Monetary Policy and the Homeownership Rate

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Abstract

Monetary policy affects not only the spending of existing homeowners, but also whether and when to become a homeowner in the first place. We study this transmission mechanism in Australia, a country with a high cost of housing, adjustable-rate mortgages, and serviceability-based borrowing constraints. We build a heterogeneous-agent life-cycle model, where the macroeconomic effects of monetary policy are due to an exogenous VAR. A contractionary shock reduces homeownership for over a decade. Homeownership dynamics depend on interest rates, incomes, borrowing constraints, and household expectations about monetary policy. Finally, the welfare costs of monetary shocks are heavily concentrated among potential homebuyers.

Keywords: Homeownership; monetary policy; interest rates; house prices; heterogeneous households

JEL: E52; E20; R21

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1. Introduction

The housing market is an important transmission channel for monetary policy. Policy affects mortgage interest costs and house prices, for example, which influence aggregate demand since houses and mortgages are the largest assets and liabilities for many households. Much prior research focuses on the effects of monetary policy through existing homeowners and their current mortgage balances.[1] But monetary policy also influences decisions about whether and when to become a homeowner in the first place. Since homeownership is a persistent state, even transitory policy shocks can have long-lasting effects on the composition of the housing market. This means that current monetary policy endogenously shapes the housing-market transmission channel by affecting the future distribution of housing wealth and mortgage liabilities.[2]

Here, we study the extent to which monetary policy shocks affect the homeownership rate. As monetary policy operates through various channels, the overall effect on homeownership is ambiguous ex ante. On the one hand, a monetary contraction raises interest rates, increases mortgage finance costs, and tightens debt-service borrowing constraints, all of which tend to reduce home purchases. At the same time, household incomes fall, which reduces borrowing capacity and slows the accumulation of savings needed for downpayment on a home. Finally, house prices fall, which makes home purchases more affordable. The net effect of monetary policy depends on the relative strength of these interest rate, income, and house price channels. Additionally, the size and duration of the homeownership response is likely to depend on institutional features of housing and mortgage markets, the distribution of household wealth, and expectations about the path of monetary policy. We combine empirical macroeconomic evidence with a quantitative heterogeneous-agent model in order to investigate the strength of these channels and mechanisms.

Much of the prior macroeconomics literature focuses on U.S. housing markets. In contrast, we take Australia as our setting, where monetary policy is likely to be particularly important for homeownership decisions. Housing is known to be especially expensive in Australia, with an average price-to-income ratio of 5.5, and a total housing market valuation-to-GDP ratio of 4 compared to 1.5 in the U.S.[3] The high cost of housing poses a substantial barrier to new homebuyers, who face tight borrowing constraints and must accumulate substantial savings out of earned income. Australian homeowners are highly indebted with the ratio of total owner-occupier mortgages-to-total annual disposable income sitting around 100 percent.[4] And this housing debt is especially exposed to monetary policy: historically 80 percent of outstanding mortgages have had adjustable-rate contracts.[5] Finally, Australian house prices are thought to be particularly sensitive to interest rate changes, suggesting large fluctuations in housing

[1] See, for example, Garriga et al. (2017), Beraja et al. (2019), Cloyne et al. (2020), Eichenbaum et al. (2022), Berger et al. (2021), and Elias et al. (2025).

[2] This mechanism is related to, but distinct from, Eichenbaum et al. (2022) and Berger et al. (2021) who argue that previously loose monetary policy locks mortgage holders into low-rate mortgage contracts, dampening the effectiveness of future monetary expansions.

[3] For Australia, see Reserve Bank of Australia (2024), Australian Bureau of Statistics (2023b), and Australian Bureau of Statistics (2023a). For the U.S., see (Board of Governors of the Federal Reserve System (U.S.), 2023; U.S. Bureau of Economic Analysis, 2023).

[4] See Reserve Bank of Australia (2026).

[5] The adjustable-rate share sat at 80 percent prior to 2020, fell to 65 percent as interest rates hit historical lows, but increased from 2022 (Reserve Bank of Australia, 2023a).

affordability.[6] These features mean that Australian homeownership is likely to be particularly sensitive to the interest rate, income, and house price channels of monetary policy.

In this paper we combine evidence from identified vector autoregressions (VARs) with a quarterly-frequency heterogeneous-agent model of homeownership decisions. Our VAR estimates show that a contractionary monetary policy shock reduces home purchases, motivating our quantitative analysis of homeownership dynamics. In the model, a transitory monetary contraction leads to a fall in homeownership that reaches a trough 4 years later, and recovers only gradually over the course of a decade. The primary channels t play are higher interest rates that lead to tighter debt-service constraints, and lower incomes that also tighten borrowing capacity and reduce savings that can be used for downpayments. Meanwhile, falling house prices only partially offset these effects. Thus, monetary policy influences not only current housing-market activity and aggregate demand, but also the future distribution of housing tenure, wealth, and mortgage exposures.

We begin the paper with motivating evidence on the effect of monetary policy on home purchases. We estimate simple, sign-restricted VARs using quarterly detrended data on real interest rates, real income, real house prices, and home purchases. Because the Australian homeownership rate is measured infrequently, we make use of data on home purchases.[7] While purchases are an imperfect proxy for homeownership, the flow of housing transactions is a useful indicator of the direction of movement in the stock of homeowners. We identify contractionary monetary policy shocks by imposing the restrictions that real interest rates rise on impact, real income falls, and real house prices fall. The response of home purchases is left unrestricted. Our estimates suggest that a 25 basis point monetary contraction results in a 5 percent decline in home purchases on impact, with purchases remaining low for around 2 years. In a series of robustness checks, we show that the effects of monetary policy are consistent across different measures of home purchases, alternative identification schemes, and when using longer time-series data from New Zealand and the U.S.

We then study homeownership decisions in detail by building a rich heterogeneous-household life-cycle model calibrated to capture key features of Australian housing and mortgage markets. As in the prior literature, we incorporate many standard model features such as idiosyncratic income risk, housing tenure choice, and long-lived mortgage contracts used to finance house purchases.[8] Unlike in many prior papers, we solve our life-cycle model at a quarterly frequency to best capture the effects of high-frequency monetary policy shocks. Other model features are informed by novel Australian institutional details. First, we assume that all mortgages are adjustable-rate contracts so that monetary policy shocks immediately pass through to mortgage rates.[9] Second, lenders impose debt-servicing restrictions at mortgage origination, where serviceability is determined via a surplus income test (i.e. income after typical household ex-

[6] See, for example, Otto (2007), Lim et al. (2018), Saunders et al. (2020), and Graham et al. (2023).

[7] Dias et al. (2022) estimate the effects of monetary policy in using quarterly homeownership data for the U.S. In our robustness checks, we also estimate a VAR for the U.S. that includes both home purchases and the homeownership rate.

[8] See, for example, Favilukis et al. (2017), Kaplan et al. (2020), Garriga et al. (2020), Chen et al. (2020), Wong (2021), Gamber et al. (2023), Diamond et al. (2025), and Eichenbaum et al. (2022).

[9] Historically, 80 percent of outstanding mortgages in Australia have been on adjustable-rate contracts, which is a significantly higher share than in most other advanced economies (Reserve Bank of Australia, 2023a).

penditures). Further, a macroprudential policy regime requires that serviceability is assessed with an interest rate buffer over and above the current mortgage rate. Third, households have access to mortgage redraw and offset accounts that reduce the long-term interest cost of a mortgage loan.[10] Fourth, home buyers pay a progressive home purchase tax known as stamp duty, which must be paid up front and cannot be financed with mortgage borrowing.[11] Fifth, high-leverage borrowing requires a lenders mortgage insurance payment, which is also paid up front and cannot be financed with a mortgage.

Rather than solve the model in general equilibrium, we characterize the macroeconomic effects of monetary policy via an exogenous stochastic process (see Chen et al., 2020; Wong, 2021; Eichenbaum et al., 2022; Kinnerud, 2025). Specifically, we use a VAR to discipline the shocks to and evolution of interest rates, aggregate income, and house prices. We estimate the VAR on real detrended quarterly Australian data and identify the effects of monetary policy using simple sign-restrictions on the contemporaneous impulse responses to a contractionary shock. While the heterogeneous agent model is solved in partial equilibrium, household expectations over macroeconomic dynamics are consistent with the VAR. Thus, when a monetary contraction raises interest rates, households understand that this results in lower incomes and house prices in the periods that follow.

We calibrate the model to Australian cross-sectional household data and use the model to study the response of the homeownership rate to a contractionary monetary policy shock. Following a 25 basis point increase in interest rates, aggregate income and house prices fall on impact and return to steady state over the next 12 to 28 quarters. As a result, households experience a fall in networth, draw down on liquid savings, cut back on consumption, and sharply reduce housing market activity. We find that home purchases fall by around 11 percent, similar to but somewhat larger than the 5 percent decline we estimated using Australian time-series data in a simple VAR. Our headline result is that the homeownership rate declines by 0.1 percentage points on impact, falls to a trough 0.3 percentage points below steady state after 4 years, and returns to steady state only gradually over the subsequent decade.

We then disentangle the effects of different channels of monetary policy on homeownership. To do this, we simulate homeownership dynamics in the model conditional on the paths of interest rates, aggregate income, and house prices in isolation. In each experiment, one of the aggregate variables follows the impulse response function induced by the VAR while we hold the remaining aggregate variables fixed at their steady state values. Note that in these experiments, households continue to make conditional forecasts of the entire aggregate state vector based on the current state. We find that higher interest rates dominate the response of homeownership on impact and over the short run. Lower incomes have a smaller effect initially, but account for much of the persistently low homeownership rate over the medium term. In isolation, lower house prices tend to increase homeownership on impact, but not by enough to offset the effects of changing rates and incomes when all three channels are operational.

[10]All Australian borrowers with adjustable-rate mortgages have the ability to "redraw" excess mortgage repayments, and nearly half of all mortgages have an attached offset account La Cava et al. (2021b). See Graham (2025) for an earlier model of mortgage offset accounts. Elias et al. (2025) argue that redraw accounts may dampen the effects of monetary policy through a build up of liquid funds used to buffer spending when interest rates rise.

[11]See Cho et al. (2024).

We further show that the endogenous evolution of the household wealth distribution is responsible for the highly persistent response of homeownership to monetary policy shocks. Following a contraction, households that narrowly miss out on a home purchase run down their savings, carry lower wealth into future periods, and are then in a worse position to buy than they would have been absent the shock. To demonstrate this, we decompose the overall response of homeownership into the contribution from household decisions and the household wealth distribution. When the distribution is held constant, household decisions in response to the shock are responsible for the initial fall in the homeownership rate. But homeownership monotonically returns to steady state over the next 5 years, tracking the persistence of macroeconomic variables in the exogenous VAR. In contrast, when household decisions are held constant, the evolving wealth distribution accounts for the medium-run persistence of the homeownership rate.

We explore how different characteristics of housing markets, mortgage markets, the macroeconomy, and household expectations influence homeownership dynamics in response to monetary policy shocks. First, we show that income-based borrowing constraints (in Australia, referred to as the Net Income Surplus constraint) dominate loan-to-value constraints for marginal homebuyers. This means that higher interest rates and lower incomes significantly reduce mortgage borrowing capacity at the onset of a monetary contraction. As a result, in the absence of the income-based borrowing constraint or the required mortgage serviceability buffer, the homeownership response to a monetary contraction is substantially smaller. Second, eliminating the stamp duty tax on home purchases also reduces the volatility of homeownership. This reflects a decline in the effective downpayment required to buy a home, which helps to reduce household senstivity to shocks. Third, lower pass-through to mortgage interest rates and lower dispersion in household exposures to aggregate income fluctuations both reduce the response of homeownership to monetary policy. Finally, we show that household expectations about the evolution of monetary policy are important for homeownership dynamics. When households are incorrectly optimistic (pessimistic) about the pace of recovery following a monetary contraction, homeownership falls by substantially more (less) than in the baseline model. This is because households under-save (over-save) in response to the perceived persistence of the monetary shocks.

Finally, we study the welfare costs of monetary policy shocks in our model. We first consider the welfare consequences of 25 basis point contractionary and expansionary monetary policy shocks. The average household experiences small losses (gains) from contractionary (expansionary) shocks. However, potential home buyers suffer losses of between 2.3 and 3.6 percent of life-time consumption following a contraction, and losses of around 0.1 percent following an expansion. During a contraction, homebuyers dislike the tightening of mortgage borrowing constraints following the rise in interest rates and the fall in incomes. But during an expansion, homebuyers dislike the rise in house prices that requires an increase in downpayments on a home purchase. We also consider the steady state welfare impact of eliminating the entire distribution of possible monetary policy shocks. We find small welfare gains from doing so, but these disproportionately accrue to renters who experience large marginal utility costs from fluctuations in incomes and rental rates.

1.1. Related Literature

Our paper fills a notable gap in our understanding of the effects of monetary policy on homeownership. While several papers study the broader impacts of monetary policy via the housing market, few consider the impacts on homeownership itself.

The closest paper to our own is Dias et al. (2022). They first directly estimate the effects of monetary policy on homeownership in a structural-VAR with quarterly U.S. data, finding that a 25 basis point contraction in monetary policy persistently reduces homeownership by 0.05 percentage points.[12] In our empirical motivating exercises for Australia we estimate a 5 percent decline in home purchases following a 25 basis point contraction, though we cannot observe homeownership directly.

Dias et al. (2022) then build a two-agent New Keynesian model to study the transmission of monetary policy through the housing market. They find that a 25 basis point contraction leads to an immediate 0.32 percentage point decline in the homeownership rate with a smooth, monotonic return to steady state over the next 5 years. In our paper, the homeownership rate declines by 0.1 percentage points in the first quarter of the shock, continues to fall to a trough of 0.3 percentage points after 4 years, and has not returned to steady state 10 years later. The persistence of our homeownership response is due to the endogenous evolution of the household wealth distribution following the shock. When we shut down this endogenous wealth channel, our model produces the same smooth, monotonic response of homeownership as Dias et al. (2022). Our paper also differs in attempting to disentangle the different channels of monetary policy transmission to homeownership, understanding the influence of institutional features of housing and mortgage markets, and exploring the importance of household expectations. Finally, Dias et al. (2022) report that the welfare cost to homeowners of a 25 basis point monetary contraction is equivalent to 2.75 percent of life-time consumption. As homeowners in that model adjust their housing stock every period, their result is similar to our finding that the welfare costs faced by potential homebuyers are equivalent to between 2.3 and 3.6 percent of life-time consumption.

Several other recent papers use heterogeneous household models to study the transmission of monetary policy via the housing market, but rely on lower-frequency models of the U.S. and do not specifically focus on homeownership dynamics (Wong, 2021; Eichenbaum et al., 2022; Kinnerud, 2025). A larger literature studies heterogeneous agent models of the housing market in the face of broader housing demand shocks. Much of this work grew out of the aftermath of the U.S. housing boom and bust of the mid-2000s (Favilukis et al., 2017; Kaplan et al., 2020; Garriga et al., 2020; Greenwald et al., 2025; Jacobson, 2022), while recent papers have studied the evolution of housing markets during the COVID-19 pandemic (Gamber et al., 2023; Diamond et al., 2025). Many of these papers either do not track homeownership directly (Favilukis et al., 2017; Diamond et al., 2025) or focus on shocks to mortgage credit rather than more typical monetary policy movements (Kaplan et al., 2020; Garriga et al., 2020).

We borrow many standard heterogeneous household model features from the literature:

[12] Dias et al. (2019) and Abramson et al. (2025) find similar effects for the U.S., using varied empirical methods. Ringo (2024) estimates that a 1 percentage point increase in mortgage interest rates reduces the share of home purchases among low-income households by 1 to 2 percentage points.

income uncertainty, incomplete asset markets, housing tenure decisions, and mortgage financing constraints. In particular, we follow a recent literature emphasizing the importance of modeling realistic loan-to-value and payment-to-income constraints in order to understand housing market boom and bust dynamics (Greenwald, 2026; Ma et al., 2021; Kinnerud, 2025; Balke et al., 2023). However, we differ from some papers in the literature in that we do not embed a rational expectations housing market equilibrium in our model. Instead, we adopt a partial equilibrium approach and take the evolution of aggregate state variables as given following Chen et al. (2020), Wong (2021), Eichenbaum et al. (2022), and Kinnerud (2025). We assume that interest rates, aggregate income, and house prices follow an estimated VAR with identified monetary policy shocks. Household beliefs in the model are consistent with the VAR dynamics. This approach ensures that model variables such as the homeownership rate respond to empirically plausible macroeconomic dynamics.

Although not the primary focus of this paper, we briefly investigate how consumption responds to monetary policy shocks in our model (see, also, Chen et al., 2020; Wong, 2021; Eichenbaum et al., 2022; Kinnerud, 2025). We find that consumption falls sharply following a monetary contraction, and this is primarily driven by the decline in aggregate income. These consumption responses are consistent with Kaplan et al. (2018) who show that intertemporal substitution effects in response to interest rate changes are much weaker than the household earnings channel in heterogeneous-agent models. In contrast, we find that changes in homeownership are primarily driven by the interaction between rising interest rates and mortgage borrowing constraints.

Finally, we build on a recent literature that studies various institutional features of the Australian housing market using heterogeneous household models. Cho et al. (2023) and Cho et al. (2024) build general equilibrium life-cycle models to study the effects of housing investor tax credits and homeowner sales duties (i.e. stamp duty), respectively. Ong et al. (2023) builds a similar model to study the effect of the long-run decline in real interest rates on the homeownership rate in Australia. Graham (2025) uses a partial equilibrium model to study the use and benefits of mortgage offset accounts among Australian homeowner. Whereas these papers study steady states and comparative statics, the current paper models the high-frequency dynamics of the Australian housing market in response to monetary policy shocks. In a recent paper, Elias et al. (2025) present a simple model of Australian homeowner sensitivity to monetary policy when mortgage redraw accounts are available.

2. Motivating Evidence

We begin by providing motivating evidence for the effects of monetary policy on housing market activity. Pre-empting our modelling approach in Section 3, we estimate Vector Autoregression (VAR) models on quarterly Australian data and identify monetary shocks using a sign-restriction approach.

For interest rates we use the 3-month bank bill rate (Organization for Economic Co-operation and Development, 2025b), for aggregate income we use log-real GDP (International Monetary Fund, 2025), and for residential house prices we use a log-residential house price index (Bank for International Settlements, 2025). We deflate interest rates and house prices using the CPI (Organization for Economic Co-operation and Development, 2025a). Australia does not produce high-frequency time series for the homeownership rate.[13] In its place, we observe home purchases, which should serve as strong predictors of changes in the homeownership rate itself. In our baseline regression, we use a measure of owner-occupied home purchases constructed from housing transactions micro-data by Gillitzer et al. (2025).[14]

In our baseline analysis, we estimate a VAR model using data over the final sample 2010:Q1–2021:Q3. We end in 2021 to maximize the available sample, where availability of the home purchase variable is the limiting factor. In all of our exercises, we deal with the pandemic by including dummy variables in our VAR for each of the quarters during Australian COVID-19 restrictions, 2020:Q1–2022:Q3.[15] We detrend the data using the HP Filter, but we estimate trends over the longest sample available for each data series. Interest rates are available from 1968:Q1–2025:Q3, GDP is available from 1959:Q3–2025:Q3, house prices are available from 1970:Q1–2025:Q3, and the CPI is available from 1959:Q3–2025:Q3. The home purchase variable is only available from 2010:Q1–2021:Q3.

As in our modeling approach in Section 3, we estimate a VAR with a lag-length of 1 but discuss robustness to this assumption below. We identify a contractionary monetary policy shock using the sign-restrictions approach.[16] We impose simple contemporaneous restrictions on three variables: the real interest rate rises on impact; real GDP falls on impact; and real house prices fall on impact. The response of home purchases is left unrestricted.

Figure 1 illustrates the IRFs to a contractionary monetary policy shock that raises real interest rates by 25 basis points. Following the shock, the real rate remains elevated for a little over 1 year. Aggregate income falls by around 0.2 percent on impact, and returns slowly to steady state over the next 2 years. House prices fall by around 1 percent on impact, returning slowly to steady state over the next 4 years. Owner-occupier home purchases decline by around 5 percent on impact, and remain below steady state for around 2 years. This result suggests that the Australian homeownership rate would decline on impact and over the short run following a monetary contraction. However, one limitation of the data from Gillitzer et al. (2025) is that it captures purchases made by both first-time buyers and repeat homebuyers. While unlikely, is possible that all of the decline in purchases is due to repeat home buyers, there is no change in first-time buyers, and the homeownership rate remains unaffected.

In Online Appendix A, we explore the robustness of our benchmark VAR results in various ways. In Figure A.1 we increase the lag length of the VAR to 4 quarters. In Figures A.2 and A.3 we replace our measure of owner-occupier home purchases with all residential property transfers and all owner-occupier mortgage originations (Australian Bureau of Statistics, 2026b; Australian Bureau of Statistics, 2026a). These measures allow for longer sample lengths, both

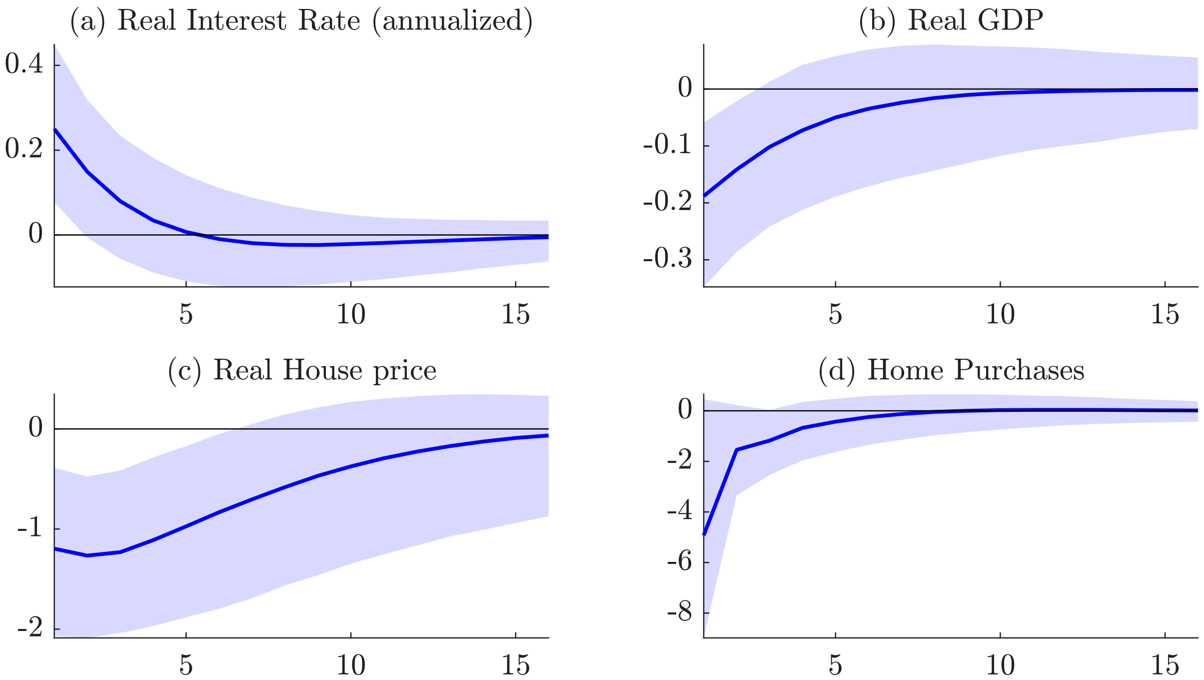
[13]The Australian census provides whole-of-population estimates of the homeownership rate every five years. Both the Survey of Income and Housing and the Household Labour and Income Dynamics surveys have sampled several thousand households about homeownership, among other variables, annually since 1994 and 2001, respectively. See https://www.abs.gov.au/statistics/detailed-methodology-information/concepts-sources-methods/survey-income-and-housing-user-guide-australia/2019-20/historical-information.

[14]We thank Christian Gillitzer for providing the data.

[15]Ng (2021) suggests this simple approach.

[16]See (Canova et al., 2002). We estimate the VAR and implement sign-restrictions using the VAR Toolbox by Cesa-Bianchi (2020).

Figure 1: VAR IRFs to Contractionary Monetary Policy Shock



Notes: IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

spanning 2002–2025, but have the drawbacks of including investor purchases and excluding non-mortgage financed purchases, respectively. In Figure A.4 we re-estimate our baseline VAR but use external instruments to identify the monetary policy shock. We use high-frequency identified monetary policy shocks for Australia from Hambur et al. (2024), which are available from 2001:Q2–2019:Q4.[17] In Figure A.5 we estimate an expanded VAR using nominal variables including: the short-term interest rate, the 10-year interest rate, the CPI inflation rate, GDP, the house price index, a commodity exports index, the trade-weighted exchange rate, and owner-occupied home purchases. Across specifications, these additional estimates produce qualitatively similar responses of home purchases to our baseline results in Figure 1.

In Figure A.6 we estimate sign-restricted VARs using data from New Zealand (Organization for Economic Co-operation and Development, 2025b; Organization for Economic Co-operation and Development, 2025a; International Monetary Fund, 2025; Bank for International Settlements, 2025; Reserve Bank of New Zealand, 2026). New Zealand is a useful comparison because it has similar monetary policy settings and has had a similarly volatile housing market to Australia in recent decades. The final data sample for New Zealand spans 1990:Q1–2023:Q3. We find similar IRFs as in our baseline estimates for Australia. Following a 25 basis point monetary contraction, New Zealand home purchases fall around 4 percent on impact and remain below steady state for around 1 year.

Finally, in Figures A.7 and A.8 we estimate sign-restricted VARs using data from the U.S. (Organization for Economic Co-operation and Development, 2025b; U.S. Bureau of Economic Analysis, 2026; U.S. Census Bureau et al., 2026a; Organization for Economic Co-operation and

[17] We thank Qazi Haque for providing the data.

Development, 2025a; U.S. Census Bureau et al., 2026b). The second exercise includes the homeownership rate itself since this is available at a quarterly frequency for the U.S. (U.S. Census Bureau, 2026). Data for the U.S. across our two samples span 1964:Q3–2025:Q1 and 1980:Q1–2025:Q1, respectively. A U.S. monetary policy contraction causes a decline in home purchases of around 1 percent, but this magnitude is much smaller than is estimated for Australia and is estimated with much wider credible intervals. Homeownership is estimated to decline on impact and recovers around a year later, but again with very wide credible intervals. Dias et al. (2022) also uses U.S. data to estimate the effect of monetary policy on homeownership, and uses a high-frequency monetary policy shock identification scheme. In response to a 25 basis point monetary contraction, they find a very similar magnitude impact on homeownership, although the IRF is much more persistent, remaining below steady state for over 5 years.[18]

Overall, our motivating evidence suggests that contractionary monetary policy reduces home purchases, likely resulting in a noticeable reduction in the overall homeownership rate.

3. Model

We now build a quarterly-frequency heterogeneous household life-cycle model featuring differences in age, income, liquid assets, housing tenure, and mortgage debt. We also incorporate several novel institutional features of Australian housing and mortgage markets that we think are important determinants of housing market outcomes. This includes adjustable-rate mortgage contracts, mortgage offset accounts, mortgage lenders insurance, progressive stamp duty (i.e. property tax) on houses, and macroprudential policies that require mortgage borrowers to satisfy conditions on their ability to service a mortgage.

We then model the influence of monetary policy via an exogenous Vector Autoregressive (VAR) process capturing the relationship between interest rates, aggregate income, and house prices. Households hold rational expectations consistent with the VAR, and take the evolution of aggregate state variables into account when making housing decisions. Note that we do not explicitly model general equilibrium in goods, labor, or asset markets. However, the VAR captures the observed evolution of the aggregate state variables in the macroeconomic data and thus provides a reasonable approximation to real-world market clearing conditions.

3.1. Households

Demographics Time is discrete and one model period is equivalent to one quarter of a year. We model household working life only, so households enter the model at age 20 and retire after age 65. We denote age by $j = 1, \cdots, J$, with retirement and exit from the model at age $J + 1$.
Preferences Households maximize expected lifetime utility, given by:

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

[18] Their VAR specification also differs somewhat from ours. They use a proxy SVAR with identified monetary policy shocks, they include nominal variables and CPI inflation separately, and they include several macroeconomic variables in growth rates.

where $u(\cdot)$ is the intra-period utility function, β is the discount factor, and $\nu(\cdot)$ are preferences over networth carried into retirement. We assume a CRRA utility function over a Cobb-Douglas aggregator of nondurable consumption c and housing services s:

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

where α is the nondurable consumption share, and $\frac{1}{\sigma}$ is the intertemporal elasticity of substitution. Preferences over networth at retirement are given by a weighted CRRA function:

$$\nu(w)=\omega\frac{\left(\frac{w}{\tilde{P}}\right)^{1-\sigma}}{1-\sigma}$$

where ω governs the desirability of holding real wealth in retirement.[19] We define real wealth $\frac{w}{\tilde{P}}$ as the value of housing, less mortgage balance and remaining interest, plus liquid assets and interest, deflated by the effective price level, $\tilde{P}=\left(\frac{1}{\alpha}\right)^{\alpha}\left(\frac{P_h}{1-\alpha}\right)^{1-\alpha}$. In this expression, the price of non-durables is normalized to 1 and P_h is the price of housing, which evolves according to the stochastic process described in Section 3.3. We use this price deflator so that variation in house prices following a shock does not lead to large fluctuations in homeownership decisions among households close to retirement.[20]

Income Household income consists of a deterministic life-cycle profile, an idiosyncratic shock, and idiosyncratic exposures to aggregate income fluctuations. Life-cycle income Γ_j follows a hump-shaped profile in j. The idiosyncratic component of income z_j follows a log-AR(1) process:

$$\log(z_j)=\rho_z\log(z_{j-1})+\varepsilon_{z,j}$$

where ρ_z governs the persistence of income shocks, and innovations follow a normal distribution $\varepsilon_{z,j}\sim N(0,\sigma_z^2)$ with mean zero and standard deviation σ_z. Income at birth z_1 is drawn from the stationary distribution for the log-AR(1) process.

As is well-known, lower income workers have more countercyclical earnings risk over the business cycle (see Guvenen et al., 2017). To capture this channel, we assume that households are differentially exposed to aggregate income shocks according their position in the income distribution. Aggregate income Y evolves according to the stochastic process described in Section 3.3. Idiosyncratic exposures are then given by

$$f(\Gamma_j,z_j,Y)=1+(Y-1)\times\left[\chi_1+\chi_2\exp(\chi_3\Gamma_j z_j)\right] \tag{2}$$

where the parameters χ_1,χ_2, and χ_3 determine the sensitivity of households at different points in

[19] This is similar to the assumption in the working-life model of Gourinchas et al. (2002), and related to a common assumption in life-cycle models that households enjoy warm glow bequests at the end of life (see De Nardi, 2004).

[20] The effective price level $\tilde{P}$ is taken from the expenditure function associated with the utility function in Equation (1) and simple budget constraint $c+P_hs=w$. Balke et al. (2023) deflate networth in their bequest function by a simple price index, $\tilde{P}=1-\alpha+\alpha P_h$, in order to account for house price fluctuations. Balke et al. (2025) scale the reference level of wealth in the bequest function by a wage index in order to account for the effect of changes in household incomes over time.

the income distribution to aggregate shocks. In steady state, aggregate income is normalized to 1 and there is no adjustment of individual income: $f(\Gamma_j, z_j, 1) = 1$. But outside of steady state, high- and low-income households may be differentially affected by aggregate income shocks. Finally, total household income at age j is given by

$$m_j(z_j, Y) = \Gamma_j z_j f(\Gamma_j, z_j, Y) \tag{3}$$

Liquid Assets Households can save in a liquid asset a. Liquid assets earn a real interest rate r, which evolves according the stochastic process described in Section 3.3. Households cannot borrow using the liquid asset, so their choices are subject to the constraint $a' \geq 0$.

Housing Households can choose to be renters or homeowners, and they enjoy housing services s associated with their tenure choice. The size of a rental house s is chosen flexibly and continuously up to a maximum size, given by the minimum house size available for purchase $\underline{h}$. Rental services can be purchased at a constant unit cost of P_r per period. We assume the rental rate is given by a simple user-cost formula, $P_r = (r + \delta + \kappa)P_h$, where r is the real interest rate, δ is the depreciation rate on housing, and κ is a wedge representing the additional cost of maintaining rental property that is factored into the rental price. Thus, rental prices inherit the time-series properties of the aggregate state variables r and P_h, as described in Section 3.3.

Homebuyers choose a new house h' from a discrete set $\mathcal{H}$ with minimum size $\underline{h}$. Households may only hold one house at a time.[21] Housing services for homeowners are given by $s = h'$ for buyers and $s = h$ for non-adjusting homeowners. Houses may be purchased at a per-unit cost of P_h. Each period, homeowners must pay housing maintenance costs given by a fraction of the value of the house $\delta P_h h$.

There are several transaction costs associated with trading housing. Home sellers pay a cost f_s proportional to the value of the property sold $P_h h$. Homebuyers pay both a proportional cost and a progressive tax on home purchases. The transaction cost f_b is proportional to the value of the home purchased $P_h h'$. The progressive tax is known as stamp duty in Australia, and increases with the value of the home purchased. Following Cho et al. (2024), the stamp duty is paid at the time of purchase and is given by

$$SD(P_h h') = P_h h' - \lambda_{sd} P_h h'^{1-\tau_{sd}}$$

where λ_{sd} governs the average level of the tax, and τ_{sd} governs the progressivity of the tax.[22]

Mortgages Homeowners make use of mortgages b to finance the purchase of their house. We make several assumptions about the use of mortgages.

First, mortgages are long-term contracts with a fixed amortization schedule that specifies a required repayment each period. This means that households cannot prepay a mortgage. The

[21]See Cho et al. (2023) for a model of the Australian housing market featuring household-landlords with multiple properties.

[22]This is the same functional form Heathcote et al. (2017) use to model progressive income taxation.

required mortgage payment on an outstanding mortgage balance b is

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

where r_b is the mortgage interest rate, and $M_j = 30 \times 4$ indicates a 30-year mortgage maturity at quarterly frequency.[23]

Second, all borrowing is via fully adjustable-rate mortgages. This is consistent with the fact that historically 80 percent of outstanding mortgages in Australia have held variable interest rates, a significantly higher share than in other advanced economies (Reserve Bank of Australia, 2023a).[24] The interest rate on a mortgage is $r_b = r + \psi$, where ψ is a fixed spread over the liquid asset interest rate r. Thus, the mortgage rate inherits the time-series properties of the deposit rate, as determined by the stochastic process in Section 3.3.

Third, mortgage origination b^* is subject to two constraints. In Australia, these constraints are a maximum loan-to-value (LTV) ratio and a maximum net income surplus (NIS) ratio. A mortgage under the LTV constraint is restricted by

$$b^* \leq \theta_b P_h h' \tag{4}$$

where θ_b is the maximum LTV ratio, and $P_h h'$ is the value of the home purchased or owned by the household. In addition to the constraint itself, borrowers with high-LTV ratio mortgages are required to pay lenders mortgage insurance (LMI). Borrowers with LTV ratios above θ_{lmi} make a one time insurance payment of $\tau_b b^*$ at origination. This payment cannot be rolled into or financed by the mortgage itself.

The NIS constraint is a servicing-based borrowing restriction, similar to the payment-to-income (PTI) ratio constraint introduced by Greenwald (2026). However, it captures institutional features of Australian mortgage markets that strongly emphasize the ability to service a mortgage given an assessment of available (i.e. surplus) income and the possibility of higher future interest rates. The NIS constraint is given by

$$\pi_j(b^*, \widehat{r}_b) \leq \theta_m (1-\alpha) m_j(z_j, Y) \tag{5}$$

where $\pi_j(\cdots)$ is the required mortgage payment, $\widehat{r}_b$ is the assessed mortgage interest rate, θ_m is the maximum borrowing capacity as a share of net surplus income, and $(1-\alpha)m_j(z_j, Y)$ is surplus income.

The net income surplus itself reflects income remaining after typical household spending (Australian Prudential Regulation Authority, 2022b). To calculate surplus income, mortgage originators typically require households to provide bank statements documenting their recent spending patterns excluding rental costs. We approximate this calculation under the assump-

[23]Karlman et al. (2021) set $M_j = \min\{30, J+1-j\}$, which means that households must repay their mortgage in full by the end of their life. Because many households still hold outstanding mortgage balances at retirement, we do not impose this restriction.

[24]Even fixed rate mortgages in Australia have relatively short fixed periods of around one to two years on average.

tions that households spend all of their income each period and that the expenditure share allocated to non-durable consumption is α. Net surplus income is then given by $(1-\alpha)m_j(z_j, Y)$.[25]

The assessed mortgage interest rate is given by $\widehat{r_b} = r_b + \phi$. As required by the Australian Prudential Regulation Authority (APRA), new mortgages must satisfy a NIS constraint evaluated at an interest rate that includes a servicability buffer (Australian Prudential Regulation Authority, 2022a). This buffer is an additional spread ϕ over the current market mortgage interest rate r_b. Note that the assessed rate is only used for the purpose of mortgage origination, but households repay mortgages in all future periods according to the actual mortgage rate r_b.

Mortgage Offset/Redraw Accounts Households have access to a mortgage product mimicking an Australian mortgage offset or redraw account.[26] Offset and redraw accounts enable borrowers to deposit or hold liquid assets against an outstanding mortgage balance to reduce accrued mortgage interest. Since $r_b > r$, mortgage holders with these accounts earn a higher effective rate of interest than they would in a standard deposit or savings account. Additionally, unlike the mortgage balance itself, assets held in these accounts remain liquid and can be drawn upon at any time with no additional cost. We assume that all liquid assets up to the size of the mortgage balance are held in the account. Any liquid assets held in excess of the mortgage balance, $\max\{a - b, 0\}$, earn the liquid asset interest rate r.

Note that these accounts do not change the required mortgage repayment $\pi_j(b, r_b)$ in a given period, but instead affect how mortgage interest is accumulated. For households repaying a mortgage the balance evolves according to:

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

Any liquid assets a held in the offset or redraw account reduce the interest accumulated on the mortgage balance b. Since the mortgage payment $\pi_j(b, r_b)$ is held fixed, mortgage balances are repaid more quickly under an offset or redraw account.

In contrast to Graham (2025), who models offset account costs and choices in detail, we assume that all households choosing to continue repaying an existing mortgage have access to a costless account. This is consistent with the fact that around 40 percent of Australian mortgage holders use an offset account, while all variable rate mortgages have access to a costless redraw account (La Cava et al., 2021b; Graham, 2025; Elias et al., 2025).

3.2. Household Decision Problems

A household enters age j with state variables $\mathbf{s} = \{a, h, b, z, S\}$ where a are liquid assets, h denotes owner-occupied housing size, b is the outstanding mortgage balance, z is the idiosyncratic component of income, and $S = \{r, Y, P_h\}$ is the aggregate state vector consisting of the interest rate r, aggregate income Y, and real house prices P_h.

Each period households make discrete choices over: renting (R), buying a new house (B), and continuing with scheduled mortgage repayments (M). The value function over the discrete

[25] Our assumptions mean that we can avoid keeping track of past spending as a state variable. It also implies that households cannot act strategically by reducing consumption and increasing their net income surplus in order to increase borrowing capacity.

[26] See discussions in La Cava et al. (2021b), Graham (2025), and Elias et al. (2025).

choice problem is characterized by:

$$V_j(\mathbf{s}) = \max\left\{V_j^R(\mathbf{s}), V_j^B(\mathbf{s}), V_j^M(\mathbf{s})\right\} \tag{6}$$

Renter Problem Renters choose the size of rental property s, non-durable consumption c, and liquid assets a'. The value function for renters is:

$$\begin{aligned} V_j^R(\mathbf{s}) = \max_{s,c,a'} \; & u(c,s) + \beta \mathbb{E}_{z',S'}[V_{j+1}(\mathbf{s}')] \\ \text{s.t.} \quad & c + P_r s + a' + b(1+r_b) = \\ & m_j(z,Y) + a(1+r) + (1-f_s)P_h h \\ & a' \geq 0, \; s \leq \underline{h}, \; h' = 0, \; b' = 0 \end{aligned} \tag{7}$$

where β is the discount factor, expectations $\mathbb{E}_{z',S'}$ are taken with respect to the evolution of next period idiosyncratic income z' and the aggregate state vector S'. Notice that a current renter may be selling a previously owned property h and repaying an outstanding mortgage b.

Home Buyer Problem Buyers choose a new home h', mortgage balance b^*, consumption c, and liquid assets a'. The value function for a home buyer is:

$$\begin{aligned} V_j^B(\mathbf{s}) = \max_{c,a',h',b^*} \; & u(c,h') + \beta \mathbb{E}_{z',S'}[V_{j+1}(\mathbf{s}')] \\ \text{s.t.} \quad & c + a' + (1 + f_b + \delta)P_h h' + SD(P_h h') + b(1+r_b) + \pi_j(b^*, r_b) = \\ & \qquad m_j(z,Y) + (1 - \mathbf{1}_{ltv \geq \theta_{lmi}} \tau_{lmi})b' + a(1+r) + (1-f_s)P_h h \\ & a' \geq 0, \; h' \in \mathcal{H}, \; ltv = \frac{b^*}{P_h h'} \\ & b^* \leq \theta_b P_h h' \\ & \pi_j(b^*, \widehat{r_b}) \leq \theta_m (1-\alpha) m_j(z_j, Y) \\ & b' = b^*(1+r_b) - \pi_j(b^*, r_b) \end{aligned} \tag{8}$$

Notice that a buying household sells any existing housing h, repays any outstanding mortgage debt b, and makes its first required payment on the new mortgage $\pi_j(b^*, r_b)$ within the period. The household faces transaction costs associated with buying and selling, pays stamp duty on the home purchase $SD(P_h h')$, and covers housing maintenance costs during the period. New borrowing is subject to both the LTV and NIS constraints, and high-LTV borrowing results in a lenders mortgage insurance payment.

Mortgage Payment Problem An existing homeowner that continues with mortgage repayments chooses consumption c and liquid assets a'. The value function is

$$
\begin{aligned}
V_j^M(\mathbf{s}) = \max_{c,a'} u(c,h) + \beta \mathbb{E}_{z',S'}[V_{j+1}(\mathbf{s}')] \quad (9) \\
\text{s.t.} \quad & c + a' + \delta P_h h + \pi_j(b, r_b) = \\
& \qquad m_j(z, Y) + a + r \max\{a - b, 0\} \\
& a' \geq 0, \ h' = h \\
& b' = b + r_b \times \max\{b - a, 0\} - \pi_j(b, r_b)
\end{aligned}
$$

where the household pays maintenance costs on their existing house. The liquid asset balance sits in the offset or redraw account and reduces interest owed on the mortgage. The mortgage then evolves according to the interest accumulated on net mortgage balances, less the required repayment. The household earns interest on any liquid assets held in excess of the mortgage balance.

3.3. Aggregate State Variables and Monetary Policy Shocks

The aggregate state vector $S = \{r, Y, P_h\}$ contains the real interest rate r, real aggregate income Y, and the real house price P_h. Rather than model these variables as outcomes of equilibrium in asset, goods, and housing markets, we assume that an exogenous, stochastic process governs their evolution. Specifically, the state vector S follows a first-order vector autoregressive (VAR) process (see Chen et al., 2020; Eichenbaum et al., 2022; Wong, 2021). The restriction on VAR lag-length is for computational tractability.

We estimate the VAR(1) using quarterly data for Australia over the final sample period 1993:Q1–2025:Q4. We begin in 1993 to capture the start of the inflation-targeting period of Australian monetary policy (Debelle, 2018). We end in 2025 to maximize the available sample period, but we account for the pandemic by including dummy variables for each of quarters during Australian COVID-19 restrictions, 2020:Q1–2022:Q3 (see Ng, 2021). We detrend the data using HP Filter, but we estimate trends over the longest sample available for each data series. The interest rate is the 90-day interbank rate in Australia, available from 1968:Q1 (Organization for Economic Co-operation and Development, 2025b). Aggregate income is real GDP, available from 1959:Q3 (International Monetary Fund, 2025). The house price is a residential house price index covering Australia's eight major cities, available from 1970:Q1 (Bank for International Settlements, 2025). We then construct real interest rates and prices using the CPI, available from 1959:Q1 (Organization for Economic Co-operation and Development, 2025a).

We estimate the VAR(1) on detrended data via OLS:

$$
S_t = A S_{t-1} + u_t \quad (10)
$$

where A is a 3×3 matrix of autoregressive coefficients, u_t is a 3×1 vector of reduced-form innovations, $u_t \sim \mathcal{N}(0, \Sigma)$, and $\Sigma = \mathbb{E}[u_t u_t']$ is the error covariance matrix.

The structural shocks can be recovered from $u_t = B\varepsilon_t$, where ε_t is a vector of orthogonal shocks and B is the impact matrix satisfying $BB' = \Sigma$. The k-th column of B gives the response of S_t to structural shock $\varepsilon_{k,t}$. Because the matrix B is not uniquely determined, we identify monetary policy shocks using rotation-based sign restrictions.[27] We impose sign restrictions on a column of B such that on impact a contractionary monetary policy shock results in: a rise in the real interest rate; a decline in real GDP; and a decline in real house prices.

While the sign-restricted VAR is set-identified, we need a single parameterization to embed the VAR in our heterogeneous household model. We select parameters from the feasible set whose VAR impulse responses are closest to the median impulse response function (IRF). Additionally, we adjust the covariance matrix to $\widehat{\Sigma} = B\mathbb{I}_{mp}B'$. The selection matrix $\mathbb{I}_{mp}$ is equal to one in the position of the monetary policy shock and is zero elsewhere. Thus, we only preserve variation in the VAR due to monetary policy shocks and discard variation generated by the full unconditional distribution of the VAR. The IRFs from a one standard deviation monetary policy contraction are illustrated in Figure 3.

Finally, we approximate the continuous-state VAR in the model by placing the aggregate state variables on a finite grid space, computing transition probabilities across states via Gaussian quadrature over the structural shocks ε_t, and interpolating value functions between grid points. The grid space is chosen to capture high probability points within the stationary distribution of the identified VAR. But we also require the grid to capture a reasonable approximation to counterfactual IRFs, such as those in which just one of the aggregate state variables deviates from steady state while the others are held constant (see our exercises in Section 5 below). For these reasons, we adopt a simple tensor grid rather than a more efficient non-tensor grid space (see, e.g. Gordon, 2021). For more detail, see Online Appendix B.

4. Calibration

We calibrate a subset of model parameters consistent with the existing macro-housing literature, Australian data, and institutional features of the Australian housing and mortgage markets. We then calibrate a small subset of parameters via a moment-matching algorithm to reproduce key statistics of Australian household wealth and housing market experiences. Australian person- and household-level data is taken from the 2019–2020 wave of the Survey of Income and Housing (SIH), covering over 15,000 households (Australian Bureau of Statistics, 2022). All model-based statistics are computed in the stochastic steady state.

4.1. Externally Calibrated Parameters

Table 1 reports our model parameters. Panel (a) reports parameters that are chosen based on information external to the model. The model period is one quarter. Households enter the model at age 20 and exit the model after retirement at age 65, so the total number of model periods is 180. We construct model population weights π_j for each age from Australian Demographic Statistics (Australian Bureau of Statistics, 2020). We fix the risk aversion parameter σ to 2.

The deterministic life-cycle profile of income Γ_j is estimated from person-level data in the SIH. We restrict the sample of households to those aged 20 to 65, in full-time employment, and with non-investment earnings of at least AU\$50 per week. We run an OLS regression of

[27] See Canova et al. (2002) for details. We implement the identification procedure using the VAR Toolbox by Cesa-Bianchi (2020).

log-earnings on a third-order polynomial in age, while controlling for sex, family type, position within family, country of birth, year of arrival in Australia, and highest level of education. Life-cycle income is illustrated in Panel (a) of Figure 2.

The persistence ρ_z and standard deviation σ_z of income shocks are taken from Cho et al. (2023). They estimate an idiosyncratic income process using panel data from the Household Income and Labour Dynamics in Australia (HILDA) survey from 2001 to 2015. HILDA is an annual survey, whereas our model is calibrated to a quarterly frequency. Assuming that income shocks are IID across quarters, we map parameters for the annual AR(1) process in Cho et al. (2023) to our quarterly model.[28] Table 1 reports the annualized values $\sigma_z^{annual}, \rho_z^{annual}$ from Cho et al. (2023).

We construct idiosyncratic income exposures $f(\Gamma_j, z_j, Y)$ to aggregate income fluctuations using estimates for Australian households reported in Stone (2016). For a sample of working-age Australian households, Stone (2016) find that the lowest (highest) quintile of income earners experience a 7.07 (-0.07) percent increase in income following a 1 percent increase in GDP.[29] Combining Equation (2) with the steady state distribution of household income, we set the parameters χ_1, χ_2, χ_3 to match the average income exposures across quintiles, as reported in Stone (2016).

Households enter the model without any housing assets or a mortgage. We assume that a fraction of households π_a enter with positive liquid assets, and they receive a fraction ω_a of their initial income in assets. We compute π_a and ω_a in the SIH data using a sample of households aged 20 to 22.

The steady state interest rate r is set to the average real 10-year Australian treasury yield over the years 2000 to 2019 (Organization for Economic Co-operation and Development, 2025c; Organization for Economic Co-operation and Development, 2025a). The mortgage interest rate spread $\psi = r_b - r$ is calculated from the average offered floating rate mortgage contract over the years 2000 to 2019 (Reserve Bank of Australia, 2023b).

The maximum LTV and NIS ratios are set to $\theta_b = 0.95$ and $\theta_y = 0.8$. The Australian Prudential Regulation Authority (APRA) has not imposed required maximum LTV ratios on Australian lenders, however, it reserves the right to do so and requires lenders to hold the ability to limit the extent of lending with LTV ratios of greater than or equal to 80 or 90 percent (see Attachment C of Australian Prudential Regulation Authority, 2022a). The Reserve Bank of Australia reports that the maximum allowable NIS ratio is 90 percent but a majority of mortgages have ratios of 70 percent or less (Reserve Bank of Australia, 2018). We set the LTV threshhold above which borrowers require lenders mortgage insurance to $\theta_{lmi} = 0.8$ (Reserve Bank of Australia, 2013). The insurance payment typically varies in the range of 1 to 5 percent across the house values and LTV ratios.[30] We set $\tau_{lmi} = 0.01$, which is consistent with borrowers close to but just above the 80 percent LTV threshold.

APRA sets mortgage lending regulations over required mortgage servicability buffers (Aus-

[28] The persistence parameter is given by $\rho_z = \left(\rho_z^{annual}\right)^{1/4}$ and the standard deviation is $\sigma_z = \sigma_z^{annual}/\sqrt{(}1 + \rho_z^2 + \rho_z^4 + \rho_z^6)$.

[29] Prior literature has estimated individual income sensitivities to aggregate income for the U.S. (Guvenen et al., 2017; Patterson, 2023) and European countries (Busch et al., 2022).

[30] See, for example, https://www.homeloanexperts.com.au/lenders-mortgage-insurance/lmi-premium-rates/.

tralian Prudential Regulation Authority, 2022a). These servicability buffers have varied between 2 and 3 percent over the last decade.[31] We use an annual servicability buffer ϕ of 2.5 percent.

For computational tractability, we assume that there are two available house sizes in the choice set $\mathcal{H}$. We set the size of the largest house relative to the smallest house $\overline{h}/\underline{h}$ equal to the ratio of owner-occupied house sizes at the 80^{th} percentile relative to the 20^{th} percentile (Australian Bureau of Statistics, 2022). Proportional house purchase and sale costs f_s and f_b are set at 1 and 2 percent, respectively, as reported in Fox et al. (2014). While stamp duty rates vary from Australian state to state, we take the estimated average progressivity τ_{sd} from Cho et al. (2024). We then set the level of the stamp duty tax λ_{sd} to generate an average stamp duty payment of 4 percent, which is consistent with the average national stamp duty rate in 2019 as reported in Cho et al. (2024). The maintenance cost of housing δ is set to 2 percent at an annual rate Cho et al. (2023). As house prices and house sizes jointly determine the overall purchase cost of housing, we normalize the steady state house price P_h to 1. We also normalize aggregate income Y to 1 in steady state.

4.2. Internally Calibrated Parameters

Panel (b) of Table 1 reports model parameters chosen via a moment-matching algorithm. We choose five parameters $\{\beta, \omega, \alpha, \kappa, \underline{h}\}$ to match the observed statistics reported in Table 2. Again, all of our targeted moments are computed from Australian household data in the 2019–2020 wave of the SIH. We briefly describe our approach to identification below.

The discount factor β governs wealth accumulation in the model. But because we only capture a limited set of assets, we do not expect to be able to match the overall wealth distribution. Further, our primary focus in this paper is the transmission of monetary policy to the housing market, which largely occurs through the use of mortgage finance. For these reasons, we set β to target the average LTV ratio for homeowners with a mortgage. The retirement utility parameter governs the level of wealth that households accumulate for retirement, so we set ω to target the ratio of total networth for households aged 50–65 relative to households aged 20–50. We define networth in the model and data as liquid asset holdings, plus the value of owner-occupied housing, less owner-occupied housing mortgages. We set the non-durable consumption share α in the utility function to target the median rental costs-to-income ratio among renters. We set the rental rate wedge κ to target the overall homeownership rate. Finally, we set the minimum house size $\underline{h}$ to target the homeownership rate for households aged 20–35.

Table 2 reports the model fit to statistics targeted in the calibration. The model very accurately captures average mortgage leverage, relative wealth holdings, and rental housing costs. Meanwhile, the model somewhat overstates the overall homeownership rate and slightly understates homeownership among young households.

Figure 2 compares various statistics in the model and the data (Australian Bureau of Statistics, 2022). Panels (a) to (c) show the life-cycle profiles of income, homeownership, and mortgage LTV ratios, while Panel (d) shows the homeownership rate across the household income

[31] See, for example, historical directives on buffers to be applied to mortgage lending: https://www.apra.gov.au/news-and-publications/apra-finalises-amendments-to-guidance-on-residential-mortgage-lending and https://www.apra.gov.au/sites/default/files/2021-10/Letter%20to%20ADIs_Strengthening%20residential%20mortgage%20lending%20assessment.pdf.

Table 1: Model Parameters

Parameter	Symbol	Value	Source
Panel (a): Externally Calibrated Parameters			
Model period		1 quarter	Authors
Minimum age		20	Authors
Retirement age		65	Authors
Population age weights	π_j	·	ABS
Risk aversion coefficient	σ	2	Authors
Life-cycle income profile	Γ_j	·	SIH
AR(1) income, persistence	ρ_z	0.9400	Cho et al. (2023)
AR(1) income, std. dev. shocks	σ_z	0.1730	Cho et al. (2023)
Income exposure to GDP, intercept	χ_1	-0.1797	Stone (2016)
Income exposure to GDP, coefficient	χ_2	24.4228	Stone (2016)
Income exposure to GDP, curvature	χ_3	-1.3931	Stone (2016)
Fraction with positive assets at $j = 0$	π_a	0.9600	SIH
Fraction of initial income in assets at $j = 0$	ω_a	0.7350	SIH
Interest rate on bonds	r	0.0133	OECD
Mortgage interest rate spread	ψ	0.0235	RBA
Maximum LTV ratio	θ_b	0.9500	See text
LTV ratio threshhold for LMI	θ_{lmi}	0.8000	RBA
Proportional LMI cost	τ_b	0.0100	See text
Maximum NIS share	θ_m	0.8000	See text
Mortgage servicability buffer	ϕ	0.0250	APRA
Proportional house sale cost	f_s	0.0200	Fox et al. (2014)
Proportional house purchase cost	f_b	0.0100	Fox et al. (2014)
Stamp duty tax progressivity	τ_{sd}	0.0090	Cho et al. (2024)
Stamp duty tax level	λ_{sd}	0.9835	See text
Housing maintenance cost	δ	0.0200	Cho et al. (2023)
Largest house size/smallest house size	$\overline{h}/\underline{h}$	2.4500	SIH
Proportional house sale cost	f_s	0.0200	Fox et al. (2014)
Proportional house purchase cost	f_b	0.0100	Fox et al. (2014)
Stamp duty tax progressivity	τ_{sd}	0.0090	Cho et al. (2024)
Stamp duty tax level	λ_{sd}	0.9835	See text
Housing maintenance cost	δ	0.0200	Cho et al. (2023)
Panel (b): Internally Calibrated Parameters			
Discount factor	β	0.918	Calibrated
Utility weight on retirement wealth	ω	276.726	Calibrated
Nondurable consumption share	α	0.785	Calibrated
Rental rate wedge	κ	0.063	Calibrated
Minimum house size	$\underline{h}$	14.739	Calibrated

Notes: Interest rate, mortgage rate spread, servicability buffer, housing maintenance cost, AR(1) income parameters, and discount factor reported at annual frequencies.

distribution. All households begin as renters and slowly move into homeownership over their working lives. Around half of all households become homeowners by age 35 and the ownership rate continues to grow, albeit more slowly, until retirement.

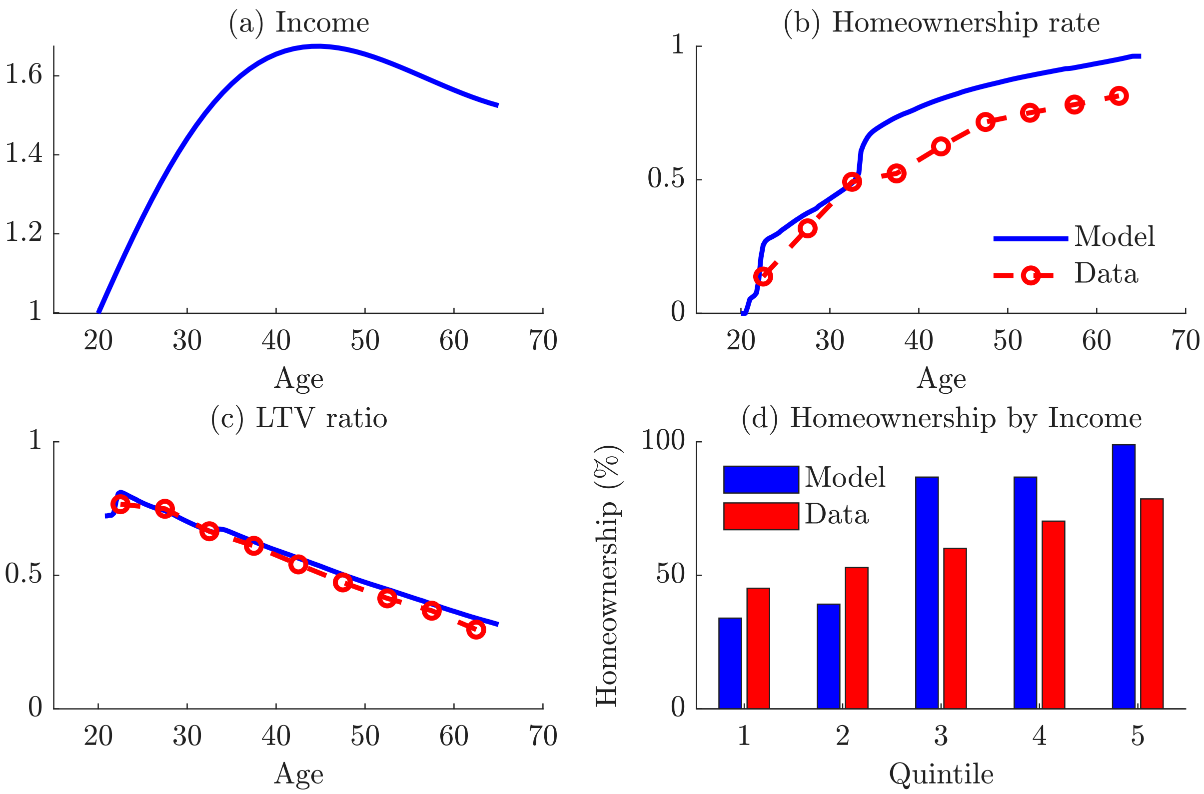
The biggest barrier to homeownership for young households is the downpayment required to purchase a house. Young households begin life with little or no wealth, and must accumulate liquid assets prior to house purchase. This is easier to accomplish for higher-income households,

Table 2: Model Fit to Targeted and Untargeted Statistics

Moment	Data	Model	Source
Mean LTV ratio, owners with mortgage	0.5160	0.5194	SIH
Aggregate networth, $j \geq 50/j < 50$	1.3625	1.3680	SIH
Median rent-to-income ratio, renters	0.2156	0.2147	SIH
Homeownership rate	0.6142	0.6718	SIH
Homeownership rate, age $\leq$ 35	0.3814	0.3619	SIH

Notes: Networth defined in model and data as liquid assets plus owner occupied house value less owner occupied home mortgage debt. Annual income used for the rent-to-income ratio.
Source: Authors' calculations using data from the 2019 Survey of Income and Housing (Australian Bureau of Statistics, 2022).

Figure 2: Model fit to data across the life-cycle



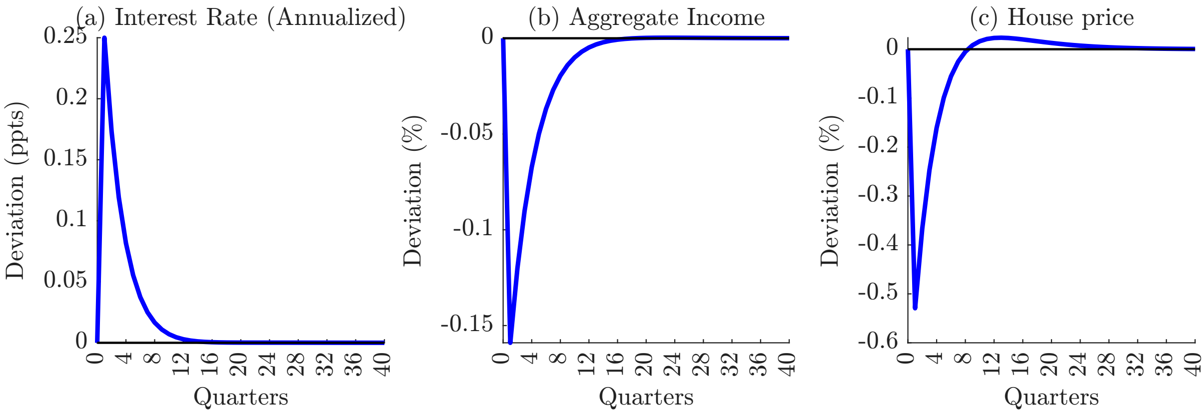
Source: Authors' calculations using data from the 2019 Survey of Income and Housing (Australian Bureau of Statistics, 2022).

hence the greater propensity for ownership at the top of the income distribution. First-time homebuyers tend to borrow up to the largest feasible mortgage implied by their LTV or NIS constraints. Thus, the average mortgage LTV ratio sits at around 80 percent for the youngest households. After borrowing to enter the housing market, the fixed mortgage amortization schedule implies a near-linear decline in mortgage balances over the life-cycle.

5. Effects of Monetary Policy Shocks

We now study the effects of monetary policy within the model. To do this, we simulate a shock that is transmitted via the aggregate state variables embedded in the VAR. In our baseline results we report the effects of an annualized 25 basis point contractionary monetary policy shock, as illustrated by the IRFs in Figure 3.[32] On impact, aggregate income falls by 0.15 percent, and house prices fall by 0.5 percent. The responses are persistent, with interest rates and incomes returning to steady state around 12 to 16 quarters after the shock, while house prices initially overshoot and return to steady state after 28 quarters. Figure C.1 in Online Appendix C also shows that rents P_r increase in response to the monetary contraction, following the user cost formula. Finally, we note that these IRFs from the estimated VAR are consistent with recent empirical literature on the effects of monetary policy in Australia.[33]

Figure 3: Aggregate State Variable IRFs to Contractionary Monetary Policy Shock



Notes: IRFs in response to a one standard deviation contractionary monetary policy shock. Aggregate state variables follow the estimated VAR from Equation (10).
Source: Authors' calculations using data from Organization for Economic Co-operation and Development (2025b), International Monetary Fund (2025), Bank for International Settlements (2025), and Organization for Economic Co-operation and Development (2025a).

In our baseline experiments we first illustrate the total impact of the monetary policy contraction, as given by the combined effect of the aggregate shocks. In our figures below, these effects are illustrated in IRFs with solid blue lines. We then consider the isolated impacts of the interest rate, aggregate income, and house price channels of monetary policy. We feed IRFs from each of Panels (a), (b), and (c) through the model one at a time, holding the other aggregate state variables at steady state. In the figures below, these effects are illustrated with dashed lines labelled "R_t only", "Y_t only", and "$P_{h,t}$ only". Note, however, that households hold rational expectations over the evolution of the VAR conditional on the current aggregate state vector.[34] We explore the importance of the household expectations channel in Section 5.5.

[32] In Figure C.4 in Online Appendix C we consider the effect of larger contractionary shocks and expansionary shocks. And in Section 6 we compare the welfare consequences of contractionary and expansionary shocks.

[33] The IRFs imply that an annualized 100 basis point contraction is associated with a 0.6 percent decline in income, and a 2 percent decline in house prices. Using identified VARs, Hartigan et al. (2020) and Beckers (2020) estimate that real output declines by around 1 percent in response to an annualized 100 basis point monetary contraction. Using both VAR and local projection methods, Fry et al. (2010), La Cava et al. (2021a), and Graham et al. (2023) estimate real house prices fall by between 1 and 4 percent following a 100 basis point contraction.

[34] We illustrate conditional forecasts from the VAR model in Figure C.2 in Online Appendix C.

In addition to the separate macroeconomic channels at work, the effects of monetary policy shocks also depend on the stringency of mortgage borrowing constraints (Section 5.2), housing and mortgage market features (Section 5.3), macroeconomic characteristics (Section 5.4), and household expectations about the future (Section 5.5). We explore the importance of each of these mechanisms in turn.

5.1. Response to Monetary Policy Shocks in the Baseline Model

Overall, the contractionary monetary policy shock reduces economic and housing market activity as illustrated in Figure C.3 of Online Appendix C. Due to the fall in house prices, households experience a sharp decline in networth. The fall in income forces households to draw down on liquid assets in order to smooth expenditures. Nevertheless, consumption falls on impact and recovers slowly. In the housing market home purchases fall, homeownership declines, and the size of the owner-occupied housing stock is reduced. At the same time, households deleverage with a reduction in both mortgage borrowing and LTV ratios. There is also a significant decline in offset account balances.[35]

As reported in our empirical work, our model shows that home purchases decline sharply at the time of the shock. Figure 4 shows that total home purchases and first-time buyer purchases fall by around 12 and 14 percent, respectively. For comparison, the point estimates from our empirical VARs in Section 2 suggest that a 25 basis point monetary contraction is associated with a 5 percent decline in home purchases. When the macroeconomic channels of the monetary policy shock are considered in isolation, we find that higher interest rates substantially reduce home purchases, lower incomes moderately decrease home purchases especially for first-time buyers, and lower house prices initially raise home purchases.

Figure 4: Response of Home Purchases to Monetary Policy Shock

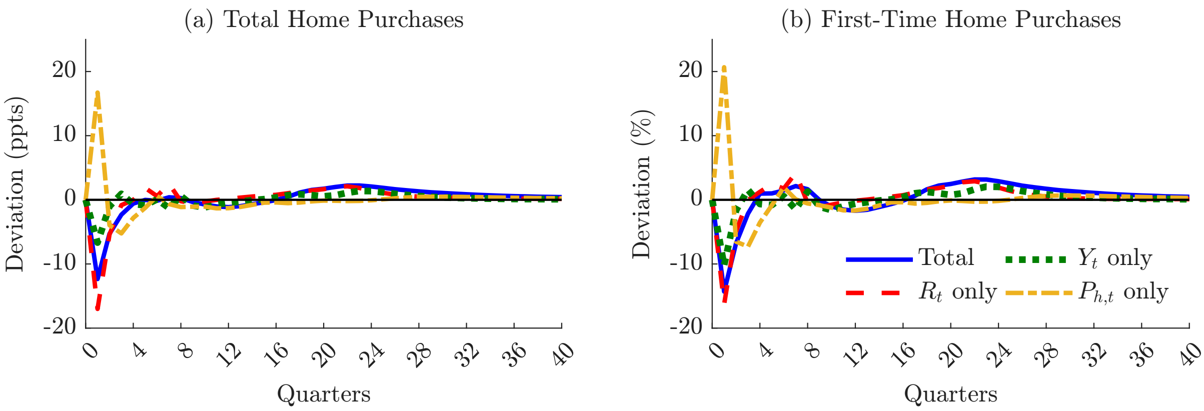


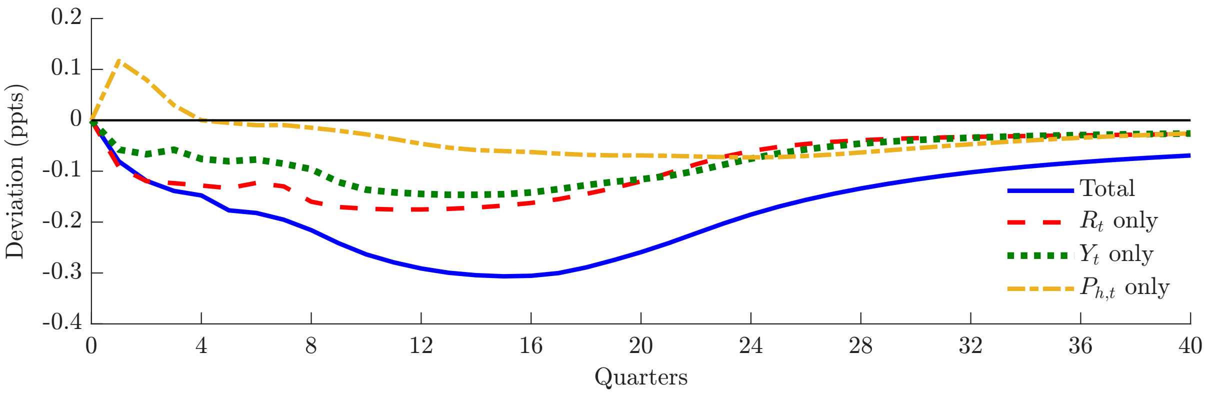
Figure 5 illustrates our headline result, showing the effect of the monetary contraction on the overall homeownership rate. Homeownership declines on impact, continues to fall for 4 years, and has not completely recovered 40 quarters, or 10 years, later. Importantly, the effects of the monetary policy shock are much more persistent than the underlying aggregate state variables themselves. At its trough, the homeownership rate sits around 0.3 percentage points below

[35] This is consistent with Elias et al. (2025), who argue that Australian households used redraw account balances in order to smooth expenditure during the monetary policy tightening cycle beginning in 2022.

its steady state level. In isolation, we find that higher interest rates have the largest impact initially. Higher rates both raise the ongoing cost of mortgage finance and tighten mortgage borrowing constraints through the NIS requirement. The effect of lower aggregate incomes is smaller at first, but builds over the next 4 years. Lower incomes reduce the ability to service a mortgage, tighten the NIS borrowing constraint, and deplete household savings that can be used for a home deposit. Lower house prices initially raise homeownership, as expected. However, homeownership quickly declines and falls below steady state for several years.

The negative effect of lower house prices may seem puzzling. But the reversal in the homeownership rate is a result of the expectations channel. Figure C.2 in Online Appendix C illustrates the conditional forecasts household make along the R_t-, Y_t-, and $P_{h,t}$-only IRFs. Panel (i) shows that the house price forecast along the $P_{h,t}$-only IRF is extremely persistent relative to the realized path of prices. Along this IRF, households are repeatedly surprised to find that house prices are much higher than they expected. This puts downward pressure on both home purchases and homeownership rates.

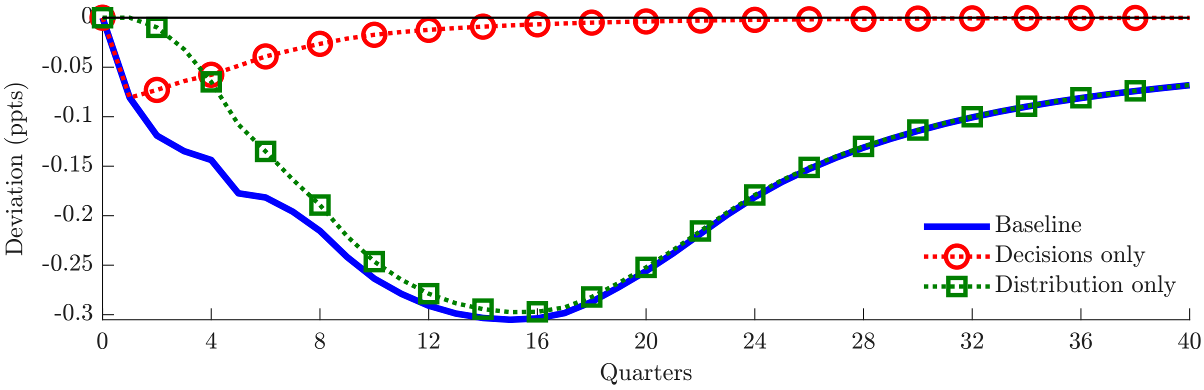
Figure 5: Response of Homeownership to Monetary Policy Shock



The excess persistence of the homeownership response is explained by the persistence of changes in the household wealth distribution. In Figure 6 we decompose the overall ownership response into effects due to household decisions and the household wealth distribution, respectively. First, we report the result of tracking household decisions along the IRF while holding the wealth distribution fixed as it is in steady state (red circle markers). The persistence of the homeownership response in this experiment matches the persistence of the aggregate state variables themselves. Second, we report the result of tracking the wealth distribution as it evolves along the IRF while holding household decisions fixed as they are in steady state. These distributional effects are much larger, and produce homeownership responses over the medium-term identical to those in Figure 5. Thus, it is predominantly the endogenous evolution of the wealth distribution that accounts for homeownership dynamics, rather than the strength of behavioral responses to the shocks.

Figure 7 illustrates the responses of homeownership by household age. Grouping households into 15-year age bins, we find that young households are the most negatively affected by the monetary policy contraction on impact. Young households are also particularly sensitive to changes in interest rates and aggregate income. As many of these households are constrained by NIS restrictions on mortgage originations, they experience sharp declines in borrowing capacity

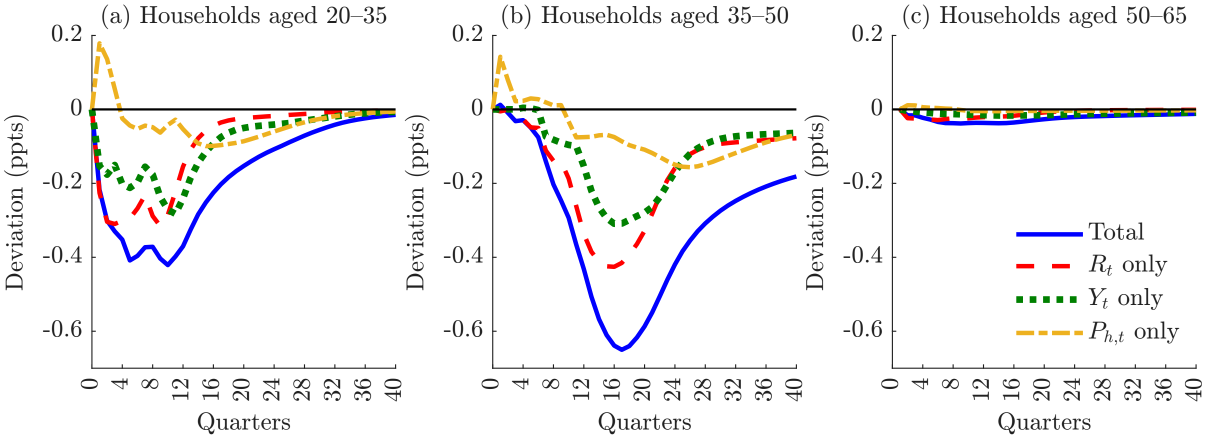
Figure 6: Response of Homeownership, Decisions versus Distributions



as a result of the rise in rates and fall in incomes (see Table 3). Further, as these households have lower income levels in the first place, they are both more exposed to cyclical income shocks and have less income and savings to cover increases in required home deposits and the higher cost of mortgage finance.

In contrast to young households, there is very little change in middle-aged homeownership initially. However, compositional changes have a substantial impact over the medium term. As young households age into the middle age group, their prior failure to enter homeownership when young is carried forward. Homeownership among the oldest group of households is largely unaffected by monetary policy shocks.

Figure 7: Responses of Homeownership by Age



Finally, we compare our results to those in Dias et al. (2022), who model a general equilibrium housing market within a two-agent, New Keynesian economy. Following a 25 basis point increase in the monetary policy rate, they report a 0.25 percentage point decline in the homeownership rate on impact, with a smooth, monotonic return to steady state around 20 quarters later. Following the same size of shock, Figure 5 illustrates an impact effect on homeownership of 0.1 basis points. However, the trough occurs 4 years later, and a return to steady state takes more than 10 years. The difference in the persistence of effects across models is entirely due to the endogenous wealth distribution. As illustrated in Figure 6, removing the influence of the wealth distribution in our model leads to a less persistent, monotonic homeownership response, very similar to Dias et al. (2022).

5.2. Mortgage Borrowing Constraints

For potential homebuyers, changes in monetary policy can affect the affordability of both mortgage repayments and the required downpayment on a new home purchase. Much of this effect occurs through the NIS constraint on mortgage borrowing, which is a function of mortgage interest rates and household incomes.

In Table 3 we illustrate the importance of this constraint. First, we compute the fraction of households whose mortgage borrowing is dominated by the NIS constraint.[36] For each household, we compute the maximum mortgages allowed under the LTV constraint and the NIS constraint, assuming households purchase the smallest house size. Households for which $b^*_{LTV} > b^*_{NIS}$ are NIS dominated. We find that nearly all renters, one-third of homebuyers, and almost half of first-time homebuyers would be NIS dominated in their mortgage borrowing. We also consider marginal homebuyers, defined as those whose absolute gap between the value functions for buying and renting, $|V_j(\mathbf{s})^B - V_j(\mathbf{s})^R|$, is within the 5^{th} percentile of gaps across all buying and renting households in the steady state distribution. Around half of marginal homebuyers and 75 percent of marginal first-time home buyers are NIS dominated. Thus, the marginal households contributing to changes in the homeownership rate are likely to be highly sensitive to changes in inputs into the NIS constraint.

Table 3 also shows how the borrowing capacity of NIS-dominated homebuyers is affected by the monetary contraction. We define the change in borrowing capacity as $\Delta b^*_{NIS}/m_j(z, Y)$. The first row reports changes due to both interest rate and income fluctuations, while the remaining two rows report the effect due to these fluctuations in isolation. Overall, the monetary contraction cuts borrowing capacity by between 34 and 46 percent of current income. For marginal first-time homebuyers, around two-thirds of the decline in borrowing capacity is due to the interest rate effect alone. The decline in ability to borrow raises the downpayment required to purchase a home, which pushes home purchases out of reach for many households. Thus, NIS-dominated borrowers in our model may be extremely sensitive to monetary policy fluctuations.

We now study the impact of mortgage borrowing constraints on the transmission of monetary policy shocks. To do this, we simulate the effects of the monetary contraction under alternative models in which each borrowing constraint is relaxed in turn. Our results are illustrated in Figure 8.

Removing the LTV constraint (red circle markers) leads to a slightly larger decline in homeownership relative to the baseline model following the shock. In the absence of the LTV constraint, more households are likely to be on their NIS constraints, and are thus more sensitive to interest rate and income fluctuations. In contrast, removing either the NIS constraint (green square markers) or the mortgage serviceability buffer (yellow triangle markers) substantially reduces the volatility of homeownership following the shock. In the absence of the NIS constraint, borrowing constraints are no longer sensitive to interest rate or income fluctuations. Homeownership rises in the short term due to lower house prices, and falls over the medium-term due to

[36] This follows a similar exercise in Ma et al. (2021).

Table 3: Distribution of Mortgage Borrowing Constraints for Potential Homebuyers

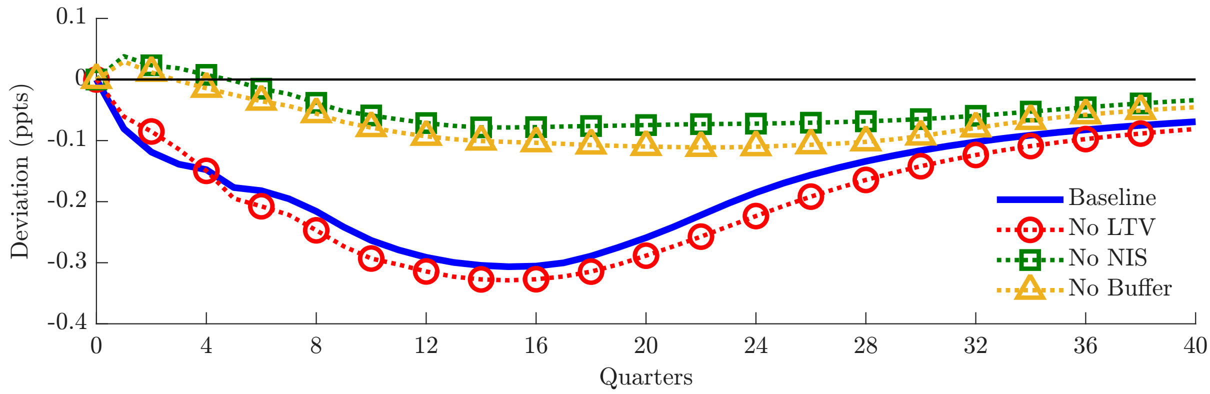
	All Renters	All Buyers	New Buyers	Marginal Buyers	Marginal New Buyers
Fraction with NIS-dominated borrowing	0.93	0.33	0.45	0.49	0.75
Change in borrowing capacity, NIS constraint					
Total	-0.35	-0.27	-0.28	-0.28	-0.37
R_t only	-0.24	-0.24	-0.24	-0.24	-0.24
Y_t only	-0.11	-0.03	-0.04	-0.04	-0.12

Notes: First row reports fraction of household groups that would be constrained by the NIS ratio when purchasing smallest house size. Remaining rows report the change in borrowing capacity under the NIS constraint, given by $\Delta b^*_{NIS}/m_j(z,Y)$. Effects calculated due to peak change in all aggregate state variables, and peak changes in interest rates and aggregate income only. Marginal buyers are those for whom $|V^B - V^R|$ is within 5 percent of the distribution of gaps among all buyers and renters.

the negative effect of low incomes on savings. The removal of the serviceability buffer operates through similar mechanisms.

Our results follow a recent literature that models both loan-to-value and payment-to-income constraints in order to understand housing market boom and bust dynamics (Greenwald, 2026; Ma et al., 2021; Kinnerud, 2025; Balke et al., 2023). In particular, our results are consistent with Greenwald (2026) who shows that U.S. mortgage borrowers under binding payment-to-income constraints are more sensitive to monetary policy than they would be under LTV constraints alone. In these models, payment-based constraints expose mortgage borrowing to the direct effects of monetary policy shocks, which can lead to large fluctuations in housing market and economic activity.

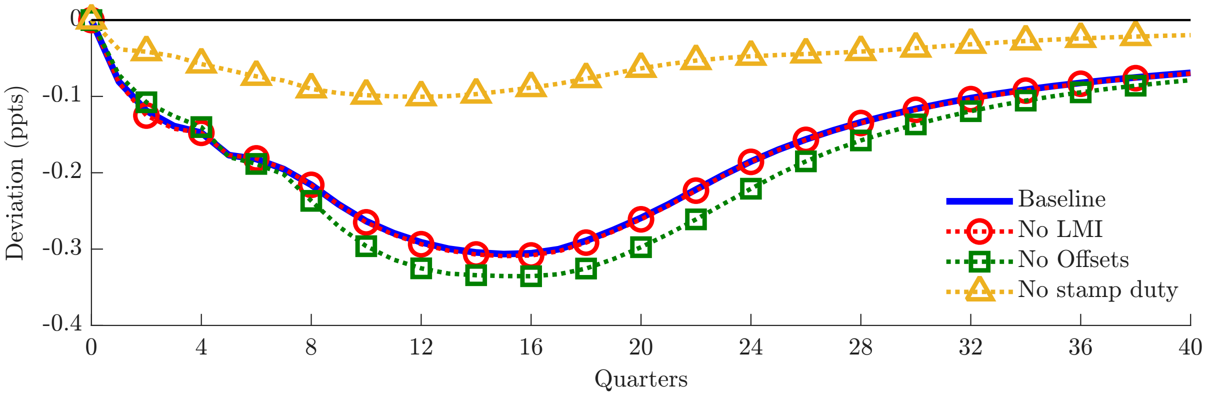
Figure 8: Homeownership Varying Borrowing Constraints



5.3. Housing and Mortgage Market Features

Homeownership is also influenced by other institutional features of Australian housing and mortgage markets. Recall that lenders mortgage insurance increases the cost of high-LTV ratio borrowing, mortgage offset accounts reduce the long-term cost of mortgage debt, and stamp duty is a tax that increases the up-front cost of home purchase. Figure 9 illustrates the effect of removing these features, one at a time.

Figure 9: Homeownership Varying Housing and Mortgage Market Features



Removing LMI (red circle markers) has virtually no effect on homeownership dynamics. While around 30 percent of first-time home buyers originate high-LTV ratio mortgages that require LMI, these are high-earning households that are not marginal buyers in the face of monetary policy shocks.

Removing mortgage offset accounts (green square markers) results in a small increase in the volatility of homeownership following the monetary contraction. In the absence of an offset account, mortgage holders must pay the interest cost of their mortgage in full, reducing the incentive to purchase a home particularly when interest rates are high. However, since the interest savings generated by an offset account accrue far in the future they are less important for decision-making than other short-term considerations. Additionally, the benefits of an offset account are primarily enjoyed by high-liquid wealth households who are less likely to be marginal homebuyers in the first place.[37] However, while offset accounts are relatively unimportant for explaining homeownership dynamics, Figure C.6 in Online Appendix C shows that removing offset accounts does lead to greater consumption volatility following a shock. This result is consistent with the dampening effects of offset accounts reported in Elias et al. (2025).

Eliminating the stamp duty tax (dash-dotted yellow line) significantly reduces the sensitivity of homeownership to the monetary policy contraction. Since stamp duty is a large up-front payment that cannot be financed with mortgage borrowing, it acts to increase the effective downpayment on a home. Without stamp duty, households can accrue and hold smaller liquid asset balances prior to purchase. Alternatively, the same sized savings balance can be used to smooth expenditure following a shock. Related to our findings, Cho et al. (2024) show that removing stamp duty increases the steady state level of homeownership and house prices in an equilibrium model of the Australian housing market.

5.4. Macroeconomic Features

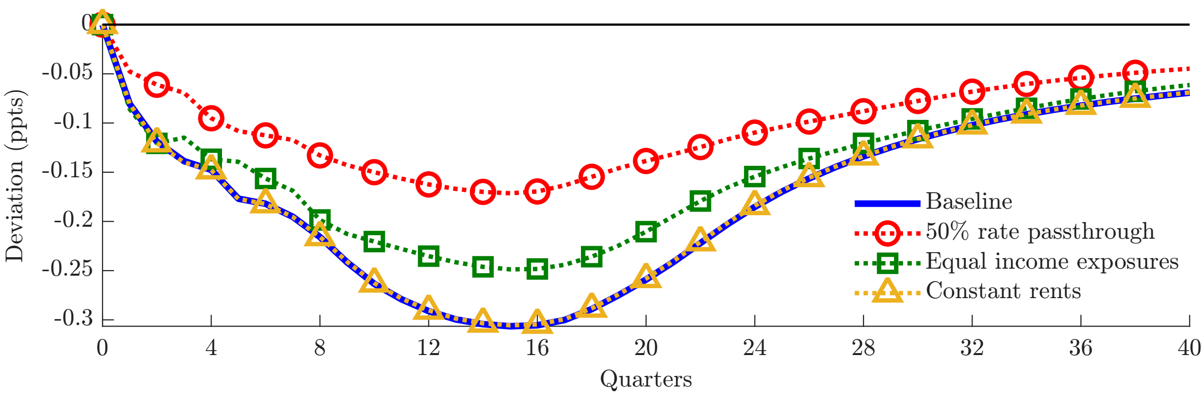
The response of homeownership to monetary policy also depends on various features of the macroeconomy. Figure 10 illustrates the impact of these features. In the first experiment, we reduce interest rate pass-through from 100 percent to 50 percent (red circle markers). In the second experiment, we set all household-level income exposures $f(\Gamma_j, z_j, Y)$ equal to the median

[37] See also Graham (2025).

exposure from the baseline model (green square markers). And in the third experiment, we hold rents constant at their steady state value P_r (yellow triangle markers).

Unsurprisingly, reducing monetary policy pass-through to mortgage interest rates significantly reduces the sensitivity of homeownership to monetary policy shocks. Since interest rates are the primary force influencing homeownership in the short run, there is a much smaller impact on homeownership over the course of the shock. Compressing the distribution of exposures to aggregate income also reduces the sensitivity of homeownership to the shock. Households that would have been heavily exposed to the fall in aggregate income now lose less cumulative income than in the baseline model. This allows them to preserve more of their liquid savings, which can then be used to purchase a home. Finally, holding rents constant has effectively no influence on the path of homeownership. This is because the decisions of marginal homebuyers are dominated by the influence of borrowing constraints rather than changes in the relative price of housing services.

Figure 10: Homeownership Varying Macroeconomic Features



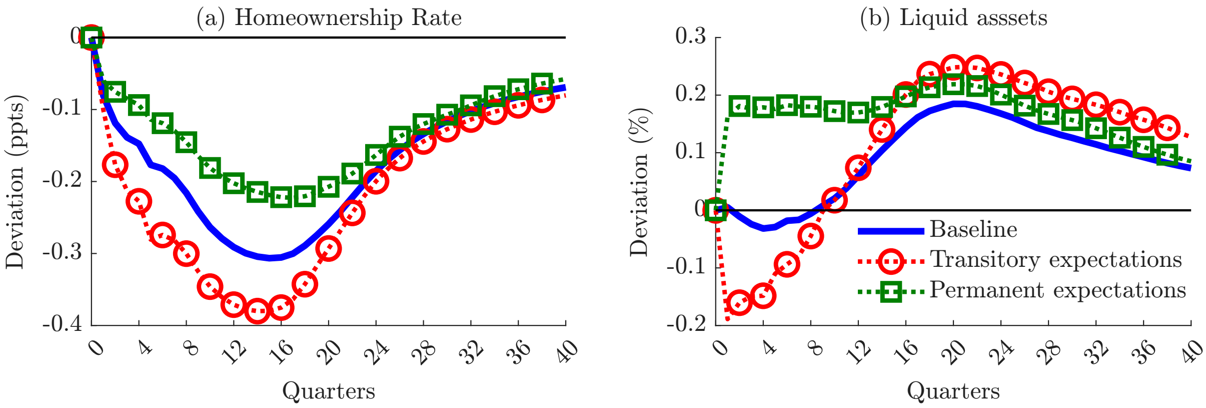
5.5. Household Expectations and Beliefs

We also study the role of household expectations and beliefs about the evolution of the aggregate states in the transmission of monetary policy shocks. Figure 11 illustrates our results. In our first experiment, we assume that regardless of the current aggregate state vector households expect an immediate return to steady state next period (red circle markers). To do this, we set all the entries of the aggregate VAR coefficients matrix A to zero. In the second experiment, we assume that households believe that all shocks are permanent (green square markers). That is, households believe that the aggregate states follow a random walk. To implement this, we set the aggregate VAR coefficients matrix A to the identity matrix.

Note that in each experiment, households are repeatedly mistaken about the actual realization of the aggregate states in the next quarter. In particular, households with transitory and permanent expectations are overly optimistic and pessimistic, respectively.

Panel (a) shows that the homeownership rate is more responsive to monetary policy shocks under transitory expectations, and less responsive under permanent expectations. Panel (b) shows how the savings behavior of these households is affected by the shock. Households with transitory expectations deplete their savings faster, since they do not believe they will need them as the effects of the monetary contraction will revert next period. Households with permanent expectations increase their savings since they believe that interest rates will remain high and income will remain low into the future. Thus, pessimistic households have run down savings balances that could be used to purchase homes in the future, while optimistic households have excess savings balances ex-post that can be used to increase home purchases in the future. These results show that beliefs and expectations about the evolution of monetary policy are important determinants of housing market sensitivity to shocks.

Figure 11: Homeownership Varying Household Expectations



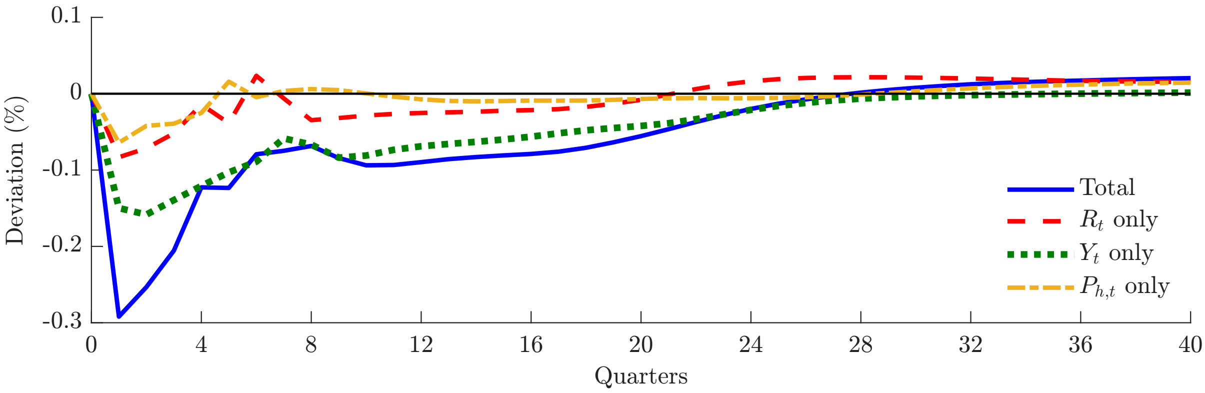
5.6. Consumption Responses to Monetary Policy Shocks

Although not the primary focus of our paper, we also report the response of non-durable consumption to the monetary policy shock. Figure 12 shows that consumption falls sharply on impact. Additionally, we find that the decline is largely driven by falling aggregate income, with the rise in interest rates and fall in house prices having smaller effects. This stands in contrast to the strong interest rate effect on homeownership dynamics. However, it is consistent with results from the HANK literature, showing that income effects on household expenditure dominate the traditional intertemporal substitution channel (Kaplan et al., 2018).

Figure C.5 in Online Appendix C shows that young households are more sensitive to monetary policy than are older households. The composition of the consumption response also varies across households, with young households most sensitive to income effects and older households more affected by housing wealth effects.

Finally, Figure C.6 illustrates consumption responses under each of our alternative models discussed above. While housing and mortgage market features have relatively minor impacts, we find that idiosyncratic exposures to aggregate income and household expectations about monetary policy have substantial impacts on the size of the consumption response to a shock.

Figure 12: Response of Household Consumption to Monetary Policy Shock



6. Welfare Costs of Monetary Policy Shocks

Finally, we consider the welfare costs of monetary policy shocks. Due to household heterogeneity in age, income, assets, and housing, there is substantial variation in the impact of a shock. In response to a contraction, for example, higher interest rates hurt borrowers but benefit savers, lower incomes disproportionately hurt poorer households, and lower house prices benefit home buyers but represent negative wealth effects for existing homeowners.

To measure welfare costs we use a Consumption Equivalent Value (CEV) measure, which we define as the percentage of life-time (total) consumption that households would be willing to forgo to avoid monetary policy shocks.[38] We first report welfare costs conditional on 25 basis point contractionary and expansionary shocks. CEVs are computed in the first period of the shock relative to the steady state where interest rates, aggregate income, and house prices are at their long-run values. We also report welfare costs for households in the steady state of the baseline model relative to a model in which the probability of monetary policy shocks is set to zero.

Table 4 reports welfare costs different groups of households. We fix groups of renters, homeowners, and potential homebuyers to households who would make those decisions in the steady state of the baseline model, even if they would choose differently following a shock. Panel (a) reports the overall effect of a contractionary monetary policy shock, as well as the effects of components of the shock in isolation. On average, households experience welfare losses equivalent to 0.1 percent of lifetime consumption. Renters fare worse with 0.2 percent losses, while homeowners experience just 0.05 percent losses. Potential homebuyers and potential first-time homebuyers experience substantial losses, equivalent to 2.3 and 3.6 percent of lifetime consumption, respectively. For potential homebuyers, interest rate rises in isolation are the most costly component of the shock, declines in income are also harmful, and lower house prices provide a modest gain. While interest rate and income shocks have relatively small impacts on other household groups, for homebuyers these changes sharply tighten borrowing constraints

[38] A household has value function $V_j(\mathbf{s})$ at age j, state vector $\mathbf{s}$. The same household has value function $\widehat{V}_j(\mathbf{s})$ in an alternative model with no shock. Then the CEV is given by an effective tax on total consumpton equal to $\tau_j(\mathbf{s}) = 1 - \left(\frac{\widehat{V}_j(\mathbf{s})}{V_j(\mathbf{s})}\right)^{\frac{1}{1-\sigma}}$. We compute average CEVs across household groups using the stationary distribution of households in the baseline model.

Table 4: Welfare Costs of Monetary Policy

	All Households	Renters	Owners	Potential home buyers	Potential first home buyers
Panel (a) Contractionary Monetary Policy Shock					
Combined shocks	0.10	0.20	0.05	2.27	3.56
R_t shocks only	0.03	0.07	0.01	1.85	2.86
Y_t shocks only	0.05	0.12	0.03	0.35	0.54
$P_{h,t}$ shocks only	0.05	0.13	0.01	-0.08	-0.09
Panel (b) Expansionary Monetary Policy Shock					
Combined shocks	-0.03	0.03	-0.05	0.07	0.08
R_t shocks only	-0.00	0.02	-0.01	-0.01	-0.01
Y_t shocks only	-0.05	-0.10	-0.03	-0.01	-0.02
$P_{h,t}$ shocks only	0.01	0.06	-0.01	1.36	2.09
Panel (c) All Monetary Policy Shocks					
Combined shocks	0.04	0.09	0.02	0.02	0.02

Notes: All welfare costs computed as Consumption Equivalent Values (CEVs). Positive CEVs reported as fraction of life-time consumption households willing to forgo to avoid monetary policy shocks. Panels (a) and (b) report CEVs in the first period of the IRF following a standard deviation contractionary and expansionary monetary policy shocks, respectively, and relative to the steady state. Panel (c) reports CEVs in the steady state of the baseline model relative to steady state in a counterfactual with no possibility of monetary policy shocks.

right at the time that these households are planning to buy a home.

Panel (b) reports the effects of a monetary policy expansion. Symmetric to Panel (a), the benefits of an expansion to all households, renters, and homeowners are relatively mild. However, potential homebuyers again experience welfare losses, in this case equivalent to around 0.1 percent of lifetime consumption. While homebuyers experience mild gains from lower interest rates and higher incomes, they face substantial losses of 2.1 percent of lifetime consumption following the rapid rise in house prices. In combination, the substantial harm from higher house prices alone is mostly offset by the increase in borrowing capacity due to lower interest rates and higher incomes.

We compare the welfare effects of monetary policy shocks in housing models reported by Dias et al. (2022) and Kinnerud (2025). Dias et al. (2022) build a quarterly-frequency, two-agent New Keynesian model with a housing market. They report that on impact a 25 basis point monetary contraction is associated with a 2.75 percent welfare loss in CEV terms for homeowners, a 2.25 percent loss for renters, and a small gain for wealthy savers. Our results for potential home buyers are similar to homeowners in Dias et al. (2022) who are assumed to adjust housing portfolio every period. Kinnerud (2025) builds an annual-frequency, heterogeneous-agent model with housing choices. Their exercise differs from ours, in that they report welfare benefits of a 100 basis point monetary expansion, and their welfare measure is the one-time tax on current resources that would leave households indifferent between steady state and the first period of the shock. They report welfare gains in Cash-on-hand Equivalent Value terms of between -0.3 and 6.9 percent, with an average benefit of around 2 percent.

Finally, Panel (c) reports the welfare costs of household expectations over monetary policy shocks. The CEVs are the willingness to pay to avoid the entire distribution of possible monetary policy shocks, from the perspective of households in the steady state of the baseline model. First, note that these expected welfare costs are smaller than the costs of avoiding a specific monetary contraction. Second, we find that owners and potential homebuyers have the smallest welfare costs at just 0.02 percent of life-time consumption, while renters have the highest costs at 0.09 percent. On average, households experience welfare losses of 0.04 percent.

Overall, households experience moderate welfare costs of monetary policy uncertainty. But they face much larger costs and benefits conditional on a specific monetary policy shock.

7. Conclusion

In this paper we study the effects of monetary policy on homeownership in Australia – a country with high housing costs, volatile housing markets, and predominantly adjustable-rate mortgages. We first use aggregate time-series data to show that a monetary policy contraction reduces home purchases, suggesting that homeownership might decline as well. We then build a detailed, life-cycle, heterogeneous household model that incorporates an estimated, exogenous VAR to capture the effects of monetary policy via changes in interest rates, aggregate income, and house prices. While we abstract from general equilibrium, our approach allows us to model housing decisions in the face of realistic macroeconomic dynamics following a shock.

In our benchmark analysis, we use the model to study changes in homeownership following a monetary contraction. Following the shock, home purchases fall sharply, as in the data, while homeownership declines slowly over a 4-year period and has not returned to steady state 10 years later. The short-run decline is determined by the effect of higher interest rates, falling incomes matter more over the medium-term, and lower house prices have a small moderating effect on homeownership in the short run. We also show that the structure of Australian housing and mortgage markets, features of the macroeconomy, and household beliefs and expectations all matter for the transmission of monetary policy shocks to the housing market. Finally, we explore the welfare consequences of monetary policy shocks. While the average household experiences small losses (gains) in the face of a contractionary (expansionary) shock, potential homebuyers face welfare losses in response to both contractionary and expansionary monetary policy. This is because contractions tighten borrowing constraints via higher interest rates and income, while expansions raise required downpayments via higher house prices.

Our paper presents a novel contribution to the macro-housing literature by providing detailed micro-foundation and institutional context for homeownership decisions in the face of high-frequency monetary policy shocks. This contrasts with prior research that takes homeownership as given, abstracts from detailed household heterogeneity, considers low-frequency household decisions, or focuses on outcomes other than the homeownership rate itself. Future research may build on our foundations to explore the transmission of monetary policy via the housing market to the rest of the macroeconomy.

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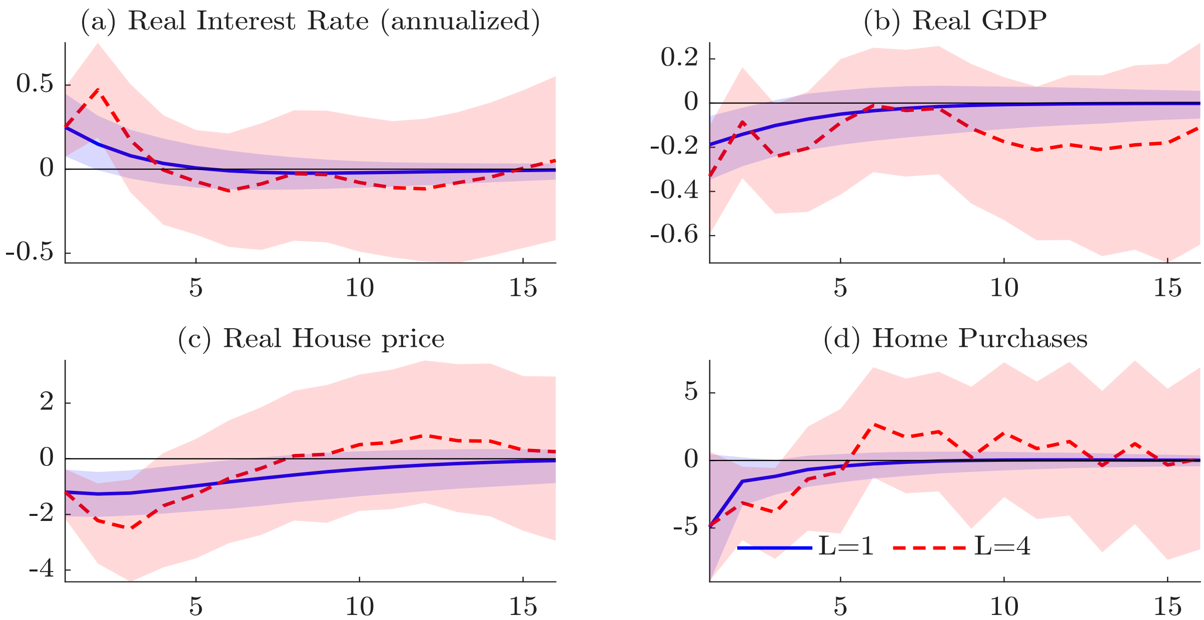
ONLINE APPENDIX

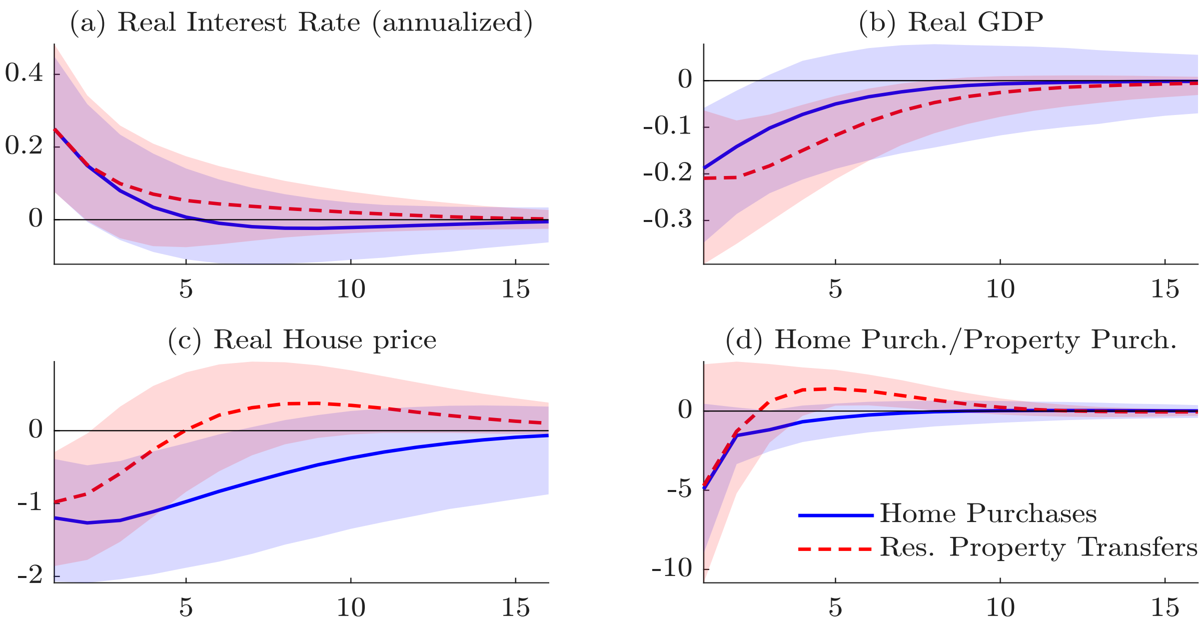
A. Additional Motivating Evidence

Figure A.1: VARs with Australian Data, Longer Lag Length



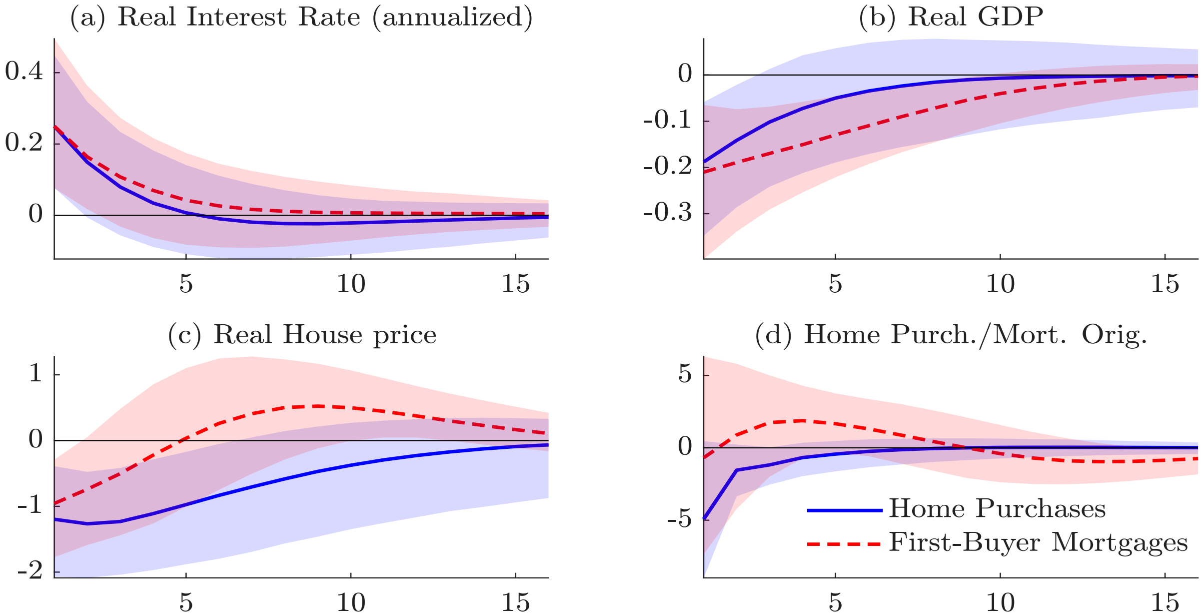
Notes: IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

Figure A.2: VARs with Australian Data, Residential Property Transfers



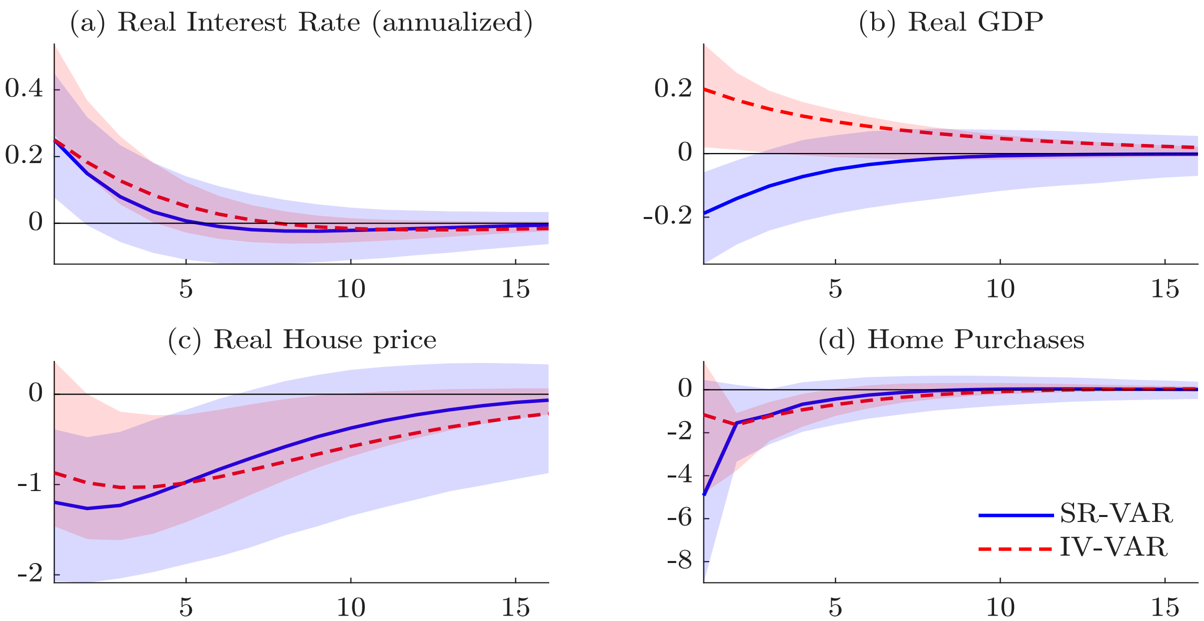
Notes: Home purchase variable is all owner-occupier mortgage originations. Sample period: 2002–2025. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

Figure A.3: VARs with Australian Data, Owner-Occupier Mortgage Originations



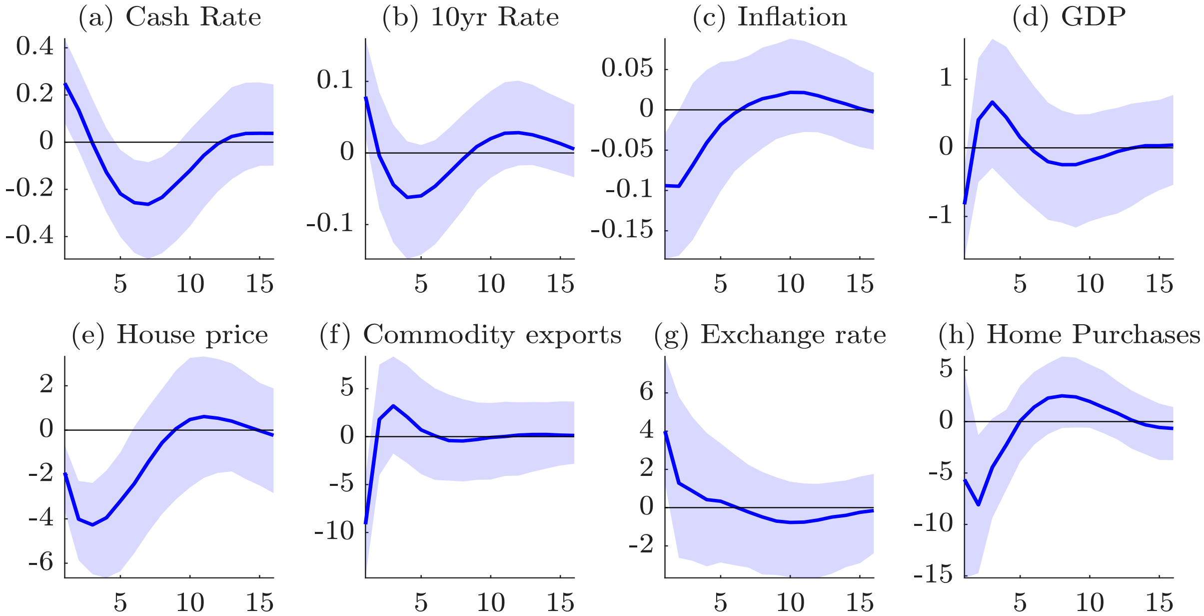
Notes: Home purchase variable is all residential property transfers. Sample period: 2003–2021. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

Figure A.4: VARs with Australian Data, External Instruments



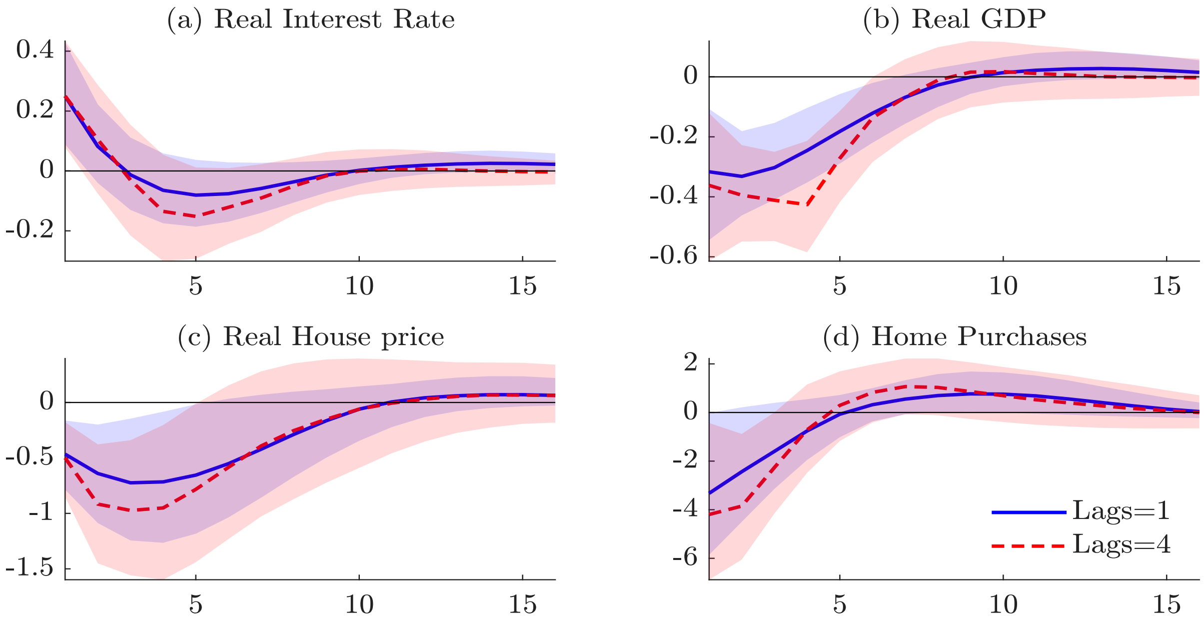
Notes: External instrument VAR uses the monetary policy shocks series produced by Hambur et al. (2024). Sample period: 2010–2019. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

Figure A.5: VARs with Australian Data, Extended Variable Set



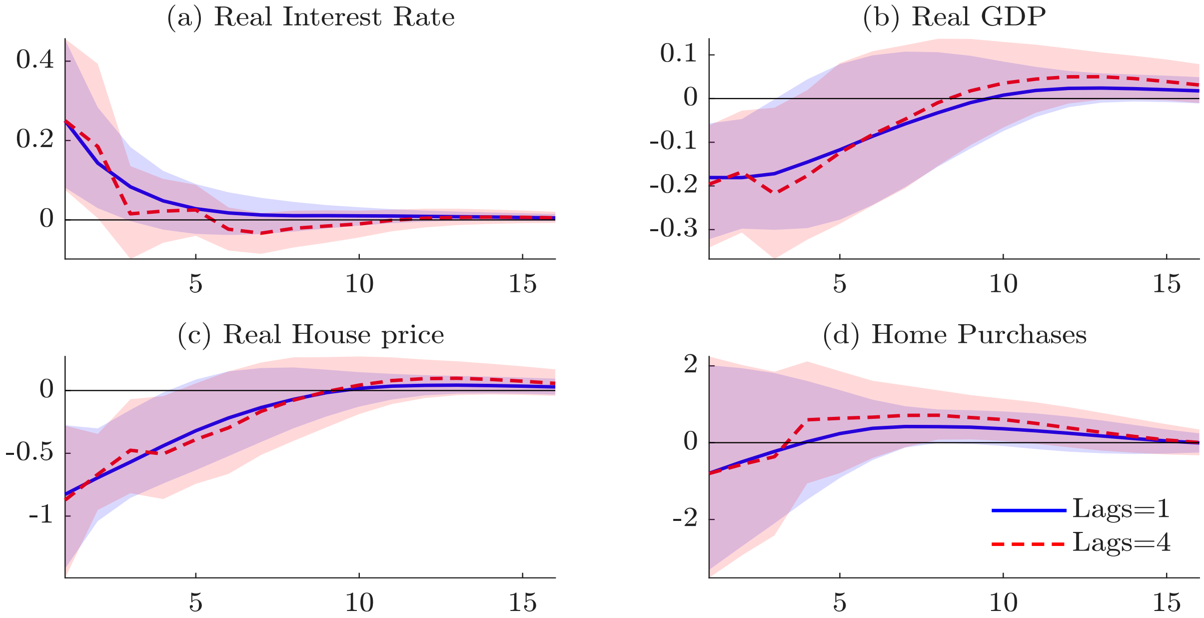
Notes: All variables in nominal terms, and additional macroeconomic variables. Sample period: 2010–2021. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

Figure A.6: VARs with New Zealand Data, Home Sales



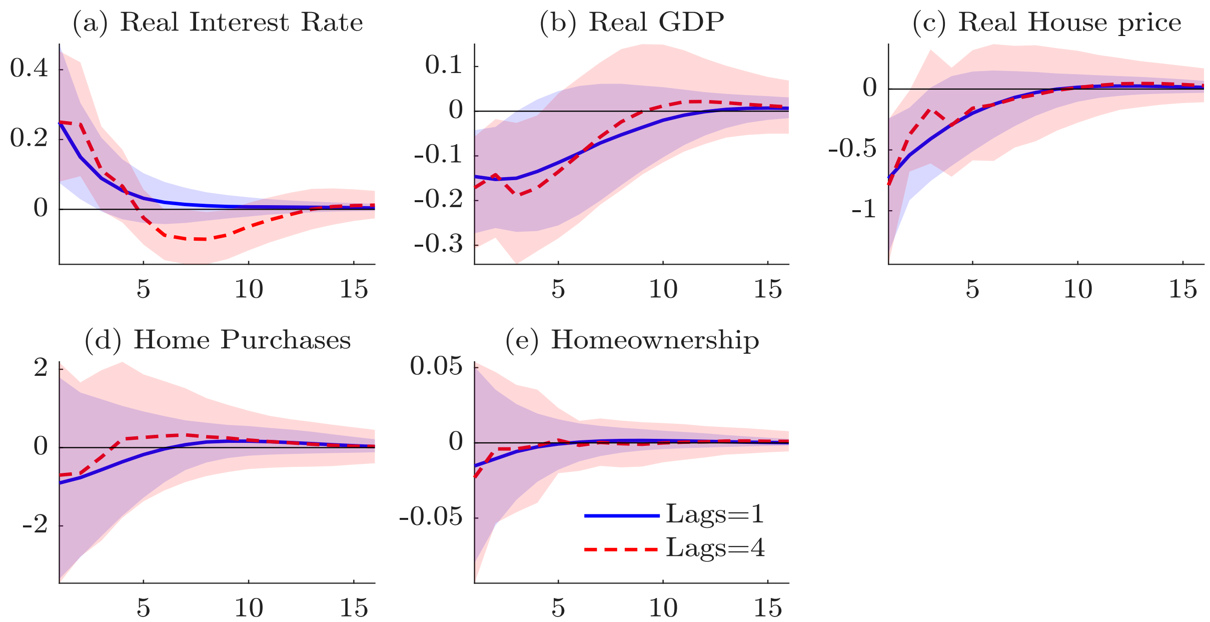
Notes: All data from New Zealand. Home purchase variable is all home sales. Sample period: 1991–2023. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

Figure A.7: VARs with United States Data, Home Sales and Homeownership Rate



Notes: All data from United States. Home purchase variable is all home sales. VAR also includes homeownership rate. Sample period: 1981–2025. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

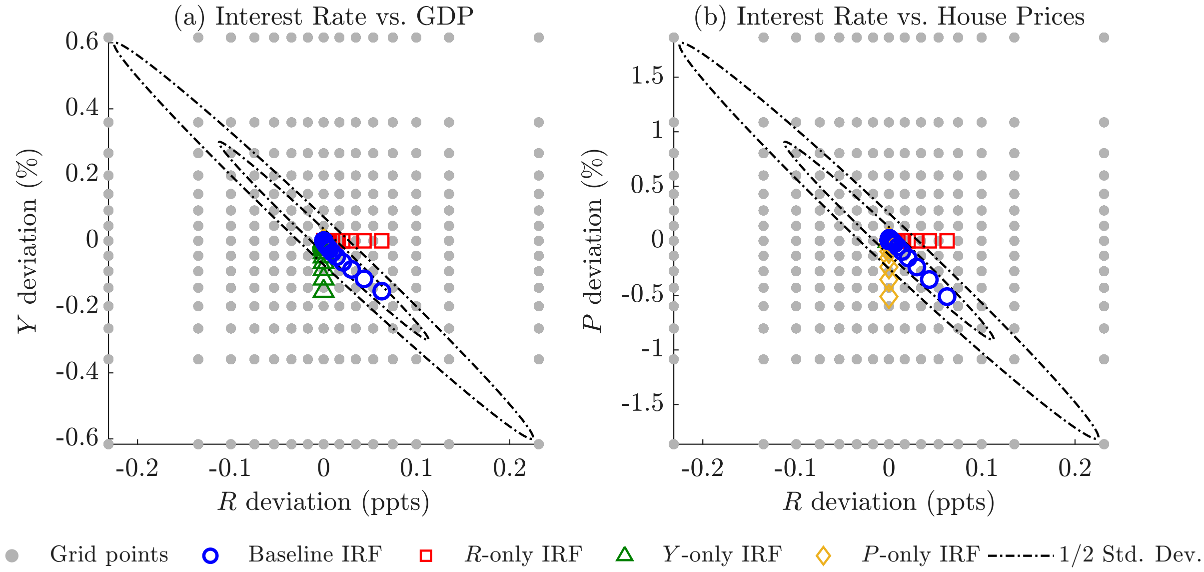
Figure A.8: VARs with United States Data, Home Sales and Homeownership Rate



Notes: All data from United States. Home purchase variable is all home sales. VAR also includes homeownership rate. Sample period: 1981–2025. IRFs to a 25 basis point increase in the real interest rate, plotting median IRFs from the identified set, and 68 percent credible intervals.

B. Computational Details

Figure B.1: Aggregate Grid Space vs. IRFs to Monetary Policy Shocks



C. Additional Model Results

Figure C.1: VAR IRFs to Contractionary Monetary Policy Shock

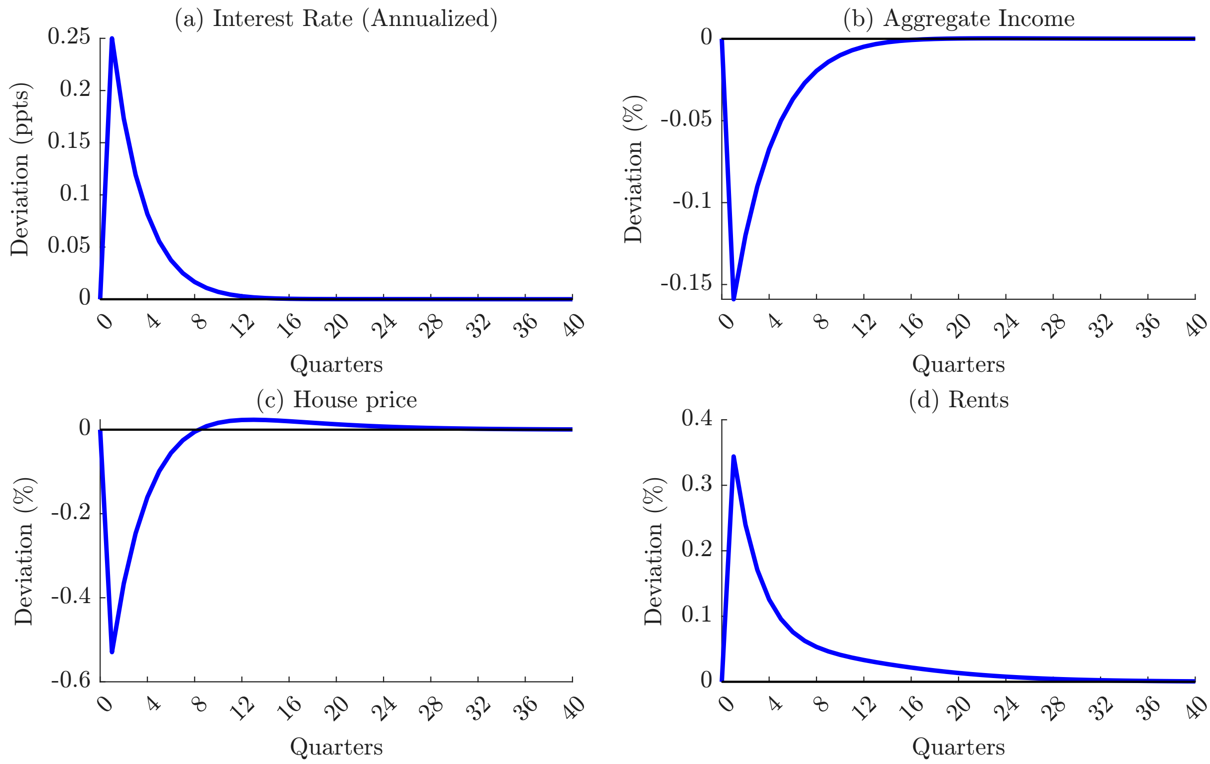
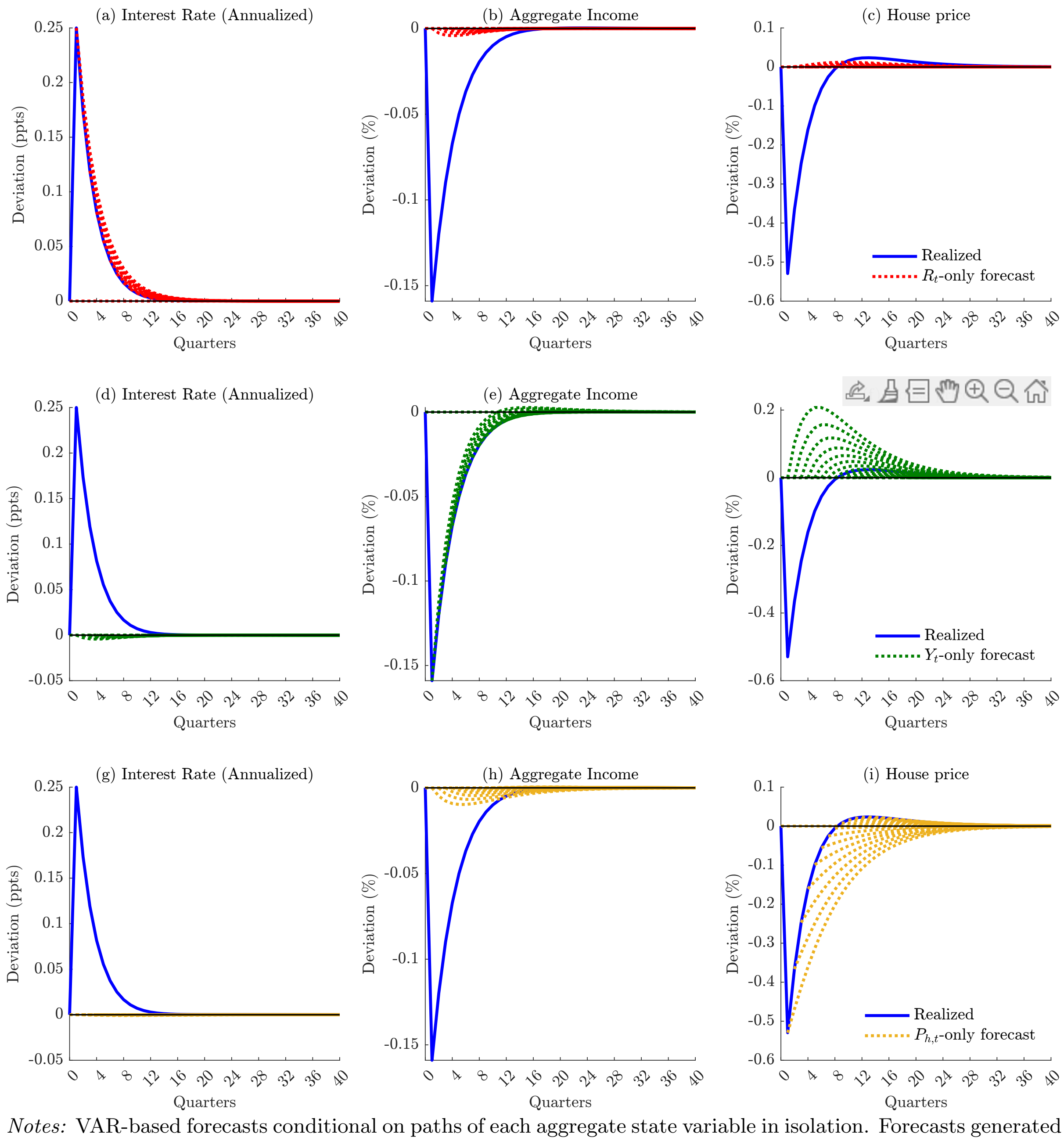


Figure C.2: Conditional Forecasts from the VAR



Notes: VAR-based forecasts conditional on paths of each aggregate state variable in isolation. Forecasts generated by iterating on the VAR in Section 3.3.

Figure C.3: Household Responses to Monetary Policy Shock

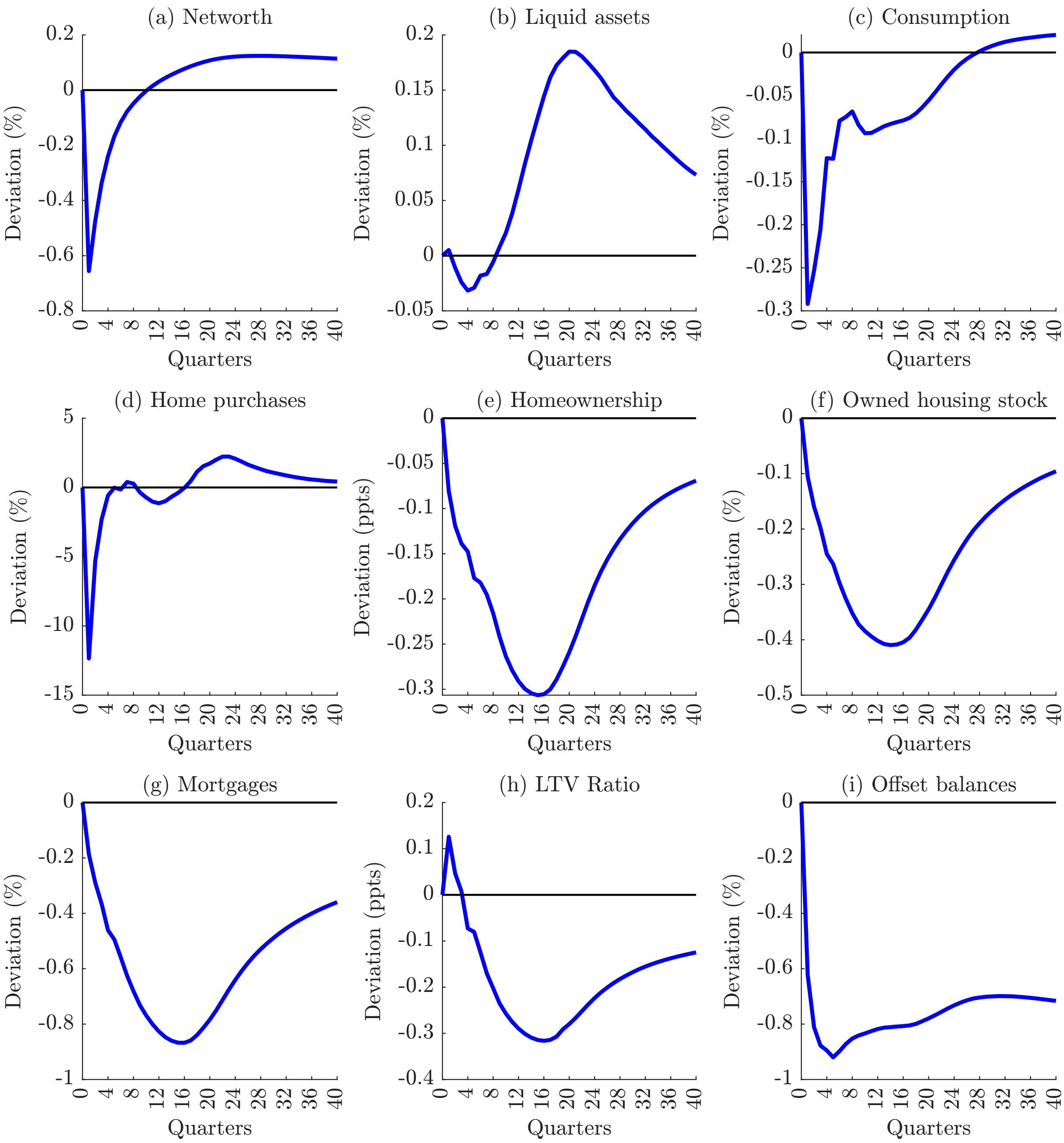


Figure C.4: Homeownership Responses to Alternative Monetary Policy Shocks

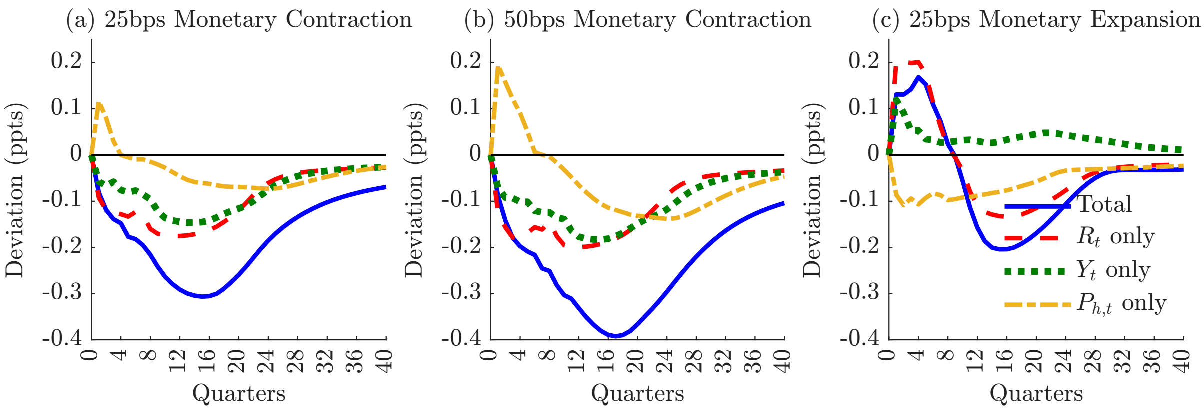


Figure C.5: Consumption Response to Channels of a Monetary Contraction, By Age

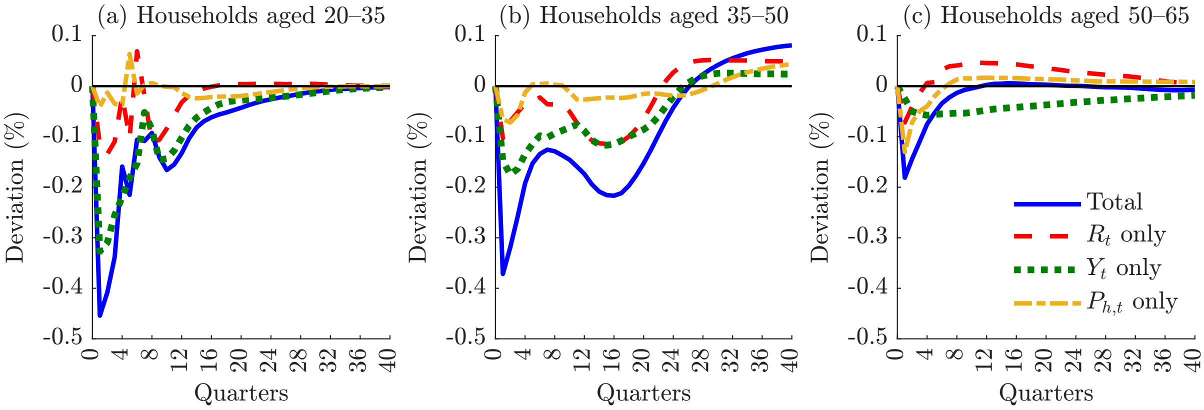


Figure C.6: Consumption Response to Monetary Policy Under Alternative Models