Introduction to securitization

Securitization structure
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Purpose and design of securitization
Securitization in the U.S.

Securitization structure
What is securitization?

- Closely-related terms for securities backed by pools of financial assets:
  
  **Securitization** generally refers to cash securities backed by mortgages, consumer debt and leases
  
  **Structured credit** or **finance** generally refer to securities backed by bank debt or bonds, or securitization in **synthetic** credit derivatives form

- **Collateralized debt obligations** (CDOs) are securitizations in which the asset pool consists of bank loans or other securitizations
Essential functions of securitization

**Pooling of risk** and diversification, similar to banks and mutual funds

**Risk transfer:** separation of **loan origination** from balance-sheet investment/use of capital

- **Originate-to-distribute** model: loan issuance based on likelihood of securitization “exit,” return of capital to originator
- Shifts banks’ revenue source from net interest margin to fees
- Loan origination is primarily information creation: selecting borrowers
- **Servicer** may be different party from loan originator and carry out monitoring

**Risk distribution:** creation of securities with different risk-reward characteristics

- Tranched products may have very different default characteristics from underlying loan or asset pool
Asset types in collateral pools

**Existing loans** may be sold into collateral pools
- Examples include residential and commercial mortgages, bank loans
- Residential mortgage pools may be highly granular
- Pools consisting of commercial mortgages generally less granular and may consist of only a few loans

**Revolving pools** of primarily short-term debt, e.g. credit card receivables and auto loans
- Securitization begins with initial pool that is replaced as it is repaid by fresh debt

**Future flows** of assets, such as remittances from abroad
- Revolving pools and pools consisting of future flows tend to be highly granular
Risk types in collateral pools

**Prepayment risk:** risk of early payment of pool loan principal, leading to
- Cash flows occurring earlier than anticipated
- Shortening of duration of loans
- Possible need to reinvest funds at lower interest rates

**Credit risk:** risk of default of pool loans
Capital structure

- **Special purpose vehicle** (SPV) owns **collateral pool** or underlying assets, issues debt
  - Must follow a **true sale** of underlying assets
  - But **implicit recourse** to or guarantee by seller of underlying assets may remain
- Generally several bonds or **tranches** in (generally) clearly defined priority, with equity tranche at bottom.
- Intermediate subordinated tranches called **mezzanine**
- Bonds may suffer **material impairment** rather than default: missed interest payments, deterioration of collateral pool performance
  - If “thin” → binary risk (see also default correlation)
- **Overcollateralization** creates protection for tranches higher senior to equity
  - Collateral pool larger than volume of bonds issued
  - Loans in pool generally also overcollateralized
- Equity most highly leveraged vis-à-vis collateral pool, senior least leveraged
U.S. securitization trends

- **Mortgage-backed securities** (MBS) by far the largest segment of securitized debt market
  - Share of total U.S. bond issuance declining since crisis from nearly half in 2005
- Non-mortgage **asset-backed securities** (ABS) issued since 1985 in U.S.
- Tranched products issued since early 1980’s
  - Introduced in the form of **collateralized mortgage obligations** (CMOs), protecting against prepayment risk
  - Tranching used in most ABS to protect against credit risk
- Early on, most issuance in auto loan and credit-card receivables segments
- Subsequently, growth in CDOs
- Rapid recent growth in **collateralized loan obligations** (CLOs)
Bond issuance in the U.S. 1996–2018

CDO issuance after the crisis

- Large volume of CDO issuance precrisis, but low issuance immediately following crisis
  - CDOs long-lived, esp. legacy CDOs with credit problems
  - → Much smaller decline in share of outstanding

- Leveraged loans: typically
  - Defined as large loans to sub-investment grade firms
  - Floating-rate loans with wide spread to index rate
  - Syndicated: issued by several banks, each bearing risk only of own issuance
  - Intended for sale into CLO asset pool
ABS issuance in the U.S. 1985–2018

Top panel: shares of total by type, percent. CLOs includes CBOs and other CDOs. Lower panel: dollar amount of issuance, annual. Source: SIFMA, U.S. ABS Issuance and Outstanding.
ABS outstanding in the U.S. 1985–2018

Top panel: shares of total by type, percent. CLOs includes CBOs and other CDOs.

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ABS outstanding in the U.S. 1985–2018

Top panel: shares of total by type, percent. CLOs includes CBOs and other CDOs.
U.S. credit spreads 1997–2019

Option-adjusted spreads (OAS) over swaps, in basis points. Credit card ABS: 5-year AAA U.S. credit-card ABS, weekly 27Dec1996 to 21Feb2019. Investment grade and high yield: BofA Merrill Lynch U.S. Corporate Master OAS indexes (C0A0 and H0A0). Sources: Barclays, FRED.
Introduction to securitization

Securitization structure
  Tranching a securitization
  Securitization cash flows
**Waterfall**

- **Waterfall**: set of rules about how collateral cash flows and losses distributed to tranches
  - Cash flows distributed “top-down,” to senior tranches first, then mezzanine, residual to equity
  - Losses distributed “bottom-up,” equity written down first
- **Attachment and detachment points**:
  - Attachment point of a tranche is the fraction of pool losses to which it is *not* exposed
  - Attachment point of a tranche is also the fraction of total liabilities subordinate to it
  - Detachment point of a tranche is the fraction of pool losses at which it is entirely wiped out
  - Attachment point of one tranche is the detachment point of the next-most junior tranche
  - The difference between the detachment and attachment points of a tranche equals its **thickness**, or share of total liabilities
- Exceptions can be written into operating agreements
## Example of a securitization

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlying debt instruments:</td>
<td>Equity note $5$ mill.</td>
</tr>
<tr>
<td>$100$ mill. of loans</td>
<td>Mezzanine debt $15$ mill.</td>
</tr>
<tr>
<td>Rate: risk-free$+750$ bps</td>
<td>Coupon: risk-free$+500$ bps</td>
</tr>
<tr>
<td></td>
<td>Senior debt $80$ mill.</td>
</tr>
<tr>
<td></td>
<td>Coupon: risk-free$+100$ bps</td>
</tr>
</tbody>
</table>

Parameters for the example:

- Risk-free rate ($\%$): $r_f = 3.5$
- Loan interest rate ($\%$): $r_l = 11.0$
- Mezzanine coupon ($\%$): $c_m = 8.5$
- Senior coupon ($\%$): $c_s = 4.5$
- Mezzanine attachment point ($\%$ of liabilities): $a_m = 5$
- Senior attachment point ($\%$ of liabilities): $a_s = 20$
Risk assumptions in the example

- Collateral pool:
  - One-year loans, no prepayment
  - Expected default rate $\pi = 0.05$ (5%)
  - Expected recovery 0

- Similar to typical **subprime auto loan** securitizations
  - Granular collateral pool
  - Debt has short **weighted-average life** (WAL)
  - Fairly high default rate

- Liabilities:
  - One-year annual coupon bonds
  - Equivalent to zero coupon bonds (but issued at par, not at discount)
Credit enhancement and pricing in the example

- **Senior bond ("20–100")**: $20 mill. equity note plus mezzanine debt
  - Senior bond has priority claim over mezzanine
  - Both bonds have priority claim over equity
- **Mezzanine bond ("5–20")**: $5 mill. equity note
- **In addition to any overcollateralization of the underlying loans**
- **Credit enhancement of senior and mezzanine bonds assumed sufficient to price them at par on issuance**
  - \(\Leftrightarrow\) Spreads are sufficient compensation for credit, other risks
- **Equity note ("0–5")** assumed to price at par on issuance
  - Expected return 11.5%, i.e. if expected default rate realized
Stipulated cash flows

- Contactually-stipulated cash flows: principal and interest (P&I)
  - Due from loan obligor to SPV
  - Due from SPV to bonds
- Contactually-stipulated cash flows actually occur if no default or bond impairment
- Contactually-stipulated cash flows from underlying collateral pool into SPV
  - Each obligor to pay P&I of $1 + r_l \times$ loan principal in one year
  - Aggregate for pool: $1 + r_l \times$ total par value of collateral
- Contactually-stipulated cash flows to bondholders
  - SPV to pay P&I of $1 + c_s$ or $1 + c_m \times$ bond principal in one year
- No contractually-stipulated cash flows due to equity tranche
Stipulated cash flows to bondholders in the example

**Senior bond** to receive par value of 80 percent of pool principal plus coupon in one year:

$$(1 - a_s)(1 + c_s) \times \text{total par value of collateral}$$

**Mezzanine bond** to receive par value of 15 percent of pool principal plus coupon in one year:

$$(a_s - a_m)(1 + c_m) \times \text{total par value of collateral}$$

<table>
<thead>
<tr>
<th></th>
<th>senior</th>
<th>mezzanine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tranche thickness (% of SPV liabilities)</td>
<td>0.80</td>
<td>0.15</td>
</tr>
<tr>
<td>P&amp;I due (% of pool principal)</td>
<td>83.600</td>
<td>16.275</td>
</tr>
<tr>
<td>P&amp;I due ($)</td>
<td>83 600 000</td>
<td>16 275 000</td>
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