

Lecture notes on risk management, public policy, and the financial system

Securitization

Allan M. Malz

Columbia University

Introduction to securitization

Securitization structure

Introduction to securitization

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

Securitization structure

What is securitization?

- Closely-related terms for creation of 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
- Resulting securities called **asset-backed securities** (ABS)
 - If backed by residential or commercial mortgage loans, generally called **mortgage-backed securities** (MBS)
- **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

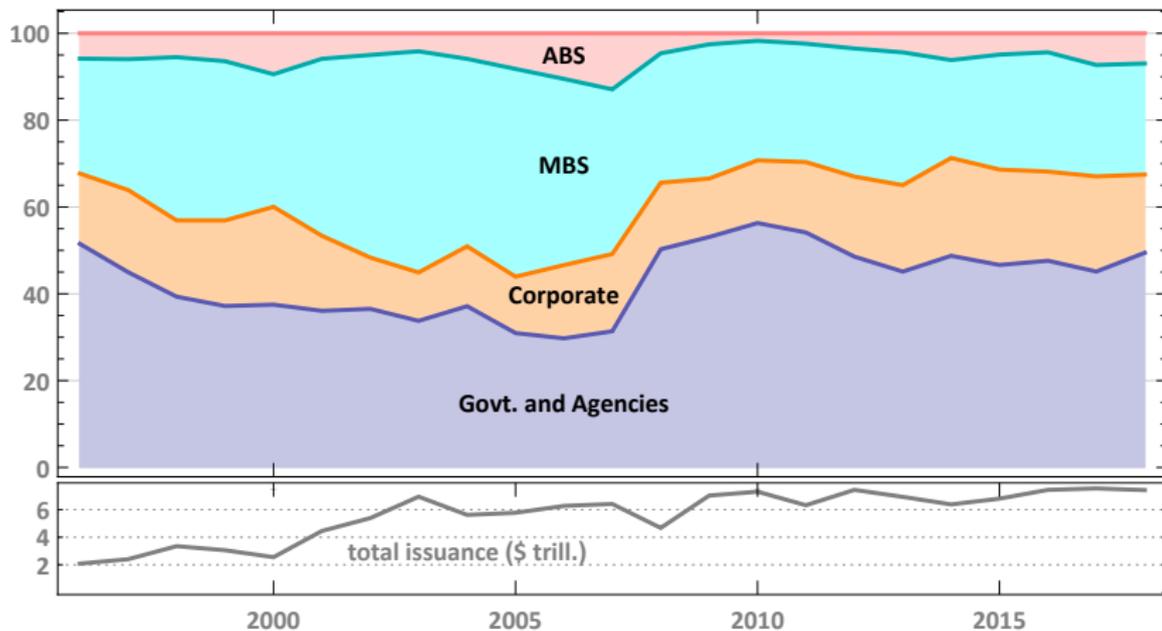
Capital structure

- **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



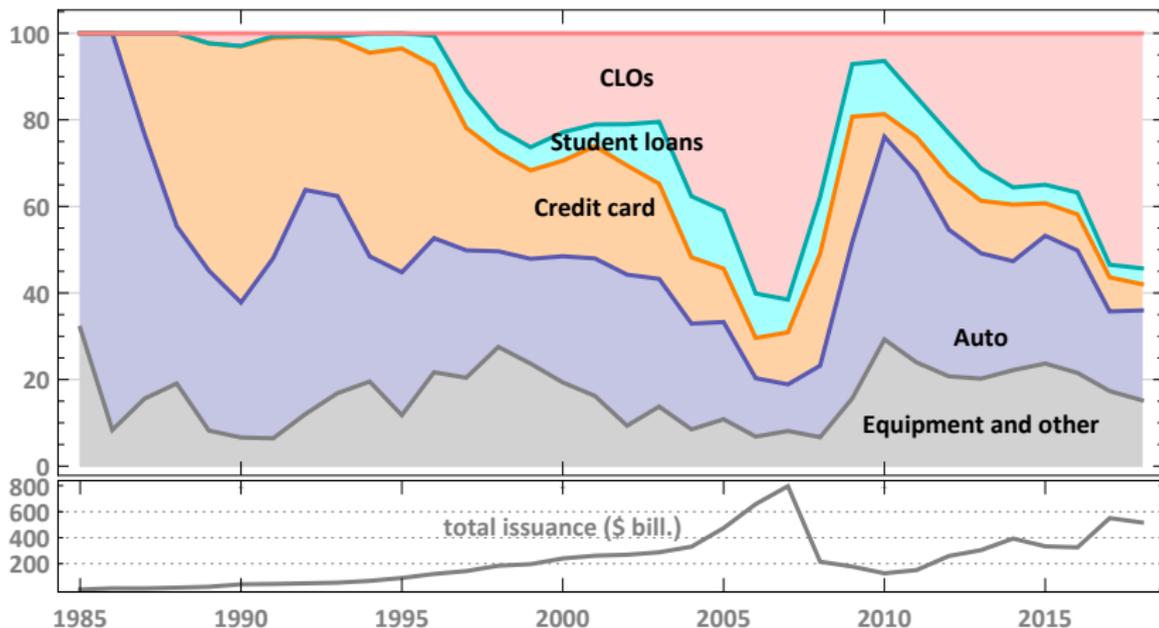
Top panel: shares of total by type, percent. Lower panel: dollar amount of issuance, annual. *Source:* SIFMA, U.S. Bond Market Issuance and Outstanding.

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

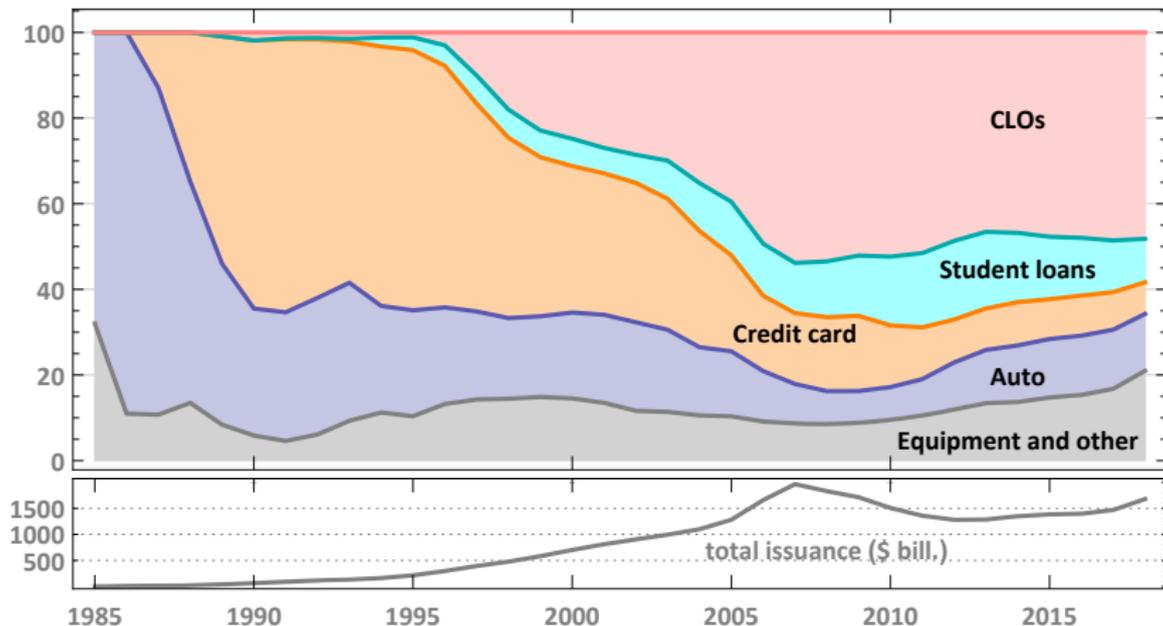


ABS issuance in the U.S. 1985–2018



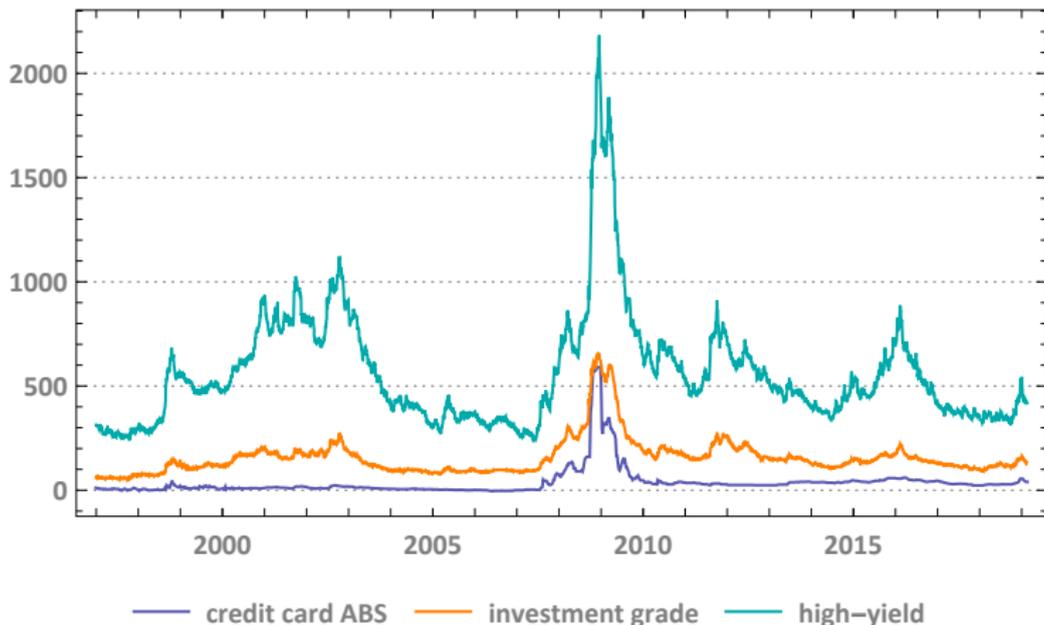
Top panel: shares of total by type, percent. CLOs includes CBOs and other CDOs.
 Lower panel: dollar amount of issuance, annual. *Source:* SIFMA, U.S. ABS Issuance and Outstanding.

ABS outstanding in the U.S. 1985–2018



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

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 (COA0 and HOA0).
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

| Assets | Liabilities |
|---|--|
| Underlying debt instruments: \$100 mill. of loans Rate: risk-free+750 bps | Equity note \$5 mill. |
| | Mezzanine debt \$15 mill. Coupon: risk-free+500 bps |
| | Senior debt \$80 mill. Coupon: risk-free+100 bps |

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
 - ⇔ 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:

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

| | senior | mezzanine |
|--|------------|------------|
| Tranche thickness (% of SPV liabilities) | 0.80 | 0.15 |
| P&I due (% of pool principal) | 83.600 | 16.275 |
| P&I due (\$) | 83 600 000 | 16 275 000 |