they had the credit to do it. Do you have a sense if that is part of the story there?

Monika Piazzesi: So, this is still an ongoing debate of how large the role of these flippers is. It depends exactly on how you define what a flipper is. You can define them in various ways. For example, people who on the mortgage application say they have other mortgages – that's a sign of a flipper. If you measure them this way than at least in San Diego County, the role of those flippers is very limited,

because basically five to eight percent of these transactions are made by people that you can call flippers. So, it's not. In other places, these play more important roles.

David Mulford: If you look at the large number of these middle-class people buying less-expensive homes, were they at the same time selling their more-expensive homes?

Monika Piazzesi: No. Not necessarily.

John Cochrane: So they had to come out of mom's basement, or apartments – there is a genuine flow of people into houses and less overall people per house.

David Mulford: This was an investment function for them.

Monika Piazzesi: Yes, they wanted to buy a home, and the only place that they could find was one that didn't quite correspond to their financial situation.

David Mulford: But then they didn't live in the home they bought.

Monika Piazzesi: They did live in the home. This was their primary residence.

David Mulford: Well, what did they do with the better house? [crosstalk] …as a middle-class house owner?

Monika Piazzesi: I'm not saying [crosstalk] that they had another one.

John Cochrane: They could have been younger and renting.

Amit Seru: So, if you look at that eight percent number, that's the same number averaged in the entire country actually. So I don't think that can explain… People speculate that these flippers are contributing to it, but the number is very small.

Monika Piazzesi: Yeah.

Amit Seru: I don't think that's it.

Monika Piazzesi: That's also my [crosstalk]

Amit Seru: It's not just San Diego that—

Monika Piazzesi: It's still a question of what we exactly measure [crosstalk]

John Cochrane: The number of mortgages is going to be dominated by flippers and refinancers, but the number of homes is going to be dominated by people who actually live in them. So the main housing picture is a young professional who's been renting for a while and says, this is our moment, we're going to move into a house now. Or maybe buy it to rent it out, but they own one, and they're not flipping it. Okay.

Monika Piazzesi: Yes.

Amit Seru: Not even the number of mortgages is dominated, but—

Monika Piazzesi: Yeah. In terms of dollar values, the dollar-volume of mortgages is dominated by middle-class people who buy homes that are quite expensive. And so, in terms of dollar numbers, they

dominate. The poorer households, they don't dominate – and this goes back to Josh's point earlier – the reason why it's not just poor households driving up house prices, is because they don't have the money to drive them up. But if you add the fact that middle-class households also were buying with a mortgage, that explains the big increase in household debt over GDP. And it explains why prices went up so much.

Josh Rauh: That could have been a direct result of the changes in lending standards. The fact that these middle-class buyers decided to stop renting and to buy property that before they wouldn't have bought. I mean, I just don't know how to disentangle this.

Monika Piazzesi: To disentangle this, we can solve the model assuming that the distribution of homes that they bought didn't change over time. In this case, the model cannot explain the price increase that we see in the data. But if you allow for the fact that they bought different types of homes, suddenly you can explain the increase in prices. That's what happens in the model. So, we need both cheaper credit and this composition effect to quantitatively account for the boom, but what's interesting is that this quantitative exercise will be consistent with the idea that there was some financial innovation, which led to the lower down-payment constraint. And that was unique. And people think that's going to stay with us in the future; that can fully explain the house price increase. In principle, you don't need crazy expectations or extrapolative beliefs or anything. It's just easy credit and the fact that middle-income households buy cheaper homes during that time.

Amit Seru: Monika, even the very high-income neighborhoods, households, saw increases in the house price, right?

Monika Piazzesi: Yes.

Amit Seru: So, that level effect is coming outside the model?

Monika Piazzesi: No, it's inside the model. And so, we're explaining the entire—

Amit Seru: So, what explains the increase that's happening for the high income?

Monika Piazzesi: So, it's really interest rates. Low interest rates. So, for the capital gains at the high end, are so low in some sense, that the change in interest rates can explain them entirely.

Amit Seru: Yeah, that's what I meant.

Monika Piazzesi: Nevertheless, let me mention, because you might think why were down payments so low? So, what made lenders offer these deals to people when they could lever up to that extent? And so, let me mention beliefs, because they might have something to do with how lenders were behaving, and also maybe how households in cheap segments were behaving.

So, we have a different study that looks at the effects of having some few optimists in illiquid search markets. Housing is a very special asset market, because only 10% of houses trade every year. So, very few assets actually trade. This is a market with high transaction costs. You have high realtor fees, and also high non-pecuniary costs of changing your house. And so, in a market like that, you only need really a few other optimists to drive up house prices in these transactions, because you have very few transactions, so you only need the few who are in the transactions to have very optimistic expectations. And so, one story could be that both lenders and borrowers were overly optimistic about housing,

especially in the cheap segments, where you have highly inexperienced home buyers – so many of these buyers were, never had anybody in their family who ever owned a home before, so you have minorities buying during this years, and so the question is, is this increase in leverage and lending a result of optimistic expectations?

So, let me show you some evidence, two charts, and then I'll stop. One chart is from the Michigan Survey of Consumers that asks every month 500 respondents the question, "Do you think now is a good time or a bad time to buy a house?" And you can answer the surveys by saying, "It's a good time," "There are pros and cons," "It's a bad time," or "I don't know." And then you get to explain your answer. You can give a reason for why you think it's a good idea. And so, let me show you the time series of how people explain that now is a good time. So, first the black line is the time series of the fraction of the population that answers, "now is a good time to buy." So, you really see that people thought it was a good time to buy around 2003. But then, moving to 2005, which was the peak of the housing boom, there's some less enthusiasm about housing. So, people don't think it's as good a time to buy anymore. So the black line comes down in 2005. What's interesting is when you look at the answers for why people think it's a good time to buy, good credit is the vast majority of the answers. So, that also points toward a credit story. So, the green line is the answer: good credit.

John Cochrane: Meaning it's easy to get a loan right now?

Monika Piazzesi: It's easy to get a mortgage. Interest rates are low. All of these answers are combined in this good credit answer. And then the blue line, these are answers that say: it's a good time to buy, because I expect house prices to go up in the future. And so, and that fraction is low in the US. If you look at 2003, it was roughly 10% of people think it's a good time to buy because house prices go up in the future. But that fraction goes up to 2005-6, it doubles to 20%. So, it's not many people who are crazy and think this is a great deal. But it's an increase from 10 to 20% and with just 10% of the market transacting, these may be enough.

Darrell Duffie: So we could use econometrics to infer the fundamental value in, lets say, a market in which everyone was negotiating to buy or sell, and it would have been a much lower fundamental price at that point. As you're saying, we're sampling from the top of the distribution of potential transaction prices. We're not seeing all the transaction prices that would have occurred had people actually all expressed their—

Monika Piazzesi: Beliefs, yes.

Darrell Duffie: Yeah, that's really interesting.

Monika Piazzesi: And, so this is the entire population. If you zero in on the homebuyers…

John Gunn: Well, in the US, it's always been a symbol to own your own home. Just going back throughout the 20th century. And so, you have this thing going up, lower rates, and everybody loaded up. You have more and more people getting into the deal. And there was actually, if you think about it, how would you politically move against that? You'd be like a skunk at a garden party.

John Cochrane: It's a symbol to own a Ferrari too, but people look at the price tag and say, "No thanks."

John Gunn: Yeah, but that's not… Here it was, you take your X amount of wealth and can buy something that's 5X to 10X as an asset. It's not surprising that they all wandered off/

Michael Boskin: At the same time, there was a lot changing in regulation. For example, banks were not only required to quit the so-called redlining that HUD was anxious about, especially Fanny and Freddie, were not only asked to be – told they basically had to have quotas lending to areas, had to invest a certain amount of their investments in these products. And this was just expanding, expanding, expanding. And I think a great under-told part of the regulatory side of this is this became a way to try to transfer assets under the guise of Americans [inaudible]… transfer income to people when it was being constrained budgetarily. This wasn't showing up in the budgets. So all this stuff, all these mandates, etc., are pushed in, were basically dissolved trying to access credit, but basically to do things for low, or maybe low-to-middle income people. But these things were causing the banks, I think, to try to find borrowers who they thought were creditworthy buying in poor areas, because they had their own issues. So, maybe that's part of the story too, that middle-income people found it easier to get money buying in a poor area, because banks met their targets.

Monika Piazzesi: I just wanted to finish with numbers of the survey that actually asks people who just bought about their expectations. And it's interesting, these are some of the cities that are here in my chart earlier – LA, San Francisco – this is the Case and Shiller Survey of Recent Homebuyers. If you look at the row on the bottom – mean response, what they expect over the next ten years? How do they expect the value of their property to change each year? It's all in the double digits. I'm just saying those who buy are really optimistic.

Laurie Hodrick: Returning to the Case and Shiller survey of homebuyers' responses showing that the few who buy are highly optimistic: I wonder in your modeling whether the direction of the relationship between the recent homebuyer transaction and the optimism matters? While it might be that it's optimism that's driving the transaction, as you suggested, cognitive dissonance might also suggest that because I made the recent transaction I answer the question optimistically, because I now need to believe that prices will increase. What would the implications of that reverse causality be for your analysis?

Monika Piazzesi: Absolutely. I presented the expectation story as sort of an alternative way to think about this episode. I very much think that credit and supply constraints/fundamentals can explain the housing price increase during the boom. But you can see that the story that sort of still challenging is why lenders were so willing to go along? And maybe it's regulation, but maybe it was some strong optimism on the part of the lenders that housing prices would go up in the future.

John Cochrane: But the lenders then would have to agree with this small number, ten percent, of optimists? We've got a model where 90% of the buyers realize this is crazy, and 10% thinks it's hot, and the lenders somehow go along with the 10%. And you also need people not to leave. The other margin of adjustment is it only takes 10% of the people to say that these prices are nuts, I'm selling, and moving to Oregon, and that would get rid of the house price boom. To get the price to go up because you only have 10% of optimists is really hard, because there's all these other responses. You can't short a house, but you can move out.

Amit Seru: So then why would lenders not go along? What's the cost? What is the cost we have seen for lenders not to go along? I mean, that's very important, right? There are no costs if they play along.

John Cochrane: Zero.

Amit Seru: I mean, that's very important, right? There are no costs if they play along.

Robert Hodrick : Whereas a lot of this is securitized and then… I think a lot of it ultimately comes back to a failure of the, not the regulators, but the credit companies, credit rating agencies.

Darrell Duffie: And the people who believed them. That had a lot to do with it. But then there's the ultimate investors, who are very, very sophisticated, more than the rating agencies, who bought those securitizations.

John Cochrane: Who were insured by AIG.

[Laughter]

Darrell Duffie: They were not.

John Cochrane: They were insured by Fannie and Freddie, lots of them.

Amit Seru: Yeah, but those portfolio managers get paid bonuses every year. There's a principle-agent problem. Simple incentives that you don't have any penalties. It's not rocket science what we see.

George Shultz: It was all built on money. And your thesis is that if Bill Martin had been chairman of the Fed, he would have taken away the punchbowl, we wouldn't have had this.

John Taylor: Yes, that's the counterfactual.

John Gunn: Nobody took away the punchbowl.

John Cochrane: Well, it's interesting to try and separate the regulatory punchbowl from the interest rate punchbowl.

John Taylor: So, I think that's right. There are people who feel it was all Fanny and Freddie. It's a different view. Monika's and mine seem to go together.

Monika Piazzesi: Yeah, I think we agree.

John Gunn: Even if people who started to short these areas, had to wait a long time for it really to work. It was a very…

Amit Seru: Fannie and Freddie didn't come to the party in the lower segment until 2005. From 2001 to 2005, pretty much it was all in the private space. The Bear Stearns was not Freddy and Fannie. Lehman was not Freddie and Fanny. Again, if there are no penalties, then you just randomly just shut down one, but not generally, you see lenders just do crazy stuff. They're all bailed out.

John Cochrane: So, let's move to the present. Look at Monika's graph on page three. Are we back at it? The 2018 looks a whole lot worse than the 2007. Part of our mission is to think about where are we now and is it all going to happen again. Or, can the houses crash, but this time we fix the financial system so like the tech stocks crashing, there is no crisis if houses crash again? Where are we now?

Monika Piazzesi: The leverage is not where we were. So, household debt to GDP is lower.

Darrell Duffie: Much higher in Canada. Much higher even than before the crisis in the US. Right now, in Canada, Vancouver and Toronto are exactly what you're talking about.

John Cochrane: I thought Vancouver prices were built on Chinese cash, not on Canadian mortgages?

Darrell Duffie: Canadian household debt is enormously high, and particularly in those two places.

John Gunn: Do you think that's about to tip over?

Darrell Duffie: It's considered the number one financial stability problem by the Bank of Canada.

John Cochrane: I thought that was held on the books by the famously stable Canadian banks, with high loan-to-value ratios? The common picture is that everything's sober in Canada?

Darrell Duffie: Yeah. Steve Haber and Charles Calomiris, as you know, wrote about how the banking system in Canada is different by design, and likely to be stable despite facing huge household debt. Who wins? I think the banks will be okay. [The book cited is *Fragile by Design*.]

John Gunn: One thing that intervenes is the interconnected telecommunications. People have actually seen people get thrown out of their houses during foreclosure. That did not occur until the last decade, ten years.

Darrell Duffie: Well, 1930s.

Monika Piazzesi: For the US, it's interesting, that the chart that has, if you look at the top tiers some would say that escapes that. I couldn't fit it on the same scale. But basically, it escapes up, and still household leverage is not very high, at least in the US. Basically, household mortgages and household debt basically are constant in this graph going forward. If you look at 2017, it's the most recent year for which we have numbers, it hasn't increased. But still you have these really high increases.

John Cochrane: The top end isn't debt financed, right? These prices are driven by whatever's going on with tech in these highly productive places, interacted with building restrictions.

The other question is: You showed us California, where it's impossible to build, but how does Austin, Texas look? Where in six months you can build a house, and you've got from here to San Antonio to do it?

John Taylor: Another question: Peter Wallison argues that it's all Fanny and Freddie. It's lower lending standards, and it's just a failure of those institutions; maybe Josh also thinks that to some extent? What would you say to that?

Monika Piazzesi: So, I think something lowered down payment constraints. And so, there is some financial innovation, something has changed during those years. And so, the question is, what made banks offer mortgages with very low down-payment constraints? That's a big question. And so, at this point, I'm not saying it's not bank incentives that caused it. There's something has caused this. So, I need some story for why these constraints came down

Michael Boskin: I think HUD lowered the down payment standards to three percent and other regulatory changes contributed.

Monika Piazzesi: You only could get a mortgage previously with a down payment of 20%. Suddenly you can almost put zero down, so that—

Michael Boskin: Whether everything that ensued after that, or whether they were catching up with the market I couldn't tell you. But they lowered the down payment to three percent.

John Cochrane: The story you're basically telling is prices are driven by *r-g*, [price to rent ratio = 1/(interest rate – rent growth)] but specific kinds of houses, and specific people, have different effective *r,* depending on constraints as well as market interest rates. There are people who are going to buy higher-end houses in bad areas because they get a particularly good draw of r, a lower effective cost of borrowing. So, each house price is driven by 1 over *r-g* for the relevant potential purchasers.

But back to Europe. We talked about Portugal. Spain had a housing crisis. They didn't have a Fannie and Freddie. They didn't have securitization, they didn't have creative mortgages. What does this story tell us about Europe?

Monika Piazzesi: It's an interesting question, because the countries without any mortgages, like Italy, have also experienced a house price boom. Spain had households who borrowed a lot, and there was a house price boom. It's an interesting question is what explains this international evidence.

Hanno Lustig: Well, one thing that happened in Europe is that bond markets stopped discriminating between different countries that were in the eurozone, before the crisis. When interest rates converged, which on the basis of fundamentals didn't make a whole lot of sense, but in the monetary union… So, one could argue this goes back to John Taylor's plot, that arguably interest rates in Spain were much too low.

John Cochrane: Interest rates to the government of Spain, yes? But if you're going to fund a mortgage to a Spanish household in euros, which is a common currency, why should the interest rate on that be any higher than funding a mortgage to a German household with the same income and house?

Hanno Lustig: Well, it would have an effect. For one thing, if the Spanish government is backing Spanish banks, then there should be a direct distribution of expectation.

John Cochrane: I see. So it does really flow through the government. In Europe, the debt is mostly on bank balance sheets, with a government guarantee. And the banks are also stuffed with government debt.

John Taylor: I think so.

Michael Boskin: It's really fascinating, but that's seldom true in a lot of other markets, a matter of fact, all markets, in a sense. So…

Monika Piazzesi: But what's different about the housing market is that very few things actually transact, while in stocks, every share of a stock transacts at least once a year.

John Cochrane: And you can short stocks, which helps a lot. You can't short houses.

Monika Piazzesi: The transaction costs are very different.

David Mulford: Has there been any research done on public attitudes towards buying houses to determine whether people's views are changing across society? One thing, for example, it didn't used to be the case that ordinary, lower income people bought stocks. But in more recent years, it's common for such people to trade stocks. What makes me asks this question is that in northern Wisconsin, around

about this period as it suffered the shock of the prices, I met many local people who said things like, "We flipped houses and had a really good time. It's over now." There was very little regret, even though they'd lost some money. They were acting like they'd begun to take part in an activity that they didn't used to do, i.e. buying a house, fixing it up and selling it, and then the good times ended, and they'd made some money, they weren't in a disaster scenario personally, and now the game was over. That could be a sociological research exercise, but I just wondered if there's been anything done on public attitudes, because the house market is a lot smaller than the stock market. That is true. But the market that's interested in houses might have been an expanding market at the time in terms of public attitudes saying, "I'm going to put my toe in the water and try this. I've never owned a house before, don't know if I even want to, but I'm going to branch out and do a little more, and people seem to be making money, if they act quickly enough", and so on. So it was a very speculative time for many new lower income investors.

Monika Piazzesi: It was certainly… the whole push towards the ownership society was going on. So that was already making attitudes of buying a house… shifted those to being more positive. And then the easy credit in some sense helped that.

David Mulford: These were people who probably already owned a house, or perhaps they were renters. In any case, they lived in a place. Whether they owned or rented it seems they decided to dabble in other properties and for a while had some success.

Josh Rauh: But I think there were some studies about the attitudes towards walking away from credit, right? There was a website, YouWalkAway.com, that talked about how you can get out of your housing debts with minimal damage. And I think that probably, you know, in conjunction with the relaxed lending standards, there may have been some phenomena there that contributed to this.

John Cochrane: We talk about the mythology of "own your own home." But what a lot of people were doing, on all parts of the spectrum, was not this mythology. It was the other half of the American mythology of housing: this is a way to make money. Now you may live in it for a couple years, you're going to fix it up, but you're going to sell it eventually and make money on it.

David Mulford: Well, if you have a low, down payment and a low interest rate, John, how can you lose?

George Shultz: I'm sitting here, trying to figure out for myself, we had a panic, why? That's our problem. And here's the answer I'm getting from what has been said. Number one, the Fed had too loose a monetary policy sustained, and it actually spread abroad as well, but let's just be here. That spurred a lot of home ownership by people who were not able to carry the loans. And this was spurred along by Fannie and Freddie and a general atmosphere that home ownership was something desirable. The more you could get people in homes, the better. Then the private financial sector comes along, and figures out how to use this situation to make money and cause it to flourish. And in the process, they wound up holding a lot of securities that were underwater. And then comes the realization that that's true. And all of the sudden, we have a crash, and that's the crisis. Is that what…?

John Taylor: Yeah. I think the other part of this which we really haven't discussed enough is why so many financial institutions took these loans on? And maybe that the expectation of bailouts, inefficient, terrible regulation. I think it's… in fact a lot of the discussion of the financial crisis, it occurred for the second reasons. People discount to some extent what Monika and I said. Look, these financial

institutions took on so much risk, they knew they would get away with it, they'd get bailed out, and then the bailing out of Bear Stearns made it worse, because you figure, well, Bear Stearns—

George Shultz: Well, but then, what I said, the question's the crisis. And then there's the question of, how did they try to handle it, and did they inflame the crisis? Or how did they go about that? I think the government handled it very badly, myself. But that's the next chapter, isn't it?

John Taylor: We tried to separate it a little bit. Darrell has a paper where he argues it was a failure of regulation, really, not to watch over this risk taking. So, I think it needs to be sorted out a little bit more at this point.

John Cochrane: It's not just regulation. George is exactly right. The central feature of the crisis is that somehow or other, house prices got funneled into short-term debt. Somehow, we started with a house, and we ended up with overnight debt. If starting with a house had ended up in long-term debt, in mortgage-backed securities sitting as long term investments in your pension fund, in equity, in anything else, there wouldn't have been a financial crisis. Something went up and then went down for good and bad reasons. But that "go down" was then concentrated on the most fragile part of the financial system. That's the key to a crisis.

John Taylor: Yeah.

John Cochrane: And then, whether the fire brigade can come in next time is the big question. But we're sitting around with gas in the basement – short term debt. That was a crucial part of it.

John Taylor: This is how it got going.

George Shultz: But then you have the question of how people started to handle the crisis, and you realize that the New York Fed, which was the most important one, was a total captive of the Wall Street banks. Total. They appointed the man in charge, and he didn't touch them with a ten-foot pole. That's the reality.

John Taylor: I think that's a really important part of the story. If that occurred, how did it occur, how can we prevent it? I tend to agree with you.

George Shultz: I remember when that job was open. I had a talk with Alan Greenspan, and we had a candidate. We didn't have a chance. The New York banks just went right by and appointed their candidate. Alan and I couldn't even get a word in. I thought I had some influence. I didn't.

John Cochrane: Well then, the one cheerful thing I've heard is that John's student, John Williams, is now in charge of the New York Fed. If he's captured by anyone, he's captured by John.

[Laughter]

That's good news.

John Taylor: We don't know, right.

Unknown Male Speaker: Who was the candidate, if I may ask?

George Shultz: Well, there were New York Fed, the Wall Street community wanted Geithner, and they got him. Alan and I wanted John, and we didn't even have a chance. We didn't even get in the

conversation. And I thought, the guy was chairman of the Fed, he'd be able to get in the conversation. But he didn't.

Robert Hodrick: The undercapitalization of the banks was amazing to me ex-post. I didn't know about that, that they were at three percent capital and you know, so, you couldn't take very much of a loss. And there's this very famous quote from Charles Prince who was… in the summer of 2007, where he says, you know, we're going to keep on lending as long as everybody's dancing, you've got to dance. And there was this competitiv**e.**

Robert Hodrick: Everybody's doing it, and so we're going to continue to do it, even though we know it's getting risky, and we know we have low capital.

George Shultz: I think there's also a point of learning what is the most effective type of regulation? And the tendency though has been regulators are all through the banks telling people what to do. That's one way of regulating. Another way of regulation is what Darrell was talking about the other day. Let's have some capital requirements for banks. Then they regulate themselves in that way. That's a different kind of regulation. In my opinion, much better.

John Gunn: I think one of the critical parts of this, is try to… If you're faced with these figures, up to '07, from 2000 – 2007, what do you do if you have political control?

John Taylor: So, I agree. This is a complex set of stories. I worked on this with John Williams and I wrote about this, also in 2007, about how the Fed should have seen this. They said it was just liquidity. We – John Williams and I—wrote a paper, which said it was not a liquidity problem; it was a counterparty risk problem in the financial institutions, and they should address it. This was written before Bear Stearns. And, I summarized it somewhat in the *Getting Off Track* book, and I've written papers about it. But it was not something that the government institution wanted to hear. It's a story of problems of government, governing agencies. But I hope that we can get into that to some extent, because it's very important. How much… What could have been done at the time, as John Cochrane was saying. Because some of this stuff was known. It wasn't known to everybody, but there could have been more research on it. But there wasn't.

John Cochrane: Or maybe the lesson is, don't count on large organizations to do this stuff?

John Taylor: Yes.

John Cochrane: As we look forward to right now, and they promise us, "This time, we'll see it all coming. This time, our guys in the banks will understand what a special-purpose vehicle is and won't see that they're using it to get around capital regulation. This time our macroprudential policy will stop too much lending." Maybe the lesson is, don't count on them doing any better this time than last time?

George Shultz: I think you're going to find that the next time is of a totally different nature. That's going to arise from the runaway debt that we have and the process by which it is increasing, out of control. And a complete inability of the political enterprise in Washington to take it seriously and deal with it.

John Gunn: Yeah, so a little different looking at Reagan and Volcker versus Trump and Powell.

George Shultz: Reagan I remember very well. I was an economic person. And it was inflation. He knew, and I knew what Paul Volcker was doing was the right thing to do. And they were saying, "He's going to

cause a recession. We're going to lose seats in the mid-term election." And he smiled, put out praise of Paul Volcker, and saw it through. It was a tough time. We did have a recession. We did lose seats in the mid-term election. But then it turned around, and the economy took off like a bird. That takes guts at the top.

John Taylor: Courage. Okay, thanks everyone for coming.

George Shultz: Very good presentation.

[Applause]