Money and Banking
Lecture 11: Shadow Banking System I

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Outline

Introduction: What is Shadow Banking System?

- Though definition of shadow banking system is controversial, the function of this system is certain, as banking system, it provides maturity transformation, liquidity transformation, and risk transformation.
- Instead of completing those transformation in one balance sheet, shadow banking system completes those across institutions.
- Money mutual funds provide short-term funding, compared with bank's liability.
- Asset-backed securities provide long-term funding, compared with bank's assets.
- Investment banks provide liquidity services, and so forth.

Introduction: What is Shadow Banking System?

- Why *shadow*?
- It has no backup from central banks at least before the financial crisis of 2007-2009.
- It has no heavy regulations on such a system.
- In the following two lectures, we discuss shadow banking system through the lens of financial crisis of 2007-2009.

Outline

Originate-and-Hold Business Model

- U.S. financial crisis of 2007-2009 stemmed from subprime mortgage crisis.
- Mortgage is the loan that households borrow from commercial banks for house purchase[1].
- Suppose a house worth \$1 million, and a household puts \$500,000 as *down payment*. It needs another half million dollars to fill the gap.
- The leverage ratio asset/equity is 2:1.

[1] We only use residential mortgages as illustration.

Originate-and-Hold Business Model

- A commercial bank *originate* a mortgage to a household by gathering private information from this household (why?).
- To profit from this origination, the bank *holds* this mortgage as an asset.
- This is the conventional *originate-and-hold* business model.
- To balance between return and risk, bank lending is fairly prudent.

Originate-and-Hold Business Model

- Deposits are main source of funding for banks. When banks need to grant more mortgages, they need more funding as well.
- Such business expansion has two drawbacks. First, financial cost increase: to attract more deposits, banks are enforced to raise deposit rates.
- Second, restrictions on bank capital. Increasing mortgage means more risk-taking. Regulators require bankers to input more bank capital.
- Increasing in bank capital, enhancing *solvency* of banks, but lowers return on equity.

Originate-and-Hold Business Model

- One way to address this problem is to move bank loans to other investors.
- Questions come up:
  1. why other investors are willing to hold mortgages?
  2. how to remove mortgages from banks' balance sheets?
  3. how to address *asymmetric information* for investors?
- It ignites the transformation of mortgage industry business model from "originate-and-hold" to *"originate-to-distribute"*.

Outline

Originate-to-Distribute Model

- Bankers are willing to sell mortgages (most of them are 30-year) to others, because sales lessens the *maturity mismatch* problem on balance sheet.
- Some institutional investors (e.g., pension funds and insurance companies) prefer such long-term assets, because their liabilities are long term as well.
- So, there is a market for mortgage sales.
- How to make a sale? *Securitization* is one way to make a sale.

Originate-to-Distribute Model

- History of securitization in housing market dates back to Great Depression in U.S..
- Great Depression of the 1930s also hit housing market in U.S.. It made many households default on mortgage payment.
- To stabilize housing market, U.S. established *Home Owner's Loan Corporation* (HOLC) to buy mortgages from banks to free banks from liquidity stress.
- When housing market stabilized, U.S. established *Federal National Mortgage Association* (FNMA, or Fannie Mae) to securitize mortgages owned by HOLC to investors.
- What is *securitization*?

Originate-to-Distribute Model

- *Securitization*, in essence, transforms illiquid assets (including physical assets) into liquid (or tradeable) assets.
- Use the trick of *diversification*. Fannie Mae *pools* thousands of mortgages together, called *asset pool*. The cash flows from this asset pool can be *distributed* to end investors.
- Basically, Fannie Mae issues a special bond, and this bond pays bondholders coupon and face value. Unlike government bonds or corporate bonds, this bond payment are from the asset pool.
- Thus, those securities are called *mortgage-backed securities* (MBS).

Originate-to-Distribute Model

- The cash flows of MBS are passed from asset pool through Fannie Mae, in this case. Those securities are also called *pass-through securities*.
- Pension funds and insurance companies, that previously cannot invest directly in housing market, now can do investment in this market by holding MBS.
- This model changes mortgage market ever since.
- Banks that *originate* mortgages now could *distribute* to a third party, i.e., *originate-to-distribute*.

Originate-to-Distribute Model

- On the one hand, after distribution, banks are no longer subject to maturity mismatch, or default risk.
- On the other, banks could originate more mortgages without bank capital increase.
- By selling mortgages to Fannie Mae and Freddie Mac (later setup by US government), mortgages should meet certain requirements.
- To increase market share of this lucrative market, banks compete with other monoline businesses (just do mortgage business) by lowering lending standards.

Originate-to-Distribute Model

- It means that now mortgage borrowers can have lower credit history and lower down payment.
- Those borrowers need to pay higher interests on mortgages (why?).
- Such mortgages are called *Alt-A* and *subprime* mortgages.
- Fannie Mae and Freddie Mac are not allowed to securitize those mortgages.
- But market will find a way out.

Originate-to-Distribute Model

- A bank could establish a separate entity, called *special purpose vehicle* (SPV), with a few equity input.
- The *special and only purpose* of this entity is to buy mortgages (plus other assets, like credit card loans, student loans, and car loans) to form an asset pool.
- To finance the purchase, SPV issues MBS.
- SPV is an independent company and is setup as a*bankruptcy-remote entity*. It means that if SPV goes under, debt holders cannot claim payback from those asset originator, in this case, that commercial bank.

Originate-to-Distribute Model

- *There is one problem left: private information on mortgages (and other loans).*
- Banks make money from *having private information*.
- In securitization, the private information needs to go public. *Rating agencies* (e.g. Moody's, S& P, and Fitch) play the role.
- Use certain mathematical models to measure default risk of those asset pools, rating agencies would label AAA, AA, or A to the MBS.
- Investors now can use rating to do investments.

Originate-to-Distribute Model

- Different investors have different risk preference, and *pass-through securities* cannot meet different requests.
- Slice or tranche tailored MBS to different investors by providing sequential payments (waterfall payment).
- Senior securities investors will be paid off first when the corresponding asset pool generates cash flows.
- When senior securities paid off, junior securities investors get paid.
- When junior securities paid off, equity or toxic securities investors get paid.

Originate-to-Distribute Model

- When some mortgages or other assets default, senior investors would not be affected.
- Say, an asset pool worth \$10 million, and SPV issues \$7 million senior, \$2 million junior, and \$1 million equity.
- \$1 million loss on asset pool only wipes out equity investors, and no influence on senior and junior investors.
- If \$2 million more loss happened, junior investors lose everything, but senior investors are safe.

Originate-to-Distribute Model

- Sequential payment makes MBS more attractive to investors.
- Equity securities, in many cases, are held by issuers to prevent *moral hazard*.
- However, junior securities may not be marketable, for they are risky.
- No worry. Pool different junior securities from different SPVs together.

Originate-to-Distribute Model

- Such kind of securities are called *Collateralized Debt Obligations* (CDOs).
- CDO is a complex type of MBS, in this case. MBS is a type of fixed income securities backed up asset pools, whereas CDOs backed up by cash flows from MBS.
- CDO also sliced to meet different investors's risk appetites.
- Juniors from CDO can be pooled again with other to form CDO-square. The trick used here again is *diversification*.

Originate-to-Distribute Model

- Some investors of MBS or CDOs still concern about default risk. How to manage the risk or to transfer default risk to others who are willing to bear it?
- *Credit default swap* (CDS), another financial innovation, comes in to play the role.
- CDS is similar to insurance, and insures for investors against default risk of indexed assets.
- CDS sellers provide insurance, i.e., takes default risk, so that they charge periodic payments from CDS buyers.
- Higher default risk of underlying assets in CDS requires higher premium payment from CDS sellers.

Originate-to-Distribute Model

- The key difference between CDS and insurance is that CDS can be held by investors who don't have underlying assets. They are called *naked shorters*.
- It reveals the speculative nature of CDS: shorters are not interested in preventing default risk from happening, rather they prefer default.
- Shorters bet the market, while CDS sellers bear more liquidity risk, i.e., materialize payment in the case of default happens.
- In some CDOs, CDO sellers allow investors to buy and sell CDS by assigning the asset pool as underlying assets.
- This kind of CDO is called *synthetic CDOs*, compared with *cash-flow CDOs*.

Originate-to-Distribute Model

- Securitization or "originate-to-distribute" model in housing market makes the credit supply (i.e. mortgages) across various financial institutions.
- Commercial banks (and other specialized corporations) originate mortgages.
- SPVs purchase mortgages (and other loans) from originators (e.g., commercial banks) by financing with mortgage-backed securities.
- Sliced MBS and CDOs are designed to meet different risk preference from investors.
- Securitization makes long-term assets - mortgages financed by long-term securities - MBS and CDOs.

Originate-to-Distribute Model

- *Private information* regarding default risk of loans is assessed and published by *rating agencies*.
- CDS functions as an important tool in *risk management*.
- However, the success of securitization highly depends on *liquidity* of MBS, CDOs, and CDS.
- Who provides liquidity in those market?
- *Investment banks*, e.g., Bear Sterns, Lehman Brothers, Merill Lynch, Morgan Stanley, and Goldman Sachs, top five investment banks on Wall Street prior to financial crisis of 2007-2009.

Outline

Investment Banks: Liquidity Provider

- Investment banks also set up SPV involving in mortgage market. Lehman Brothers, for instance, acquired monoline mortgage originators, and then used SPV to securitization.
- Liquidity here means (1) *funding liquidity* and (2) *market liquidity*.
- *Market liquidity* refers to the situation where securities can be exchanged without significant loss.
- *Funding liquidity* refers to the situation where borrowers can issue securities to raise funding without substantial transaction cost.
- Funding liquidity and market liquidity are highly related.

Investment Banks: Liquidity Provider

- Investment banks do not only produce MBS and CDOs, but also trade those securities to ensure liquidity.
- Suppose an investor wants to get out of the investment in an MBS. One option is to sell directly in the market. Yet the cost of waiting is high, if she wants a quick sale.
- An alternative is to sell it to an investment bank with a discount, so no waiting cost incurs.
- An investor who wants to get in this market faces similar tradeoff: either wait to get a seller or buy from an investment bank.
- In this case, investment banks take the advantage of *bid-ask spread*.

Investment Banks: Liquidity Provider

- Investment bankers are very sensitive about bid-ask spread. If it is too wide, it indicates illiquid.
- Investment bankers would either sell more at discount or buy less to narrow the spread.
- *How to finance in security trading or security holding*?
- In this course, we discuss three ways to do financing:
    1. repurchase agreements (repos)
    2. commercial papers
    3. asset-backed commercial papers

Outline

SUMMARY

- So far, we introduce *securitization* as a way for many non-banking institutions to get into *credit* supply activity.
- They are SPVs, rating agencies, investment banks, insurance companies, pension funds, hedge funds, and many other.
- Interesting, with securitization, credit supply chain is extended from banking industry to nearly all financial industry.
- Thus, end borrowers are more efficiently to raise funds from end investors.
- However, the story does not end here. *Liquidity transformation* in securitization process now falls onto *liquidity provider* - investment banks.