Section #10

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1 Financial Crisis Background

1.1 Financial Crisis Terms

Financial innovation leading into the Great Recession played a key role in creating the conditions for the later collapse in financial markets beginning in 2007. It is helpful to understand what some of these innovations were help you sort through the details of the financial crisis.

1. *Leverage Ratio*: a key indicator of the riskiness of a financial institution's (or household's) current balance sheet holdings.

$$\lambda = \frac{A}{A - L}$$

where λ is the leverage ratio, A are the bank's assets, and L are the banks liabilities. It summarizes the portion of a bank's assets that are funded by its capital (equity) which can absorb losses compared to debt or deposits (liabilities) which cannot. US banks historically have had a leverage ratio around 12.

2. *Asset Transformation*: a process banks undertake whereby they take assets with particular characteristics and use them to acquire assets with different characteristics. In particular, banks sell liabilities in the form of deposits to customers which are short-term, highly liquid, and pay low-interest and these deposits are bundled together to make loans which tend to be long-term, illiquid, and high-interest paying assets. This difference in the characteristic of a bank's liabilities and assets allows them to earn a profit. One advantage that the process of securitizing mortgages into mortgage-backed securities offered was that it took an illiquid asset (mortgage loans) and made it much more liquid. This made them easier to move off of a bank's balance sheet and allowed a bank more flexibility in the event of a call on a bank's liquidity.

3. *Structured Purpose Entity/Vehicle* (SPE or SPV): a type of limited liability company (or partnership) that are created to securitize loans. In order for mortgage backed securities that obtain a high rating a bank has to legally separate the pool of mortgages from its balance sheet so that it is distinct from the bank's other obligations and the mortgage backed securities will have the first priority to receive payments on the loans. These became an important type of "shadow" financial institution that allowed enabled banks

to create AAA-rated mortgage-backed securities.

4. *Collateralized Debt Obligation* (CDO): a type of structured asset-backed security that are issued by SPEs and are collateralized (deriving their value from) by debt obligations such as bonds or mortgages. They were often created in differing tranches which carried different levels of risk. These tranches allowed banks to construct assets that were given high ratings despite the fact that the underlying assets were high risk.

5. *Structured Investment Vehicle* (SIV): a type of finance company that earned a profit by issuing short-term debt instruments and using those funds to purchase long-term assets. These entities often issued commercial paper that paid low interest rates and they typically purchased residential mortgage backed securities and other securities that offered higher interest rates. These entities were invented by Citigroup in 1988 but disappeared following the financial crisis. They were successful because they were able to obtain very high credit ratings (often AAA/Aaa) so they could borrow at close to the London Interbank Offered Rate (Libor) and then they typically earned a return by investing in assets with a higher interest rate and rolling over their short term debt until the maturity of their longer term assets.

1.2 Group Activity: Understanding the effects of financial innovation

1. Consider the balance sheet of an American bank before the crisis. On the liabilities side the bank has total of 10 billion dollars in capital and 110 billion dollars in deposits. On the asset side, the bank has 10% of its assets in subprime mortgages. The rest of the bank's assets are considered safe.

a) What is the leverage of this bank? (Hint: Recall that capital = assets - liabilities)

b) Suppose that after the outbreak of the crisis, the value of the subprime loans fall by half. Is this bank still solvent? What is its new leverage?

c) According to the new U.S. Federal Reserve requirements in July 2013, the 8 systemically important financial institution banks are required to maintain a leverage ratio in excess of 6% (50/3 according to the definition above). Suppose this bank is subject to this regulation, do they need to recapitalize? If so, by how much? (Hint: their new leverage ratio is $\lambda'' = \frac{4+x+110}{4+x}$).

2. Suppose 100 worth of mortgages are securitized into two bonds, one worth 80, and the other worth 20. The first losses in the original mortgages are applied to the bond worth 20. A CDO purchases the first

bond (in fact this is its only asset) and issues 2 bonds, a low risk bond worth 60, and a second bond worth 20. First losses to the CDO portfolio are applied to the second bond (the one worth 20).

a) Suppose there are mortgage defaults worth 10, what is the effect on the securities that are structured from them?

b) Repeat part (a) for 70 worth of defaults.

c) Consider what degree of losses the original mortgages have to experience for a purchaser of the senior tranche of the CDO to feel the effect of the underlying losses in the assets from which their security is derived. What role do you think this kind of asset structure played in the financial crisis?

3. In mid-2007 the market for asset-backed commercial paper (ABCP) collapsed due to concerns over the exposure of banks to subprime mortgage securities. Figure 1 shows the spread between the 1-month and 3-month Libor and the Overnight Interbank Swap (OIS) rates (the latter is the interest rate that banks charge one another when swapping overnight federal funds for 1-month federal funds). Discuss how the concepts of adverse selection, liquidity, and SIVs are related to the patterns you see in the data.