The Federal Reserve and the Financial Crisis
The Federal Reserve's Response to the Financial Crisis, Lecture 3
George Washington University School of Business
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[Applause]

Chairman Bernanke: Hello, welcome back. So, as Professor Fort says today we want to talk about the Federal Reserve's response to the financial crisis. Now let me--in the last couple of lectures I've mentioned a key theme of the lectures which is the two main responsibilities of central banks, financial stability and economic stability. Let me turn it around just a bit and talk about the two main tools. For financial stability, the main tool the central banks have is lender of last resort powers by providing short-term liquidity to financial institutions, replacing lost funding. Central banks as they have for, you know, number of centuries, can help calm a financial panic. For economic stability, the principal tool is monetary policy, of course in normal times, that involves adjusting the level of short-term interest rates.

Now, today I will be focusing primarily on the intense phase of the financial crisis in 2008, 2009, and so I'll be focusing primarily in the lender of last resort function of the central bank. I'll come back to monetary policy in the final lecture when we talk about the aftermath and recovery.

Now, last time, this is just a repeat from last time, I talked about some of the vulnerabilities in the financial system that transformed the decline in housing prices which by itself seemed no more threatening than the decline in dot-com stock crisis. But because of these vulnerabilities, that decline in housing prices led to obviously a very severe crisis. The vulnerabilities I talked about last time were private sector vulnerabilities including the excessive debt taken on perhaps because of the period of the Great Moderation. Very importantly, the banks' inability to monitor their own risks, excessive reliance on short-term funding which as a bank in the 19th century

would tell you makes it vulnerable to a run as short-term funding is pulled away, and increased use of exotic financial instruments like credit default swaps and others that concentrated risk in particular companies or in particular markets. So that was the private sector.

The public sector had its own vulnerabilities including gaps in a regulatory structure. Important firms and markets did not have adequate oversight. Where there was adequate oversight at least in law, sometimes the supervisors and regulators didn't do a good enough job. For example, there wasn't enough attention paid to enforcing banks to do a better job of monitoring and managing their risks. And finally, an important gap that we've really begun to look at since the crisis is that with individual agencies looking at different parts of the system, there was not enough attention being paid to the stability of the financial system taken as a whole.

Let me talk just a moment more about another important public sector vulnerability, and these were the so called government-sponsored enterprises Fannie Mae and Freddie Mac. Now, Fannie Mae and Freddie Mac are not only private corporations, they have shareholders and a board, but they were established by Congress in support of the housing industry and they're known as government-sponsored enterprises or GSEs. Now Fannie and Freddie, as they're called, don't make mortgages. You can't go to Fannie's headquarters and get a mortgage. What they do instead is they are the middleman so to speak between the originator of the mortgage and the ultimate holder of the mortgage. So if you're a bank and you make a mortgage loan, if you like, you can take the mortgage that you made and you can sell it to Fannie or Freddie. They will in turn take all the mortgages that they collect, put them together into mortgage-backed securities, so called MBS. So, a mortgage-backed security is just a security which is a combination of hundreds or thousands of underlying mortgages, and then sell that to the--to the investors. That's a process called securitization. And Fannie and Freddie pioneered this--this basic approach to getting

funding from mortgages. In particular, the GSEs, Fannie and Freddie, when they sell their mortgage-backed securities, they provide guarantees against credit loss. So if mortgages go bad, Fannie and Freddie make the investor whole. Now, Fannie and Freddie were permitted to operate within adequate capital. So in particular, they were at risk in a bad situation where there were a lot of mortgage losses. They didn't have enough capital to pay off, make good those guarantees that they have promised. And while many aspects of the financial crisis were not well anticipated, this one was. And going back for at least a decade before the crisis, the Fed and many other people, you know, said that the--Fannie and Freddie just didn't have enough capital and that they were in fact a danger to the stability of the financial system. What made the situation even somewhat worse was that Fannie and Freddie besides selling these mortgage-backed securities to investors, they also purchased on their own account large amounts of mortgage-backed securities, both their own and some that were issued by the private sector. So they made profits from holding those mortgages, but again, that created an additional to the extent that those mortgages were not insured or protected, they were vulnerable to losses and again, without enough capital they were at risk. Now an important trigger, and I'll come back to all these issues, but an important trigger that I talked about a little bit last time, to say a little bit more about it. Again, it wasn't just the house price boom and bust but it was the mortgage products and practices that went along with the house price movements that was particularly damaging.

There were a lot of exotic mortgages, by which I mean sort of nonstandard, you know, standard mortgages is 30-year prime fixed rate mortgage. There are all different other kinds of mortgages being offered and often to people with weaker credit. Now, one feature that many of these mortgages had was that in order for them to be repaid, you had to have ongoing increases at

house prices. So for example, you might be a mortgage borrower who would buy an adjustable rate mortgage, an ARM, where the initial interest rate was say 1 percent which meant that you could afford the payment for the first year or two. Now, after 2 years, the mortgage might go up to 3 percent, then after 4 years 5 percent and then higher and higher. So in order to avoid that, you had to at some point refinance into a more standard mortgage. And as long as house prices were going up, creating equity for homeowners, then it was possible to do that refinance. But once home prices stopped rising and by 2006, they're already declining quite sharply, borrowers were finding themselves rather than having building equity, they found themselves underwater, they couldn't refinance and they found themselves stuck with these increasing payments on their mortgages.

Here are some examples of bad mortgage practices, I won't go through all of them, but they all have the characteristic, take for example the second one, an option ARM, that's an adjustable rate mortgage and the option is the borrower's option to vary how much they pay. They could pay less in the full amount and what they didn't pay just got rolled back into the mortgage. So most of these mortgages had the feature that they reduced monthly payments at least early in the mortgage but allowed mortgage payments to rise over time. The other aspect of bad mortgage practices like no-doc loans for example was that there was very little underwriting, which means very little analysis to make sure that the borrower was credit worthy and was able to make the payments on the mortgage.

Here are some advertisements from the period that can illustrate some of the issues. I like the one on the right. We took the name of the company off. And let's look at the features that they're offering here. One percent low start rate. Start rate, that's what you pay the first year, we don't tell you about the next year. Stated income, that means you tell us what your income is, we write

it down, that's all the checking we do. No documentation, well, that's evident. A hundred percent finance, no down payment in other words. Interest-only loans, which means that you pay the interest but you don't have to pay any principle back. And debt consolidation, this was an interesting thing which meant that you could go to the mortgage company and say, "Well, not only do I want to borrow money to buy the house, but I want to add in all my credit card debt and everything else I owe and put that into one big mortgage payment and, you know, and I'll pay for that with the 1 percent start rate." So you can see that there are obviously some very problematic practices here.

So now the mortgage companies and banks and savings and loans and the variety of other different kinds of institutions made these mortgages, but where did they go? How are they financed? You know some of them were kept on the balance sheet of the mortgage originator, but many or most of these exotic or subprime mortgages were packaged in securities and sold off into the market. So for example, some of the securities were relatively simple. If the mortgages were sold to Fannie and Freddie and they had to meet Fannie and Freddie's underwriting standards, Fannie and Freddie would combine them into mortgage-backed securities and sell them with a guarantee as I described before. And those are relatively simple securities that are made up of basically just hundreds or thousands of underlying mortgages. But some of the securities that we're creating were very complex and very hard to understand. An example would be a collateralized debt obligation or CDO. This would often be a security to combine mortgages and other kinds of types of debt together in one package. And it could be sliced in different ways so that you would sell to one investor the most safe part of the security and to another investor the most risky part of the security. So they were very complicated, took of a lot analysis.

Now one reason that many investors are willing to buy these securities were because they had the comfort of the rating agencies whose job it is to rate the quality of bonds and other securities giving triple A ratings to many of these securities, essentially saying that they're very, very safe and therefore you don't have to worry about the credit risk of these securities. So again, many of the securities were sold to investors including pension funds, insurance companies, foreign banks, even in some cases, wealthy individuals. But also the financial institutions that either made these loans or created these securities often retain some of them as well. For example, sometimes they would create an accounting fiction, an off-balance-sheet vehicle, which would hold these securities and finance itself by cheap short-term funding like commercial paper. So, some of the securities went to investors, some of them stayed with the financial institutions themselves. In addition, we had companies like AIG that were selling insurance. They were using various kinds of credit derivatives to basically to say, "Well, pay us a premium and if the mortgages in your mortgage-backed security go bad, we'll make you good, we'll make you whole." And that makes it triple A rated. Of course, these practices made the underlying securities no better and--what they basically did was they created a situation where risks could be spread throughout the system.

So here's a little bit of a diagram showing how a subprime mortgage securitization might work. On the left here, where it's the box says low quality mortgages, you might have a mortgage company or a thrift company making the loans. This thrift company or the mortgage company doesn't care too much about the qualities of loan because they're going to sell it anyway. So they take the mortgages and they sell them to large financial firms who take those mortgages and maybe other securities as well, combine them into a security which is essentially an amalgamation of all the underlying mortgages and other securities.

Now, the financial firm that created the security might negotiate with the credit rating agency to say, "Well, what do we have to do to get triple A rating?" And there will be negotiations and discussion and in the end, the security will be rated triple A. The financial firm would then take the security, could cut it up in different ways or to sell it as it is, sell it to investors like a pension fund or some other type of investor. But in addition, again, financial firms kept many of these securities on their own books or in related investment vehicles. And finally, you had over here on the right, you had credit insurers like AIG and other mortgage insurance companies that for a fee provided insurance in case the underlying mortgages went bad. So this is kind of this basic structure. In actuality, I've seen some diagrams of the complete flowchart and they're incredibly complex. This is a very simplified version but the basic idea is here.

Okay, now remember, what is a crisis? A crisis or a financial panic occurs when you have any kind of financial institution. Think of a bank, which has illiquid assets like long-term loans for example but liquid short-term liabilities like deposits. And in a classic bank panic, if bank depositors lose faith in the quality of the assets held by the bank, they run, pull out their money, the bank can't pay off everybody because they can't change their loans into cash fast enough and so the run on the bank is self-fulfilling. The bank will either fail or it will have to dump all of its long-term assets quickly in the market and take big losses.

So that's what a panic basically is in the context say of a banking system. Well, the crisis of 2008, 2009 was basically a classic financial panic but in a different institutional setting. Not in the bank setting, but in a broader financial market setting. So in particular, as house prices fell in 2006 and 2007, for the reasons I described as with house prices falling, people who borrowed on a subprime mortgage, we're not able to make the payments. It was increasingly evident and more and more than we're going to be delinquent or default and that was going to impose losses on the

financial firms, the investment vehicles they created and also on credit insurers like AIG. Unfortunately, the securities were so complex and the monitoring of the financial firms at their own risks was not sufficiently strong that there was a--it wasn't just the losses. I mean I think a very striking fact is that if you took all the subprime mortgages in the United States and put them all together and assume they were all worthless, the total losses to financial system will be about the size of one bad day at the stock market, they just weren't that big. But what was the problem was, was that they were distributed throughout different securities and different places and nobody really knew where they were and who was going to bear the losses. So there was a lot of uncertainty created in the financial markets. And as a result, wherever you had short-term funding, whether it was commercial paper or other types of short-term funding, we had all kinds of funding that was not deposit insured, it was so called wholesale funding, it came from finan--investors and other financial firms. Whenever there was a doubt about a firm, just like in a standard bank run, the investors, the lenders, the counterparties would pull back their money quickly because of the same reason that a depositor would pull their money out of a bank that was thought to be having trouble. So there was a whole series of runs which generated huge pressures on key financial firms as they lost their funding and were forced to sell their assets quickly and many important financial markets were badly disrupted. Now in the depression of the '30s, there were thousands of bank failures but the great--almost all of the banks that failed in the '30s, at least in the United States, were small banks and there were some larger banks that failed in Europe. The difference in 2008 was there were many small banks that failed in the United States but there were also intense pressures on quite a few of the largest financial institutions in the United States. And the next two pages are just a short list of some of the firms that came out during intense pressure. Bear Stearns which is a broker-dealer came under very

intense pressure in the short-term funding markets in March of 2008. It was sold to JP Morgan with Fed assistance in March. Things calmed down a bit after that and over the summer there was some hope that the financial crisis would moderate but then in the late summer, things really began to pick up.

In September 7th of 2008, Fannie and Freddie clearly were insolvent. They didn't have enough capital to pay the losses on their mortgage guarantees. The Federal Reserve worked with Fannie and Freddie's regulator and with the Treasury to determine the size of the shortfall and over the weekend, the Treasury with Fed's assistance came in and took those firms and put them into a form of limited bankruptcy called conservatorship. And the same time, the Treasury got authorization from Congress to guarantee all of the Fannie and Freddie obligations. So if you held a Fannie and Freddie mortgage-backed security, the company itself was now sort of in a partial bankruptcy but the U.S. government now guaranteed. So that protected those investors. That had to be done or else it would have been an enormous intensification of the crisis because investors all over the world held literally hundreds and billions of those--of those securities.

Famously, the middle of September, Lehman Brothers, a broker-dealer, and I'll talk more about this, I have a case study in this coming up, had severe losses. It came under great pressure, it couldn't find either anybody to buy it or provide capital for it. And so in September 15th, it filed for bankruptcy. On the same day, Merrill Lynch, another big broker-dealer was acquired by the Bank of America, again basically saving the firm from potential collapse.

On September 16th, the next day, AIG with the largest multidimensional insurance company in the world had--which remember had been selling the credit insurance, came under enormous attack from the people demanding cash either through margin requirements or through short-term

funding. The Fed provided emergency liquidity assistance for AIG and prevented the firm from failing, and again, I'll come back to this as well.

Washington Mutual was one of the biggest thrift companies, a big provider of subprime mortgages. It was closed by regulators later of September. After parts of the company were taken off, J.P. Morgan acquired this company as well. October 3rd, Wachovia, 1 of the 5 biggest banks in the United States, again, came under a serious of pressure. It was acquired by Wells Fargo, another large mortgage provider.

So this just gives you some sense of--these are some of the--all these firms I'm talking about were among the top 10 or 15 financial firms in the United States and similar things were happening in Europe. So, this was not a situation where only small banks were being affected, I mean that was a problem too of course. But here we had the biggest, largest, most complex international financial institutions at the brink of failure.

Now, the lessons with the Great Depression, going back, part two. First, remember the Fed did not do enough to stabilize the banking system in the 1930s and so the lesson there is that in the financial panic, the central bank has to lend freely according to Bagehot's rules to halt runs and to try to stabilize the financial system. And the second lesson of the Great Depression, the Fed did not do enough to prevent deflation and contraction of the money supply, so the second lesson of the Great Depression is you need to have accommodative monetary policy to help the economy avoid a deep depression. So, and heeding those lessons, the Federal Reserve and the Federal Government did take vigorous actions to stop the financial panic, worked with other agencies and worked internationally with foreign central banks and governments.

Now, one aspect of the crisis that, I think, maybe doesn't get quite enough attention is the fact that this really was, first of all, a global crisis. In particular, Europe as well as the U.S. was suffering very severely from the crisis. But it was also a very impressive example of international cooperation. And one particular date that I have singled out here is October 10th, 2008. As it happened on that day, there was a previously scheduled meeting of the G7 industrial countries that happened to take place here in Washington. The G7 are the 7 largest industrial countries, and the central bank governors and the finance ministers of those 7 countries came and met in Washington. Now, I'll tell you a deep, dark secret which is these big high-profiled international meetings are usually a terrible bore because the--much of the work is done in advance by the staff, and we have a discussion but there's a communiqué which has been written already by the staff and, you know, it's simply fairly routine in most cases. This was not one of those boring meetings. We essentially tore up the agenda and we sat down and we talked about what are we going to do? How are we going to work together to stop this crisis which was threatening the global financial system? And in the end, we came up with a statement that was written from scratch based actually on some Fed proposals and was circulated, and there were a number of principles and statements involved in that. But among those were first, that we were going to work together to prevent the failure of anymore systemically important financial institutions. This was after Lehman Brothers had failed. We were going to make sure that banks and other financial institutions had access to funding from central banks and capital from governments. We were going to work to restore depositor confidence and investor confidence, and then we were going to cooperate as much as possible to normalize credit markets. So this was a global agreement and subsequent to this agreement, just in the following week, the UK was the first to announce a comprehensive program to stabilize its banking system. The U.S. announced major

steps to put capital into our banks and so on. So a lot really happened in just the next couple of days after this meeting. Now, just to show you that this worked, this shows you--this graph shows you the interest rate charged on loans between banks. This is the interbank interest rate so bank A lends to bank B overnight, this is the interest rate that was charge.

Now, normally, the interest--the overnight interest rate between banks is extremely low, way less than 1 percent because banks, you know, they need some place to park their money overnight and they have a lot of confidence that it's safe to lend to another large bank overnight. Well, as you can see, starting in 2007, banks lost confidence in each other and that's shown by the increase in the rates they charged to each other to make loans. So for example, in 2007, you begin to see the pressures as house prices begin to fall and there were increasing concerns about the quality of the mortgage securities and the quality of the firms. In March of 2008, you could see another little peak there which is around Bear Sterns and that was a--it doesn't look like much, I guess, in comparison but that was a pretty tough period. It was a period of quite sharp movements in financial markets and in funding markets. Now, look what happened when Bear Sterns happened. There was just an enormous spike in these interbank market rates and probably, not much lending was taking place even at those high rates. What this was indicative of was that suddenly there was no trust whatsoever even between the largest financial institutions because nobody knew who was going to be next, who was going to be--who was going to fail, who was going to come under funding pressure. Look what happened after the international announcements.

Within a few days, the--we began to see a reduction in the pressure and by the end of the year, in early January, there was an enormous improvement in the funding pressures in the banking system. So this, I think, is a great example of international cooperation and it illustrates the point

that this was not just a U.S. phenomenon, it was not just U.S. policy, it was not just the Federal Reserve, it really was a global cooperative effort, particularly between the United States and Europe.

Now, the Fed played an important role, however, in providing liquidity, in making sure that the panic was controlled. Let me just talk briefly about this in general and I'll do 2 case studies that will illustrate some of the issues. Now, the Federal Reserve has a facility called the discount window, which it uses routinely to provide short-term funding to banks, maybe a bank which just finds itself short of funding at the end of day. It wants to borrow overnight. It has collateral with the Fed. Based on that collateral, it can borrow overnight at what's called the discount rate which is the interest that the Fed charges. So the discount window which allows the Fed to lend to banks is always there. It's always operative. No extraordinary steps were needed to lend to banks. The Fed always lends to banks. We did make some modifications in order to reassure banks about the availability of credit. And to get more liquidity into the system, we extended the maturity discount window loans, which were normally overnight loans. We made them longer term and we had auctions of discount window funds where firms bid on how much they would pay, and the idea there was by having a fixed amount that we were auctioning, we would at least assure ourselves that we got a lot of cash into the system.

Anyway, the point here is that the discount window which is the Fed's usual lender of last resort facility lending to banks was operative and we used it aggressively to make sure that the banks had access to cash to try to calm the panic. But our financial system is a lot more complicated than the one that existed when the Fed was created in 1913. We have many other different kinds of financial institutions in markets now. And as I said, the crisis was like an old time bank crisis, but it was appearing in all different kinds of firms and different kinds of institutional contexts. So

the Fed had to go beyond the discount window. We had to create a whole bunch of other programs, special liquidity and credit facilities that allowed us to make loans to other kinds of financial institutions, again, on the Bagehot principle that providing liquidity to firms that are suffering from loss of funding is the best way to calm a panic. Now, all these loans were secured by collateral. We weren't taking chances with taxpayer money, and I'll talk about that when we come back. But the cash was going not just to banks, but more broadly into the system. Again, the purpose of this was to enhance stability of the financial system and get credit flows moving again. And just to emphasize, this is the traditional lender of last resort function of central banks that has been around for hundreds of years. What was different was that it took place in a different institutional context than just the traditional banking context.

Here are some of the institutions and markets that we addressed through our special programs. Banks, of course, were covered by the discount window. But another class of financial institutions, broker-dealers, which are financial firms that deal in securities and derivatives, were also facing very serious problems that included Bear Stearns, Lehman Brothers, Merrill Lynch, Goldman Sachs, Morgan Stanley, and others and we provided cash or lend--short-term lending to those firms on a collateralized basis as well. As I'll talk about commercial paper borrowers, received assistance, as did money market funds, I'll come back, I'm going to do a little case study on those two, and finally, the asset-backed securities market. In the modern economy, modern financial system, a lot of the funding that you get for, not just mortgages, but auto loans, credit cards, all different kinds of consumer credit are funded through the securitization process, that is, a bank might take all of its credit card receivables, bundle them together to a security and then sell them in the market to investors, much the same way that mortgages were sold, and that's called the asset-backed securities market. The asset-backed securities market pretty much dried

up during the crisis and the Fed created some new liquidity programs to help get it started again which we were successful in doing.

Now I should mention that while the banks were lending through the discount window, this was totally standard lending through the normal discount window. These other types of lending required us to invoke emergency authorities. There is a clause in the Federal Reserve Act called 13(3) which says that under unusual and exigent circumstances, basically in an emergency, the Fed can lend to other types of entities other than just banks. And this authority had not been used by the Feds since the 1930s. But in this particular case, with all these other problems emerging in different institutions, in different markets, we invoked this authority and used it to help stabilize a variety of different markets.

So let me give you just a little bit of a case study here that will help you understand, you know, what we did and how it helped the economy. So I want to talk a little bit here about money market funds. Now, money market funds are basically investment funds in which you can buy shares and money market funds take your money and invest it in short-term liquid assets. Money market funds historically almost always maintain a $1-dollar share price. So they're very much like a bank actually and they're used frequently by institutional investors like pension funds. So a pension fund with $30 million dollars in cash probably wouldn't put that into a bank because that much money is not insured, you know, there is a limit to how much deposit insurance covered. So what a pension fund might do instead of putting the cash in a bank would be to put the money into a money market fund which promises $1 dollar for each dollar put in, plus a little bit of interest on top. And invest in very short term safe liquid type assets and so it's a pretty good way to manage your cash if you're an institutional investor of some kind. So this diagram just shows investors putting their money into money market funds.

Now, as I said, money market shares are not insured, they do not have deposit insurance, but the investors who put their money into a money market fund expect that they can take their money out at anytime, dollar for dollar. So they treat it like a bank account, basically. The money market funds in turn have to invest in something and they tend to invest in say short-term assets like commercial paper. Commercial paper is a short-term debt instrument issued typically by corporations, short-term in that it's 90 days or less, typically. A non-financial corporation might issue a commercial paper to allow it to manage its cash flows. It might need some short-term money to meet its payroll or to cover its inventories. So ordinary manufacturing companies like GM or Caterpillar would issue commercial paper to get cash to manage their daily operations. Financial corporations, including banks, would also issue commercial paper to get funds that they can then use to manage their liquidity possessions and they can use again to make loans to the private economy. So here's a--here's the picture of it more completely and the left again, you see the investor investing their excess cash in a money market fund. The money market fund buys commercial paper which is basically a funding source for both non-financial businesses, like manufactures and for financial companies who would lend it on to other borrowers.

Okay, so now what happened to this very nice arrangement? Well, Lehman Brothers was--created a huge shockwave as I'll describe. Lehman Brothers was an investment bank, it was a global financial services firm, it was not a bank, so it was not overseen by the Fed, it was an investment company. It held lots of securities, it did a lot of business in the securities markets; it could not take deposits, not being a bank. Instead, it funded itself in short-term funding markets including the commercial paper market.

Lehman invested heavily in mortgage-related securities and also in commercial real estate during the 2000s. Now, as we know, as house prices fell and delinquencies on mortgages rose,

Lehman's financial position got worse and they were also losing lots of money in their commercial real estate. So, Lehman was becoming insolvent, it was losing money in all of its investments, and it was coming under a lot of pressure. And indeed, as Lehman's creditors lost confidence, they started withdrawing funding from Lehman. For example, investors refused to roll over Lehman's commercial paper and other business partners said, "Well, we're not going to do business with you anymore because we're afraid you're not going to be here next week." So, Lehman was increasingly losing money and increasingly finding itself unable to fund itself. It tried with Federal Reserve and Treasury help to either find somebody willing to put more capital into the firm or to acquire the firm. It was unable to do that, so on September 15th, as I mentioned, it filed for bankruptcy. And this was an enormous shock that affected the whole global financial system. Now in particular, one of the many implications of the failure of Lehman Brothers was in the money market funds. There was one particular fairly large money market fund that held, among its other assets, commercial paper issued by Lehman. And when Lehman failed, that commercial paper was either worthless or at least completely illiquid for a long time. And so suddenly, this money market fund could no longer pay off its depositors at a dollar per share. It didn't, and it lost money. Now, suppose you're an investor in a money market fund and you know that if you go there and ask for a dollar back, you can get it. But you also know that they don't have enough money there to pay everybody off a dollar. What are you going to do?

Same thing that a 19th-century bank depositor would do if they heard that their bank had lost money. So, investors in this fund and then in other money market funds began to pull out their money just like the standard bank run. And I'll show you the data on that just a second, but we

had a very intense bank run, or in this case, a money market fund run in which investors in these funds began to pull out their money just as quick as they could.

Now, the Fed and the Treasury responded very quickly to the situation, the Treasury provided a temporary guarantee which said that we, you know, we guarantee that you'll get your money back, if you just don't pull it out right now. And the Fed created a backstop liquidity program, under which we lent money to banks, who in turn used that money to buy some of the assets of the money market funds. And that gave the money market funds liquidity that they needed to pay off their depositors and help to calm the panic.

And just to show you a sense of what was happening here, this is the money outflows from the money market funds. This is a $2-trillion industry. This is daily data. So you see, the Lehman bankruptcy, a couple of days later, you see the money market fund breaking the buck, which meant that it was unable to pay its investors a dollar a share. Following that announcement, you can see that for about two days there, about $100 billion a day was flowing out of these funds. Within two days, the Treasury announced a guarantee program; the Fed came in to support the liquidity of these funds. And as you can see, the run ended pretty quickly.

So, absolutely classic, classic bank run, classic response, providing liquidity to help the institution being run provide the cash to its investors, providing guarantees and that successfully ending the run. But that was at the end of the story because remember, the money market funds were also holding commercial paper. And as they began to face runs, they in turn, began to dump

commercial paper as quickly as they could. And as a result, the commercial paper market went into shock.

This is a really nice example of how financial crises can spread in all different directions. So, we had Lehman failing. That in turn, called the money market funds to experience a run, and that in turn, led to a shock in the commercial paper market. So, everything is connected to everything else and it's really hard to try to keep the system stable. So there was--as the money market funds withdrew from the commercial paper market, there was a sharp increase in rates in the commercial paper market, and lenders weren't willing to lend for more that maybe one day to commercial paper borrowers, which in turn affected the ability of those fun--companies to function and the ability of those financial institutions to fund themselves.

Once again, the Federal Reserve, responding in the way that Bagehot would have had us respond, established special programs. Basically, we stood as backstop lenders, we said: "Make your loans to the--these companies, and we'll be here ready to backstop you if there's a problem rolling over these funds." And that restored confidence in the commercial paper market.

And there's the picture here, this is commercial paper rates. Again--and once again, you can see this, the panic phenomenon, a sharp, sharp increase in rates, which really understates the pressure, because it doesn't also include that fact that for many companies, there was no price in which they could get funding. Or if they got funding, it was for only overnight or very short-term periods. The Fed's actions restored confidence in that market, and you can see the response rates came back down in the beginning of 2009.

OK, one other type of activity, which is the last thing I want to cover. So, a lot of what I've been talking about is probably stuff you didn't hear too much about when you're reading the papers. You know, I was working with these critical markets and working with these--providing broad-based liquidity to financial institutions to try to bring the panic under control. But we also--the Fed and the Treasury--also got involved in trying to address problems with some individual critical institutions.

In March of 2008, as I mentioned before, a Fed loan facilitated the takeover of Bear Stearns by JP Morgan Chase, avoiding a failure of that firm. The reason we undertook that action was first, that we at the time, the financial markets were quite stressed and we were fearful that the collapse of Bear Stearns would greatly add to that stress and perhaps set off a full-fledged financial panic. Moreover, it was our judgment at least that Bear Stearns was solvent. At least JP Morgan thought so, they were willing to buy the firm and to guarantee its obligations. So that by lending to Bear Stearns, we were consistent with the proposition that we should be making loans that are likely to be paid back. And we felt that we were well-secured in making the loan that we did.

In the second example, in October 2008, as I'm sure you all know, AIG was very, very close to failure. This, again, was the largest insurance company, perhaps among the largest in the world. And let me just talk a bit about that case. AIG was a complicated company. It was on the one hand, a multinational financial services company with many constituents part, including a number of insurance companies, global insurance companies. But it had a part of the company

which was called an AIG Financial Products that was involved in all kinds of exotic derivatives and other types of financial activities including, as I mentioned before, the loans--sorry, the credit insurance that it was selling to the owners of mortgage-backed securities. So when AI--when the mortgage-backed securities started going bad, it would--became evident that AIG was in big trouble and its counterparties began demanding cash or refusing to fund AIG, and it was coming under tremendous pressure.

Now, the failure of AIG in our estimation would have been basically the end. It was interacting with so many different firms. It was so interconnected with both the U.S. and the European financial systems, global banks. We were quite concerned that if AIG went bankrupt that we would not be able to control the crisis any further. Now, fortunately, from the perspective of lender of last resort theory, AIG was taking a lot of losses in its financial products division. But underlying that, those losses was the world's largest insurance company. So, it had lots and lots of perfectly good assets. And as a result, it had collateral which it could offer to the Fed to allow us to make a loan to provide the liquidity needed to stay afloat.

And so, to prevent the collapse of AIG, we used AIG assets as collateral and loaned AIG $85 billion, obviously a fairly serious amount of money. Later, the Treasury provided a judicial assistance to keep AIG afloat. And again, that was highly controversial. It was both, we thought, legitimate in terms of lender of last resort theory because it was a collateralized loan, and the Fed is in fact didn't fully pay it back. And secondly, because it was a critical element in the global financial system. Over time, as I said, AIG stabilized. It has repaid the Fed with interest. The

Treasury still owns a majority share of its stock but it has--AIG has been paying back the Treasury as well. It's been in the process of doing that.

Now, I'd like to emphasize that what we had to do with Bear Stearns and AIG is obviously not a recipe for future crisis management. This is--first of all, it was a very difficult and, in many ways, distasteful intervention that we had to do on the grounds that we needed to do that to prevent the system from collapsing. But clearly, it is something fundamentally wrong with a system in which some companies are "too big to fail." If a company is so big that it knows that it's going to get bailed out, even putting aside the fairness of that--it's not at all fair to other companies. But even beyond that, obviously, they have an incentive to take big risks with it, where they'll say: "Well, we'll take big risks. Heads I win, tails you lose. If the risks pay off, we make plenty of money. And if they don't pay off, the government will save us." That's too big to fail and that's a situation, which we, you know, cannot tolerate.

So, as I'll describe more next time, the problem we had in September of 2008 was we really didn't have any tool--legal tools, policy tools--that allowed us to let Lehman Brothers and AIG and these other firms go bankrupt in a way that would not have incredible damage--create incredible damage on the rest of the system. And therefore, we chose the lesser of two evils and prevented AIG from failing. With that being said, going forward, we wanted to be sure that this never happens again. And we wanted to be sure that the system is changed so that if a large systemically critical firm like AIG comes under this kind of pressure in the future, that there'll be a safe way to let it fail, so that it can fail and the consequences of its--the stakes can be borne by its management and shareholders and accreditors. But in doing so, it doesn't bring down the

whole financial system. And I'll talk more next time about the progress we've made collectively in instituting the system that will, I hope, eventually at least, end too big to fail.

So finally, let me just say a couple of words about the consequences of the crisis. We did stop the meltdown. We avoided what would have been, I think, a collapse of the global financial system. That was obviously a good thing. But to give you a sense--one thing that I was always sure of and I think the Federal Reserve was always sure of was that a collapse of some of these big financial firms was going to have very serious collateral consequences. There were people arguing even as late as September of 2008, "Well, why don't you just let the firms collapse? You know, there's not going to be--you know, system can take care of it. Bankruptcy, we have bankruptcy code. Why don't you let them fail?" And you know, we never thought that that was really a good option. Particularly, if the whole system had collapsed, we would have had extraordinarily serious consequences.

As it was, even though we prevented the total meltdown, there were still, obviously as you know, very serious collateral impact on not just the US economy but the global economy as well. So following the crisis, even though the crisis was brought under control, the U.S. economy and much of the global economy went into a sharp recession. And the United States GDP fell by more than 5 percent, which is a quite deep recession. There are some other statistics, eight and a half million people lost their jobs, and unemployment rose to 10 percent, so very consequential impact.

And as I said, this was not just the U.S. situation. The US recession was in fact kind of an average recession. There are many countries around the world that had worse declines, particularly those dependent on international trade. So it was a global slowdown. And as all this was happening, fears of a Great Depression, a second 1930s depression, were very real. So nevertheless, the Great Depression was much worse than the recent recession. And I think the view is increasingly gaining acceptance that without the forceful policy response that stabilized the financial system in 2008 and early 2009, we could have had a much worse outcome in the economy.

Here's a couple of indicators just to close with a couple of graphs here. So this--I think this is an interesting graph. This shows the stock market. The blue line starts in August 1929, which is the peak of the stock market before the Great Depression. The red line is the more recent stock prices. It starts in October of 2007. And then the--each of the graphs shows you the evolution of stock prices in the Depression period in the blue and in the more recent period in the red. And the thing which is pretty striking here is that for the first 15 or 16 months, stock prices in United States behaved pretty much in this crisis as they did in 1929 and 1930. But about 15 or 16 months into the recent crisis, which would have placed it in early 2009, about the time that the financial crisis was stabilizing, look what happened. In the Depression era, the stock prices kept falling and as I mentioned, in the end, stock prices lost 85 percent of their value. In the United States, by contrast, stock prices recovered and began a long recovery, and they now are more than double where they were three years ago.

This is industrial production, the measure of output. Again, the red is the more recent data. The blue is the Depression-era data. You can see in this case that the fall in industrial production was not as quite as severe, quite as fast as in the Depression. But you get the same basic phenomenon that about 15 to 16 months into the episode, about the time that the financial crisis was brought under control, industrial production bottomed out and begun a period of steady recovery, whereas in the Depression, collapse continued for several more years.

OK, so that is a very rapid overview of the crisis of '08 and '09. In lecture 4, we'll talk about the aftermath, the recession, how the monetary policy responded to the recession? Why has the recovery been relatively sluggish? What has happened to financial regulation to try to make sure this never happens again? And what lessons has the Fed taken from this experience?

OK. Questions. Yes?

[Pause]

Student: Hello, Chairman Bernanke. My name is Yu Ki Wu [phonetic] and in both this class and last class, you mentioned about the increasing issuance of exotic and the subprime mortgages. So why do you think these financial institutions are willing to lend such mortgages bear so much risks to even poor credit borrowers? And do you think if they have foreseen the decreased pricing in the housing market, will they still do the same thing? Thank you.
Chairman Bernanke: So there were a couple of reasons. One reason was simply the fact that firms were probably too confident about house price increases and said, “Well, house prices are

likely to keep rising." And in a world in which house prices are rising, these aren't such bad products because people can afford to pay, you know, for a year but then they can refinance to something more stable and this might be a way to get people into housing. But of course, the risk was that house prices wouldn't keep rising, and of course that's ultimately what would happen.

The other aspect of this was that the demand for securitized products grew very substantially during this period. In part, there was a large international demand from Europe and from Asia for high-quality assets and the ever clever U.S. financial firms figured out that they could take a variety of different kinds of underlying credits, whether be subprime mortgages or whatever, and through the miracles of financial engineering, they could create from that at least some securities that would be high quality. It would be rated triple-A, which they could then sell abroad to other investors. Unfortunately, that sometimes left with them with the remaining bad pieces, which they kept or sold to some other financial firm. So there were trends in the financial markets, I think, including overconfidence about their ability to manage those risks. A belief that house prices would probably keep rising. A sense that they could--even after he made those mortgages, they could then sell them off to somebody else and that that other person or other investor would be willing to acquire them. There was a big demand for "safe assets." For all those reasons, it was a--actually a very profitable activity while it lasted. And it only when the house prices began to fall that it become a big loser. Yeah? Yu Ki, do you have--oh, sorry.

Student: Mr. Chairman, my name is Sameer Iqbal. You were talking about how one of the major things the Fed had to do was figure out how to get liquidity flowing again in the market. And that kind of reminds me of the Volcker rule because as I understand that Volcker rule, of course, bans prop trading by investment banks. But it also means gray areas for principal trades, which as I

understand, very important for market makers to create markets and find liquidity. So I'm wondering what you think about that. Doesn't that seem kind of counterintuitive?

Chairman Bernanke: Well, the Volcker Rule is a part of the Dodd-Frank Financial Regulatory Reform that I'll be talking about in more detail on Thursday and which the Fed and other agencies are tasked with implementing. The purpose of the Volcker Rule, as you said, is to reduce the risk of financial institutions by preventing banks and their affiliates from doing "proprietary trading," which means doing short-term trading on their own account, so from taking those kinds of risks.

Now, the law recognizes that there are legitimate exceptions to--for why banks might want to acquire short-term securities. And those include, for example, hedging against risk. But one particular exception is to make markets, to serve as intermediaries who buy and sell in order to create liquidity in a particular market. And that's accepted from the Volcker Rule, and one of the challenges of implementing this rule is trying to figure out how to set a set of standards that allows the so-called exempted or legitimate activities, like market making and hedging, and while ruling out the proprietary trading. And that's obviously very difficult, and we're working on that. We're, you know--we put out a rule. We've gotten thousands of comments where we're looking at that trying to figure out how best to do that.

But, you know, the point you raised is that liquidity in markets is important. During the crisis, it was much worse--a much worse problem than just a little bit lack of trading volume. You had big financial institutions unable to fund themselves, unable to find the funding to support their asset positions, the assets that they held, which left them with one or two possibilities: either they're defaulting because they didn't have enough funding, or the fact that many of them took, which

was to start selling off assets as quickly as possible, which in turn spread to panic. Because if there's a huge sellers' market for, say commercial real estate bonds, that's going to drive the price down very sharply. And then anybody else who is holding those bonds finds their financial position being eroded and that creates pressure on them. So one of the--I didn't use the word contagion in my discussion. A contagion just as in an illness context is the spreading of panic, the spreading of fear from one market--from one institution to another. And contagion was a major problem in many financial panics, but certainly in this one. And that was one of the mechanisms that led the funding pressures to jump from firm to firm and created such a broad-based, broad-based problem. Daniel. Anybody have--? [Inaudible Remark]

Student: All right, thank you, Mr. Chairman. My name is Daniel Wright [phonetic] and I had a question specifically--I'm sorry. [Laughter] There we go. My name is Daniel Wright, and I had a question specifically about global collaboration during the financial crisis. You talked about the G7 in 2008. Specifically, as we saw multinational corporations begin to be on the brink of failure, what pressures came from the international community when the decision to, say, bail out AIG was being debated?

Chairman Bernanke: Well, there weren't any real pressures. Everything was happening too fast. I think, in fact, you know, one area where collaboration was not as good as we would like was it was exactly dealing with some of these multinational firms. For example, there were problems between U.K. and U.S. over Lehman Brothers failure, for example, and inconsistencies which caused problems for some of the creditors of Lehman.

So one of the things that we're trying to do under the Dodd-Frank financial reform legislation, which includes, as I mentioned before, includes provisions for safely allowing large financial

firms to fail. But one of the complexities there is that many of the firms that would--this would be applied to are multinational firms. Maybe not just two or three countries, maybe dozens of countries. And so, collaboration with other countries in figuring out how we would work together to help a large multinational firm fail as safely as possible is part of what's going on now as we work internationally. We tried during a crisis to cooperate in mostly ad hoc way, and we were in touch with regulators in U.K. and elsewhere. But given the timeframes and the lack of preparation, we, you know, we didn't do as much as we would be able to do with a lot more lead time. So that was, I think that was a weakness of international collaboration.

For the most part though, countries cooperated in dealing with the financial institutions that were based in their own countries. AIG was an American company, and we dealt with that; whereas company like Dexia, which was a European company, was dealt with by the Europeans. Also, there was a lot of cooperation between Central Banks. And I may have a chance to say a bit more about this, but there were a lot of European banks that use dollars that needed dollar funding as opposed to Euro funding. They use dollar funding both because they held dollar assets; they made dollar loans; they made loans to support trade, which is often done in dollars, so they needed dollars. The European Central Bank can't provide dollars. So what we did was what was called a swap, where we gave the European Central Bank dollars. They gave us Euros. They took the dollars we gave them and lent them on their own recognizance to European banks taking off the dollar funding pressure and easing dollar funding pressures around the world. So, those swaps, which are still in existence now because of the recent issues in Europe, were an important example of collaboration. We also, in October of 2008, right before--right as this crisis was intensifying, the Federal Reserve and, I think, five other Central Banks all announced the interest cuts on the same day. So we coordinated even our monetary policy. But, so we did our best to

coordinate. There were some areas where, like working on multinational firms where, you know, a lot more preparation was needed and we are still working on those things cooperatively today. Noah.

Student: I'm just--My name is Noah Wiviott. I was wondering if you could elaborate on the off-balance sheet vehicles that were being used and sort of why they were allowed to, you know, keep that much information off their books.

Chairman Bernanke: Well, it has to do with accounting rules, basically. You create this separate vehicle, and the bank might have substantial interest in that vehicle. It might, for example, have a partial ownership. It might have some promises to provide credit support if it goes bad or liquidity support if it needs cash. But it doesn't have, under the rules that existed at that time, if the amount of control that the bank had on this off-balance sheet vehicle was sufficiently limited, then according to the accounting rules, it could treat it as a separate, a separate organization, so to speak, not part of its own balance sheet. That allowed the banks to get away with somewhat less capital, for example, than they would have had to carry if they've had all these assets on their own balance sheet.

Now, one of the many good developments since the crisis is that these rules have been reworked, and many of the off-balance sheet vehicles that existed during the--before the crisis would no longer be allowed. They would have to be consolidated, which means they would have to be brought back onto the balance, made part of the bank's balance sheet, have appropriate capital and so on. So those practices are not completely gone. But the accounting rules have greatly toughened up the situations and circumstances under which a bank can put something off its balance sheet into a separate investment vehicle. Max.

[Pause]

Student: Thank you, Mr. Chairman. You mentioned several large firms that came under pressure in 2008 and also the Fed's doctrine, if you will, of too big to fail. My question was: Where do you draw the line between bailing out a bank and allowing it to fail? Is it arbitrary or is there some sort of methodology that the Fed goes by?

Chairman Bernanke: Oh, this is a great question. So first of all, I want to resist that word doctrine a little bit. These firms proved to be too big to fail in the context of a global financial crisis. That was a judgment we made at the time based on their size, their complexity, their interconnectedness, and so on. It was not something that we ever thought was a good thing. And one of the--again, one of the main goals of the financial reform is to get rid of it because it's bad for the system. It's bad for the firms. It's unfair in many ways, and it would be a great accomplishment to get rid of too big to fail. So it was not something that we advocate or support in any way and we were just forced into a situation where we were forced into having to choose the least bad of a number of different options.

Now, it's a good question, I mean, I think in the case of the--during the crisis, you know, we had basically had to make judgments on a case by case basis, and we were trying to be as conservative as possible. I think in the case certainly of AIG, there was really not much doubt in our minds. This was a case where action was necessary, if at all possible. Lehman Brothers was in itself probably too big to fail, in the sense that its failure had enormous negative impacts on global financial system. But there, we were helpless because it was essentially an insolvent firm. It had--didn't have enough collateral to borrow from the Fed. We can't put capital into a firm that's insolvent. This was before the TARP or anything else that provided capital that the

Treasury could use. So we really just had no legal way to do it. I think if we could've avoided that, we would've done so. So it was somewhat ad hoc, I think. Although the cases, the two cases were intervened, Bear Stearns and in AIG, I think, the case was pretty clear given not only the firms themselves but also the context, the environment that was going on at the same time.

Now interestingly we've had to get much more into this issue since the crisis because there are a number of different rules and regulations which actually require the Fed and other regulatory agencies to make some determination about how systemically critical a firm is. For example, the new Basel 3 capital requirements require the largest most systemically critical firms to have a capital surcharge. They have to hold more capital than firms which aren't as systemically critical. And as part of that process, the International Bank Regulators have worked together to try and set up a set of criteria relating to size, complexity, interconnectedness, derivatives, a whole bunch of criteria that help determine, you know, how much capital, extra capital they have to hold. Likewise, the Fed now, when it approves some merger of two banks, it has to evaluate whether the merger creates a systemically more dangerous situation. So we have worked hard, and we have put out criteria that describes some of the--variety of criteria including some numerical thresholds that we look at to try to figure out if a merger creates a systemically critical firm, which if it does we're not supposed to allow that merger to happen.

So, the science of doing this is progressing. It's still very in its infancy. But again in the crisis, our actual interventions were limited to--well, to--principal interventions were Bear Stearns and AIG along with other agencies. We also provided assistance to a couple of other institutions, but nothing nearly to the extent that the AIG situation involved. But we are--we are looking very seriously at this and indeed now that the Fed has become much more focused on financial stability where, you know, we have a whole division of people working on various metrics,

various indicators both to try to identify risks to the system and also to try to identify firms that need to be, you know, particularly carefully supervised and maybe hold extra capital because of their--the potential risk that they bring to the system. David?

Student: Thank you Mr. Chairman, my name is David [inaudible]. One vulnerability that you mentioned was that the credit rating agencies were assigning triple-A ratings to securities that carried much more risk than perhaps a triple-A rating might warrant. Was--it seems like the incentives would be aligned for the buyers to seek out ratings that were more accurate because they would be taking on more risk. Was there a systemic problem as far as how incentives were aligned within the credit ratings system that allowed these faulty ratings to propagate throughout the system?

Chairman Bernanke: Yeah, there were some incentive problems. And you identify one of them, which is that you would think somehow that instead of the seller of the security being the one who hires and pays the credit rater, you would think that it would be in the interest of the buyers, who after all are the ones bearing the risk, to band together somehow and pay the credit rater to give them the best opinion they can about what the credit quality is of the security. Unfortunately, that model doesn't seem to work. There are very few examples, if any, that I know of that where it works and the problem is what the economists called a free rider problem. Basically, if 5 investors get together and pay Standard and Poor's to rate a particular issuance, unless they can keep that completely secret, anybody else can find out you know what the rating was and then they can basically take advantage of that without having to pay and be part of the consortium that paid.

So there have been a lot of ideas out there about how you can restructure the payment system to create better incentives for credit raters. But it is a challenging problem because, again, just obvious--"obvious solution" of having the investors pay only works if the investors collectively can share the cost, and somehow keep that information from being spread among other investors.

OK, 2 o'clock. I'll see you in Thursday to talk about the aftermath of the crisis. Thank you.

[Applause]