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**Financial Crisis and Recession 2008 -09**

Hello, everyone. Welcome to today's session. In this session, we will explore one of the defining economic events of our time: the global financial crisis of 2007-2009. We will examine how a combination of subprime lending, mortgage-backed securities, and complex financial products, such as CDOs, created systemic vulnerabilities in the economy. We will also examine how moral hazard and agency problems were exacerbated by excessive risk-taking, ultimately leading to the collapse of major financial institutions. We will then look at how governments intervened with bailout packages and stimulus programs, and finally, what regulatory lessons were drawn to prevent future financial crises. By the end of this session, I hope you will not only understand how the crisis unfolded but also the broader lessons it taught us about the financial markets, regulations, and the global economy.

Let me begin by providing you with a few key facts about the 2008-09 recession. The key economic impacts, with special reference to the US, are highlighted here. The recession is a period of declining economic activity. As you can see, GDP, which represents the annual production of goods and services, declined by 5.1 percent. The unemployment rate peaked at 10 percent in October 2009. Household wealth deteriorated, falling nearly \$19 trillion, mostly due to the collapse of the mortgage market, the steep decline in housing net worth, and the stock market collapse that occurred at that time. Additionally, the global trade sector experienced an overall decline, contracting by over 10 percent in 2009. As shown in the figure, GDP declined significantly, and the unemployment rate increased.

Regarding the crisis, how did it unfold? It began as a subprime mortgage crisis that affected the mortgage and housing markets, which further escalated into a global financial crisis and triggered a deep economic contraction, ultimately leading to a recession. Overall, there was a sharp decline in consumer spending, business investment, and credit flows, primarily in developed countries, and to some extent, this was also reflected in developing countries. Let me now highlight the major causes that led to the financial crisis. The roots of the 2007-09 financial crisis lay in three interconnected problems. The first was financial innovation in mortgage markets, which introduced complex products such as mortgage-backed securities and collateralized debt obligations.

These financial instruments were products of financial engineering at the time. Due to financial innovation, they were intended to spread risk, but instead made the system more fragile and encouraged stakeholders to take on more risk, which further led to the market's collapse. The second issue is that agency problems existed in lending, primarily due to the actions of bankers and other financial institutions. So, banks no longer kept the loans they issued; instead, they sold these loans to a third party. This originated from the distribution model they followed, which encouraged quantity over quality because they were not overly concerned about default risk. The banks, having now given the mortgage loans, then sold these loans to a third party. The third party converted them into a financial product, then issued us a financial instrument in the market, and raised money by selling it. So, it led to a surge in risky subprime mortgages in the market. Finally, the third part is that credit rating agencies often misjudge the risk, frequently giving triple-A ratings to securities that are far from safe. As we studied in one of the previous sessions, this means the credit rating ranges from triple A to the bottom, which is typically a speculative bond or junk.

When default risk is very low, they receive AAA ratings; however, some of these products, despite not being assessed by credit rating agencies for default risk, were still granted AAA ratings, even though they were far from safe. This asymmetric information problem meant investors underestimated the danger because they mainly relied on the ratings given by the rating agencies. This fueled the bubble, and it eventually burst. In fact, investors overall underestimated the two risks associated with mortgage loans, which led to a mispricing of these assets. Then let me show you how this crisis unfolded, and it's mostly the 2007-2009 crisis.

It mainly consisted of three stages. The first was a real estate crisis, specifically a mortgage crisis. The second stage further led to a financial crisis, a banking crisis. The third and final stage triggered an economic recession, which led to an economic crisis.

We can simply point out three important events. In 2007, a real estate crisis occurred; in 2008, a financial crisis emerged; and in 2009, an economic crisis, essentially a recession, ensued. The first stage of the crisis began with financial innovations in the mortgage markets. The mortgage market mainly refers to the housing market. The products include subprime mortgages.

Subprime mortgages primarily refer to loans for borrowers who are typically ineligible for traditional bank loans. Because subprime means high risk, these borrowers typically don't have much net worth. That mainly means the people who defaulted and have very low net worth. That means they cannot repay their loans. That's mainly poor people.

And those who don't have a very formal job, such as those working in the informal sector, are considered subprime borrowers. Products like subprime mortgages, primarily these

housing loans, were given to low-income individuals. Additionally, mortgage-backed securities spread risk across investors. In addition, the collateral debt obligations were designed to expand lending and spread risk, but they encouraged excessive risk-taking by the investors and the borrowers. At the same time, you can also see that during this period in the US, global liquidity poured into the US market, resulting in a significant capital inflow into the US economy, which fueled the housing boom.

The rising demand continues to push home prices higher. The banks began to lend more money to customers who had previously been deemed ineligible for loans. As a result, many people obtained loans, and demand for housing increased, which ultimately led to a rise in housing prices in the market. This, in turn, is creating a bubble due to the increasing demand for housing, as many are obtaining loans to purchase homes. That led to further escalation in housing prices; you know that this is a kind of bubble because the increase in house mortgage prices is not due to its true economic foundations but because the banks began to give subprime loans, and as a result, there is a huge increase in the demand for housing loans, which led to a further hike in the price of houses in the US markets.

Furthermore, after a certain point in time, it began to reveal its true nature, which meant it started to expose its underlying economic foundation. Initially, it was simply a bubble, but that was unsustainable in the long run. As you can see, I am illustrating how housing prices exacerbate the crisis. Following the 2001 recession, the mild recession of that year led to the rapid expansion of subprime mortgages, with politicians and lenders promoting the idea of credit access for all. By 2007, the trillion-dollar market for home ownership had reached record highs, largely due to the more liberal approaches of politicians and policymakers, who believed it was time for the democratization of credit. The people who are otherwise seemingly not eligible to get loans from the financial institutions, the government, and other policy stakeholders began to promote subprime loans.

They encouraged people from low-income backgrounds and those with subprime credit to apply for loans and own homes. Overall, it raised US home ownership to a historic high. Because there is tremendous support from the policymakers, the banks took it as an opportunity; they began to give loans to everyone who was approaching or even calling, reaching out to people directly, and offering housing loans. All the banks, especially the investment banks, began to offer loans to subprime customers. So, as a result, you know that the prices of this housing began to increase, and the prices you can see here are that they began to increase from 2002 to 2006.

You can see that housing prices became high, reaching their peak in 2006 and again in the middle of 2012. And you can see that, suppose you are one of the customers or borrowers who bought a housing loan, for example, \$1,000, and you know that you got this loan because housing prices keep increasing. If you bought within one year and you see that

the housing prices have doubled to 2 lakhs, then you have every incentive to pay it back. Your loan is because you know that you took the loan for 1 lakh, but now the housing prices and the market value of the house have increased; your mortgage has become 2 lakhs, and after some point next year, it will become 3 lakhs or 4 lakhs, so there is an incentive for the borrowers to pay back their EMI. And then, when they pay back all their EMI, they also get an additional loan to buy more housing.

That means people began to consider it an investment opportunity. As you can see, over a period from 2002 to 2006, the housing price escalated. As a result of subprime lending and overall speculation, housing prices in the US increased by 2009, but this came at the cost of risky lending practices. So, when the housing bubble burst, you can see that prices fell by more than 30 percent by 2009. As you can see, this represents the peak of housing prices. However, by 2009, the housing prices experienced a sharp decline.

Then, the borrowers who had obtained the mortgage loan began to realize that the asset value of their houses had deteriorated too quickly, and many customers, almost all of them, started to default on their loans. They knew that if they did not repay the loan, only the mortgage would be accrued by the bank. And they were fine with it because there was a steep decline in housing prices. As you can see in the figure, by 2009, there was a sharp decline in the asset value of the mortgages. And as a result, overall, there were many defaults on the mortgage loan.

And then you know that the banks fell into trouble because of the loans they had extended to these customers, which resulted in numerous defaults; as a result, many banks failed. Now, moving further, you can also see that the stock market had been increasing; there was upward pressure in the stock market, but by mid-2007, the stock market reached its peak, and after that, you can see that there was a steep fall in the stock prices, which means the market crash happened in 2007. This was mainly because the investors, who had invested in the mortgage loans, converted them into financial products. Since people were not repaying their loans, these financial products had also begun to fail. And then, as a result, you know that the banking system began to fail, and financial institutions began to fail.

The others involved in this business also saw their share prices begin to fall, leading to a decline in economic activity. As a result, you can see here that a stock market crash occurred, and the steepness of the fall is evident; this indicates a significant decline in stock market prices. Moving further, there were also some behaviors from the policymaker side that contributed to the subprime mortgage crisis. And the Fed, especially the Federal Reserve System, made a cut in the Fed Fund rate, which is the short-term interbank interest rate; there was a cut in that. As you can see, the early 2000s experienced a mild recession.

To combat the 2000s recession, the Fed reduced the interest rate 11 times, from 6.5% at the initial period to 1.75%. So, you can see that when the interest rate is declining for the mortgage, the mortgage loans also become very cheap because you know that when the Fed funds rate declines in parallel, you can see other interest rates also decline. So, you can see this has been reflected in the interest rate and other interest rates as well.

As a result, a credit boom occurred in all sectors of the economy. As a result, you can see that one impact is lower interest rates, which encourage banks to expand consumer lending. That is one. Secondly, mortgages became widely available, fueling a housing boom. In addition, I mentioned a couple of minutes ago that policymakers, especially the government, also supported encouraging low-income individuals, particularly those in need, to own housing.

Overall, all these factors led to a rise in subprime lending during this period because, you know, banks extended credit not just to low-risk customers, who are the prime customers whose credit scores are very high, but also to subprime borrowers, whose credit scores are much lower, which means high-risk customers at a higher interest rate. At that time, the market interest rate was already very low. Then, when they were extending these loans to subprime borrowers, they would get a relatively higher interest rate because, you know, they were high risk. High risk meant they needed to pay a high interest rate. Overall, these factors created a surge in risky mortgages that would later collapse.

Let me also discuss one of the key financial instruments that emerged during the early 2000s. These are called mortgage-backed securities, and they played a central role in the 2008 financial crisis. By converting individual mortgages into tradable securities, banks created an investment that appeared safe and profitable. So, investors loved them for their high returns and liquidity, as I already mentioned, because in the early 2000s, subprime mortgage borrowers were eager to repay them, as they saw that housing prices continued to increase. For the investors, those who purchased these financial products, a bank sold the mortgage loans to a third party, which then combined all these loans and mortgages into a single financial product.

And then they issued it as a financial product to the investors. Initially, as I mentioned, the repayment was clear and on time; there was no default. As a result, investors initially began to receive a high return on their investment. They allowed them because, as I mentioned, of the high returns and liquidity, while banks continued lending to their customers because they enjoy transferring the risk off their balance sheet after immediately selling their loans to a third party. This widespread securitization also meant that when US homeowners began to default at a later stage, the shockwaves were transmitted across the global financial system.

That means, as I mentioned, that when the default occurred, it sent shockwaves across the sectors, including investors, the third party I mentioned, and the banks. Let me now move to one of the most important instruments that magnified the 2007-2009 financial crisis. It is called a collateralized debt obligation. So, CDOs pooled mortgages into securities and sliced them into tranches with different risks and returns. As you can see, these are all cash flow-generating assets, such as mortgages, grouped together and divided into tranches.

These tranches, which are how these tranches look, have an AAA rating. In household mortgages, you might suppose you only look at the default risk. Initially, there was no default risk. So, all these loans were categorized into different tranches, different financial product groups, and those who got the AAA rating meant that, suppose, out of all the loans, whoever is paying back their EMI initially would go to these AAA-rated products, and if there are those who are paying later, that would go to the lowest-rated product. Then the AAA tranches were considered safe, while lower tranches offered higher yields. So, what rating agencies do here is that they often give even risky tranches high ratings, boosting investors' demand.

A subprime borrower defaulted, causing the CDO structure to collapse even as safe tranches turned toxic. Overall, banks and investors worldwide face significant losses, and firms are often dependent on CDOs when they are bankrupt. Therefore, the repackaging into CDO squared only increased the risk and exacerbated the crisis. So, let me show you how it looks. So, CDO means just look, these are all the individual mortgage loans.

There are millions of people who have taken out loans. These are all individual home loans, or mortgage loans, that the borrowers have. So, all these mortgage loans, you know, were sold by banks, immediately after making the loans, instead of keeping them and servicing the debt, to a third party. The third party pulled all the mortgage loans, and what they did was that they are mainly investment banks and other financial institutions. They categorize this as a form of financial engineering; actually, these are all loans, specifically mortgage loans, that they have converted into different financial products.

Loans with low default risk were categorized as triple A, while the others, which carry higher risk, received lower ratings. Furthermore, they initially based the security on mortgage-backed securities, commonly referred to as MBS. Later, the lowest-rated mortgage, this financial product, was bundled into another financial instrument called CDOs. Again, these are all lower-rated products.

As you can see here, these are lower-rated products. This has been transferred to another collateral debt obligation, and further tranches have been created. Again, this has been rated as triple A, AA, A, and finally, speculative grade. As you can see here again, this is the lowest loss; however, at the bottom, you can see the first loss. So, that means if there

is a default among the total loans, for example, out of 100 loans, a 10 percent default is considered a default.

This default would go here in this group. That means if there is a remaining balance and the crisis intensifies, you can see that if there is an 80 percent default, these individuals would suffer mainly. And those at the top, these individuals, will mainly get their money back; their investment is safe. Moving forward, this is what it looks like. This is some text I suggest you review to gain more clarity on how collateral debt obligations are structured and how they function as structured financial instruments that purchase and pool financial assets, such as the riskier tranches of various mortgage-backed securities. Overall, to simplify the entire crisis, the different phases are as follows: first, the mortgage loans; then, the CDO pool assets are bundled; and finally, they are categorized into various risk categories.

However, as you are aware, there is a default risk, which ultimately led to the financial crisis. So, this may initially appear more complicated, but I suggest that you go through it carefully. By examining numbers 1, 2, and 3, it becomes clear how the 2007-09 crisis unfolded systematically, starting with mortgage loans, then moving to MBS, then CDO, and ultimately leading to the economic crisis. Furthermore, by 2008, the financial crisis had escalated into a full-blown banking crisis. Banks faced huge write-downs: you know that there was a default in the mortgage loan, and they had sold off assets and tightened credit.

Major institutions, such as those I have already listed here—Bear Stearns, Fannie Mae, Freddie Mac, and Lehman Brothers—either collapsed or required massive bailouts. As a result, the ripple effects were severe. Between 2008 and 2012, the Federal Deposit Insurance Corporation shut down over 465 banks, marking one of the worst episodes in banking history. You can see that I took some screenshots during the newspaper reporting at that time.

For example, Lehman collapsed, causing a shockwave around the world. Then I will also show you the timeline of the 2008 financial crisis. So, as I mentioned initially, it was a real estate crisis, and later it became a financial crisis. Different events are noted here over a one-year period. To make this a crisis, one of the factors I mentioned at the beginning of this session is moral hazard. Before the crisis, banks assumed regulators would not let them fail; many banks thought they were too big to fail because if these banks failed, it would affect the credit flow in the economy. As a result, they believed the regulator would not allow them to fail.

The presumption was that some banks were so vital to the economy that they were considered too big to fail. This belief encouraged risky lending and relaxed lending standards. The agency problem then emerged because mortgage bank brokers who

originated the loans often did not make a strong effort to evaluate whether borrowers could afford to pay off the loans, since they would quickly sell the loans to investors in the form of mortgage-backed securities. Similarly, borrowers had little incentive to disclose information about their ability to pay. Likewise, commercial and investment banks, which earned large fees by underwriting MBS and structured products like CDOs, also had weak incentives to ensure that the ultimate holders of the securities would be paid off. As a result, a problem arose with the information that had grown.

Investors were unable to distinguish between which products were risky and which were less risky. Initially, housing prices bubbled. There was a rise in this bubble, but after some time, it began to burst, exposing the weak loans. Regarding government intervention, the government aimed to reduce bank failures by offering deposit insurance. Here, the idea is that this guarantee encouraged banks to take more risks.

However, they believed that if they took more risks and the venture succeeded, the banks would profit. If they took risks and failed, the taxpayers would bear the cost through government bailouts. This had an overall adverse effect on discipline in the banking sector, exacerbating the crisis. So, I am showing you some of the data to illustrate the magnitude of the financial crisis and the banking crisis. You can see that in 2001, real estate loans were only 20 percent of their portfolio, but they increased to 33 percent by 2006.

I am also showing you additional screenshots of the studies and the write-up on the MBS and the 2008 financial crisis. This crisis initially occurred in developed nations, primarily in the US, and then gradually spread to the rest of the world, becoming a global financial crisis. The final phase of this crisis was the recession of 2008-09. The banking failure led to a contraction in economic activity due to a decline in liquidity in both the banking system and the economy.

As a result, the signs of a recession became clear. This led to a full-fledged recession, characterized by a 5.1 percent decline in GDP. Unemployment is at 10.10%. Regarding government intervention, in the middle of the crisis, the US government faced a major debate. Should they bail out Wall Street? On September 29, 2008, the House of Representatives rejected a \$700 billion Troubled Asset Relief Plan, but just a few days later, on October 3, it was passed. This allowed the Treasury to purchase toxic mortgage assets and recapitalize banks. Soon after, in February 2009, Congress approved another \$787 billion stimulus package to boost the economy. Overall, thanks to the quick and large-scale intervention, the Great Recession, while severe, did not spiral into a depression as deep as the one experienced in the 1930s.

Overall, as I mentioned, the payload package ultimately saved Wall Street from Main Street. It also underscored that being too big to fail was a widely acknowledged issue,

leading to more regulations to mitigate the too-big-to-fail problem. Therefore, these are the proposed solutions to the break of large financial institutions, as an institution that is too large would create the "too-big-to-fail" problem. So, in conclusion, as we wrap up this session, let us recall the key takeaways. The crisis began with subprime lending and risky innovations like MBS and CDOs, which were amplified by moral hazard and agency problems.

What began as a housing market issue escalated into a full-fledged global financial crisis. Government intervention through stimulus packages and plans prevented total collapse, but the episode remains a problem, as the too-big-to-fail issue is still very real. Thank you for watching this session. See you in the next session. Thank you.