Mortgage-Backed Securities

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Handbook of Financial Markets conference
November 1 2021

Introduction: Mortgage-backed securities (MBS)

- MBS market is one of the largest and most liquid global fixed income markets
  - $\rightarrow$ US: \$11tr in bonds, $\approx$ \$250-300bn in daily average trading volume
  - $\rightarrow$ Mortgage securitization and covered bonds also popular internationally

- Key source of financing for real estate
  - $\rightarrow$ 65% of US home mortgages securitized into MBS
  - $\rightarrow$ Securitization has variety of effects: credit supply, home prices, financial stability etc.

- **This chapter:** Review of MBS, with emphasis on the US agency MBS market
  - $\rightarrow$ Stylized facts and statistics on market size, growth, liquidity etc.
  - $\rightarrow$ Highlight insights from growing body of academic research

Chapter overview

1. The MBS universe

   $\rightarrow$ Institutional setting + time-series and cross-sectional facts

2. Security design

3. Risks and asset pricing

4. Trading

5. Economic effects of mortgage securitization

6. Open questions and future research

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The MBS universe

- MBS = bonds with cash flows tied to payments on underlying mortgage pool
  - → May be residential or commercial mortgages, although we focus on RMBS
  - → Includes **pass-through** and **structured** MBS ("collateralized mortgage obligations")

- Key distinction: **agency** vs **nonagency**
  - → Agency MBS: credit guarantee from Fannie Mae, Freddie Mac or Ginnie Mae
  - → Nonagency MBS: investors bear credit risk, MBS tranched by seniority

- Competition between government & private securitization is key market dynamic
  - → See Adelino, McCartney and Schoar (2020) for evidence
  - → Key drivers: (i) market price of credit risk, (ii) regulation

Stock of US residential MBS
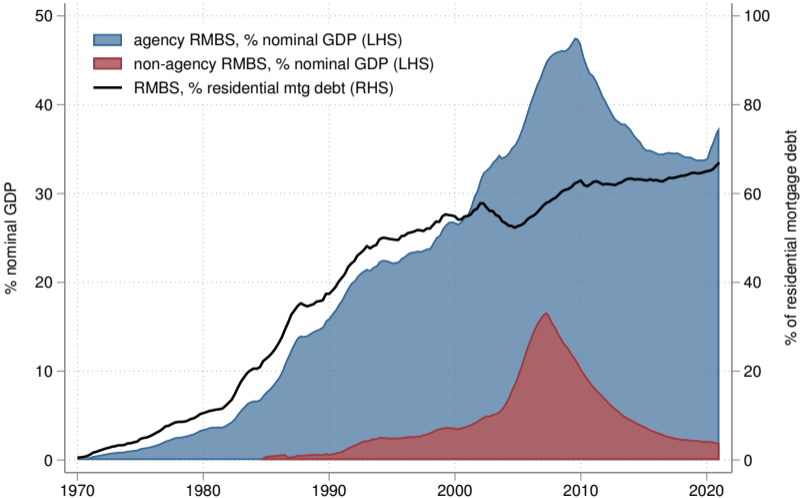
Data sources: FAUS, BLS.

The cross-section of agency MBS pools

- Snapshot based on eMBS security-level data:
  - $\rightarrow$ \$7.7tr in MBS pools [\$3.3tr Fannie; \$2.4tr Freddie; \$2.0tr Ginnie]
  - $\rightarrow$ 84% of underlying loans are 30-year fixed-rate mortgages (FRMs)

- Substantial degree of fragmentation and heterogeneity:
  - $\rightarrow$ 1,003,222 individual MBS pools
  - $\rightarrow$ Wide range of pool size: median = \$353m. 99th percentile = \$41.2bn (weighted)
  - $\rightarrow$ Wide variation in pool age, coupon, prepayment speed.

- Despite fragmentation, liquidity created through small number of "to-be-announced" (TBA) forward contracts

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Key risks and drivers of MBS value

- **Duration risk:** MBS have fixed coupons & long notional maturity

- **Prepayment risk:** Borrowers can prepay mortgage *at par* anytime.
  - $\rightarrow$ Key risk for investor, who is short the prepayment option.
  - $\rightarrow$ Prepayment rises due to refinancing when interest rates fall.
  - $\rightarrow$ Structural & reduced form models (e.g., Agarwal et al. 2013; Stanton 1995).

- **Credit risk:** Borrower may default – key risk for *nonagency* MBS
  - $\rightarrow$ Double trigger of negative equity & income loss (e.g., Ganong & Noel, 2020)

- **Trading & funding liquidity:** Ease of trading and funding are additional risks that affect MBS returns
  - $\rightarrow$ E.g., Song and Zhu, 2019; Fusari et al. 2021; Boyarchenko et al. 2019

Components of MBS yield and drivers of OAS

$$r_{MBS} - r_{tbill} \approx \underbrace{(r_{dur} - r_{t-bill})}_{\text{Term Premium}} + \underbrace{\text{Option Cost}}_{\substack{\text{Value of} \\ \text{prepayment option}}} + \begin{array}{c} \text{Option-Adjusted} \\ \text{Spread (OAS)} \end{array}$$

- **OAS:** spread over duration-matched Treasury/swaps, adjusted for prepay option

- Boyarchenko et al. (2019): OAS is reward for non-interest-rate prepayment risk
  - $\rightarrow$ "Smile" pattern with higher OAS for coupons trading further from par
  - $\rightarrow$ Positive OAS for both interest-only and principal-only strips
  - $\rightarrow$ OAS also co-moves with other risk premia, suggesting common marginal investors
  - $\rightarrow$ See also Diep et al. (2020); Gabaix et al. (2007)

OAS in the time-series and cross-section
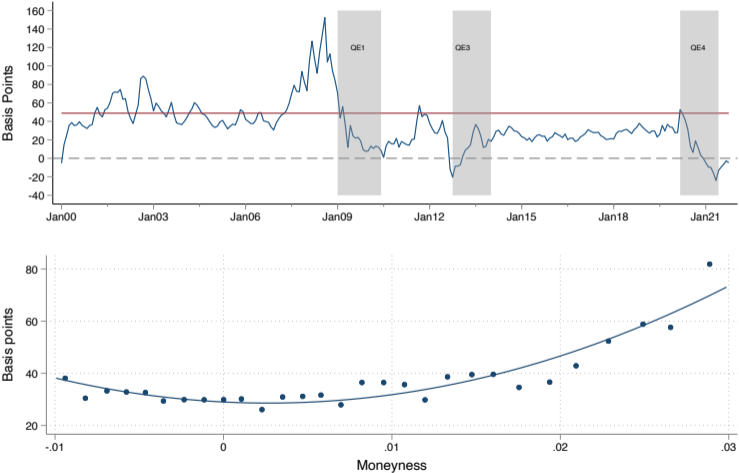
Note: Author calculations based on data from J.P. Morgan & Freddie Mac.

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Trading

- $\approx$ 90% of agency MBS trading is via to-be-announced or "TBA" forward market
  - $\rightarrow$ **Key feature:** seller does not specify which pools will be delivered at settlement
  - $\rightarrow$ Six parameters: agency, coupon, maturity, price, face value, settlement month
  - $\rightarrow$ Seller delivers "cheapest-to-deliver" pools satisfying these criteria
  - $\rightarrow$ Huh & Kim (2021); Fusari et al. (2021); Gao et al. (2017); Vickery & Wright (2013)

- TBA mkt coexists with "specified pool" market for trading individual pools
  - $\rightarrow$ Higher-value & TBA-ineligible pools trade as spec pools
  - $\rightarrow$ Fusari et al (2021) studies asset price implications of this dual market structure

- TBA trading costs much lower than other MBS/ABS (Bessembinder et al., 2013)
  - $\rightarrow$ One-way trading costs: 1bp for TBA, 39bp for spec pools, 40bp for CMOs
  - $\rightarrow$ TBA liquidity spills over to spec pool market (Gao et al., 2017)

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Economic effects of mortgage securitization

- Lowers mortgage rates & increases credit supply ...
  - → Nadauld & Sherlund 2013; Calem et al. 2013; Passmore et al. 2005 etc.
  - → Huh Kim (2021): *TBA liquidity* lowers mortgage rates, increases refinancing

- ... but may create moral hazard, weaken screening and monitoring
  - → Keys et al. 2010; Bubb & Kaufman (2014); Choi and Kim 2020 etc.

- MBS convexity hedging affects Tsy volatility (Hanson 2014; Hanson et al. 2021)

- Changes the structure of the financial system:
  - → Promotes nonbank lending (Buchak et al. 2020; Gete & Reher 2020).
  - → Weakens link b/w lending and bank financial condition (Loutskina & Strahan 2009)

- Affects mortgage design, supports FRMs (Fuster & Vickery 2015)

- Modestly increases home prices & home ownership
  - → Grundl and Kim (2021); Adelino et al. (2012); Kung (2014)

Comments: economic effects of securitization

- Many papers exploit **conforming loan limit** – size cutoff for agency securitization

- Estimates bundle a number of things about conforming mortgages:
  - $\rightarrow$ Net value of government-backed credit guarantee
  - $\rightarrow$ Liquidity benefits of agency MBS
  - $\rightarrow$ Other benefits of agency MBS (e.g., preferential regulatory treatment)

- Can partially disentangle: e.g., "superconforming" limit (Huh and Kim, 2021 etc.)

- Various other natural experiments used too e.g.,:
  - $\rightarrow$ FICO cutoffs for securitization (Keys et al. 2010)
  - $\rightarrow$ 2007 nonagency "freeze" (Kruger 2018; Calem et al. 2013; Fuster & Vickery 2015)

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Open questions and future research

1. Securitization and alternative mortgage designs
   - $\rightarrow$ Various proposed designs improve macro stability or have other benefits (e.g., "ratchet" mortgage; automatic stabilizer mortgage of Eberly & Krishnamurthy)
   - $\rightarrow$ How would such mortgages be funded? Can securitization help?
   - $\rightarrow$ Does MBS market "lock in" existing designs (thick mkt for 30 year FRMs)

2. What's limiting the recovery of nonagency mortgage securitization?
   - $\rightarrow$ Regulation now too tough (risk retention, risk weights...)? Past boom just a bubble?

3. What drives investor behavior? (e.g., MBS now *half* of bank security holdings)

4. International mortgage secondary markets: MBS and covered bonds

5. Securitization and the environment (e.g., Fannie Mae green MBS)