Swaps

Reference: Bodie et al, Ch 23

Econ 457

Week 15-b

Outline

End of semester

1. Swaps
2. OTC and Cleared Swaps
3. Types of Swaps
   - Interest Rate Swaps
   - Credit Default Swaps
4. AIG
   - Securitization
   - CDOs
   - AIG Financial Products
   - AIG Failure and Bailout

End of Semester

Please fill out your course evaluations

I appreciate your candid feedback.

End of Semester

Final

Date: Tuesday, December 16, 2:00 - 4:00 pm

Location: Normal Classroom

Content:

- Material covered in first midterm: 40%
- Material Covered in second midterm: 40%
- Options, swaps, and futures: 20%

Please bring a caluclator

1. Swaps

What is a Swap?

Definition: A swap is a derivative contract where two parties agree to exchange sequences of cash flows for a set period of time.

- **Bilateral agreement** between two counterparties
- **Exchange of cash flows** based on different underlying variables, specified at the time the swap initiated
- **No principal exchange** at initiation (typically)
- **Zero initial value** when fairly priced
- **Customizable terms** (notional amount, maturity, payment frequency)

2. OTC and Cleared Swaps

OTC

Over-the-Counter (OTC) Markets:

- **Definition:** Trades executed directly between counterparties, not on exchanges
- **Characteristics:** Customizable terms, bilateral negotiation
- **Counterparty risk:** If the counterparty fails, the swap may be worth zero, regardless of the underlying variables.

Pre-2008: Most swaps were OTC with significant counterparty exposure

2. OTC and Cleared Swaps

Cleared Swaps

Central Clearing (Post-Dodd Frank):

- **Central Counterparty (CCP):** Clearinghouse becomes counterparty to both sides
- **Benefits:**
  - Eliminates bilateral counterparty risk
  - Standardizes terms and margining
  - Provides transparency and netting
- **Requirements:**
  - Initial and variation margin posting
  - Daily mark-to-market settlements
  - Standardized contract terms

Today: Most interest rate swaps are centrally cleared, significantly reducing systemic risk

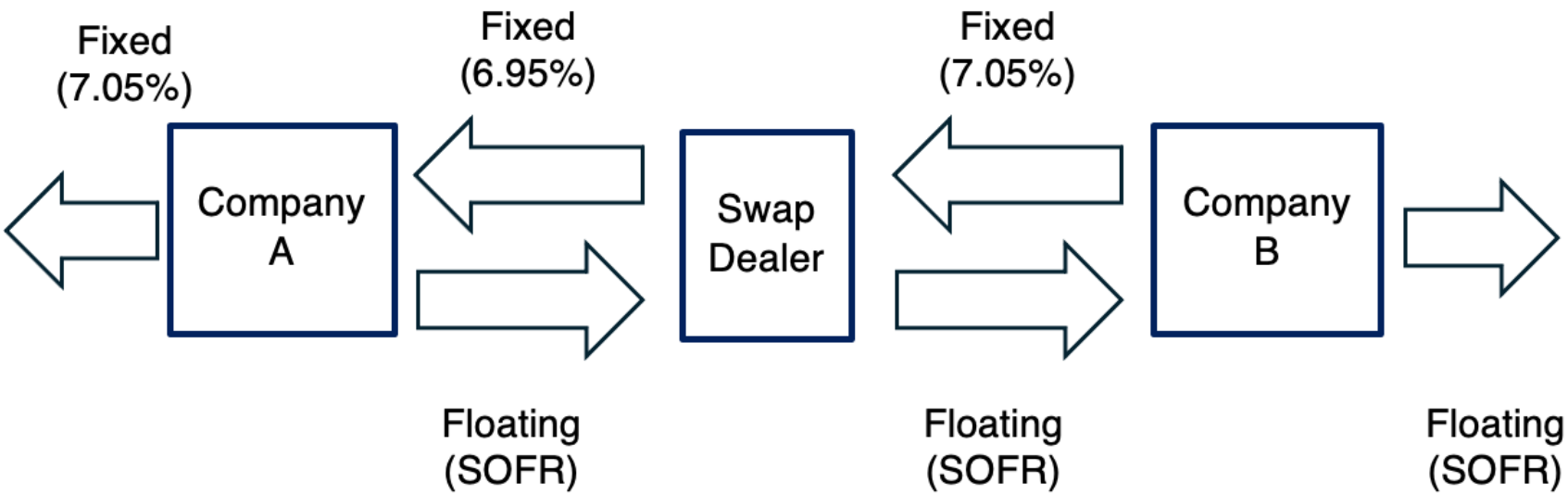
2. Types of Swaps

Interest Rate Swaps

Example:

Company A: Paying floating (SOFR) and receiving fixed (6.95%).

Company B: Paying fixed (7.05%) and receiving floating (SOFR).



2. Types of Swaps

Interest Rate Swaps

Uses of interest rate swaps:

1. **Asset-Liability Matching:** For example, banks may *pay fixed* to to convert fixed rate asset (loans) to a floating rate asset, which are better matched to their floating rate liabilities.
2. **Adjust Exposure to Interest Rate Risk (with no upfront cash):** Swaps provide an alternative to bonds and do not require cash upfront. For example, underfunded pension plans may *receive fixed* to gain exposure to long term interest rates and offset long-dated liabilities.

2. Types of Swaps

Fixed rate is set so that PV of both legs are equal:

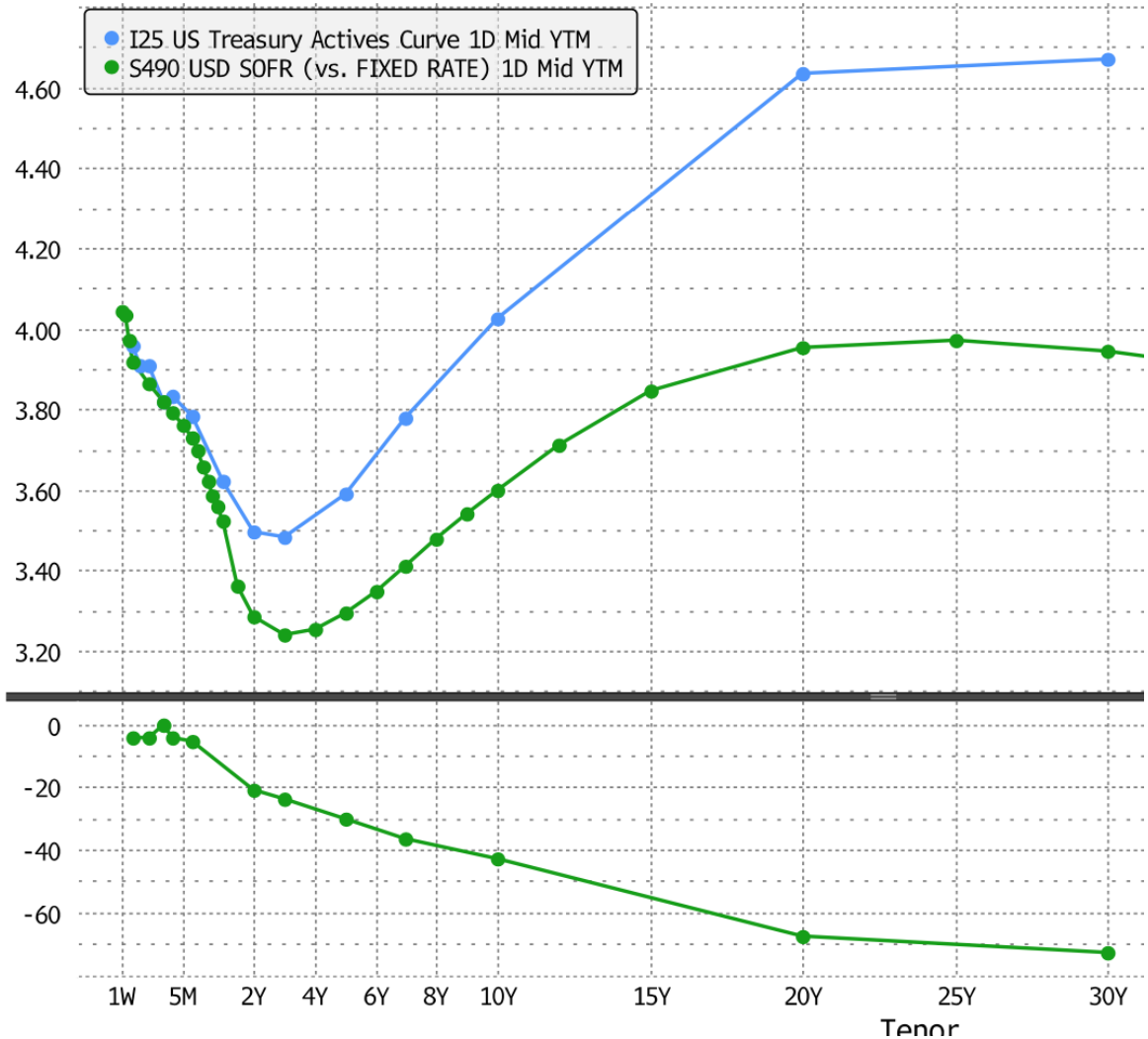
$$\text{Fixed Rate} \times \sum_{i=1}^{n} \frac{\text{Notional}}{(1+r_i)^{t_i}} = \sum_{i=1}^{n} \frac{F_i \times \text{Notional}}{(1+r_i)^{t_i}}$$

Where F_i is the forward rate and r_i is the discount rate for period i.
Notes:

- Swap has zero initial value when fairly priced
- After origination, value changes as yield curve shifts (F_i and r_i change)
- The value of the swap can be determined by the difference between the value of a fixed rate bond and a floating rate bond.
- The received fixed party has exposure similar to that of a bond owner: gains when interest rates fall, loses when interest rates rise

2. Types of Swaps

Interest Rate Swaps



2. Types of Swaps

Interest Rate Swaps

Reasons why there may be a difference between swap yields and Treasury yields:

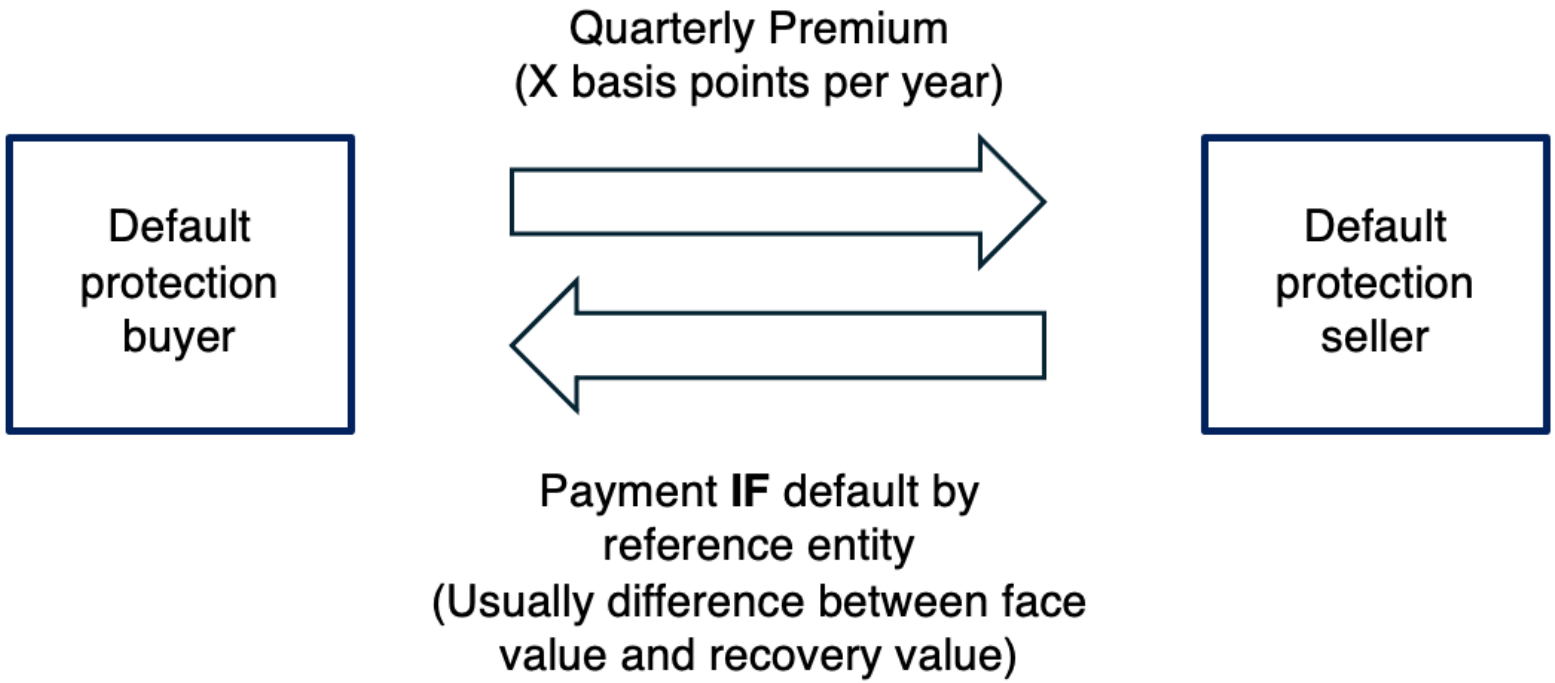
1. End users may be different and the market may be segmented
   - For example, insurance companies **receive fixed** swaps to hedge liabilities. Banks may **pay fixed** to convert fixed rate assets to floating rate assets.
2. Differences in liquidity
   - Swaps may be more liquidity
3. Regulatory factors prevent arbitragers from closing the spreads
   - Banks may be required to hold capital against US Treasuries due to the Single Leverage Ratio. Swaps do not get the same treatment because they are derivatives.

Most interest rate swaps are now cleared, which has significantly reduced counterparty risk.

2. Types of Swaps

Credit Default Swaps

Generic Credit Default Swap (CDS)



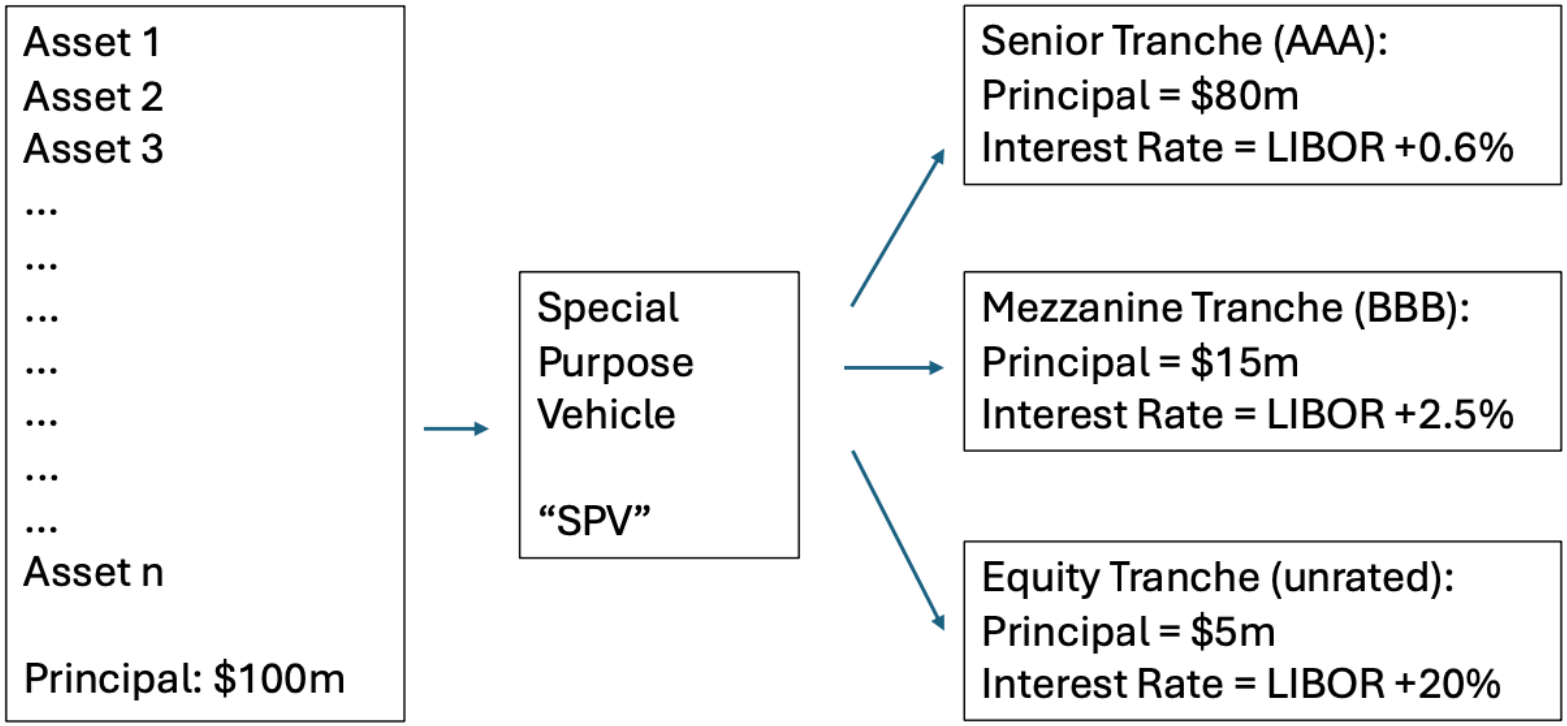
2. Types of Swaps

Credit Default Swaps

Goldman Sachs CDS

3. AIG

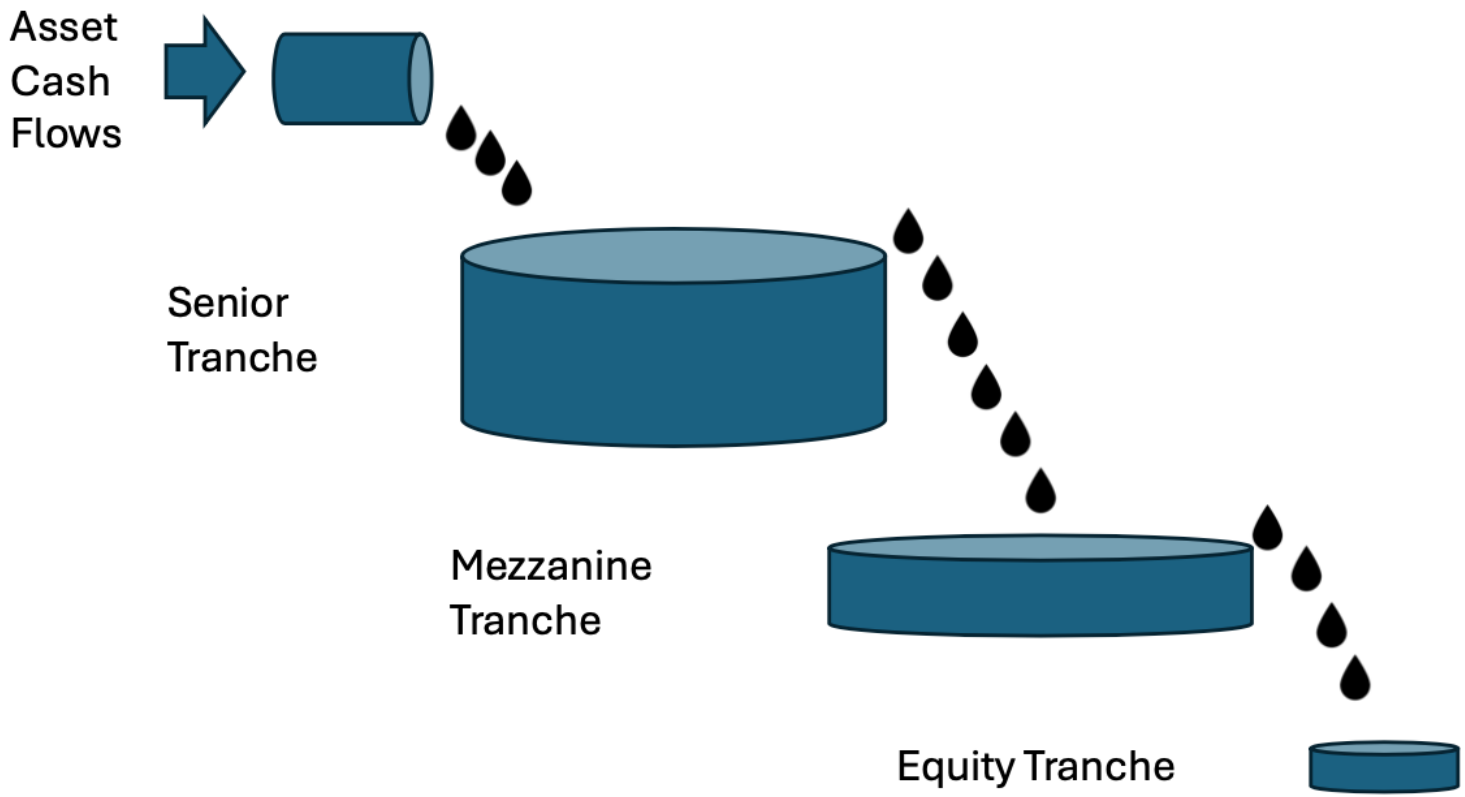
Securitization



Note: Example from Hull, "Options, Futures and Other Derivatives"

3. AIG

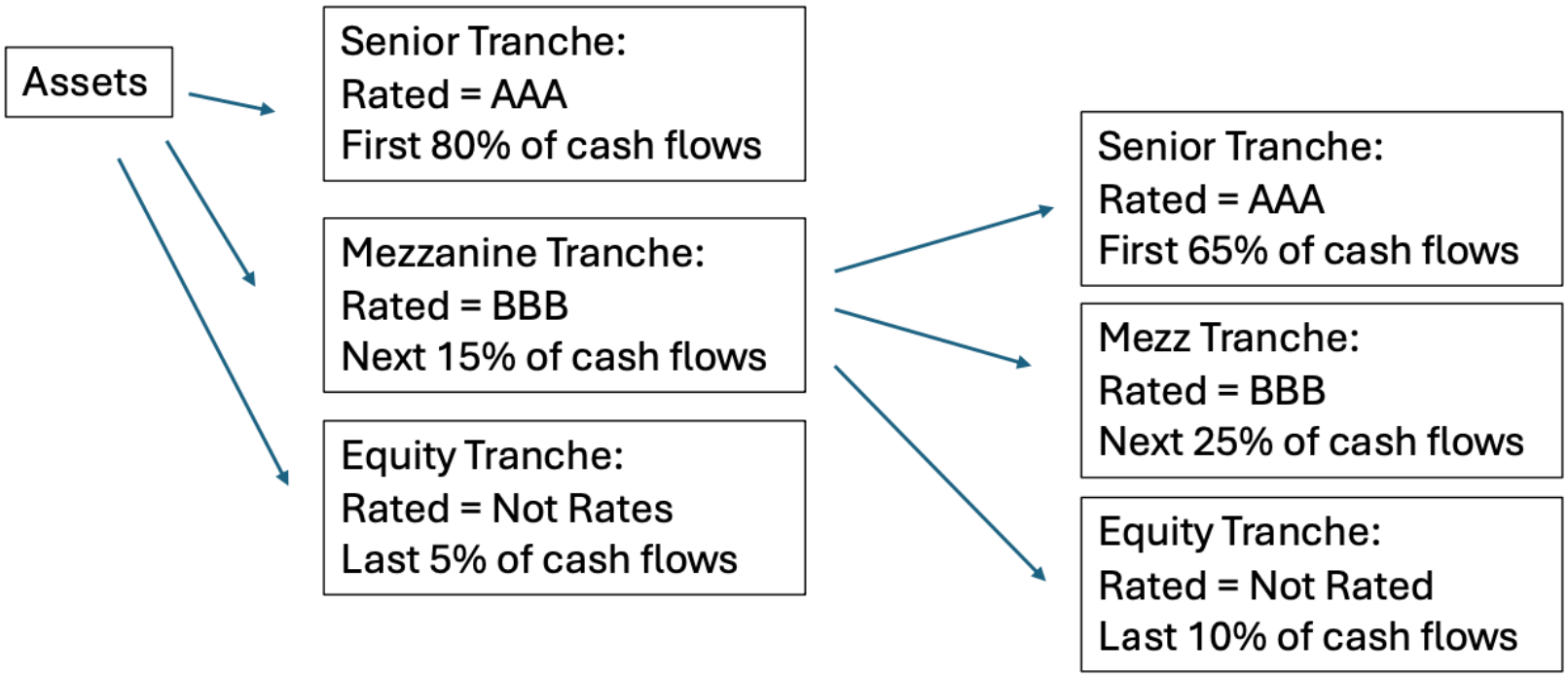
Securitization



3. AIG

CDOs

Collateralized Debt Obligation (CDO) – Securitization of a Securitization…



3. AIG

Financial Products

AIG was one of the largest insurance company in the world and had over $1 trillion in assets in 2008. in assets

Securities Lending Program

- AIG facilitated lending of securities held by insurance companies
- AIG invested in MBS and CDOs in order to enhance returns.

CDS Sales

- AIG Financial Products sold $500 billion CDS on a variety of financial assets, including CDOs.
- These were bilateral, OTC swaps. The amount of required collateral was determined, in part, by AIG's rating. Downgrade forced collateral to be posted.

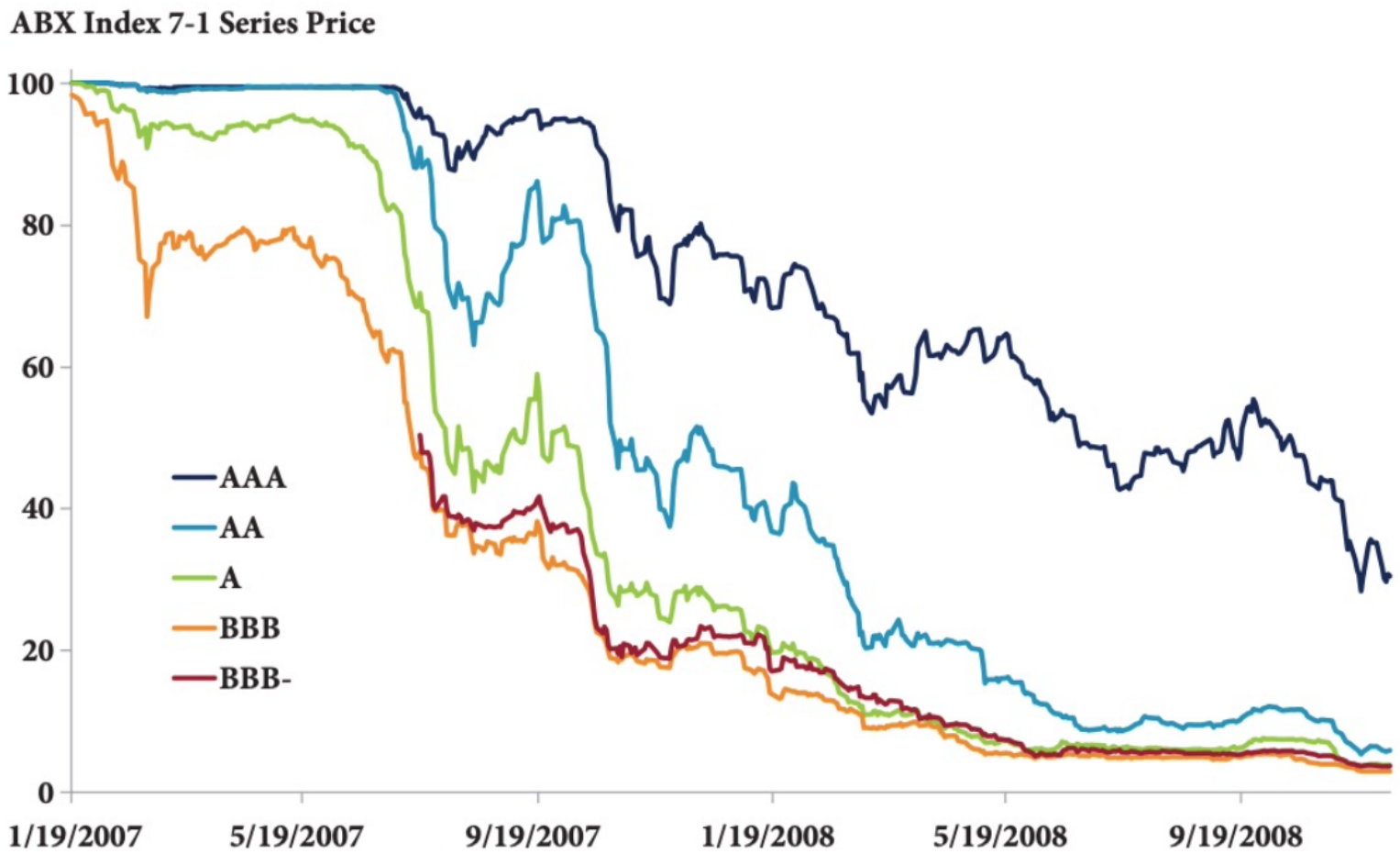
Losses on these two activities totaled $50 billion in 2008.

Source: McDonald and Paulson, "AIG in Hindsight", NBER

3. AIG

Financial Products

Figure 1.6. Mortgage Credit Default Swap ABX Indexes



Source: Bloomberg.
Note: The 7-1 series started January 1, 2007.

3. AIG

Failure and Bailout

- Lehman Brothers filed for bankruptcy on Mon., Sep 15, 2008
- Markets panicked. The S&P fell by more than 4.4% percent on Monday and then by another 4.7% on Tuesday.
- AIG's credit rating was downgraded, requiring it to post additional collateral on its OTC swaps.
- AIG was unable to borrow in short-term debt markets
- AIG received an $85 billion line of credit from the Federal Reserve on Tuesday night
  - AIG drew close to $40 billion in the first week.
  - The loan was under the Fed's 13(3) authority.
  - The Fed accepted the AIG insurance business as collateral

3. AIG

Failure and Bailout

- The Treasury Department received a 79.9% ownership stake in AIG in exchange for the extraordinary support.
- The initial terms of the Fed loan were tough, and further ratings agency downgraded forced AIG to post additional collateral, exacerbating the situation.
- A month later TARP funds were used to inject capital into AIG
- Total government support for AIG reached $180 billion: $70 billion in capital and $110 billion in loans.
- AIG Financial Products paid bonuses of $165 million in March 2008. This was a public relations nightmare, but the Treasury decided it couldn't void the contracts.
- Treasury sold its stake in AIG in December 2012, and made $7.6 billion profit

3. AIG

Failure and Bailout

Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010

- Systemically Important Financial Institutions (SIFI) are now regulated by the Federal Reserve. The Fed can require SIFIs to hold capital.
  - AIG did not really have a regulator prior to 2008
  - AIG was designated as a SIFI from 2013-2017.
- It is now much harder for the Federal to make loans to single financial institutions. Loans should be 'broad based'
- Interest rate swaps and some CDX are now cleared (reducing counter party risk)
- The FDIC has 'Orderly Liquidation Authority' covering non-bank SIFIs. (Prior to 2008 there was no workable bankrutpcy regime for AIG)

3. AIG

Failure and Bailout

3. AIG

Failure and Bailout

"The national commitment to the free market lasted one day... It was Monday"

- Barney Frank, Congressman from MA, September 2008

"If there is a single episode in this entire 18 months that has made me more angry, I can't think of one other than AIG"

- Ben Bernanke, Fed Chair, March 2009