Monetary Policy and the Homeownership Rate

James Graham (University of Sydney)
Avish Sharma (University of Sydney)

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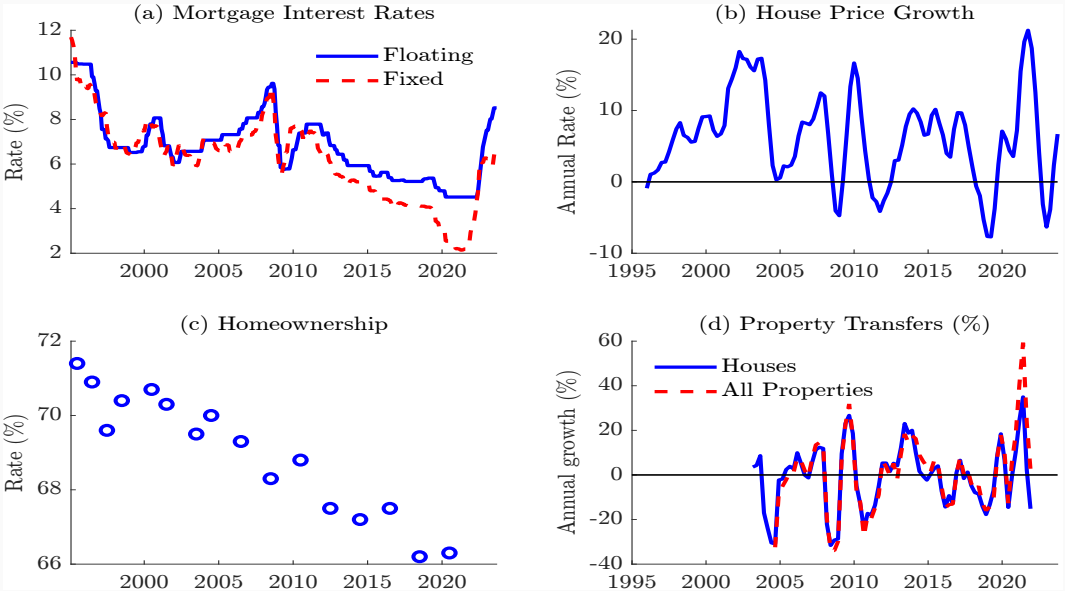
Motivation: Australian Monetary Policy and the Housing Market



Research Questions

- How does monetary policy affect the homeownership rate?
- Which monetary policy transmission channels matter most for homeownership decisions?
  - Interest rates
  - Incomes
  - House Prices

This Paper

- Build a heterogeneous household life-cycle model of housing decisions
- Partial equilibrium in housing market conditional on VAR macro-dynamics

- Following a contractionary monetary policy shock: **[preliminary!]**
  - Higher **interest rates** have immediate negative effect on homeownership
  - Persistently low **house prices** encourage more homeownership over the medium-term
  - Lower **aggregate incomes** have minimal impact on homeownership

Model

Model Overview

- Heterogeneous household life-cycle model of housing decisions
- Standard model features:
  - Differences in age, income, savings, housing, mortgages
- Novel features of Australian housing/mortgage market:
  - Mortgage offset accounts
  - Net income surplus constraint on borrowing
  - Mortgage servicability buffer imposed on borrowing (i.e. APRA)
- Vector Autoregressive process for macro effects of monetary policy shocks via:
  - **Interest rates**
  - **Aggregate incomes**
  - **House prices**
- Study IRFs to monetary policy shocks

Model: Demographics and Preferences

- Discrete time, model period = one quarter
- Ages: working life 20 to 65, unmodeled retirement after 65

- Households maximize expected lifetime utility, given by:

$$E_0 \left[\sum_{j=1}^{J} \beta^{j-1} u(c_j,\ s_j) + \beta^J \nu(w_{J+1}) \right]$$

- Flow utility, CRRA on Cobb-Douglas:

$$u(c, s) = \frac{\left(c^\alpha s^{1-\alpha}\right)^{1-\sigma}}{1-\sigma}$$

- Retirement preferences, CRRA:

$$\nu(w) = \omega \frac{w^{1-\sigma}}{1-\sigma}$$

Model: Household Income

- Overall income:

$$m_j(z, Y) = \Gamma_j \times z \times f(\Gamma_j, z, Y)$$

  - Deterministic, quadratic life-cycle profile in age j:

$$\Gamma_j = \gamma_1 + \gamma_2 \left(\frac{j}{J}\right) - \gamma_3 \left(\frac{j}{J}\right)^2$$

  - Idiosyncratic log-AR(1) prcess:

$$\log(z') = \rho_z \log(z) + \varepsilon_z$$

  - Idiosyncratic exposures to aggregate income shocks Y (Stone, 2016):

$$f(\Gamma_j, z, Y) = 1 + (Y - 1) \times [\chi_1 + \chi_2 \exp(\chi_3 \Gamma_j z)]$$

Model: Liquid Assets

- Save in a liquid asset a
- No borrowing in liquid assets: $a' \geq 0$
- Real return r
- Return evolves according to macro-VAR following monetary policy shocks

Model: Housing

- Renters:
  - Flexibly choose size of housing services s each period (i.e. continuous choice)
  - Per-unit rental cost P_r, assumed constant over time
- Owners:
  - Single house size: $s = H$ (computationally tractable)
  - Per-unit purchase prices P_h
  - Price evolves according to macro-VAR following monetary policy shocks
  - Maintenance costs $\delta P_h H$
  - Housing sales cost $f_h P_h H$

Model: Mortgages

- Homeowners use mortgage b to finance house purchase
- Adjustable-rate mortgages: $r_b = r + \kappa$
- Long-term contract, fixed amortization schedule with per-period payment:

$$\pi_j(b, r_b) = b \times \left(\sum_{k=1}^{M_j} \left[\frac{1}{1 + r_b} \right]^k \right)^{-1} = b \times \frac{r_b(1 + r_b)^{M_j}}{(1 + r_b)^{M_j} - 1}$$

- Where $M_j = \min\{30 \times 4, J + 1 - j\}$
- Origination cost $f_b b'$

Model: Mortgage Constraints (a "Net Income Surplus Constraint")

Judge who said borrowers could cut down on steak and shiraz labelled 'out of touch'

Consumer advocates criticise decision dismissing legal action against Westpac, which had been accused of 250,000 cases of irresponsible lending

'I may eat Wagyu beef every day, washed down with the finest shiraz but, if I really want my new home, I can make do on much more modest fare,' the judge said. Photograph: PR

A judge who said borrowers could cut down on wagyu beef and "the finest shiraz" to make their home loan payments is out of touch with reality, consumer advocates say.

The Consumer Action Law Centre and the Financial Rights Legal Centre (FRLC) said the remarks, made by federal court judge Nye Perram, showed the law needed to be changed to force banks to properly consider the financial circumstances of borrowers.

Model: Mortgage Constraints

- For tractability, new mortgage originations given by:

$$b' = \min\{b'_{LTV}, b'_{NIS}\}$$

- Maximum loan-to-value (LTV) ratio:

$$\underbrace{b'_{LTV}}_{\text{mortgage loan}} = \theta_b \underbrace{P_h H}_{\text{house value}}$$

- Maximum net income surplus (NIS) ratio:

$$\underbrace{\pi_j(b'_{NIS}, \widehat{r}_b)}_{\text{mortgage payment}} = \theta_m \underbrace{(1-\alpha) m_j(z_j, Y)}_{\text{surplus income}}$$

- Assessed mortgage interest rate $\widehat{r}_b = r_b + \phi$ with servicability buffer ϕ (i.e. via APRA)

Model: Mortgage Offset Accounts

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Online Banking - Personal

ROCKET REPAY: VARIABLE HOME LOAN WITH OFFSET

Get a variable rate, make unlimited extra repayments with no associated break costs and save interest on your home loan balance with an optional offset account.

Apply online | Book appointment

Why choose our variable home loan with offset

Save interest with 100% offset

Every dollar in your offset account counts towards reducing the interest on your linked home loan.

Flexible features

Split your loan across variable and fixed rate, redraw anytime with no fees, and enjoy unlimited extra repayments on the variable portion.

Package & save

Package your loan for a 1.29% p.a. home loan rate discount, no credit card annual fee and more, all for a $395 annual package fee#.

Tailored discounted rates

Discounted variable rates tailored to your situation and needs. Discuss your rate with a dedicated lender.

Model: Mortgage Offset Accounts

- Mortgage offsets following Graham (2024):
  - Hold liquid assets against outstanding mortgage balance to reduce interest costs
  - Since $r_b > r$, earn higher effective rate of interest on liquid assets
- Without an offset account, mortgage balances evolve according to:

$$b' = (1 + r_b)b - \pi_j(b, r_b)$$

- With an offset account, mortgage balances evolve according to:

$$b' = b + r_b \times \max\{b - a, 0\} - \pi_j(b, r_b)$$

- Offset account incurs fixed cost f_o each period
- Excess liquid assets $\max\{a - b, 0\}$ earn interest rate r

Model: Household Decisions

- Household state vector:

$$\mathbf{s} = [\quad a, \qquad h, \qquad b, \qquad z, \qquad r, \qquad Y, \qquad P_h \qquad]$$

$$[\textit{assets}, \textit{house}, \textit{mortgage}, \textit{income}, \textit{interest rate}, \textit{aggregate income}, \textit{house price}]$$

- Each period, households make discrete choice over:
  - Renting (R)
  - Buying a new house (B)
  - Making mortgage payments without an offset account (N)
  - Making mortgage payments with an offset account (O)
- Value function over discrete choice problems is:

$$V_j(\mathbf{s}) = \max\left\{ V_j^R(\mathbf{s}), V_j^B(\mathbf{s}), V_j^N(\mathbf{s}), V_j^O(\mathbf{s}) \right\}$$

Model: Aggregate State Variables VAR

- Aggregate state vector maps to de-trended data via:

$$S = \{r, Y, P_h\}$$
$$= \{\text{Real 90-day rate}, \text{ Real domestic final demand}, \text{ Real sales prices capital cities}\}$$

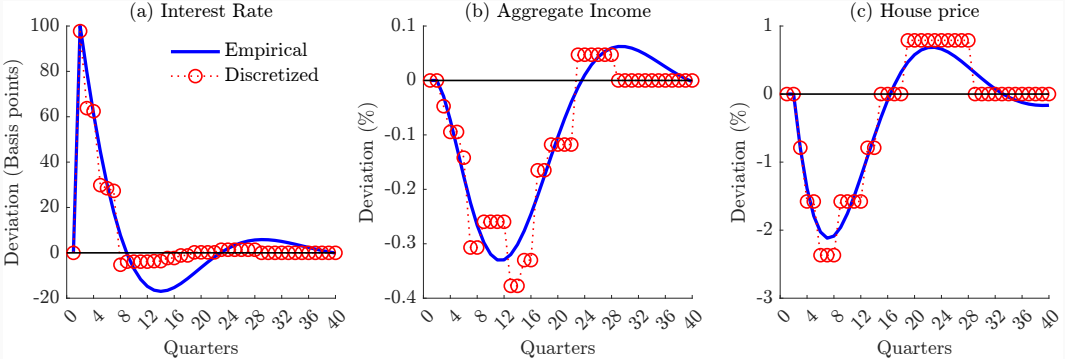
- Estimate VAR(1):

$$S_t = AS_{t-1} + u_t$$

- Identify monetary policy shocks via standard recursive identification scheme
- Discretize VAR, embed in model of household decisions (Tauchen, 1986)

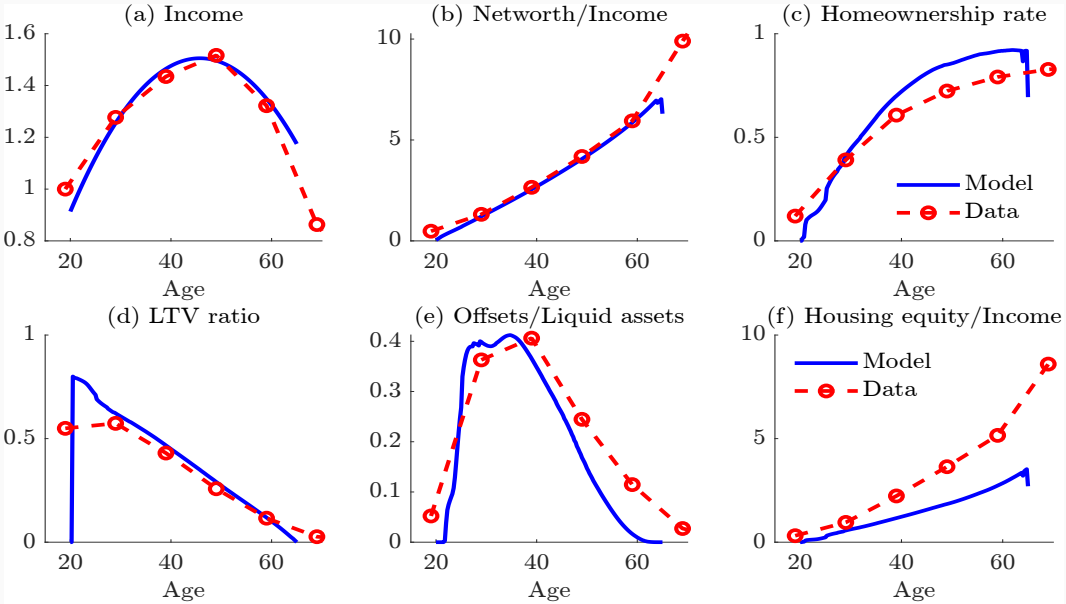
Model: Aggregate State Variables VAR

- Discretization: $\{N_r, N_Y, N_{P_h}\} = \{7, 5, 7\}$



Calibration and Model Fit

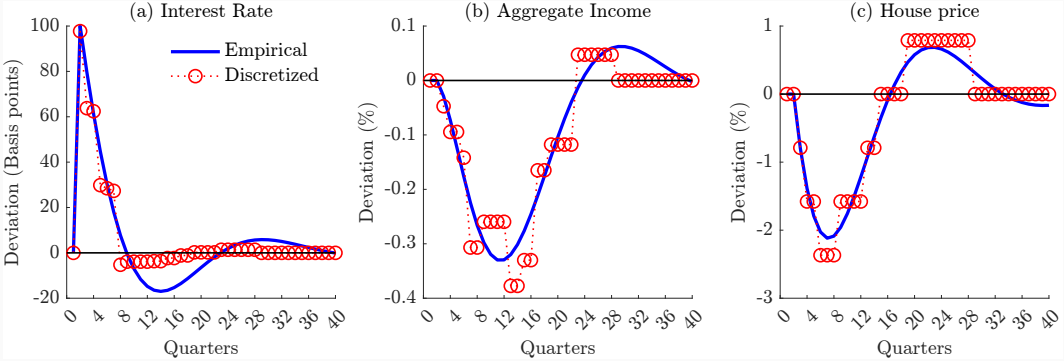
Calibration: Life-Cycle Profile



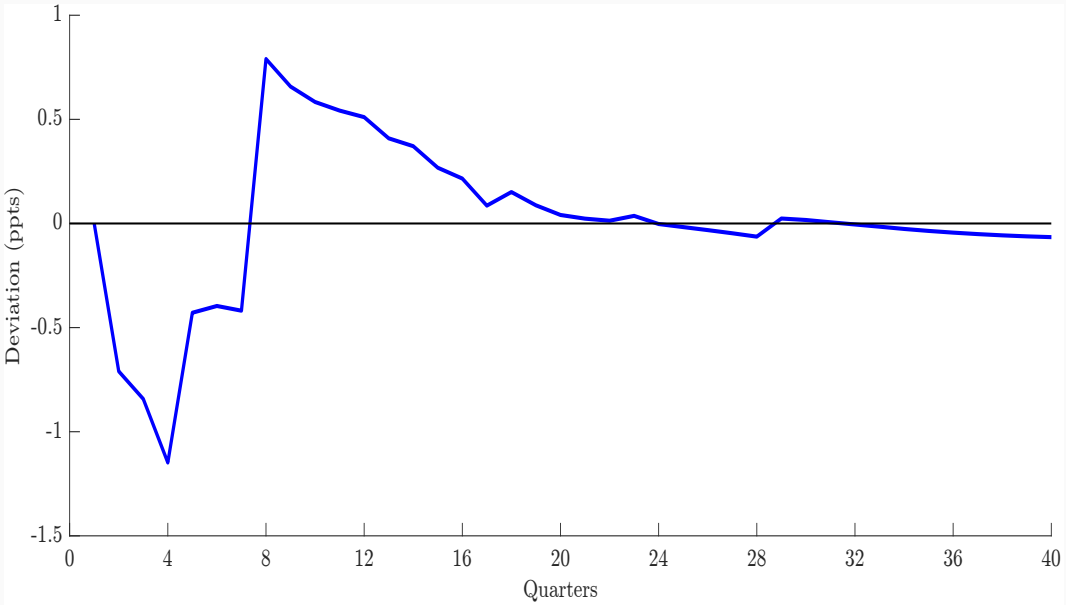
Monetary Policy Shocks
Baseline Model

Monetary Policy Shocks

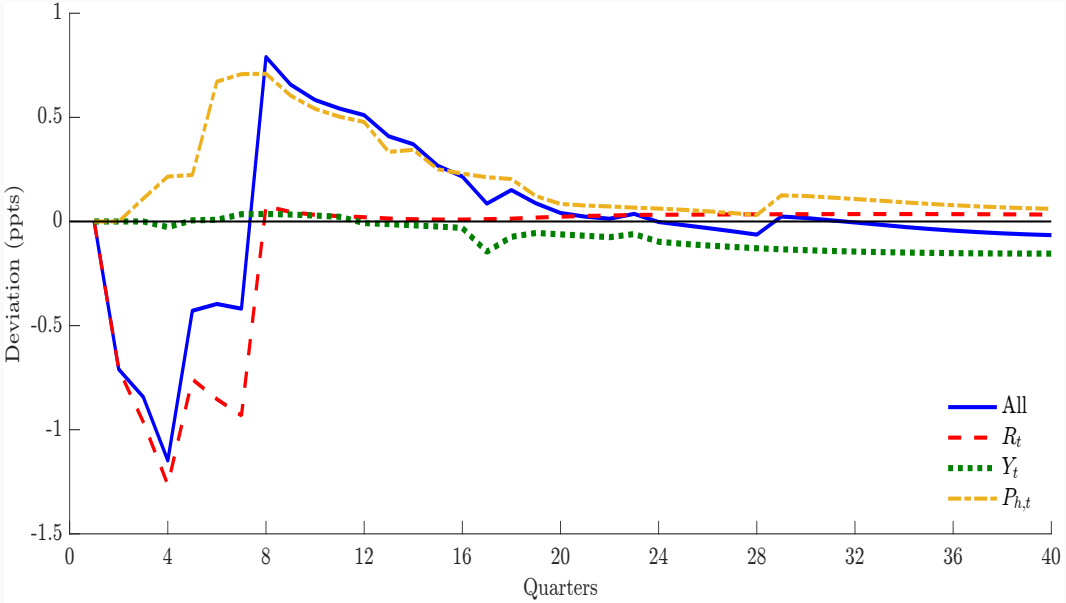
- First, overall monetary policy shock
- Second, each channel of monetary policy shock in isolation
  - Note: still have accurate expectations over evolution of aggregate states



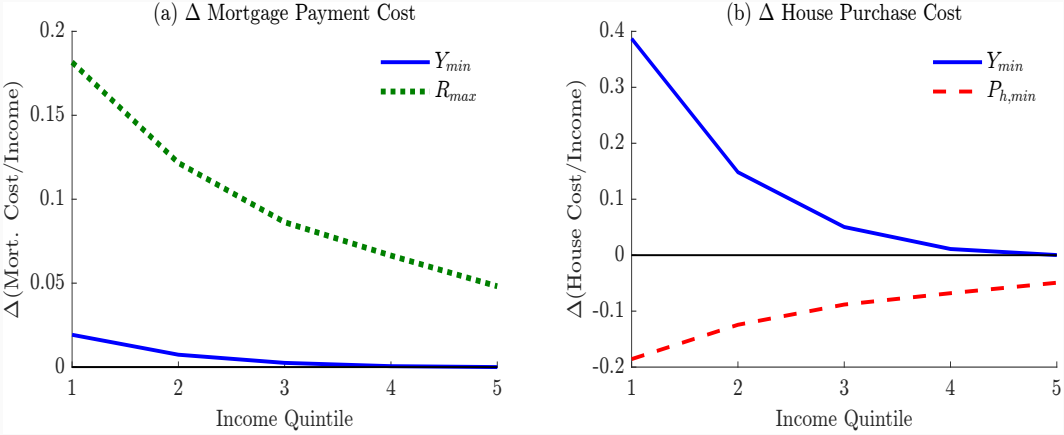
Monetary Policy Shocks: Homeownership



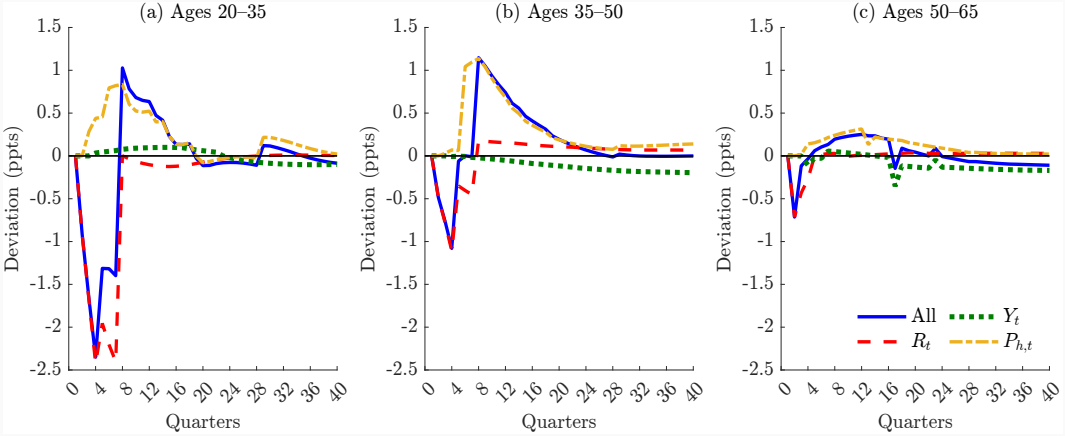
Monetary Policy Shocks: Homeownership



Monetary Policy Shocks: Changing Home Purchase and Mortgage Costs



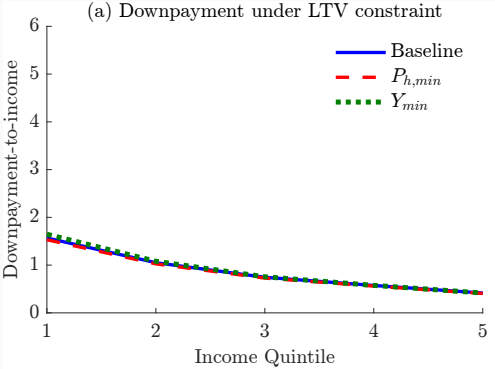
Monetary Policy Shocks: Homeownership By Age Groups

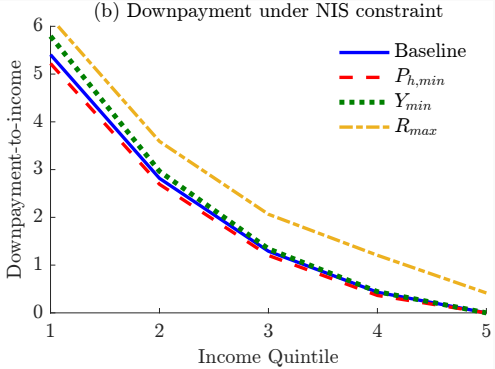


Monetary Policy Shocks Variation in Borrowing Constraints

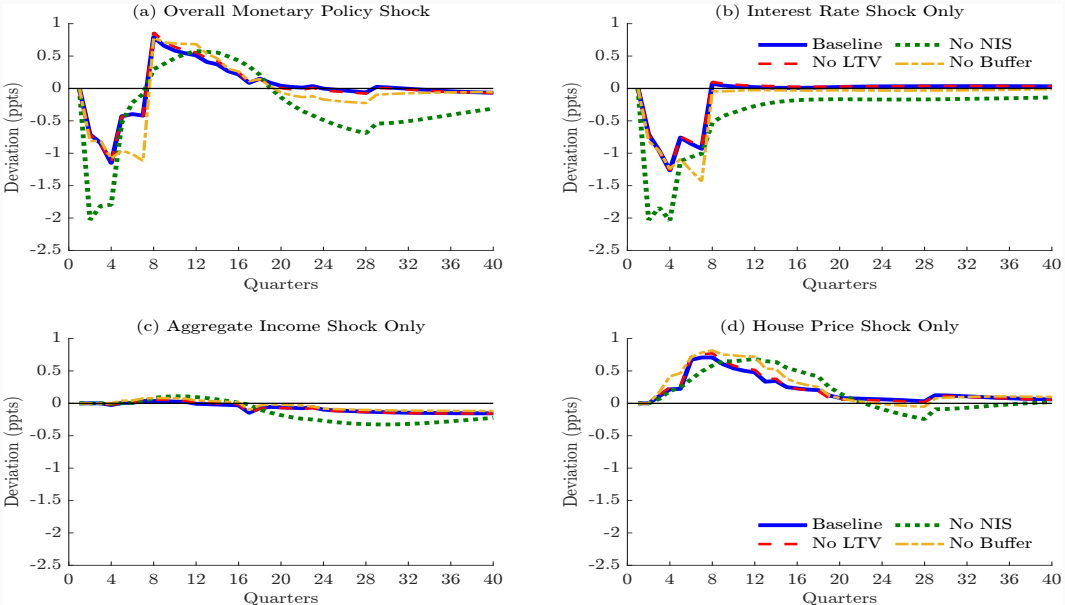
Variation in Borrowing Constraints

- House purchase downpayments vary across borrowing constraints and by income
- NIS constraint generally more binding than LTV constraint
- Shocks to interest rates have largest effect on borrowing under NIS constraint



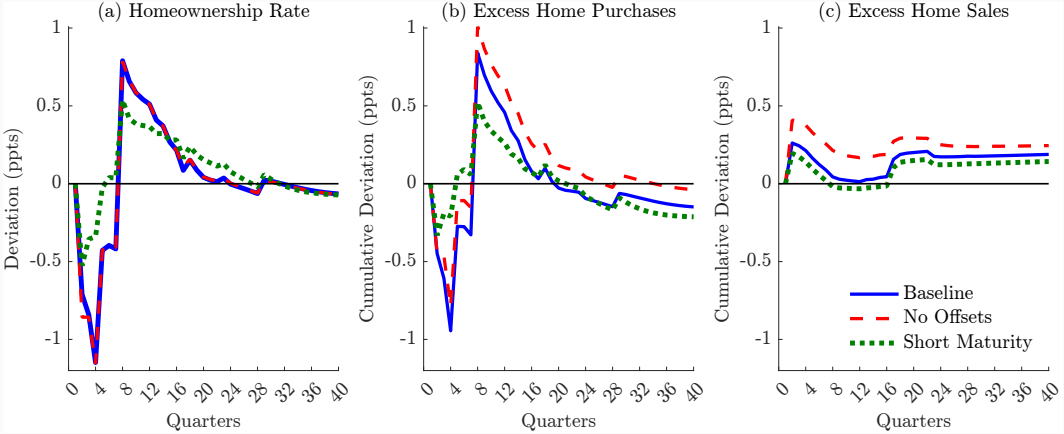


Variation in Borrowing Constraints



Monetary Policy Shocks
Variation in Mortgage Flexibility

Variation in Mortgage Flexibility



Conclusion

Conclusion

- Study effect of monetary policy on the homeownership rate
- Build life-cycle heterogeneous household model of housing and mortgage decisions
  - Novel features of the Australian housing and mortgage markets
  - Exogenous VAR to capture macro dynamics following a monetary policy shock

- Monetary policy shocks have a complex relationship with homeownership:
  - Short run: High interest rates discourage/delay home purchases
  - Medium run: Low house prices increase affordability, encourage homeownership
- Mortgage credit conditions, mortgage flexibility, and household expectations also play important roles in housing dynamics