Economics of Banking and Finance Markets
Prof. Sukumar Vellakkal
Department of Economic Sciences
Indian Institute of Technology, Kanpur

Lecture - 36
Financial crisis - III

Hello everyone, welcome to this session. So, in the previous sessions we had discussed the theoretical framework regarding financial crisis.

(Refer Slide Time: 00:29)

2007–2009 Financial Crisis

Subprime crisis: The sub prime crisis was the result of excessive amounts of loans made to subprime people (who cannot not afford them), and excessive amounts of money thrown into the mortgage sector by investors for high return. Low rate of interest, rising home prices and mortgage securitization brought huge gains.

Most mortgage lenders resell their loans to financial firms (Wall Street firms), who then in turn bundle thousands of mortgage loans from different lenders into mortgage-backed securities (MBS). These institutions then slice these mortgages into residential mortgages backed securities(RMBS: securities that are backed by collateral; the collateral here being the mortgages held by sub-prime borrowers).

These mortgage-backed securities are further sliced into Collateralized Debt Obligation (CDO). The CDOs are pools of bond securities that are grouped together to help diversify risk. Rating agencies rated the different tranches of these structures and the Wall Street firms sold these to institutional investors including mutual funds, banks, hedge funds, central banks and pension funds.

Stakeholders: Homeowners, Real estate agents, Mortgage lenders (banks), Wall Street firms, Rating agencies, Investors

And we initiated a discussion of 2007-08 crisis. So, we started saying that the 2007, 08, 09 crisis was a subprime crisis. So, especially in the year 2007, it was mostly a subprime mortgage crisis and in 2008 it became a full-fledged financial crisis.

Coming to this one, we also discussed how it is called a subprime crisis, it was a subprime crisis because of the result of excessive amounts of loans are made to subprime people; that means, who cannot afford them, and excessive amounts of money thrown into the mortgage sector by investors for high return.

So, the low rate of interest, rising home prices, mortgage securitization brought huge gains in the financial market. So, we also seen that, most mortgage lenders resell their loans to financial firms, who then in turn bundle thousands of mortgage loans from different lenders into mortgage-backed securities. These institutions then slice these mortgages into residential

mortgage-backed securities. So that means, RMBS means securities that are backed by collateral, and here the collateral is the mortgages held by subprime borrowers.

So, here actually the mortgage, mortgage means nothing, but the loan taken to buy a home; that means, the home itself become, the mortgage itself become the collateral. So, the problem here is that all the individual loans, all these were clubbed together and made into a mortgage-backed securities which was bought by financial firms, mostly investment banks from the banks who lend these loans to subprime borrowers.

Then, again we are going to see that this MBS further sliced into Collateralized Debt Obligations. CDOs are pools of bond securities that are grouped together to help diversify risk. And, risk agencies rated different tranches, tranches of the structures and the Wall Street firm sold these to institutional investors, including mutual funds, commercial banks, and pension funds.

These RMBS are another kind of bonds, in fact, and these bonds is a new financial product. This was originated from the mortgage loans. So, the main stakeholders included in the 2007-09 crisis, where one is homeowners, mainly subprime borrowers, subprime people who otherwise not eligible for, in the normal condition they are not eligible for a home loan. There is their credit score is much lower than the prime customers obviously.

Then, real estate agents, then the mortgage lender is mainly banking institutions and Wall Street firms who are the investment banks. Investment banks who bought all these loans and then converted it into mortgage-backed securities, that is a kind of bond instrument.

And then, the rating agencies who rated these financial products and the investors who bought these RMBS and CDOs are mostly the real estate investors who want to make huge gains out of the real estate boom during this period.

(Refer Slide Time: 04:24)

Mortgage Backed Security (MBS): These are like bonds. Their shares are also traded in secondary market. But the only difference is that they pose a bigger risk of loss (compared to government bonds). Hence, to compensate this risk, they offer higher returns. The investment banks started buying the "mortgage agreements" from the retail banks. This way, they became entitled to receive the monthly payments from the borrowers.

Need for Mortgage Backed Security (MBS): In year 2000's, the yield of government back securities (like treasury bonds) very low. All risk free, fixed income instruments were yielding very low yield. Hence bankers were busy inventing a *low risk – high return* investment option. This gave rise to mortgage backed security (MBS). As MBS had 'mortgage loans' as their assets, it was considered safe. At a time when treasury bills were yielding less than 3.5% returns, MBS could promise 5-6% fixed returns.

Investment banks bought loans from retail banks. Several such mortgages were *clubbed together* to form a Mortgage Backed Security (MBS). This MBS was valued based on its *future income potential* (Monthly payments received from the homebuyers.)

Before we go further, let us make a clear definition what is this mortgage-backed securities. These are like bonds. Their shares are also traded in the secondary market. But the only difference is that they pose a bigger risk of loss compared to government bonds and these are private bonds, and not the government bonds. So, they face the risk of high default risk. And, hence, to compensate this risk, they offer higher returns.

So, the investment banks started buying the mortgage agreements from the retail banks and this way they became entitled to receive a monthly payment from the borrowers. So, that means, the Wall Street firm or the investment banks, they bought all these loans from the retail banks who lend these loans to subprime borrowers. And, then they became entitled to receive a monthly payment from the borrowers.

So, in year 2000, we have seen that the Fed fund rate because of the anticipated recession or near recession and in year 2001, we have seen that thereafter Fed has reduced the Fed fund rate.

We have seen that there is nearly huge decline in Fed fund rate. It finally, became 1.75 in 2006. So, that means, the yield from these is also related to the rate of interest from all other securities, which we have seen in one of the sessions; previous sessions that all yield that the rate of interest all of them move together.

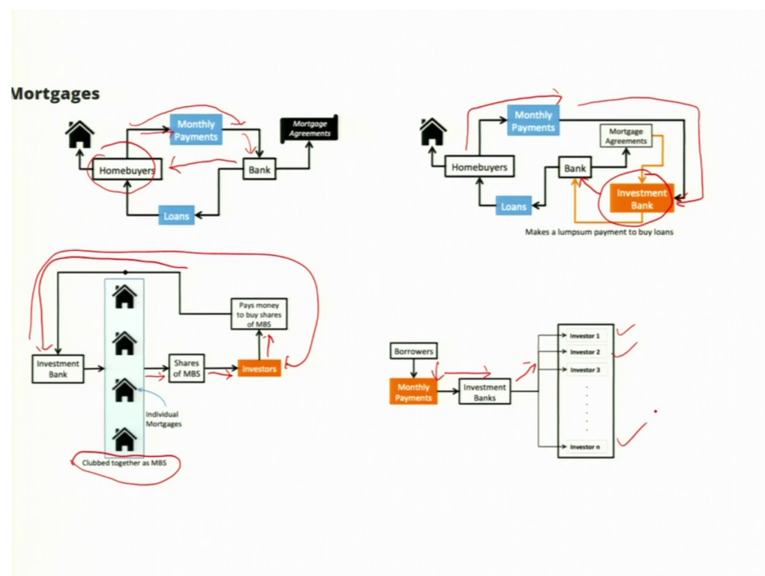
That means, when the Fed fund rate were slashed, if it was more than 6 percentage, now it became 1.75. Then you know that the rate of interest was declined further and further. So, the yield from government backed securities also declined. So, all risk-free fixed income instrument were yielding very low yield during this period, especially after 2000.

Hence, bankers were busy inventing a low risk, a high return investment option. So, this led to the gave to rise to the mortgage-backed security, the general birth of mortgage-backed securities. And, MBS had mortgage loans as their assets, and it was considered safe. So, because the mortgage itself is the collateral. So, at a time when the treasury bills were yielding less than 3.5 percentage return, and MBS could promise 5 to 6 percentage return.

So, you could see that the big difference this RMBS have been giving; that means, high fixed return. So, at that time, it was considered the early periods of 2000, in the early years it was being considered as a good investment. It was very liquid at that time and yielding higher return, not only that the asset price, the mortgage price, housing prices has been kept on increasing in the US at that time.

So, investment banks as I mentioned here bought loans from retail banks. Several such mortgages were clubbed together to form mortgage-backed securities. This MBS was valued based on the future income potential, that the monthly payments received from home buyers.

(Refer Slide Time: 08:01)



So, putting to this one, some graphical representation. So, we can see that these are the home buyers that the who bought loans from retail banks. So, they make a monthly payment to the bank. They have taken a loan from the bank, and then in every month they will be making repayment to the bank.

Then, investment banks come into the picture. Investment banks buy these loans from the bank. So, in return what they get that, the payment which is being given by the home buyers; it will come to the investment banks. This is the monthly potential earnings or the return from this investment, that is, from the mortgage. Then, what investment banks did, by using this one they converted, clubbed all together into mortgage back securities.

And this mortgage back securities, this has been sliced into shares and then it was sold out to the investors. So, it was sold out to the investors. What the investors will get? When they pay money to buy MBS share and then they will be buying it from the investment bank. So, when the invest these owners of this mortgage; that means, mortgage borrowers when they make a monthly payment, it is the return for these investors.

It will be going through the investment banks. So, you can see here is that borrowers, they make monthly payment to the investment banks. Then, they will be lending this one to the investors who had invested in this mortgage back securities.

(Refer Slide Time: 09:56)

We can summarize this one in a figure like this. So, here what we can see that people all over the country, they take out loan. This is individual, that the home borrowers, mortgage borrowers that the who took loan. all these are individual borrowers. Then, the investment banks, these securities are grouped into tranches by levels of risking risk earnings for bond holders.

The RMBS, this has been rated by rating agencies. So, the rating, you can see the triple A, double A, A like that this has been done. It has been made into different groups of RMBS. They have been made into different groups, further categorized into based on the default risk, made into different groups of products.

Then, you know that those who buy triple A rated bond that RMBS, this bond they will be getting; obviously, you know that higher the rating that the lower the default risk, they will be getting low rate of interest.

Suppose not everyone is making loan repayment, so 40 percentage is making loan repayment. So, this will be given to the triple A rate rated RMBS holder. So, subsequently for additional next 10 percentage makes, then it will go to double A, then another 10 percentage makes loan repayment, then it will be going to in this way.

If everyone makes payment; that means, all the 100 percentage; if everyone makes repayment then all these people will be getting, who are holding this RMBS will be getting. And, within that you know that who are is holding triple A bonds, they will be getting less income because the rate of interest is less agreed. And those with the unrated or BBB they will be getting higher return because you know the higher the risk, higher the rate of interest.

However, you know that the default risk, there is this default risk is there. Suppose within these tranches, you can see that only few people are making, not everyone is making. That, in this way you can see, 60 percentage of the homeowners are making repayment of that loan. So that means, mainly the return, the payment will be given to triple A holders and little bit to the double A holders, but nothing here, nothing for here, again, nothing for here as well.

Same here, if there is a default, then you know that the investors who bought low rated RMBS, they will be getting nothing here. They are not getting payments at all. So, what they did? So, you know that the ratings, that the lower yield higher rating, but they will be lastly

paid. That means, if everybody makes the monthly repayment, then actually those who having this RMBS, that the BB minus that the unrated enrolled, they will be paid lastly.

So, that means, if 20 percentage of the people not making payment, then who will be getting affected? These people will not get payments. So, what further interesting thing is here anyway there is this RMBS was categorized into different products, different financial products, bonds with a different rating. So, within this again, those with the low rated; that means, low rating that triple B, BB and minus negative; that means, these lower rated bonds RMBS has been further classified as CDOs.

That means, the structured financial engineering because of the financial engineering, the development of new sophisticated financial instrument which led to the structured credit products, that paid out of out income streams from the collection of underlying assets. You know that this has been further categorized into and designed to have particular risk characterize characteristics that appeal to investors with differing preferences; that means, a kind of asset transformation has happened here.

And this one, this RMBS with a high risk that low ratings, this has been the notorious one is that they further made into a new product called CDOs. The CDO means that the Collateralize Debt Obligation. This is one of the notorious of these products; that means, the risk associated with the financial innovations are not limited here; that means, just to make RMBS, but they further made it into new group of products called CDOs. The interesting thing is here we know that the CDOs are originating from higher default risk bond, the high default risk RMBS.

But, this has been made a new product called CDOs. The CDOs again made into different ranches again with ratings, that within this also, there is triple A rating, double A rating, A, B unrated etcetera. And it’s no stopping here, this has been further within that, suppose within this unrated within the bottom, that is the high default CDOs has been further categorized into CDO square.

So, that means, it is become very complicated products; that means, completely new products in the market and even the people who are buying this, who are investing in these are not fully aware of it. Because it is very complicated product and very difficult to understand how this product originated. And many individual investors as well as many institutional investors, they invested in this RMBS, CDOs and even CDOs square.

(Refer Slide Time: 16:38)

Possible reasons

Government policy (through legislation like the Community Reinvestment Act.) and **Fed's policy** (reducing the fed rate)

Borrowers: Many borrowers bought a home they could not afford but hoped that prices would continue to rise and that they could re-sell their homes for a profit, sometime in the future. Unfortunately, prices went in the wrong direction.

Mortgage brokers: Interested in their commission, they have been blamed with steering borrowers to unaffordable loans, appraisers with inflating housing values.

Mortgage lenders: High fixed costs of the loan originator platform motivated the mortgages lenders to generate as many loans as they could and then sell them quick In order to compete with other mortgage lenders, they relaxed lending standards.

Investment banks: With money easily available from banks, investment bought individual home loan mortgages from banks, consolidated them into big packages and chop these into smaller pieces that serve as collateral for the issuance of tradable mortgage-backed securities. Investment banks backed subprime mortgage securities without verifying the strength of the underlying loans.

The rating agencies, were making millions of dollars in fees from Wall Street's mortgage desks. The rating agencies appear to have been too free in giving out prized AAA badges for structured products, especially CDOs. This is partly because their models were faulty and partly because of the appraiser is paid by the seller instead by the buyer. The rating agencies were beguiled by the low default rate of sub-prime loans which was partly due to rising house prices making refinance of loans possible.

Source: *B Murthy and A Deb .Sub Prime Crisis in US: Emergence, impact and lessons*

Let us now see what the possible reasons are. Then finally, what we are going to see that the subprime crisis, it after certain point of time, the market collapsed. Before going to that, let us put that a sequence of events, the crisis by in sequence of events. One possible reason we already seen the government policy through legislations like Community Reinvestment Act, which engaged giving loans to subprime people borrowers.

Then, another thing we have noted Fed's policy of reducing the Fed rate; that means, the market rate of interest became very low, that also tempted financial system to engage in RMBS. And, about borrowers you know that borrowers many borrowers bought a home they could not afford but hope that prices would continue to rise. And, that they could resell their homes for a profit sometime in the future, unfortunately price went up in the wrong direction.

So, mortgage blockers, how what is their stake in here. So, about borrowers you know that many borrowers they are getting loan. Even though they did not want loan, the bankers are behind them, mortgage brokers are behind them, to give them loan and they also see that the mortgage prices are shooting up, increasing.

So, they thought that it is going to be a capital investment as well. And, about mortgage brokers, they are interested in their commission. They have been blamed with steering borrowers to unaffordable loans and appraisers with the inflating housing values.

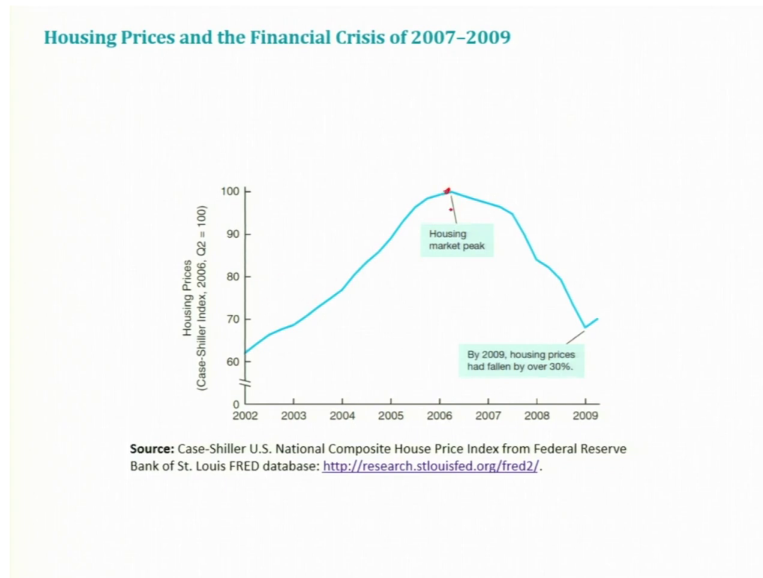
So, the mortgage lenders, especially the bankers, retail bankers, high fixed cost of the loan originator platform motivated the mortgage lenders to generate as many loans as they could and then resell them quick to compete with the other mortgage lenders. So, what they did that they relax lending standard. So, you could see here that the retail banks when they give the as many loans as possible.

So, immediately they could resell, make a resale of these loans to investment banks. So, about investment banks, who bought these loans from retail banks because for them with money easily available from banks, investment bought individual home loan from banks, consolidated them into big packages and chopped these into smaller pieces, that serve as collateral for the issuance of tradable mortgage-backed securities.

So, investment banks backed subprime mortgage securities, they without verifying the strength of the underlying loans. And, coming to the rating agencies, we have seen that the credit rating agencies, they were making millions of dollars in fees from Wall Street’s mortgage desk. Rating agencies appear to have been too free in giving out triple A badges, that the high ratings for structured products, especially for CDOs.

This is partly because their models were faulty and partly because of the appraiser is paid by the seller, instead by the buyer. You know that the rating agencies are paid by the investment bank and not by the investors. So, the rating agencies were beguiled by the low default rate of subprime loans, which was partly due to rising house prices making refinance of loans possible.

(Refer Slide Time: 20:16)



So, you can see here is that this is the housing price. You can see, there is a huge increase, there was sharp increase in the housing prices; that means, it became peak by 2006.

(Refer Slide Time: 20:29)

Mortgage(asset) price Boom/Bubble and the inevitable Bust

Homeowners: As more people were becoming eligible for the mortgage, the demand for homes started increasing. More people had money (borrowed) to buy a new home. This created a price bubble in the real estate sector. The price of residential properties only went up. Bubble and Bust....Mortgage default (When other homeowners with mortgages also attempt to meet their financial obligations, some of them put their homes up for sale, which drags down the price of other houses in their neighborhood, not merely those houses with subprime mortgages. Thus, the entire real sector was involved.)

Investors: These defaults will lead to huge losses for investors

Mortgage lenders: Mortgage lenders are seeing their lines of credit dry up and Wall Street is unwilling to buy any mortgage loans because of the liquidity crunch. Hundreds of mortgage lenders have shut down.

Wall Street firms: Wall Street firms, who issued and underwrote many of the mortgage-backed securities and structured vehicles (such as CDOs) that were sold to investors worldwide, have suffered huge losses on their holdings and business has come to a standstill. In addition, all banks have suffered losses in other markets from the "contagion", which will likely continue.

Source: *B Murthy and A Deb .Sub Prime Crisis in US: Emergence, impact and lessons*

So, here simply you can see that the homeowners, they have been experiencing a mortgage price boom. That means, homeowners as more people were becoming eligible for the mortgage as per the basic economic theory, that the demand theory we can see that as the demand for home started increasing, you know that when the demand for home started

increasing; obviously, price will increase. That means, more people had money because they are getting loan to buy new home.

This created a price bubble in the real estate sector. This created a price bubble in the real estate sector. So, the price of residential properties only went up and most of the borrowers or the subprime borrowers, they began to think that is a capital investment. And they can make lots of money or get profit out of this investment, even that you are taking mortgage loan. So, but obviously, you know that when this keep on that when the bubble happens, when the boom happened which is above their economic fundamental.

Suppose when the house is cost 1 million, based on the real economic fundamentals maybe one house, a mortgage, cost 1 million. But, because of the new financial products, financial innovation, and the increased subprime lending, because of huge increase in the demand for house; you can see that the prices have increased to 5 million and again its increasing further maybe 10 million etcetera.

So, this means, based on the real demand, and supply it should be 1 million. But what happened that because of the innovations and whatever the events happened in 2000, the products value became 10 million. So, you know; obviously, after certain point of time it must burst, right. So, it started bursting the more because every everyone was making money out of the business. There is lots of conflict of interest, then mortgage defaults started happening.

So, you know when other home mortgage default happened, whoever is taken loan, they began to see that the prices has started declining. So, when they see that the prices are started declining, not only the effect there will be spiral effect, external effect in the market. So, the mortgage default, the other homeowners with the mortgages also attempt to meet their financial obligation, then the prices will be declining in the market.

Then what happened that investors because there will be default, the payments from RMBS started declining, then after certain point of time, started fully declining. So, you can see these defaults will lead to huge losses for investors. And, for mortgage lenders, mortgage lenders are seeing their lines of credit dry up and Wall Street is unwilling to buy any mortgage loans because of the liquidity crunch.

So, hundreds of mortgage lenders have shut down because of this. Then, what about the investment banks. So, the Wall Street firms who issued and underwrote many of the mortgage-backed securities and structured vehicles, that were sold to investors worldwide have suffered huge losses on their holdings and business and has become a standstill. So, in addition, all banks have suffered losses in other markets from the contagion, which will likely to continue further.

(Refer Slide Time: 24:13)

Stage 2: Banking crisis

In 2008: full fledged financial crisis

Deterioration of financial institutions' balance sheets:

- Write downs
- Sell of assets and credit restriction
- the failure (or near-failure) of several major investment and commercial banks, insurance companies, and savings and loan associations

High-profile firms fail

- Bear Stearns (March 2008)
- Fannie Mae and Freddie Mac (July 2008)
- Lehman Brothers, Merrill Lynch, AIG, Reserve Primary Fund (mutual fund) and Washington Mutual (September 2008)

So, this is the sequence of events. So, then you can see that, in stage 2, this had led to a banking crisis. So that means, by year 2008, it became nearly a full-fledged financial crisis. How come? You know that the there was deterioration in the financial institutions balance sheets, that is one thing, one related thing. And, since there is mortgage default, an increased rate of mortgage default because of that there were lots of asset write downs.

And, because of the asset write downs, they must make fire sell their assets and make credit restrictions. Because, of the deterioration in the bank's balance sheet, they must make fire sale of their existing asset to increase the liquidity. Then, you know that when there is excess supply because in a distress sale, when they make distress sale of their asset, there will be oversupply of assets in the market.

And obviously, you know that the prices of their existing assets also decline, which would lead to the decline in the net worth of the bank. So, what happened here is that because of

this, there was the failure or almost near failure of several major investment and commercial banks, insurance companies, savings, and loan association during this period.

So, we can see that several high-profile firms fail especially by 2008, they failed. Then, private enterprises sponsor that, but sponsored by the government housing firms Fannie Mae and Freddie Mac, they also failed in July 2008. And, another big failure was Lehman Brothers, the investment bank failed in 2008. Almost, nearly these firms, almost started failing during this period.

We covered the basic aspects of the financial crisis 2007-08. And let us continue this discussion of 2007-08 crisis as well as also discuss some of the crisis financial crisis in some emerging market economies in the next session. Thank you for watching this video and see you in the next session.

Thank you.

Keywords: financial crisis 2007-08, sub-prime crisis, tranches, ratings, financial engineering, CDOs, RMBS, investment banks, boom, asset burst, failure of big banks