**The Federal Reserve and the Financial Crisis**
**The Aftermath of the Crisis, Lecture 4**
**George Washington University School of Business**
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Dr. Tim Fort: I believe we are ready to get started, everyone. The sad thing, of course, about today is it's the last one, and I know that everybody who's been here for the last two weeks has really enjoyed this very much and it has been a terrific experience, a learning experience academically and intellectually, as well as just an experience to be in the midst of this event, which it is, as well as being a class. And so, we're looking forward today to the final, concluding lecture of the aftermath of the crisis with Chairman Bernanke, Mr. Chairman.

[ Applause ]

Chairman Bernanke: Well, hello again. So, today in the final of our four lectures, as Professor Fort said, we want to talk about the aftermath of the crisis.

Now just to recap briefly, we talked last time about the most intense phase of the crisis, in late '08 and early '09; financial panic both in United States and in other countries, industrial countries; threat in the stability of the entire global financial system; the Federal Reserve working, as I'll describe, with others served in its lender of last resort role provided short-term liquidity to help stabilize key institutions and markets.

I think one of the points that we can now draw having looked at the history is that rather than being some ad hoc and unprecedented set of actions, that the Fed's response was very much in keeping with the historic role of central banks, which is to provide lender of last resort facilities in order to calm a panic. And what was different about this crisis was that the institutional structure was different. It wasn't banks and depositors. It was broker-dealers and repo markets. It was money market funds and commercial paper but the basic idea providing short-term liquidity in order to stem a panic was very much what Bagehot envisioned when he wrote Lombard Street in 1873.

Now, I've been focusing very much on the Fed's actions. That's been the topic of the course, of course, but the Fed obviously didn't work alone. We worked in close coordination with both other U.S. authorities and foreign authorities.

For example, the Treasury was actually engaged after the Congress approved the so called TARP legislation. The Treasury was in charge of making sure that banks had sufficient capital and the U.S. government took an ownership position in many banks that was essentially temporary. Most of those have now been reversed. The FDIC, the Federal Deposit Insurance Corporation, played an important role. In particular, the deposit insurance limits, the $250,000-deposit insurance limits, were raised essentially to infinity for the transactions accounts. And the FDIC also provided guarantees to banks who wanted to issue up to three years of debt, corporate debt, in the marketplace. For a fee, the FDIC guaranteed those issuances so that banks could get longer term funding. So this was a collaborative effort between the Fed and other U.S. agencies.

We also worked closely with foreign agencies. I mentioned last time the currency swaps, which are still in existence whereby the Fed gave dollars to foreign central banks in exchange for their own currencies. And those foreign central banks took the dollars and on their own responsibility, on their own risk made those--made dollar loans to financial institutions that required dollar funding. We also of course continue to be in close touch with finance ministers and regulators around the world as we try to coordinate to deal with the crisis.

Now, putting out the most intense phase of the fire was not really enough. There's been a continuing effort to strengthen the financial systems, strengthen the banking system. For example, in a quite successful action, one that I think was very constructive, the Fed working with the other banking agencies led stress tests of the 19 largest U.S. banks in the spring of 2009. So this was not far after the most intense phase of the crisis. And what we did in an unprecedented way was to disclose to the markets what the financial positions were of the major banks. And those stress tests, which confirmed that our banks could survive even a return to worse economic and financial conditions, created a great deal of confidence in investors and allowed banks to go out and raise private capital, a great deal of private capital, and many cases to replace the government capital they've received during, during the crisis. The process of stress testing has continued. Just a couple of weeks ago the Fed led another round of stress tests, a very demanding set of stress tests. Our banks did quite well. They've raised a great deal of capital even since 2009. They're, in many ways, in a stronger position than they were even prior, prior to the crisis in terms of capital.

So these are steps that are being taken to try to get the banks back into full lending mode. It's still a process in progress but restoring the integrity and the effectiveness of the financial system is obviously part of getting us back to a more normal economic situation.

Now just saying a few words about the lender of last resort programs. As I've already argued in some lengths, the programs, it did appear to be effective. They arrested runs on various types of financial institutions, and they restored financial market functioning. The programs, which were instituted primarily in the fall of '08, were mostly phased out by March of 2010. And they were phased out really in two different ways.

First, some of the programs just came to an end. But more often, what happened was that the Fed would, in making loans, liquidity provision to financial institutions, the Fed would charge an interest rate that was lower than the crisis rate, the rate, the panic rate, but higher than normal interest rates. And so as the financial system calmed down and rates came down back to more normal levels, it was no longer economically attractive or financially attractive for the institutions to keep borrowing from the Fed, and so that the program just sort of wound down quite naturally. So we didn't have to just shut them down, they just basically disappeared on their own.

The financial risks that the Federal Reserve took in this lender of last resort programs was quite--were quite minimal. As I've described, lending was mostly short term. It was backed by collateral in most cases. In December of 2010, we reported to Congress all the details involved in 21,000 loans that the Fed made during the crisis. Of those 21,000 loans, zero defaulted. Every single one was paid back. So even though the objective of the program was stabilizing the system, it was not profit making. The taxpayers did come out ahead in those loans.

So that was lender of last resort activity. That was the tool, the fire hose, to put out the fire of the financial crisis. But of course as I've described last time, the--even though the crisis was contained, the impact on the U.S. and global economies was severe. And new, new actions were needed to help the economy recover. Remembering that the two basic tools of central banks are lender of last resort policy and monetary policy, we now turn to the second tool, monetary policy, which was the primary tool used to try to bring the economy back after the trauma of the--of the financial crisis.

Now, you're all familiar with conventional monetary policies. Conventional monetary policies involve management of the short-term overnight interest rate called the federal funds rate. By raising and lowering the short-term interest rate, the Fed can influence a broader range of interest rates. That in turn affects consumer spending, purchases of homes, capital investment by firms and the like, and that provides demand for the output of the economy and can help stimulate a return to growth.

Just a few words on the institutional aspects. Monetary policy is conducted by a committee called the Federal Open Market Committee. The FOMC, as it's called, meets in Washington eight times a year. During the crisis, it sometimes also held video conferences. When we have a meeting of the FOMC, there are 19 people sitting around the table. There are seven governors, the seven members of the Board of Governors, who have been appointed by the President and confirmed by the Senate. And then there are the 12 presidents of the 12 Reserve Banks, each of whom has been found or appointed by the Board of Directors of each of the Reserve Banks and then confirmed by the Board of Governors in Washington. So they're 19 people around the table. We all participated in the monetary policy discussion.

When it comes time to vote, the system is a little bit more complicated. At any given meeting there are actually only 12 people who are able to vote. The voters at any given meeting are the seven members of the Board of Governors, currently five, we have two empty seats and we hope to get those filled soon. But the seven members of the Board of Governors have a permanent vote in every meeting. The president of the New York Federal Reserve Bank also has a permanent vote, which goes back, of course, to the beginning of the system and the fact that New York remains the financial capital of the United States. Of the other 11 reserve bank presidents, there's a rotation system in each year four of the 11 other Reserve Bank presidents' vote and then at the end of the year, they move on to another set. So again, there's a total of 12 votes in any given meeting or any given decision on monetary policy but the entire group participates in the discussions.

Now, here's the federal funds rate, again, the short-term interest rate that is a normal tool that the Fed uses for monetary policy. You can see that at the end of Chairman Greenspan's term and the beginning of my term in 2006, we were in the process of raising the federal funds rate in an attempt to normalize monetary policy after having easier policy earlier in the decade in order to help the economy recover from the 2001 recession. But in 2007, as the problems began to appear, typically in the subprime mortgage market, the Fed began to cut interest rates, so you can see the right side of the picture as interest rates were sharply reduced. And by December of 2008, the federal funds rate was reduced to a range of between 0 and 25 basis points. The basis point is one-hundredth of one percent, so 25 basis points means 1/4 of 1 percent. So, essentially by December 2008, the federal funds rate was reduced basically to zero. It can't be cut anymore obviously.

So given that, as of December of 2008, conventional monetary policy was exhausted. We couldn't cut the federal funds rate any further. And yet, the economy clearly needed additional support. Into 2009, the economy was still contracting at a rapid rate. We needed something else to support recovery, and so we turn to less conventional monetary policy. And the main tool that we've used is what we call in the--within the balance of the Fed, the large-scale asset purchases or LSAPs, more properly known in the press and elsewhere as quantitative easing, or QE. I won't get into why I think LSAPs is a better descriptive name, but in any case, I've had to bow to the common usage. But these large scale asset purchases, as I'll explain in more detail, were an alternative way of easing monetary policy, again, to provide support to the economy.

So how does this work? Well, to influence longer-term rates, the Fed began to take--undertake large scale purchases of Treasury and GSE mortgage-related securities. So, just to be clear here, the securities that the Fed has been purchasing are government-guaranteed securities, either

Treasury securities, that's government debt of the United States, or the Fannie and Freddie securities, which recall were guaranteed by the U.S. government after Fannie and Freddie were taken into conservatorship.

There have been two major rounds of large scale asset purchases, one announced at March 2009 often known as QE1, and another announced in November 2010, known as QE2. There have been some additional variations since then, including a program to lengthen the maturity of our existing assets, but these were the two bigger--biggest programs in terms of the size and the impact on the balance sheet. And to get--taken together, these actions boost the Fed’s balance sheet by more than $2 trillion.

So here's a picture of the asset side of the Fed's balance sheet to help us see the effects of the large scale asset purchases. The green at the bottom is the traditional securities holdings. So just to be absolutely clear even under all most normal circumstances, the Fed always owns a substantial amount of U.S. Treasuries. We owned about $800 billion plus of U.S. Treasuries before the prices even began, And so in that respect, there was--it's not like we began buying them from scratch. We've always owned a significant amount of these securities. So the green shows sort of the baseline where we started from.

Now what else appeared on the Fed's balance sheet on the assets side during this period? The dark blue represents assets acquired or loans made during the crisis period. And you can see that in late 2008, our loans outstanding to financial institutions and to some of these other programs rose very sharply. But you can also see that as time passed and certainly by early 2010, those initiatives to address financial strength had been greatly reduced.

If you look at the far right by the way, you see a little a bump right there recently. Now that's the swaps. We instituted and extended the swap agreements with European Central Bank and other major central banks and there has been some usage of that in an attempt to try and reduce strains in Europe, and that shows up as a little bump there at the far right of the picture. Now again, we owned about $800 billion in Treasury securities at the beginning of the crisis. But as you can see from the red, labeled LSAPs, we added about $2 trillion in new securities to the balanced sheet during the period starting in early 2009. And then at the top there, you have other assets, variety of things, could be security reserves, physical assets, and other miscellaneous items.

Now why were we doing this? Why were we buying these securities? This is, by the way, an approach, which monitors like Milton Friedman and others have talked about. The basic idea is that when you buy treasuries in GSE securities and bring them on to the balance sheet, that reduces the available supply of those securities in the market. Investors want to hold those securities and--or they'd be willing to hold a smaller amount, they have to receive a lower yield. Or put in another way, if there's a smaller available supply of those securities in the market, they are willing to pay a higher price for those securities, which is the inverse of the yield.

So again by purchasing Treasury securities, bringing on them on our balance sheet, reducing the available supply of those Treasuries, we effectively lowered the interest rate on longer-termed treasuries and on GSE securities as well. Moreover to the extent that investors no longer having available Treasuries and GSE securities to holding their portfolios, to the extent that they are induced to move to other kinds of securities, like corporate bonds, that also raises the prices and lowers the yields on those securities. And so the net effect of these actions was to lower yields across a range of securities. And of course as usual, lower interest rates have supportive stimulative effects on the economy.

So this was really a monetary policy by another name, instead of focusing on the short-term rate, we were focusing on longer term rates. But the basic logic of lowering rates to stimulate the economy is really the same.

Now, you might ask the question: “Well, the Fed is going out and buying $2 trillion of securities. Well, how do we pay for that?” And the answer is that we paid for those securities by crediting the bank accounts of the people who sold them to us. And those accounts at the banks showed up as reserves that the banks would hold with the Fed. So the Fed is a bank for the banks. Banks can hold deposit accounts with the Fed essentially, and those are called reserve accounts. And so as the purchases of securities occurred, the way we paid for them was basically by increasing the amount of reserves that banks had in their accounts with the Fed.

So you can see this--here, this is the liability side of the Fed's balance sheet. Of course, assets and liabilities including capital have to be equal. So the liability side had also to rise near $3 trillion, as you can see. Now take a look first, as you look at this, take a look first at the light blue line at the bottom. The light blue line at the bottom is currency, Federal Reserve notes in circulation. Sometimes you hear that the Fed is printing money in order to pay for the securities we acquire, and I've talked about that in some--you know, in some--in giving some conceptual examples. But as a literal fact, the Fed is not printing money to acquire the securities. And you could see it from the balance sheet here. The light blue line is basically flat; the amount of currency in circulation has not been affected by these activities.

What has been affected is the purple area, those are reserve balances. Those are the accounts that banks, commercial banks, hold with the Fed and their assets to the banking system and their liabilities with the Fed, and that's basically how we pay for the--for those securities. And so the banking system has a large quantity of these reserves, but they are electronic entries at the Fed. They basically just sit there. They're not in circulation. They're not part of any broad measure of the money supply. They're part of what's called the monetary base. But again, they're not--they certainly aren't cash. Then there are other liabilities including Treasury accounts and a variety of other things that the Fed does. We act as the agent, the fiscal agent for the Treasury. But the two main items you can see are the notes in circulation and the reserves held by the banks.

So what do the LSAPs or the quantitative easing, what does it do? Well, we anticipated that when we took these actions that we would able to lower interest rates and that was generally successful. For example as you probably know, 30-year mortgage rates have fallen below 4 percent, which is a historically low level, but other interest rates have fallen as well. Corporate credit has fallen, the rates of interest that the corporations have to pay on bonds, for example, have fallen, both because the underlying safe rates have fallen but also because the spreads between corporate bond rates and Treasury rates have fallen as well, reflecting greater confidence in the financial markets about the economy. And lower long-term rates have, in my view, and I think in terms of the analysis we do at the Fed, have promoted growth and recovery. Although as I'll talk about, the effect on housing was probably weaker than we had hoped. We've got mortgage rates down very low. You would think that would stimulate housing but, as you probably know, the housing market has not yet recovered.

Now of course, always, we have a dual mandate. We always have two objectives. One of them is maximum employment, which we interpret to mean is trying to keep the economy growing and using its full capacity, and low interest rates are a way of stimulating growth and trying to get people back to work. But the other part of our mandate is price stability, low inflation. We've been quite successful in keeping inflation low. It's been a help, I would say, that Volcker in particular and also Greenspan made it much easier for me because they had already persuaded markets that the Fed was committed to low inflation, and there's a lot of credibility the Fed has built up over last 30 years or so. And as a result, markets have been confident that the Fed will keep inflation low, inflation expectations have stayed low. And except for some swings up and down related to oil prices, overall, inflation has been quite low and stable.

At the same time, while we've kept inflation low, we've also made sure that inflation hasn't gone negative, particularly around the time of QE2, November 2010, there was concern that inflation had been falling. It was well below normal levels. And the concern was we might actually get into a negative inflation or a deflation. Those of you familiar with the Japanese situation understand that's been a big problem for their economy now for quite a few years. We certainly wanted to avoid deflation. I talked about deflation also in the context of the Great Depression. So, monetary ease also guarded against the risks of deflation by making sure that the economy didn't get too weak.

Now just one more comment on large scale asset purchases. A lot of people don't make a very good distinction between monetary and fiscal policy. And of course, I'm sure you understand they're very different tools. Fiscal policy is the spending and taxation tools of the federal government. Monetary policy has to do with the Fed's management of interest rates. These are very different tools. And in particular, when the Fed buys assets as part of a LSAP or QE program, this is not a form of government spending. It doesn't show up as government spending because we're not actually spending money. What we're doing is buying assets which at some point will be sold back to the market, and so the value of that--of those purchases will be earned back. In fact, because the Fed gets interest, of course, on the securities that we hold, we actually make a very nice profit on these LSAPs. What we've done over the last three years is transfer about $200 billion in profits to the Treasury. That money goes directly to reducing the deficit. So these actions are not deficit-increasing, they are in fact significantly deficit-reducing.

All right, so a major tool we used when we ran out of room for short-term interest rates was LSAPs, asset purchases. The other tool that we have used to some extent as well is communication about monetary policy. To the extent that we can clearly communicate what we're trying to achieve, investors can better understand our objectives and our plans, and that can make monetary policy more effective. The Fed has made a lot of steps to become more transparent about monetary policy to try to make sure people understand what we're trying to accomplish.

Here is one example. This is a picture of me giving a press conference. So four times a year, now after two-day FOMC meetings, I give a press conference and answer questions about the policy decision. So this is, you know, a new thing for the Fed in terms of trying to explain, you know, what our policies are.

Another recent step that we took in terms of communicating our policies more clearly was to put out a statement that described our basic approach to monetary policy, and in particular, gave for the first time a numerical definition of price stability. Many central banks around the world already have a numerical definition of price stability and we, in our statement, said that for our purposes, we were going to define price stability as 2 percent inflation. And so, the markets will know that over the medium term, the Fed will try to hit 2 percent inflation, even as it also tries to hit its objectives for growth and employment.

Finally, the Fed has also begun to provide guidance to investors and the public about what we expect to do with the federal funds rate in the future, given how we currently see the economy.

So given how we currently see the economy, we tell the market something about where we think the rates are going to go. To the extent that they--market is--better understands our plans, that's going to help reduce uncertainty in financial markets. And to the extent that our plans are, in some sense, more aggressive than the market anticipated, we'll also tend to ease policy conditions. OK, so again, monetary policy has been used to try to help get to the economy back on its feet.

The recession, which the period of contraction, which was very severe, as of course I mentioned, officially came to an end. There's a committee called the National Bureau of Economic Research, which officially designates the beginning and end dates of recessions. I was a member of that committee before I became a policymaker. And they determined that this recession began in December 2007 and ended in June of 2009, so it was a long recession. When they say the recession ended, what that means basically is not that things are back to normal; it just means that the contraction has stopped and the economy is now growing again. So we've been growing now for almost three years, averaging about 2 and a half percent a year. But as I described, we're still some distance from being back to normal. So when you say the economy is no longer in recession, we don't mean that things are great. We just mean that we're no longer actually contracting, we're now growing.

So here's a picture of the sluggish economic recovery that we've had. The blue line in the graph shows the path of real GDP. The gray bar shows the period of the official National Bureau of Economic Research recession. You can see it begins in December 2007, and real GDP begins to decline during that period. In mid-2009, the recession is officially over. And you can see since then, the blue line has been moving up as the real economy has been expanding.

But you can also see those is--is a comparison here. What we did was, we said suppose that the economy had been recovering since mid-2009 at the same average pace as previous recoveries in the post-war period. And that's--that average recovery is shown by the red line. And you can see by comparing that this recovery has been slower than the average recovery in the post-World War II period. It's actually even worse than that in a way, because this was the most severe recession in the post-World War II period. And so you would expect perhaps that recovery might be a little quicker as the economy comes back to its normal levels, but in fact it's been actually slower on average in terms of growth than previous post-war recoveries.

Now a question, sorry, and so an implication, of course, of the sluggish recovery is only very slow and proven in the unemployment rate. You can see the unemployment rate rising sharply during the recession period, peaking around 10 percent, and now coming slowly down to its current value of about 8.3 percent. That's still quite high obviously. Here's housing, single family housing starts. As we discussed in the last lecture, in the previous one, housing starts collapsed even before the recovery--before the recession began. Of course, it was a trigger of the recession. And you see how very sharply construction declined. But then if you look at the most recent year or two, you see that there have been a little few wiggles but the housing market has not come back.

So, you know, this is one reason, if you think you've asked the question, you know, why has this recovery been more sluggish than normal? One reason certainly is the housing market. In a usual recovery, housing comes back. It's an important part of the recovery process. The construction workers get put back to work, related industries like furniture and appliances begin to expand, and that's again part of the recovery process. But in this case, we haven't seen it. Now, you know, why not?

Well, there's still a lot of structural factors in the housing market, which are preventing a more robust recovery. On the supply side, we still have a very high excess supply of housing, a high vacancy rate. The graph shows you the percentage of housing units in United States which are vacant. You can see that that peak at over 2 and a half percent during the recession. It's come down some but still well above normal levels. So, foreclosed homes, homes where the seller is unable to find a buyer. There are a lot of homes on the market, and that produces excess supply and falling house prices.

On the demand side, you might think that a lot of people would be buying houses these days because one thing is true about the housing market is that, the houses are really affordable. Prices are down a lot; mortgage rates are low. And so if you're able to buy a house, you can get an awful lot of house for your monthly payment now, compared to where you were a few years ago. But being able to take advantage of that affordability requires, among other things, that you get a mortgage. And this graph shows what's happening in the mortgage market. The lines show the--the bottom line shows the 10th percentile, the top line the 90th percentile of credit scores of people receiving mortgages. And you can see that before the crisis, people with relatively low credit scores were able to get mortgages. But since the crisis, you can see the whole bottom part of that yellow area has been cut away, implying that people with lower credit scores--and 700 is not a terrible credit score--are unable to get mortgages. And just in general, there’s been a much—there have been much tighter conditions in terms of trying to find a mortgage. So even though housing is very affordable and monthly payments are affordable, a lot of people are unable to get mortgages.

So the implications for the economy with a lot of excess supply in the market; with a lot of people unable to get a mortgage credit or afraid to get back into the housing market; house prices have been declining, as shown by the picture on the right. Recently we've seen some leveling out, some flattening out, but so far not much evidence of a pickup. Declining house prices means it's not profitable to build new houses, and so construction has been quite weak. And more broadly, existing home owners, when they see their house prices down, it may mean they can't get a home equity line of credit. It may mean that they just feel poorer. And so that affects not just their housing behavior, but also their willingness and ability to buy other business services. So that's one of the reasons, the declines in housing prices, and to some extent also stock prices, are part of the reason why consumers have been cautious and less willing to spend.

The other major factor--of course, housing was a big reason for this crisis and recession. Of course, the other major factor was the financial crisis and its impact on credit markets. And that is another reason why the recovery has been somewhat slower than we would have hoped. As I've discussed, the U.S. banking system is stronger than it was three years ago. The amount of capital in the banking system over the last three years has increased by something like $300 billion, a very significant increase. And generally speaking, we're seeing credit terms getting a bit easier. We're seeing expansions in bank lending in a lot of categories. So there is certainly some improvement in banking and credit.

Nevertheless, there are still scenarios where credit remains tight. I've already talked about mortgages where, if you have anything less than a perfect credit score, it's awfully hard to get a mortgage these days. And other categories like small businesses have also found it difficult to get credit. And it's well known: Small businesses are an important creator of jobs. And so their inability to--the inability to start a small business or to get credit to expand a small business is one of the reasons why job creation has been relatively slow.

Another aspect of financial and credit markets has to do with the European situation, which I haven't gotten into. But following on the financial crisis in Europe, which was very severe alongside of ours, there's now sort of a second stage whereby the solvency issues of a number of countries, the concerns about whether or not countries like Greece and Portugal and Ireland can pay their creditors, have led to some stressed financial conditions in Europe. And those have affected the U.S. by creating risk aversion and by volatility in the financial markets, so that has also been a negative factor.

I think a lesson worth drawing from this, and when I've cited in testimony and elsewhere, is that monitory policy is a powerful tool but it can't solve all the problems that there are. And in particular, what we're seeing in this recovery is a number of structural issues relating for example to the housing market, to the mortgage market, to banks, to credit extension, and of course to the European situation, where other kinds of policies, whether they're fiscal policies or housing policies or whatever they may be, are really needed to get the economy going again. So the Fed can provide stimulus. It can provide low interest rates. But monetary policy by itself can't solve important structural, fiscal, and other problems that affect the economy.

All right, well this is all a bit discouraging. Again, it's taking awhile to get back to where we are and we're still a long way from--where we'd like to be. So let me just say a couple of words about the long run. We did have, of course, a major trauma. The crisis is very deep. We have a lot of people who have been unemployed for a long time. About 40 percent or more of all the unemployed had been unemployed for six months or more. And, if you're unemployed for six months or a year or two years, your skills will start to atrophy, and your ability to get reemployed will decline. So that is a problem clearly, and then there are many other issues that the United

States was facing even before the crisis, like federal budget deficits and those have not gone away. In fact, they've gotten somewhat worse through the process of the recession.

So clearly, there's been some real headwinds for our economy. That said, I think it's really important to understand that our economy has faced many short-term shocks in the past. Some not so short term, but has been able to recover. We have a lot of strengths in this economy. It's of course the largest economy in the world, between 20 and 25 percent of all output in the world is produced in the United States, even though we have something more like 6 percent of the world population or less. And the reason that we are so productive has to do with the diverse set of industries that we have; our entrepreneurial culture, which still is clearly the best in the world; the flexibility of our labor markets and our capital markets; and our technology, which remains one of our very strongest points. Increasingly, technology has been driving economic growth. And with some of the finest universities in the world and research centers and as a magnet for talented people from around the world, the United States has been very successful in the research and development area. So, that has also been a source of ongoing growth and innovation in our economy. Now again, we have weaknesses and the financial crisis highlighted a few. but we've also tried of course to address that--and I'll come back to it--by strengthening our financial regulatory system.

Here's a picture I find kind of interesting just to put a little perspective on what we've been talking about for the last few lectures. The dashed line shows a constant growth rate of a little over 3 percent in real terms. So this is a log scale, so the straight line means a constant growth rate. And you can see that the United States economy going back to 1900 has grown pretty consistently around 3 percent for more than a century. You can see in the 1930s, you can see the big swing in as the Great Depression pulled actual output below the trend line. And then you can see the movement above the trend line during World War II. But look what happened after World War II, we kind of went right back to the trend line. There were recessions and booms and busts in the post-war period but remained pretty close to the trend line. Now, if you look to the very far right, you see where we are today, we are below the trend line. There are debates about whether or not that decline is in some way permanent. But I think there's a reasonable chance looking at the long run of history that the U.S. economy will return to a healthy growth somewhere in the 3 percent range. There are factors to take into account like changes in our population growth rate and our aging of our population and so on. But broadly speaking what this picture shows is that over long periods of time, our economy has been successful in maintaining long-term economic growth.

I'll just say a few words about regulatory changes. You recall that I discussed in the last couple of lectures the vulnerabilities in the--both the private and public sector in the financial system. On the public side, the crisis revealed many weaknesses in our regulatory system. We saw what happened with Lehman Brothers and AIG, and the too big to fail problem, the effects that they had on our system. And more generally, the problem of lack of any attention to the broad stability of the system as opposed to individual parts of the system.

So, there has been a very substantial amount of financial regulatory reform in the United States, the biggest piece of legislation is the so called Dodd-Frank Act. In United States, I'm sure you know legislation is named after the chairmen of the relevant committees. Barney Frank is the--was the head of the House Financial Services Committee when the Democrats controlled the House and in 2010 and Senator Chris Dodd was the head of the House--I'm sorry, the Senate Banking Committee. And, so this Wall Street Reform and Consumer Protection Act, passed in summer of 2010, was a comprehensive set of financial reforms addressing many of the vulnerabilities that I talked about earlier.

Now, what were these vulnerabilities? Let me just remind you. One of them was the fact that there was nobody sort of washing the whole system; nobody looking at the entire financial system to look for risks and threats to overall financial stability. So, the Dodd-Frank Act, one of the main themes of the Dodd-Frank Act is to try to create a systemic approach, one where regulators look at the whole system and not just individual components of it. So among doing that--among the tools to do that was the creation of a council called the Financial Stability Oversight Council of which the Fed is a member, which helps regulators coordinate. We meet regularly in this council and discuss economic and financial developments and talk about ways that we can look at the whole system and try to avoid various kinds of problems.

Moreover, the Dodd-Frank Act gave all regulators a responsibility to take into account broad systemic implications of their own individual regulatory and supervisory actions. And in particular, the Federal Reserve has greatly restructured our supervisory divisions so that we are looking now very comprehensively at a whole range of financial markets and financial institutions. So that we have a big picture that we didn't have before the crisis.

I mentioned in discussion of vulnerabilities, the rate--the many gaps in the financial system. There were important firms, like AIG, for example, but others as well that really had no significant comprehensive oversight by any regulatory agency. The Dodd-Frank Act provides kind of a fail-safe in that the Financial Stability Oversight Council can designate, by vote, can designate any institution which it views as not being adequately regulated to come under the supervision of the Federal Reserve. And that's a process that's going on now. So there will not be any more large complex, systemically critical firms that have no oversight. Likewise, the FSOC can also designate the so called "financial market utilities" like a stock exchange or some other major exchange to be supervised by the Fed and other agencies. So those gaps are getting closed. We won't have the situation that we had before the crisis.

Another set of problems had to do with too big to fail and dealing with firms that are systemically critical. The approach to dealing with too big to fail or systemically critical institutions is two-pronged. On the one hand, under Dodd-Frank, large complex systemically important financial institutions are going to face tougher supervision regulation than other firms. The Federal Reserve working with international regulators has established higher capital requirements that these firms will be subject to including surcharges for the very largest and most systemic firms. Rules like the Volcker rule which prohibit bank affiliates from trading taking risky bets on their own account will try to reduce the riskiness of large firms. Stress tests, I talked about, will be conducted. Dodd-Frank requires that large firms be stress tested by the Fed once a year and conduct their own stress test once a year. So we'll be comfortable, or at least, you know, more comfortable that these firms can withstand a major shock to the financial system.

Now, one part of tackling too big to fail is by bringing these large complex firms under tougher scrutiny: more supervision, more capital, more stress tests, more restrictions on their activities. But the other side of too big to fail is well, failing. In the crisis, the Fed and the other financial agencies faced a very bad choice of either trying to prevent some large firms like AIG from failing, which was a bad choice because it ratified too big to fail and meant that the firm was not really punished for--adequately punished for the risk that it took. But the alternative will be to let it fail and to have huge consequences for the whole financial system in the economy. So that's the too big to fail problem.

The only way to solve that problem in the end is to make it safe for a big firm to fail. And one of the main elements of the Dodd-Frank Act is what's called the "orderly liquidation authority," which has been given to the FDIC. As you probably know, the FDIC already has the authority to shut a failing bank, and it can do that quickly and efficiently over the weekend, typically. And depositors are made whole. And the FDIC's ability to do that has avoided, you know, panics and bank runs since the 1930s. Well the idea here is that the FDIC will do something similar but instead it will do it for large complex firms, which obviously is much tougher. But in cooperation with the Fed and with regulators from other countries, where in case of multinational firms, work is underway to prepare. So that should it happen that a large firm comes to the brink of insolvency and cannot be--cannot find an answer, cannot find new capital for example, that the ability of the Fed to intervene the way we did in 2008 has been taken away. We can't do it legally anymore. The only option we'll have is to work with the FDIC to safely wind down the firm and that will ultimately reduce, or we hope eliminate the too big to fail problem.

There are many other aspects of the Dodd-Frank Act. Remember I talked about another vulnerability was the exotic financial instruments, derivatives and so on that concentrated risk. There's a whole set of new rules that require more transparency about derivatives position, standardizations of derivatives, trading of derivatives through third parties called central counterparties. The idea here is to take derivatives and those transactions out of the shadows, make them available and visible to both the regulators and to the markets to avoid a situation like we saw during the crisis.

One of the shortcomings--and, again, here, the Federal Reserve did not do as good a job as it should have in protecting consumers on the mortgage front. So the Dodd-Frank Act creates a new agency, called the Consumer Financial Protection Bureau, which is meant to protect consumers in their financial dealings, and that would include things like protections on the terms of mortgages, for example.

So there's quite a variety of these--of aspects of Dodd-Frank. It's a large and complex bill, a lot of complaining about the fact that it is large and complex. The regulators are doing their best to implement these rules in a way that will be both effective and at the same time minimize the cost to the industry and to the economy. That's difficult, but it's an ongoing process. We do that through an extensive process of putting out proposed rules, gathering comments from the public, looking at those comments, making changes to the rules and so on. And so, it's an iterative process by which we develop these regulatory--that put into place these regulatory standards. And again, it's still very much underway.

So finally, let me just conclude by saying just a couple of things about the future. Central Banks obviously, and not just the United States but around the world, have been through a very difficult and dramatic period, and has required a lot of rethinking about how we manage policy, how we manage our responsibilities with respect to the financial system. In particular, during much of the World War II period, because things were relatively stable, because financial crisis were something that happened in emerging markets and not in developed countries, many central banks began to view financial stability policy as kind of a junior partner to monetary policy. It was not as important. It was something that attention was paid, to but it was not something that to say an amount of resources and attention was paid to.

Obviously, based on the crisis and what happened and the effects that we're still feeling, it's now clear that maintaining financial stability is just as an important a responsibility as monetary and economic stability. And indeed, this is, you know, very much a return to the--where the Fed came from in the beginning. Remember the reason that Fed was created was to try to reduce the incidents of financial panics, so financial stability was the original goal of creation of the Fed. So now we sort of come full circle.

So, financial crises will always be with us. That is probably unavoidable. We've had financial crisis for 600 years in the Western world. Periodically, they're going to be bubbles or other instabilities in the financial system. But given what the potential for damage is now as we've seen, it's really important for central banks and other regulators to do what we can first to try to anticipate or prevent a crisis. But if a crisis happens, to mitigate it and to make sure the system is strong enough that it will able to make it through the crisis intact.

So again, we began by noting the two principle tools of central banks, serving as lender of last resort, to prevent or mitigate financial crises and using monetary policy to enhance economic stability. In the Great Depression as I described, those tools were not used appropriately. But in this episode, the Fed and other central banks, and I should say that there's been a great convergence that other major central banks have followed, or on their own have to--have followed very similar policies to that of the Fed, that these tools have been used actively. And in my belief in any case, we avoided--by doing that, we avoided much worse outcomes in terms of both the financial crisis, and the depth and severity of the resulting recession. A new regulatory framework will be helpful. But again, it's not going to solve the problem. The only solution in the end is for us regulators and our successors to continue to monitor the entire financial system and to try to identify problems and to respond to them using the tools that we have. OK. So that's--those are my comments. We have some time and I'd be happy to take your questions, Kelly.

Student: Thank you, Dr. Bernanke. My name is Kelly Quinn. In the first class, you touched upon the main street versus Wall Street divide, and this has been in the back of my mind throughout the lecture series. You've talked about the importance of educating the public on monetary policy. And although this lecture series has definitely demystified the Fed for me, I think it's really been Wall Street, not Main Street, that's been tuning in. So given how unpopular bank bailouts were among many Americans struggling to pay their mortgages who don't really understand the importance of financial stability, do you ever see Americans reconciling these differences?

Chairman Bernanke: Well, you're right. It's some of the same conflicts that we saw in the 19th century, you know, that you see echoes of them today as well. I don't have a simple answer to that question. As you know, the Fed has done more outreach--the press conferences and other kinds of tools--to try to explain what we did and what we're doing. Clearly, the Fed is very accountable. We testify frequently, not just myself but other members of the Board or Reserve Bank presidents. We give speeches. We, you know, we appear in various events and so on.

It's inherently difficult because the Fed is a complicated institution. And as you've seen last four lectures, these are not simple issues. But all we can do, I think, is do our best and hope that our educators and our media and so on will, you know, begin to carry the story and help people understand better. So it is a difficult challenge. It is a difficult challenge and it's--it does reflect a tension that has been in U.S. American feelings about central banks ever since the beginning. Sorry, Andres.

Student: Thank you, Mr. Chairman. My name is Andres. Earlier you mentioned that the Fed had several ways to unwind the large participative scale of assets, including some income back into the market. What guarantees that investors will be willing to buy them back in the future?

Chairman Bernanke: Well again there, first of all, we have essentially three separate types of tools that we can use, any of which by themselves would actually allow us to unwind our policies. But taken together, I think, gives us a lot of comfort.

First of all, we have the ability to pay interest on the reserves that banks hold with us. So, when the time comes--whenever that time may come, whenever that time comes for the Fed to raise interest rates, we can do so by raising the rate of interest we pay to banks on those reserves. Banks are not going lend out the reserves that rate lower than what they can earn at the Fed. And so that will lock up those reserves, raise interest rates, and serve to tighten monetary policy. So, that one tool by itself, even if our balance sheets stayed large, could tighten monetary policy.

The second tool we have is what's called draining tools, and I won't get much into this. But basically we have various ways that we can drain the reserves from the banking system and replace them with other kinds of liabilities even as, again, the total amount of assets on our balance sheet is unchanged.

So, the third and final option is either to let the assets either run off as they mature or to sell them. And, these are Treasury securities. These are government-guaranteed securities. It's certainly possible that the interest rate that will prevail when we sell those securities will be higher than it is today. In other words, we'll have to pay a higher interest rate in order to make investors willing to acquire them. But actually, that will be part of the process, right? That will be a time when we're trying to raise interest rates. It'll be the reverse of what we did when we bought them. At that point, we'll be trying to raise interest rates in order to exit from the easy policy and to a policy that will allow the economy to grow in a low inflationary way.

So, I don't think there's any danger that investors won't buy the assets. They'll certainly buy them at a higher interest rate and that, in a way, would be part of the objective of reducing the balance sheet would be to tighten financial conditions, so as to avoid inflation concerns in the future. Noah.

Student: Thank you. So, I read an article--and I'm sorry I don't remember the exact source--and it outlaid a plan to allow homeowners who have been on time with their mortgage payments to refinance at the current lower rates sort of as a way to protect them from their housing prices dropping. So, I was wondering whether you've heard of plans like that and what sort of involvement the Fed would have or whether that would fall to the Consumer Protection Agency.

Chairman Bernanke: So, there are some programs like that, one in particular is called the HARP, H-A-R-P program, and that's run by the GSCs, Fannie and Freddie and by their regulator which is called the FHFA. And on this program, if you are underwater in your mortgage, in other words, if you're--if you owe more on your mortgage than your house is worth, you still may be able, under this program, if your mortgage is held by Fannie or Freddie, you may be able to refinance at a lower interest rate, which will reduce your payments. So, that program is underway in being expanded. It doesn't necessarily work if your mortgage is being held by a bank because they're not part of this program, but they may choose voluntarily to do it. But, you know, you might be out of luck if your mortgage is not held by Fannie and Freddie.

So, that--yes, there are programs like that. The Fed is not involved in them. Our job has been to keep the mortgage rate low and hope that we can help homeowners. But programs like that, which allow people to get lower payments, obviously are going to be helpful to those people because they'll face less financial stress, and there'd be a smaller chance that they'll end up being delinquent on their mortgage.

[ Pause ]

Student: Hi, I'm Michael Feinberg. Thank you very much. You mentioned in your lecture the dangers of deflation from the Great Depression and more recently in Japan. And one of the arguments for maintaining in target inflation rate above zero is to provide cushion against possibility of deflation. Yet in the last two recessions in the United States, there's been a pretty significant fear of deflation causing the Fed to keep monetary policy pretty very accommodative in the beginning of the last decade and even more so, at this point. Do you think that 2 percent is enough of a cushion to prevent deflation? And have you considered higher inflation target rates? Thank you.

Chairman Bernanke: Well, that's a great question, and there's been a lot of research on it. It seems like the international consensus is pretty much around 2 percent. I mean almost all central banks that have a target either have a 2 percent target or a 1 to 3 percent target or something like that. And there's a tradeoff here, 'cause on the one hand, you want to have it above zero, as you say, in order to avoid or reduce deflation risk. But on the other hand, if inflation is too high, it's going to create problems for markets. It's going to make the economy less efficient. And so there's a tradeoff in which one level of inflation gives you at least some reasonable buffer against deflation, but it's not so high that it makes markets work less well. And so again, the international consensus has been around 2 percent, and that's sort of where the Fed has been informally for quite a while. So that's what we announced and that's, you know, for the foreseeable future, that's where we plan to stay. But it's obviously an issue that researchers will continue to look at trying to address exactly that tradeoff that you're referring to. Yeah, you.

Student: Thank you Chairman Bernanke. My name is Yuqi Wu. You mentioned one of the biggest lessons you've learned from the recent financial crisis is: Monetary policy is powerful, but it cannot solve all the problems, especially like the structure problems. So what do you think are the effective tools that can be used to solve these structural problems in like housing and financial and credit markets? Thank you.

Chairman Bernanke: Well, it depends on the particular set of problems. So in the case of housing, the Federal Reserve staff wrote a white paper which analyzed the number of the issues, talked about not just foreclosures, but also issues like: What do you do with empty houses? [The white paper] talked about issues of how you get more appropriate mortgage origination conditions, things of that sort. We didn't come down with a list of actual recommendations because that's really up to Congress and to other agencies to determine. But we did go through a whole list of possible approaches, which I guess I won't try to do here.

But housing is a very complex problem, and there are many different things that could be done to try to make it work better. And indeed, looking forward, given the problems with Fannie and Freddie, we had some very big decisions as a country to make about what our housing finance system is going to look like in the longer term, so a lot of issues there.

In Europe, for example, you know, there has been a very complex problem. We've been in close discussions with our European colleagues. They've taken a number of steps. They're right now talking about the so-called firewall, how much money they're going to contribute to provide us protection against the possibility of contagion if some country defaults or fails to pay its bills.

So, each one of these issues has its own approach. In the labor market, we have the problem of people who have been out of work for a long time. Obviously, one of the best ways to deal with that will be some various forms of training, increasing skills. So you could just go down the list. And basically, anything that makes our economy more productive, more efficient, and deals with some of these long-term issues related to our fiscal problems, those are all things that would help. And the fact that the Fed is doing what we can to try to support the recovery, you know, should mean that no other policies are undertaken. I think it's important that we look across the entire government and ask, you know, what kinds of constructive steps can be taken to make our economy stronger and to help the recovery be more sustainable. You.

Student: Thank you, Chairman. So you mentioned that the Fed is doing what it can to, you know, to sustain the recovery and--but with unemployment at, you know, 8.3 percent and the housing issues that you mentioned very sluggish and the problems in Europe, what other tools do you think the Fed has to potentially fight off other issues that we're going to have in the future?

Chairman Bernanke: Give me an example what's--

Student: I mean that's--I guess, you know, if--other--like just other issues that let's say unemployment decides to rise or the housing recovery gets worse or, you know, Portugal, Spain, and Italy, you know. All three of those issues so--

Chairman Bernanke: Oh my, oh now, you'd cost me a night’s sleep now. [Laughter] Well, I've described--what I described today was basically, in these lectures, is basically what the toolkit is for the Federal Reserve and other central banks. I mean, we have lender of last resort authority. We still have that. It's been modified in some ways by the Dodd-Frank, but strengthened in some ways and reduced in some ways. So between that and our financial regulatory authorities, we want to make sure our financial system is strong. And we've worked particularly hard to make sure that we do everything we can to protect our financial system and our economy from anything that might happen in Europe, you know.

So, that whole set of tools is still very much available and in play should there be any new problems in financial markets. Then on the monetary side, I've described to you, I don't have any completely new monetary tools. But we have the tools we've used and--and our interest rate policies, and you know, we can continue to use monetary policy as appropriate as the outlook changes to try to achieve the appropriate recovery while still maintaining, you know, price stability, which is, of course, the other half of the Federal Reserve mandate.

So we have these two basic sets of tools. We'll have to continue to use them and--and continue to evaluate where the economy is going and use them appropriately. We don't have, you know, lots of other tools. And that's why I was saying earlier that we really need an effort across different parts of the government, and indeed, the private sector to do what can be done to get our economy back on its feet. Max. I think this has to be the last question.

Student: Thank you, Dr. Chairman. You spoke a lot about the economic recovery and that while it is painfully slow, there is a clear recovery happening. My question is, what are the key indicators that you and the Federal Reserve are looking at that would suggest that the private sector has begun self-sustaining this economic recovery and that the Fed may begin to tighten monetary policy?

Chairman Bernanke: Well, that's a great question. So, you know first, one set of indicators that has been looking better lately and we've been paying a lot of attention to is developments in the labor market, you know, jobs, unemployment rate, unemployment insurance claims, hours of work, all of those indicators suggest that labor market strengthening. And indeed, employment is one of our two mandates, one of our two objectives. So clearly, that's something we'd like to see sustained. We'd like to see a continued improvement in the labor market.

As I talked about in the speech I gave on Monday, it's much more likely that that will be sustained if we also see increases in overall demand and overall growth. So we'll continue to look at indicators of consumer spending and consumer sentiment, capital plans, capital expenditures, indicators of optimism on the part of firms, those kinds of things to see where production and demand are going to go. And then, of course, as always, we have to look at the--at the inflation side and--and be comfortable that price stability will be maintained and that inflation will be low and stable. So those are the things we'll be--we'll be looking at, and the there is no simple formula. But, as the economy strengthens then--and becomes more self-sustaining, then at some point, obviously, the need for so much support from the Fed will begin to diminish.

I really want to express my appreciation for the, you know, for this class. I think you guys have been, you know, really obviously engaged and your questions have been terrific and thanks for giving me this chance. Thank you.

[ Applause ]

Dr. Tim Fort: Just a couple of things that I'd like to say before we all run off. And first of all, I would like to acknowledge a special guest that is here today. In early December, I had an e-mail from Susan Phillips about the Federal Reserve’s interest of having Chairman Bernanke come over to GW and do some presentations, which is about as specific as we were at that time. Susan

Phillips is the former Dean of the GW Business School and also a former Federal Reserve Governor. And she is the matchmaker, she is the one who made this happen. So welcome and we thank you very much [applause] for what you did to make this happen.

Second obviously, I have to thank the Chairman and also the Chairman's staff. At every turn over the last three months, I kept getting the same message from them, which was "Tim, this is your class." And I think that's extraordinary. I mean when you get into this, agreeing to do this kind of a program, frankly, you wonder whether a powerful organization like that might run over you. They never did, and maybe it's because their boss is a professor himself. But I could not possibly have asked for a better group of people who are more respectful of the educational process in all of the planning that went into this, capped by four very stimulating lectures that the Chairman gave. And so I would like to thank the Federal Reserve and the Chairman for all of that as well.

Third, there're a lot of people at GW that did a heck of a lot of work for this, from information technology to media relations and everybody in between. So thank you all for that.

And then finally, by the way, students and faculty, remember we're going next door. We have a small little gathering with the Chairman. But, I know that there is some people on the back row here, and also some people who are watching here who have been enjoying this. And I just want to let you know, the class has just begun. We're going to be having an engaged dialogue next week on the Chairman's remarks. And then we're going to be looking at other issues pertaining to the Fed, the constitutionality of the Fed, its independence from the political sector, from the banking sector, China, Europe, sociology and finance, consumer protection--Consumer Protection Bureau, and even whether the Fed and central banking might have an impact on reducing violence in the world. I mean we've got a full agenda here. [Laughter] And so I welcome you to come back. It won't be live streamed on the Fed, but we will be recording these and posting on the GW website so we can watch it afterward.

So, this has been a fabulous start, as fabulous as a start that any class could possibly imagine to begin. But we've got a lot to go and we've got some of the finest professors around this university that are going to come in. And so I encourage you to hang around. It's going to be a great ride. So again, thank you, Mr. Chairman. Thank you all for coming and I look forward to the rest of the class.

Thank you.

[ Applause ]