Mortgage Structure, Financial Stability, and Risk Sharing (by Vadim Elenev and Lu Liu)

Isha Agarwal

UBC Sauder

Western Finance Association
June 2025

Summary

- How does mortgage fixation length affect financial stability and risk sharing?

Summary

- How does mortgage fixation length affect financial stability and risk sharing?

- Develops a quantitative model to answer this question
  - Adjustable rate mortgages (ARMs) tie household mortgage payments to interest rates so rising interest rates increase household default but protect banks
  - Fixed rate mortgages (FRMs) protect households from rising payments but expose banks to interest rate risks

Summary

- How does mortgage fixation length affect financial stability and risk sharing?

- Develops a quantitative model to answer this question
  - Adjustable rate mortgages (ARMs) tie household mortgage payments to interest rates so rising interest rates increase household default but protect banks
  - Fixed rate mortgages (FRMs) protect households from rising payments but expose banks to interest rate risks

- **Main finding:** U-shaped relationship between mortgage fixation length and financial stability risks

Summary

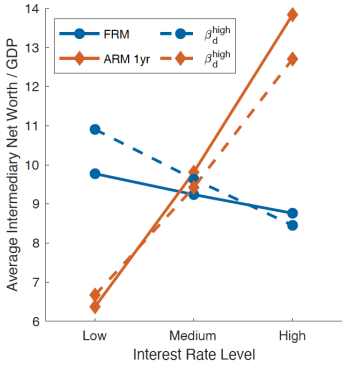
- How does mortgage fixation length affect financial stability and risk sharing?
- Develops a quantitative model to answer this question
  - Adjustable rate mortgages (ARMs) tie household mortgage payments to interest rates so rising interest rates increase household default but protect banks
  - Fixed rate mortgages (FRMs) protect households from rising payments but expose banks to interest rate risks
- **Main finding:** U-shaped relationship between mortgage fixation length and financial stability risks
- **Key message:** Interest rate risk, credit risk, and risk premia **jointly** determine financial stability risks in equilibrium

Conceptual Framework

- Financial stability, measured using volatility of bank net worth, depends on
  1. **Duration**: Sensitivity of bank assets and liabilities to interest rates
  2. **Credit risk**: Sensitivity of bank equity to credit losses arising from household defaults
  3. **Risk premia**: Correlation of defaults with good vs bad states of the world

Mortgage Structures and Bank Equity Duration

(a) Intermediary Net Worth



1. FRMs have positive duration while ARMs have negative duration
   - **FRMs**:

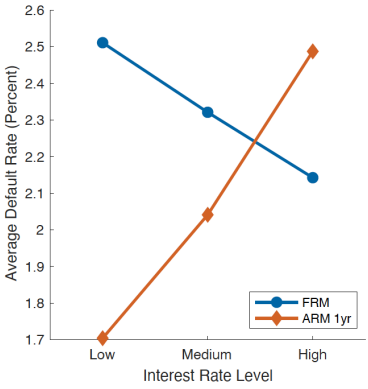
     Interest Income ~~——~~ Interest Expense↑ → Net Interest Margin↓ → Profits↓
   - **ARMs**:

     Interest Income↑ Interest Expense↑ → Net Interest Margin↑ → Profits↑

2. Smaller absolute duration under FRM
   - Interest income and expense insensitive to changes in interest rates

Mortgage Structures and Household Default

(b) Default Rates

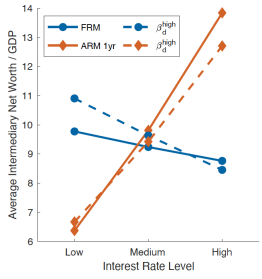


1. Household defaults increase with interest rates in ARMs
   - Higher mortgage payments make households liquidity constrained

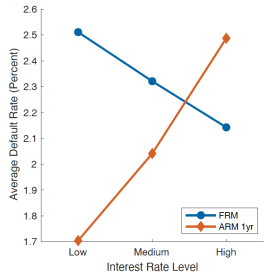
2. Household defaults go down as interest rates in FRMs
   - Higher interest rates makes holding on to current mortgage more attractive

Default, Net Worth, and Risk Premia

(a) Intermediary Net Worth



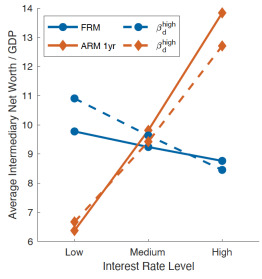
(b) Default Rates



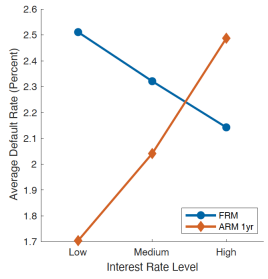
- For both FRM and ARM, high net worth is positively associated with credit losses arising from default – defaults are net worth hedged

Default, Net Worth, and Risk Premia

(a) Intermediary Net Worth



(b) Default Rates



- For both FRM and ARM, high net worth is positively associated with credit losses arising from default – defaults are net worth hedged
- Defaults less sensitive to interest rates in FRM so net worth hedging weaker, risk premia higher

Mortgage Structures and Financial Stability

- FRMs offer lower net worth duration but default hedging weaker
- ARMs make net worth duration higher but stronger default hedging
- Optimal fixation length balances these tradeoffs
- Zero duration mortgage structures do not minimize equity volatility because they do not take the effect of credit losses and risk premia into account

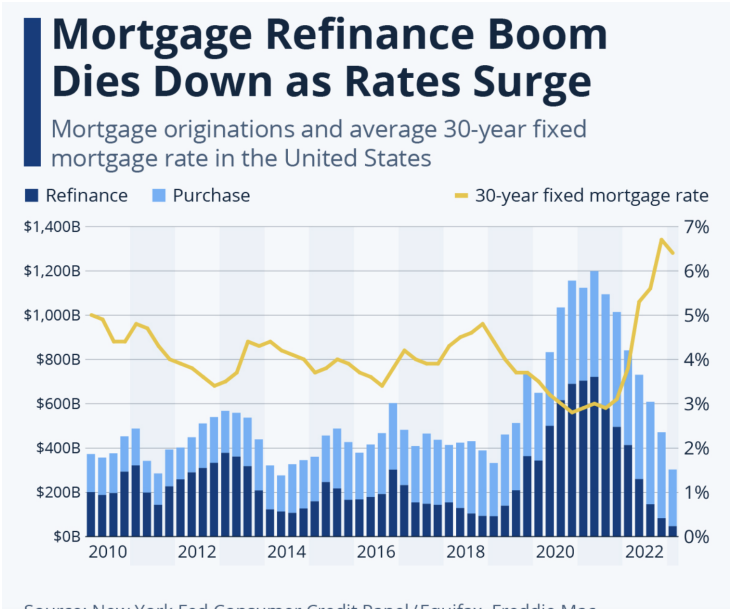
Comments

- Important and timely question
  - Last two years saw the sharpest increase in interest rates in decades
- Important contribution to the literature by bringing together separate literatures studying how interest rates affect
  - Bank balance sheets
  - Household liquidity and default
- Some questions on modeling choices and how they affect the key insights delivered by the model

Role of Prepayment Risk

- The model considers banks' differential exposure to credit risk under different mortgage structures: the risk that a bank stops receiving debt payments due to borrower default
- Another important difference between ARMs and FRMs is prepayment risk: early voluntary termination of a mortgage contract
- Changes in interest rates affect borrowers' incentive to prepay their fixed rate mortgages
- How would this affect the volatility of banks' equity under FRMs?

Role of Prepayment Risk



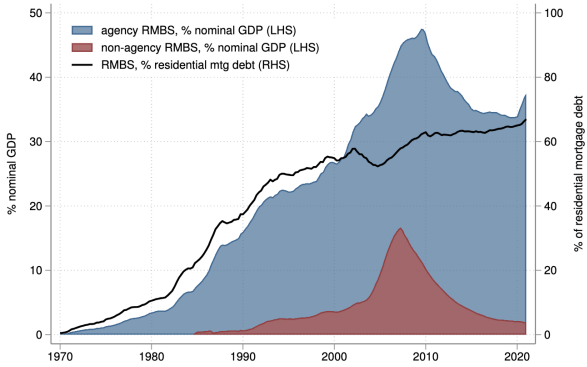
Role of Prepayment Risk

- As interest rates fall and borrowers prepay their loans, banks' interest income falls as they have to reinvest the principal at lower interest rates
- With sticky deposit rates, this would translate into lower profits for the bank when interest rates are low
- At the same time, an increase in interest rates would lower prepayment speeds, increasing the effective duration of the mortgage portfolio, potentially leading to a larger mark-to-market loss when interest rates rise
- Reducing the upside when interest rates fall, magnifying the downside when interest rates increase $\rightarrow$ **equity more volatile?**

Role of Balance Sheet Retention of Mortgages

- Over 50 percent of the mortgages originated by banks are securitized and sold to GSEs(Buchak et al. 2018)
- Banks could still be exposed to interest rate risk as banks hold a vast majority of MBS but credit risk is transferred to the GSEs

Figure 1: **Mortgage-backed securities outstanding**



Source: Fuster et al. (2022)

Correlation of Balance Sheet Retention with Bank Net Worth

- Mortgages carry a capital charge and occupy balance sheet space
- Buchak et al. (2025) show that banks move between selling and retaining loans depending on their net worth
- Higher retention when net worth is high and vice versa
- If banks sell more loans when bank net worth is low, could that free up loss absorbing capacity in bad states of the world and lower risk premia?

Conclusion

- Important paper that provides a useful framework to study the interaction between monetary policy and financial stability
- Model already quite rich but including some real-world aspects of the FRM system in the US would make the discussion even richer