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Financing first home ownership: modelling policy impacts at market and individual levels

From the AHURI Inquiry: Inquiry into financing first home ownership: opportunities and challenges

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https://www.ahuri.edu.au/research-in-progress/Inquiry-into-financing-first-home-ownership-opportunities-and-challenges

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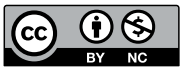

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Acronyms and abbreviations used in this report

ABS	Australian Bureau of Statistics
AHURI	Australian Housing and Urban Research Institute Limited
AHURI-3M	Australian Housing and Urban Research Institute Housing Market Microsimulation Model
APRA	Australian Prudential Regulation Authority's
CAPITA	Comparative Analysis of Personal Income Tax and Transfers in Australia
CGT	Capital Gains Tax
CRA	Commonwealth Rent Assistance
EU	European Union
FHLDS	First Home Loan Deposit Scheme
FHOG	First Home owners Grant
FHSS	First Home Super Saver Scheme
GDP	Gross Domestic Product
GFC	Global Financial Crisis
HILDA	Household, Income and Labour Dynamics in Australia (HILDA)
HTB	Help To Buy
IGOTM	Intra-Governmental Tax and Benefit Model
LMI	Lenders mortgage insurance
LTV	Loan-to-value
MARIA	Model of Australian Retirement, Incomes and Assets
MIDAS	Microsimulation for the Development of Adequacy and Sustainability
MITTS	Melbourne Institute Tax and Transfer Simulator
NATSEM	National Centre For Social And Economic Modelling
NHFIC	National Housing Finance and Investment Corporation
NHG	New Home Guarantee
PTI	Payment-to-income
RBA	Reserve Bank of Australia
STINMOD	Static Incomes Model
TRIM3	Transfer Income Model, version 3
SEIFA	Socio-Economic Indexes for Areas
SES	Socio-economic status
TBM	Tax and Benefit Model

Glossary

A list of definitions for terms commonly used by AHURI is available on the AHURI website ahuri.edu.au/glossary.

Executive summary

Key points

- This report evaluates the effectiveness and implications of policy settings that influence the availability of finance for Australians purchasing their first home.
- Modelling indicates that the decline in interest rates accounts for one-third of the rise in house prices over the last 25 years.
- As interest rates fall, the increase in house prices reduces the home ownership rate despite lower borrowing costs.
- While tighter credit conditions reduce the build-up in mortgage debt, this results in lower home ownership rates for young households as they cannot easily build the deposit required for home purchase.
- Among aspiring first home buyers, only 11 per cent do not face borrowing constraints. Approximately 84 per cent of first home buyers face a downpayment constraint and 71 per cent face a repayment constraint.
- Microsimulation suggests that 16 per cent of first home buyers would be eligible to access a mortgage guarantee scheme modelled after the Federal government's Home Guarantee, while 31 per cent would be eligible to access a shared equity scheme modelled after the Federal Government's Help to Buy scheme.
- Of those aspiring first home buyers simulated to be eligible for these programs, 22 per cent would be assisted into home ownership by the mortgage guarantee scheme, and 41 per cent would be assisted by the shared equity scheme.
- The application of lower income thresholds under the shared equity scheme results in expanded access by more financially disadvantaged Australians than the mortgage guarantee.

Key findings

Housing finance conditions, the housing market and first home ownership – a macro level analysis

In Australia, real interest rates have fallen by more than five percentage points over the last three decades. At the same time, real house prices have more than doubled. The home ownership rate has also fallen from over 70 per cent to 66 per cent in recent years.[1]

We conduct two experiments to examine the relationship between housing finance conditions and first home ownership. First, we simulate the housing market's response to a shock that decreases the interest rate in the economy. Second, we simulate the market's response to variations in borrowing standards akin to changes in prudential regulations. Those borrowing standards allow households to borrow more or less against the value of their homes.

When interest rates decline, the cost of financing housing declines. The opportunity cost of investing in housing also declines due to the reduction in interest that can be earned in savings accounts. Thus, the demand for housing increases, which tends to lead to increases in house prices. Our model predicts that house prices rise by 33 per cent when interest rates decline by the magnitude observed between 1994 and 2017. The actual rise in house prices was 109 per cent, suggesting that the decline in interest rates is associated with approximately one-third of the rise in house prices over the last 25 years.

When interest rates fall, the increase in house prices significantly reduces home ownership for all age groups. Much of the response to changes in interest rates arises from greater housing demand among those who would be home owners anyway, rather than due to large increases in the home ownership rate itself. Despite lower borrowing costs, aspiring first home buyers find it difficult to save for a deposit quickly enough to enter home ownership earlier than they would have in a high interest rate environment. The modelling indicates that the major barrier to home ownership for most households remains the challenge of raising the funds to satisfy the downpayment constraint.

We also re-run our model with the fall in interest rates from 1994 to 2017, but at the same time we consider the effect of tighter and looser borrowing constraints by shifting the maximum Loan-To-Value (LTV) on mortgages. In one simulation, the maximum LTV ratio is decreased from 85 per cent to 60 per cent. An alternative scenario considers the implications of loosening borrowing constraints by increasing the maximum LTV from 85 per cent to 100 per cent. These experiments highlight how preventing or encouraging more borrowing would have helped households with housing affordability as interest rates fell over the last 25 years.

Our results show that with tighter LTV constraints, house prices would have increased by a smaller amount. Looser LTV constraints would have seen house prices increase by more. Consequently, home ownership rates would have fallen by more if LTV constraints were tighter, and would have fallen by less if LTV constraints were looser. Young households are most affected by these changes as they are extremely sensitive to borrowing conditions.

Taken together, the results suggest that while tighter credit conditions would have prevented some of the build-up in mortgage debt and costs for borrowers, this would have come at the cost of lower home ownership rates for young households. This is because young households cannot easily build the deposit required to make a downpayment on a house and raising the required deposit size puts home ownership further out of reach.

1 ABS Survey of Income and Housing, 2017-2018.

First home buyer assistance schemes and first home ownership – a micro level analysis

We estimate that among aspiring first home buyers only 11 per cent would be able to become home owners as they can overcome both downpayment and repayment constraints. On the other hand, for two-thirds of aspiring first home buyers, both constraints are binding. The downpayment constraint is the greater hurdle, with 84 per cent of aspiring first home buyers failing to meet this requirement. Repayment constraints are also significant, faced by 71 per cent of first home buyers

We measure the extent to which first home buyer assistance schemes influence prospects for achieving home ownership by altering the housing finance conditions faced by first home buyers.

We simulate two programs. The first is a mortgage guarantee scheme designed to alleviate the downpayment constraint (but not the repayment constraint), modelled after the Federal Home Guarantee scheme for first home buyers. The second is a shared equity scheme that addresses both forms of constraints, modelled after the Federal Help to Buy (HTB) program. Both schemes are subject to the same property caps, but the shared equity scheme applies stricter income limits than the mortgage guarantee scheme. The mortgage guarantee scheme is accessible by those who have deposit savings of at least 5 per cent but not exceeding 20 per cent. The shared equity scheme is accessible by those who have deposit savings of at least 2 per cent.

Of the 1.6 million rental income units that are aspiring first home buyers, we find that 266,500 income units or 16 per cent are classified as eligible under the mortgage guarantee scheme, while 496,800 or 31 per cent are classified as eligible for the shared equity scheme. Thus, the shared equity scheme is accessible by a larger segment of the population than the mortgage guarantee scheme.

Those who are eligible for both schemes are, on average, younger and healthier than those who are ineligible. Eligible first home buyers average 30 years of age and a 6 per cent incidence of a long-term health condition or disability compared to nine to 13 per cent among the ineligible groups. However, couples (as compared to singles) are more likely to be eligible for the mortgage guarantee than the shared equity scheme. Despite there being no upper limit to the deposit savings range for the shared equity scheme, the application of lower income thresholds results in expanded access for more disadvantaged Australians under the shared equity scheme than the mortgage guarantee scheme. Specifically, income units eligible for the shared equity scheme report lower incomes and have lower levels of educational qualifications as well as lower rates of labour force participation.

Twenty two per cent of eligible aspiring first home buyers are assisted into home ownership by the mortgage guarantee scheme, and 41 per cent are assisted by the shared equity scheme. This is because the shared equity scheme is designed to reduce both the downpayment and repayment constraints. While the mortgage guarantee scheme is highly effective in overcoming the downpayment hurdle for those who are downpayment constrained, it is not designed to address the repayment hurdle.

Policy development options

The case for (and against) looser restrictions on mortgage borrowing

Our findings suggest that looser restrictions on mortgage borrowing may help to offset the access difficulty that first home buyers face in a low interest rate—high house price environment. The expansion of mortgage borrowing does not excessively increase total housing demand, and the resulting increase in house prices does not offset the ability of young households to purchase houses with larger mortgages.

The policy implication from our findings is at odds with much of the recent discussion of counter-cyclical mortgage macro-prudential policies (e.g. APRA 2021). This is because we do not account for the higher risks associated with an increase in mortgage borrowing. Hence, policies seeking to loosen restrictions on mortgage borrowing will need to assess the policy trade-off between housing affordability and financial stability in low interest rate environments. At the same time, there is a need to explore the risks of mortgage distress and default associated with increases in mortgage borrowing.

The design of first home buyer assistance schemes

Australian governments have favoured demand-side assistance schemes to help households overcome downpayment constraints through grants, concessions, loans, guarantees and equity instruments.

Based on our simulations of a mortgage guarantee scheme and shared equity scheme, we find that the downpayment constraint is binding for a higher proportion of aspiring first home buyers than the repayment constraint. Nonetheless, a shared equity scheme may be accessible to larger numbers of constrained aspiring first home buyers because it is designed to address both the downpayment and repayment hurdles. In comparison, the mortgage guarantee scheme only assists the downpayment constrained, and is not designed to address the repayment hurdle.

Targeting additionality

A common criticism of many landmark first home buyer policies in Australia is that they simply bring forward the decision to purchase and/or allow the purchase of a higher priced dwelling for those already on track to enter the market. These policies may then simply raise prices for residential properties, at the detriment of future first home buyers.

We show that the design of a scheme targeted at low-income earners may be more effective in providing 'additionality' than a mortgage guarantee scheme. Our simulations show that the shared equity scheme is more accessible by low-income earners than the mortgage guarantee scheme. This is largely attributable to the stricter income limits under the former scheme of $90,000 for singles, and $120,000 for couples. In comparison, the latter scheme has higher income limits of $125,000 for singles, and $200,000 for couples.

The importance of supply in entry markets

We show that a range of demand-side government measures including a decline in interest rates, relaxation of borrowing standards, and first home buyer assistance schemes all boost demand for housing in entry markets. This has to be matched by an adequate supply of new housing to offset upward price pressures generated by the additional demand in these markets.

Guarding against post-purchase unintended consequences for low-income first home buyers

Policy makers need to guard against unintended consequences when implementing policies that boost demand among low-income aspiring first home buyers. For instance, eligible home buyers under both the mortgage guarantee and share equity schemes modelled have more precarious employment than those not eligible for the schemes. Also, while looser restrictions on mortgage borrowing may help to offset the access difficulty that first home buyers face in a low interest rate—high house price environment, there may be higher risks associated with an increase in mortgage borrowing post-purchase, especially when interest rates rise. This raises some potential concerns regarding low-income first home buyers' exposure to repayment risks after accessing home ownership, especially in an era of rising interest rates. Unintended consequences such as mortgage distress and mortgage default may be highly detrimental to the wellbeing of low-income households.

The study

This study is part of an AHURI Inquiry program entitled *Inquiry into Financing First Home ownership: Opportunities and Challenges*. It addresses the fourth research question of the inquiry:

> How might entry into home ownership evolve in response to specific policy settings and what are the implications of this for housing markets and the broader economy?

The study addresses some important concerns around policies financing first home ownership in Australia. In recent years, falling real interest rates have reduced the cost of servicing a mortgage. However, while borrowing costs have fallen, house prices have risen and mortgage terms have tightened since the Global Financial Crisis (GFC), exacerbating the deposit gap problem facing first home buyers. Growing numbers have been forced to delay transitions into first home ownership or become highly leveraged to purchase their first home. Over many years Australian governments have provided a range of programs to improve first home buyer access to finance, in particular demand-side schemes. However, the current range of first home buyer programs has been subject to criticism. A primary concern is a lack of targeting that might merely bring forward purchases by those who would have been able to achieve first home ownership without assistance. There are also concerns that these demand-side schemes may risk causing unsustainable house price inflation in entry markets, especially if the majority of first home buyers purchase towards the bottom end of the price distribution.

Against the backdrop of these policy concerns, this report will contribute to the Inquiry program by addressing the following three aims:

1. Examine how changes in mortgage finance conditions affect housing market shifts, and resulting impacts on the market-based affordability of home ownership for first home buyers. We model two 'macro' simulations at the market level that reflect different housing finance conditions, and examine impacts on market-wide housing demand.
2. Assess the extent to which first home buyer assistance programs enhance prospects for achieving first home ownership and the distributional effects of such programs. We model two 'micro' simulations at the household level that reflect different housing finance conditions, and examine distributional outcomes.
3. Draw out the implications of the project findings for possible reforms to first home buyer assistance policies in Australia.

Our primary research approach is simulation modelling. Simulation modelling provides an important and unique tool to model a range of scenarios and predict outcomes under these scenarios. We deploy simulation modelling at both 'macro' (or market) level and the 'micro' (or income unit) level using nationally representative datasets.

The macro-simulation model relies on a combination of datasets, including the Australian Bureau of Statistics (ABS) Surveys of Income and Housing, Reserve Bank of Australia (RBA) interest rates and inflation rates, and the CoreLogic hedonic price index. The base model is calibrated to 1994, when the real interest rate on savings accounts was 4.48 per cent and the interest rate on mortgage loans was 6.81 per cent. In 2017, these interest rates were 0.29 per cent for savings accounts, and 1.89 per cent for mortgage loans. We assume these low interest rates persist into the foreseeable future. The micro-simulation model draws on the 2018 Household, Income and Labour Dynamics in Australia (HILDA) Survey. It captures the taxes, benefits and housing assistance programs affecting owners' after-tax economic costs of owning housing versus renters' costs of renting in 2018.

Our study captures both macro and micro level effects of policies affecting first home ownership. Hence, it offers an extensive and nuanced evidence-base at individual and market levels to support the design of subsidies and schemes that promote first home purchase. As with economic models in general, our simulation models are highly stylised versions of the Australian housing system, so policy implications from the models are subject to the assumptions underlying the models. However, the modelling at both micro and macro levels offer a more comprehensive analysis than past studies that have not adopted a whole-of-market approach.

1. Introduction

- **This report addresses a need to better understand how policy settings affect first home buyers' ability to access and afford home ownership.**
- **A micro-simulation model is applied to predict how first home buyer assistance programs can affect first home buyers' ability to overcome downpayment and repayment constraints, as well as distributional consequences of those policies.**
- **A macro-simulation model is applied to predict how different housing finance conditions including interest rate changes will affect housing demand, home ownership rates and house prices at the market level.**

This report evaluates the effectiveness and implications of policy settings that influence the availability of finance for Australians purchasing their first home. It is part of an AHURI Inquiry program entitled *Inquiry into Financing First Home ownership: Opportunities and Challenges*. Specifically, this report addresses the fourth research question of the inquiry:

> How might entry into home ownership evolve in response to specific policy settings and what are the implications of this for housing markets and the broader economy?

Over many years Australian governments have provided a range of programs to improve first home buyer access to finance (Pawson et al. 2019). These usually take the form of demand-side incentives and concessions such as the First Home Owner Grant (FHOG), First Home Super Saver (FHSS) Scheme, the First Home Loan Deposit Scheme (FHLDS), stamp duty discounts, and the recent HomeBuilder program that forms part of the COVID-19 economic recovery package.

The current range of first home buyer programs has been subject to criticism. The relatively non-targeted nature of first home owner grants has been subject to the ongoing objection that they merely bring forward purchases by those who would have been able to achieve first home ownership without such assistance. The effect may be merely to enable the purchase of a home superior to that which would have been otherwise acquired (Yates 2014).

On the other hand, there are concerns that these grants may risk causing unsustainable price inflation in more marginal housing markets. This would be the case if the majority of first home buyers purchase towards the bottom end of the price distribution (Randolph et al. 2013).

As real house prices soared over the past two decades, growing numbers of Australians have been forced to delay transitions into first home ownership and/or become highly leveraged to purchase their first home. The Banking Royal Commission has also highlighted poor lending practices that have exposed borrowers to undesirable levels of financial risk (Hayne 2019). The GFC-induced housing market crash in various countries laid bare the vulnerability of first home buyers to risks of mortgage defaults (Scanlon and Elsinga 2014). Most recently, the COVID-19 pandemic has reinforced the need to understand how first home owners might be protected against financial risks. With a market correction likely as economic growth slows in the face of higher interest rates, there is now growing concern that highly leveraged households helped into first home ownership by generous government subsidies could be exposed to enhanced risks of mortgage defaults and financial stress post-ownership.

Prevailing housing finance conditions influence home purchases both directly and indirectly. For example, in recent years falling real interest rates have reduced the cost of servicing a mortgage, encouraging home purchase. However, overall housing affordability depends on the behaviour of other housing market actors. Lower interest rates encourage housing investment activity, which increases housing demand, and pushes up house prices. To the extent that investors compete for similar houses, upward pressure on prices in entry-level market segments narrow home purchase opportunities for aspiring first home buyers.[2] These pressures are exacerbated within Australian housing markets where supply is typically price inelastic (Melser et al. 2022). Moreover, while borrowing costs have fallen, mortgage terms have tightened since the GFC. This exacerbates the deposit gap problem facing first home buyers. In the face of these issues, prospective home owners may be increasingly dependent on family wealth as a source of finance. Additionally, young people may find it increasingly difficult to borrow against future income while employment becomes more precarious.

Against the backdrop of these policy concerns, this report will contribute to the Inquiry program by addressing the following three aims:

1. Examine how changes in mortgage finance conditions affect housing market shifts, and resulting impacts on the market-based affordability of home ownership for first home buyers. We model two 'macro' simulations at the market level that reflect different housing finance conditions, and examine impacts on market-wide housing demand.
2. Assess the extent to which first home buyer assistance programs enhance prospects for achieving first home ownership and the distributional effects of such programs. We model two 'micro' simulations at the household level that reflect different housing finance conditions, and examine distributional outcomes.
3. Draw out the implications of the project findings for possible reforms to first home buyer assistance policies in Australia.

1.1 Policy context

Australia is widely known as a home ownership society, where owner-occupation is typically the preferred and dominant tenure. Like various countries with liberal welfare regimes in the English-speaking world, such as the United States and United Kingdom, Australia has as tenure-divided housing system in which owner-occupation enjoys generous tax concessions and is highly mortgaged (Smith et al. 2022). These three countries have relatively high debt to Gross Domestic Product (GDP) ratios compared to countries such as Finland and the Netherlands. In Australia, mortgage markets are well-developed and tend to score highly on measures of mortgage market maturity. It has liberalised mortgage markets with competitive housing finance models that allow ease of access to mortgage debt via diverse funding channels (Haffner et al. 2015).

2 Wood and Ong (2010) examine the factors affecting investment decisions in the rental market. The study found that financial factors are particularly important in influencing the decision to buy to let, including the after-tax economic cost of holding rental property.

For many decades Australian Governments have promoted home ownership as a key pillar of housing policy. Ownership is aggrandised as a widespread and democratic means of economic security and wealth accumulation, following an optimistic ideology of mass home ownership observed in other home ownership societies (Arundel 2017). Past contexts of supportive federal, state and territory government policies and strong economic conditions grew home ownership rates in post-war Australia and abroad. However, since the late 1980s home ownership is declining, a trend especially prominent amongst the young (Lennartz et al. 2016; Smith et al. 2022). This has renewed interest in policy to support first home buyer entry into ownership; explicit attempts to improve affordability were initiated in the 2000s, following a period of little to no assistance to first home buyers during the 1990s (Pawson et al. 2019).

To highlight this commitment, in the decade to 2021, the Australian Government provided $20.5 billion in direct concessions and grants to first home buyers (Pawson et al. 2022). Though generally popular among the public, the efficiency and effectiveness of these landmark first home buyer policies in combating declining ownership have been routinely called into question (Pawson et al. 2022; Yates 2012). In response, the recent decade has seen the introduction a range of institutional innovations and mortgage market instruments that appear to offer superior first home buyer assistance than existing direct concessions. The policy and electoral significance of these innovations and instruments to the modern first home buyer policy mix was highlighted by the Morrison Australian Government of 2019, which announced government-guaranteed first home buyer mortgages as its marque housing policy during their 2019 federal election campaign (Pawson et al. 2022). Similarly, an expansion of these mortgages, and the introduction of a national shared equity scheme, was the key housing policy pillar of the now presiding Labor Australian Government in its 2022 federal election campaign (Australian Labor Party n.d.).

The remainder of this section summarises and gives context to the current first home buyer policy mix in Australia. Parallel AHURI research from this inquiry, entitled *Assisting first home buyers: An international policy review*, provides a detailed typology of the first home buyer schemes active in Australia (Pawson et al. 2022). Here, we briefly summarise this typology, and then recap the most relevant of these schemes, including their influence on the accessibility and affordability of home ownership. Schemes that reduce the deposit hurdle promote accessibility, while those that reduce repayment cost burdens promote affordability.

First home buyer policy interventions can be distinguished by whether they impact upon the demand- or supply-side of the housing market. Demand-side policies are benefits directly received by first home buyers, effectively enhancing their purchasing power. Conversely, supply-side instruments directly relate to the production of housing suitable for the first home buyer cohort. Early post-war demand-side policies in Australia were complimented by a strong suite of supply-side policies (Milligan 2003). However, in modern times few supply-side policies of note remain, with less interventionist demand-side policies favoured by policy makers (Pawson et al. 2019). There are only a few small-scale programs that take advantage of public land or government planning powers. The most notable is the Australian Capital Territory (ACT) Land Rent Scheme, which enables non-homeowning low-income buyers to acquire a newly built residential building in select suburbs, but not the land the buildings are on (ACT Revenue Office, n.d.). Instead, the purchaser rents the land from the ACT Government, set at 2 per cent of the land's value. There is currently no indication that this scheme will be adopted by other states and territories, and at a federal level the current Australian Government has not committed to any notable supply-side policy innovations that specifically targets first home buyers.

The demand-side factors can be further classified into two notable types of assistance. The first is grants and concessions, which involves direct transfers or gifts from the public purse to first home buyers. The second type of demand-side assistance is loans, guarantees and equity instruments, which are associated with some form of specialist mortgage products that must be repaid. A third type of demand-side assistance existed in post-war Australia and involved direct controls on banking that gave preferential treatment to first home buyers in mortgage markets. Such financial regulations specifically targeting first home buyers are no longer active in Australia, but it is prudent to note that general changes to financial regulations and macro-prudential policy can have a notable impact on first home buyer affordability.

1.1.1 Grants and concessions

First Home Owners Grant

One of Australia's most high profile form of first home buyer assistance is the First Home Owners Grant (FHOG). In the year 2000, a federal-state intergovernmental agreement called for the establishment of a uniform scheme across states and territories, in which first home buyers would receive a cash grant of $7,000 for the purchase of a home, regardless of income or property value (Randolph et al. 2013). Following its inception, the scheme has gone through cycles of dismantling and expansion, including the temporary federally funded First Home Owner Boost during the GFC, which supplemented the value of the grant up to $35,000 in some regions (Randolph et al. 2013). Various FHOG schemes continue to operate in Australia administered by state and territory governments. These schemes differ in property value limits and the levels of grant available depending on the state or territory, and are now mostly restricted to newly built homes.

Concerned for the impact of the COVID-19 pandemic on the construction industry and general economy, the Australian Government temporarily returned to funding cash grants for residential property through its HomeBuilder initiative in 2020 (Leishman et al. 2022). Made defunct in April of 2021, the initiative saw supplementary cash grants of up to $25,000 for new build properties, major renovations and off-the-plan home purchases. Despite not being specifically targeted at first home buyers, its eligibility criteria are believed to have resulted in most new construction having involved first home buyers (Pawson et al. 2022). Industry experts suggest that the policy was successful in stimulating demand amongst potential owners, and its targeting of new builds is viewed more favourable than earlier iterations of the FHOG applicable to existing properties (Leishman et al. 2022). However, they also expressed concerns surrounding unforeseen consequences of exacerbating labour and material shortages, which are still impacting upon the affordability of residential construction after the end of the scheme.

Stamp duty concessions

State and territory governments offer another form of direct assistance to first home buyers in the form of stamp duty concessions. In Australia, when ownership of a property is transferred it is subject to a significant transaction tax (stamp duty) levied on buyers by state and territory governments. With broad based land taxes absent from most of Australia, stamp duty forms an important source of tax revenue. With the exception of South Australia, stamp duty concessions are available to first home buyers and provide either an exception from stamp duty or a discounted concessional rate. As with the FHOG, the parameters of the policy differ by state and territory; eligibility can vary by property value and whether it is a new or established property.

Both the FHOG and stamp duty concessions have a similar impact upon access and affordability. They are very effective at adding to housing demand, by encouraging first home buyers to bring forward a purchase and overcome the deposit barrier. However, they may not expand access to home ownership to persons otherwise excluded (Randolph et al. 2013). Neither impact upon the ongoing costs of a mortgage, but may reduce the minimum required mortgage to an affordable level. Any access and affordability benefits of the schemes are potentially offset by their inflationary effects on housing prices (see Chapter 2). Increasing the buying power of first home buyers already able to enter the market may increase house prices and hence the size of deposits required, and so ultimately exacerbate access and affordability challenges. Despite this, direct transfers to first home buyer remain popular amongst policy makers and the public. Cash grants are an effective tool for stimulating demand in the economy, especially during economic crises (Leishman et al. 2022). Cash grants are also very popular amongst voters, with more than 80 per cent of Australian constituents in 2017 supporting the FHOG scheme, above and beyond other housing affordability measures (Sheppard et al. 2017).

1.1.2 Loans, guarantees and equity instruments

Home Guarantee Scheme

Grants and stamp duty concessions have dominated the Australian first home buyer policy mix for the last couple decades. However, in recent years, the Australian, state and territory governments have come to embrace institutional innovations and financial instruments that are not direct transfers, and instead must be repaid. This is highlighted by the Home Guarantee scheme, which was introduced as the FHLDS in January 2020. The FHLDS was followed by subsequent variants in the form of the New Home Guarantee (NHG) (introduced in November 2020) and First Home Guarantee (introduced in July 2022). The Home Guarantee scheme allows eligible borrows to take on low deposit home loans of just five per cent from mainstream mortgage lenders, with the National Housing Finance and Investment Corporation (NHFIC) acting as guarantor on up to an additional 15 per cent of the mortgage value. This injection of collateral incentivises mortgage lenders to offer high Loan-To-Value (LTV) finance to otherwise credit-worthy customers, who might otherwise be deemed as too risky. Eligibility constraints for the placements available yearly consist of income limits and price caps, targeting first home buyers with moderate incomes, but low savings. The Australian Government has, at time of writing, committed to continuing these schemes (with some potential eligibility adjustments). The Australian Government has also committed to introducing a Regional First Home Buyer Support Scheme, which provides additional placements targeted at regional first home buyers.

The schemes have proved popular among first home buyers, with 22,879 purchases supported by the FHLDS and NHG to June 2021, and is estimated to have brought home purchase forward by an average of four years for the FHLDS, and four and a half years for the NHG (NHFIC 2021). Deposit guarantees bring forward access to ownership by significantly reducing downpayment requirements, but their impact on affordability is minimal, as the borrower still needs a sufficient income to service a mortgage at up to 95 per cent of the dwelling price. Any affordability benefit is attributed to the avoidance of lenders mortgage insurance (LMI), a premium that protects the bank against loss and would otherwise be added to a low deposit home loan in the absence of a guarantor. Low deposit schemes also come with an additional downside risk – all other things being equal, with a deposit of 5 per cent, a relatively small drop in dwelling prices of more than 5 per cent would see the borrower enter negative equity, and unable to repay the loan if forced to sell. Such a situation is particularly important in Australia given most home lending is classified as 'recourse' lending and the full amount owed is repayable in the event of default.

Shared Equity Scheme

Another policy innovation growing in prominence is shared equity schemes, which refer to a range of ownership models in which the value of a dwelling is divided between more than one legal entity. In our context, equity is shared with government, or a government supported lender. Examples of government shared equity schemes in Australia are the Western Australian Shared Home Ownership Scheme[3], and the Victorian Home Buyer Fund[4]. The Australian Government has committed to implementing a nationwide 'Help to Buy' shared equity scheme, eligible each year to 10,000 households on incomes up to $90,000 for singles and $120,000 for couples (Australian Labor Party n.d.). Under the scheme, the Australian Government will contribute 30 per cent (for an existing property) or 40 per cent (for a new property) to the purchase price of the dwelling. This allows the home buyer to purchase with as low as a 2 per cent deposit on the full price of the property, and service a mortgage on 60 to 70 per cent of the purchase price.

A shared equity arrangement provides both a significant access and affordability benefit to first home buyers, but at the cost of forgone wealth accumulation on the non-owned equity of the property if market value increases. Owners can counteract this somewhat with the option of taking additional equity over time.

3 https://www.keystart.com.au/guides-and-tips/guides/all-about-shared-ownership
4 https://www.sro.vic.gov.au/home buyer

1.2 Existing research

The analytical exercises conducted as part of this report draw heavily on existing research on simulation modelling at both the macro and micro levels.

The macro-simulation model in this report is informed by a large literature that models the interactions between household decisions about home ownership, housing policy, and housing markets. These models generally account for the lifecycle of households, inequality in income and wealth, and restrictions on the ability to borrow for house purchase. Importantly, these models reflect housing markets in which house prices must adjust to ensure that housing demand and supply are balanced, that is housing markets are in equilibrium. Recent studies have focused heavily on borrowing constraints faced by home buyers. For instance, Yang (2009) incorporates both restrictions on the amount that households can borrow for housing and transaction costs associated with buying and selling houses. Chambers et al. (2009) build a model with a realistic mortgage contract structure, while Boar et al. (2022) model various transaction costs associated with adjusting housing and mortgages.

Importantly, the literature show that changes in first home buyers' borrowing constraints can influence demand and prices in the housing market (see for instance Halket and Vasudev 2014). Indeed, changes in housing credit conditions can generate booms and busts in the housing market, largely through first home buyers whose demand for housing contributes to house price movements (Ortalo-Magne and Rady 2006). When there is a general rise in household income many young home owners overcome their borrowing constraints at the same time, which leads to an increase in demand and higher house prices. While most studies model the impact of LTV constraints, Greenwald (2018) and Zubairy (2021) highlight the importance of payment-to-income (PTI) constraints.

Recent literature has studied changes in policy and macro-economic conditions that have affected the demand for housing and home ownership. These papers emphasise the response of house prices in the equilibrium of the housing market. In this way, changes in conditions or policies can affect home ownership beyond direct effects on housing demand. These conditions and policies may also indirectly affect home ownership through changes in the market price of housing.

The Interactions between credit conditions and housing market cycles have been highlighted by a number of studies including Alpanda and Zubairy (2017), Favilukis et al. (2017), Kaplan et al. (2020) and Garriga and Hedlund (2020). A recent study by Gamber et al. (2021) found that low mortgage interest rates explain around one-third of the overall increase in house prices during the COVID-19 pandemic in the United States.

However, unlike the micro-simulation modelling housing literature, which is populated with a large bank of studies drawing on the Australian housing tax and transfer systems, there has been relatively little research that uses macro-simulation models to study the Australian housing market.

Micro-simulation models are policy simulation tools designed to mimic a social welfare system (existing or proposed) of a country or a region. These models assess the impact of a welfare system on individual or household outcomes. These have been applied in various policy domains including tax transfer interactions (Wood and Ong 2008), health (Li and O'Donoghue 2013) and childcare (Callan 2021). Of particular relevance to this report is the literature on micro-simulation models of the tax transfer system.

The literature covers two types of micro-simulation modelling – static and dynamic. Static models are commonly used to simulate the distributional impacts of existing and proposed policy settings. In the area of housing, there exists a significant bank of literature by Wood and others that have modelled the distributional impacts of housing related tax transfer policies or proposals in Australia, including the impacts of abolishing stamp duty and replacing it with land tax (Wood et al. 2012), the Henry Review proposals on the savings income discounts and Commonwealth Rent Assistance (CRA) (Wood et al. 2011), the National Rental Affordability Scheme (Wood and Ong 2008), and the implementation of secure leases in the private rental market by offering financial incentives to landlords (Wood et al. 2017). These studies show that proposals such as the abolition of stamp duty in favour of land tax will improve affordability outcomes for home buyers (Wood et al. 2012). While the savings income discounts that affect negative gearing provisions and capital gains tax on property are shown to adversely impact on financial

outcomes for negatively geared investors, they offer financial gains to equity-oriented investors (Wood et al. 2011). Wood et al. (2017) show that the cost of offering private landlords an incentivising premium to provide more secure leases to private renters who are eligible for public housing is lower than the cost of building additional public housing stock to accommodate these tenants.

Dynamic models are more sophisticated and resource-intensive than static models in that they simulate a population's characteristics year-on-year on the basis of their characteristics in the previous year (O'Donoghue 2001). These models have the capacity to forecast government support eligibilities over the course of a lifetime and well into the future. Thus, the future implications of current policies can be projected (see for instance Johnson et al. 2019; Geyer and Steiner 2010). In the field of housing, recent research by Wood et al. (2017) and Ong et al. (2019) used dynamic models to 'age' the population in order to project future expected demand for CRA and public housing in the face of population ageing and home ownership profile changes. Wood et al. (2017) projects that the cost of CRA will rise by 62 per cent due to a forecasted rise in demand for CRA. The study shows that about half of the predicted increase is due to demographic changes, while the other half is attributable to an increase in the share of private renting in the population. Focusing on older persons aged 55 years and over, Ong et al. (2019) find that due to tenure and demographic change, the demand for CRA by older persons is projected to rise by 60 per cent from 414,000 in 2016 to 664,000 in 2031. In addition, the unmet demand for public housing from older private renters is expected to rise by 78 per cent from 200,000 to 440,000 households.

1.3 Research methods

Our primary research approach is simulation modelling. Simulation modelling provides an important and unique tool to model a range of scenarios and predict outcomes under these scenarios. We deploy simulation modelling at both the macro (or market) level and the micro (or income unit) level.

1.3.1 Macro-simulation model

We build a macro-simulation model to examine the impact of shocks to housing finance conditions on the housing market and home ownership in Australia over the last 30 years. The structure of our model captures both differences in individual household outcomes (such as home ownership), as well as changes in housing market outcomes (such as house prices).

At the household level, our model describes the ways in which differences in household circumstances matter for home ownership decisions. Specifically, households are considered to differ by their age, income, assets, housing and mortgage debt. Given their circumstances, households make decisions today that affect their circumstances tomorrow, and so on. In this way, we model the dynamic decision-making process that determines the lifecycle profile of home ownership.

At the market level, households participate in a housing market which is in equilibrium. That is, house prices adjust to ensure that the total demand for houses equals the total (fixed) supply of houses. While changes in housing finance conditions directly affect individual decisions, taken together these decisions contribute to changes in total housing demand, which require changes in house prices to maintain housing market equilibrium. Note that in order to focus on the behaviour of households, we assume that housing supply is held fixed and does not itself respond to housing finance conditions.

The model is used to study the effect of shocks to mortgage finance conditions. We model these changes in a way that characterises the long-run decline in interest rates observed in Australia between the mid-1990s and the mid-2010s. In response to the shocks, the model generates equilibrium increases in house prices, which helps to explain the long-run decline in Australia's home ownership rate. Finally, we also use the model to run experiments studying what might have happened had restrictions on mortgage borrowing been looser or tighter over the period that interest rates were declining. In effect, we ask how outcomes would have changed had prudential regulations differed.

A more detailed description of the model is laid out in Chapter 2.

1.3.2 Micro-simulation model

We will draw on AHURI-3M, a micro-simulation model developed to examine the impact of housing policy reforms on income units (Wood and Ong 2008). The model's key function is to analyse the housing outcomes of housing consumers under existing housing-related policy parameters, and to predict these outcomes under alternative reform scenarios.

The model comprises four inter-related modules – the tax and income support system, housing suppliers, housing consumers, and mortgage markets and market intermediaries. Using the model, we are able to predict home purchase access and affordability outcomes for first home buyer income units under alternative policy scenarios. We are then able to observe the distributional consequences of policy reforms on income units, and highlight the characteristics of those who gain versus those who lose under alternative policy scenarios.

AHURI-3M is operationalised using the 2018 Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Survey is a nationally representative survey that contains a comprehensive range of variables on respondents' demographic, income, labour market, housing, neighbourhood, health and wellbeing characteristics. Cross-sectional population weights from 2018 are applied to produce population-level estimates for the year to reduce the bias from attrition of respondents from preceding years.

A more detailed description of the model is set out in Chapter 3.

2. Housing finance conditions, the housing market and first home ownership

- In Australia, real interest rates have fallen by more than five percentage points over the last 30 years, while real house prices have more than doubled over the same period. At the same time, the home ownership rate has steadily declined from over 70 per cent to 66 per cent in recent years.
- We present a macro-economic simulation model to capture long-run shocks to housing finance conditions so as to model the housing market response to them, and to understand changes in first home purchase access and affordability over time.
- Shocks that reduce interest rates do not directly increase home ownership, but they significantly increase housing demand conditional on owning.
- Higher housing demand leads to significantly higher market prices for housing, which drastically reduces the ability to purchase a first home.
- While the interest costs of mortgage finance are lower following a decline in interest rates, high house prices raise overall mortgage payments and thereby increase the size of the deposit required to purchase housing.
- A second experiment considers the effect of shocks to restrictions on mortgage borrowing. A decrease in the maximum loan-to-value ratio decreases mortgage debt burdens and reduces house prices due to lower housing demand. However, lower loan-to-value ratios mean that larger housing deposits are required and this reduces young households' home ownership rates by up to 20 per cent.

This chapter studies the interaction between shocks to mortgage financing costs, the housing market and first home ownership. The approach taken is to build a macro-economic simulation model that captures both household-level home ownership decisions and broader market-wide developments in house prices as the demand for housing changes. We use the model to run two experiments affecting mortgage finance conditions. First, we simulate the model in response to a shock that decreases the interest rates on saving and borrowing. This experiment broadly corresponds with the experience in Australia over the past three decades. Second, we simulate the model to study the response to changes in borrowing standards, which allows households to borrow more or less against the value of their homes.

We begin with an overview of the macro-simulation modelling literature in Section 2.2. In Section 2.3, we first discuss the evolution of mortgage financing, house prices, and home ownership rates in the Australian data since the 1990s. We then describe the macro-simulation model, including our modelling assumptions and details, the model calibration and key statistics in the model and data. In Sections 2.4 and 2.5 we set out the results from our two experiments studying changes in housing mortgage finance conditions. Section 2.6 offers some comments on policy implications of the macro-economic modelling presented in this chapter.

2.1 Macro-simulation modelling literature

2.1.1 Model assumptions

Our macro-simulation model follows a large literature that studies the interactions between household decisions about home ownership, housing policy and housing markets. Most of these models are characterised by the following common features: households that 'age' and move through a lifecycle; inequality in income and wealth across households; restrictions on the ability of households to borrow for house purchase; and housing markets in which prices adjust to ensure that housing demand and supply are balanced. Moreover, later models have attempted to incorporate observed features of mortgage markets such as the transaction costs associated with initiating a mortgage. We now summarise the key papers that we draw on and their main results of interest for our study of first home buyers.

2.1.2 Life-cycle factors

Gervais (2002) presents an early model in which households differ in their ages, incomes and savings. In that model, young and low-income households must first save before they can afford to purchase housing. Attanasio et al. (2012) also adopt a lifecycle approach and focus on explaining first home ownership. They demonstrate that young households will delay home purchase decisions when their incomes are low or uncertain and when house prices are high.

2.1.3 Borrowing constraint factors

Later models have focused heavily on restrictions on the home buyer's ability to borrow. Those restrictions include maximum LTV ratios and limits on PTI ratios. Yang (2009) builds a model that incorporates both restrictions on the amount that households can borrow for housing and transaction costs associated with buying and selling houses such as real estate fees. Chambers et al. (2009) develop a model with a realistic mortgage contract structure. Mortgages are debts with constant payments over a long maturity period. When the origination of new mortgages is costly, the constant amortising mortgage structure locks households into a fixed stream of mortgage payments even if income falls and repayment becomes more difficult. Boar et al. (2022) consider the various transaction costs associated with adjusting housing and mortgages in more detail. They show that these costs make housing illiquid in the sense that it is difficult to convert into cash when facing unexpected income shocks. The combination of income uncertainty and transaction costs can deter home ownership among young households, especially if their income is very uncertain.

First home buyers represent a subset of market participants so while changes in first home buyers' borrowing constraints shape individual decisions to enter into home ownership, collectively those choices impact demand and prices in the housing market more broadly. For example, Halket and Vasudev (2014) show that while housing

borrowing constraints influence housing demand, tighter borrowing constraints provide an incentive for younger households to choose smaller houses rather than delay house purchase. In a similar vein Ortalo-Magne and Rady (1999; 2006) show that changes in housing credit conditions can generate booms and busts in the housing market, largely through the decisions of first home buyers whose demand for housing contributes to house price movements. For example, changes in income can move households past binding borrowing constraints and into home ownership. However, when there is a general rise in household income many young home owners overcome their borrowing constraints simultaneously leading to an increase in demand and higher house prices.

The literature highlights that the form of household borrowing constraints matters for the relationship between macro-economic conditions and the housing market more generally. While most models had focused on LTV constraints on mortgage borrowing, Greenwald (2018) shows that PTI limits can also be important. This is because small changes in household incomes or in mortgage interest rates immediately affect the PTI constraint. Ma and Zubairy (2021) explicitly compare the relative importance of LTV and PTI constraints for the household transition from renting to owning. They show that PTI type constraints are much more important for explaining home ownership decisions for young households. Intuitively households would like to buy houses commensurate with the high incomes they expect later in life, but are constrained by PTI limits and the relatively low incomes they earn when young. A relaxation of the PTI constraint effectively provides an opportunity for households to transition into owner-occupied housing which would otherwise be achieved much later in the lifecycle.

2.1.4 Effects of macroeconomic and credit conditions

Recent literature has sought to provide insight into how changes in policy and macro-economic conditions have important feedback mechanisms. While such changes affect the demand for housing and home ownership, these papers emphasise that house prices change to maintain the equilibrium of the housing market. Put another way, the choices of buyers and sellers of housing must be consistent with one another. In doing so, these papers capture an important feedback mechanism in that changes in conditions or policies affect home ownership beyond the direct impact on housing demand. These conditions and policies may also indirectly affect home ownership through changes in the market price of housing.

As house prices have increased rapidly in many industrialised economies, increasing attention has been paid to what, if any, is the appropriate policy response. Alpanda and Zubairy (2017) study the ability of mortgage credit policies to curb household debt during a housing boom. They find that tighter mortgage borrowing constraints reduce the ability of buyers to leverage house purchases. This lowers demand for housing, and reduces the market value of houses, as well as the amount of debt issued to borrowers. Favilukis et al. (2017) study the US housing boom of the 2000s. A key finding of this analysis is that wealth inequality is important for understanding fluctuations in house prices. If many households are relatively poor, they have few resources to draw on when purchasing houses. Instead, they rely heavily on mortgage debt to become home owners. In these circumstances, changes in mortgage credit can lead to large swings in housing demand and house prices. This is because these debt-sensitive households respond simultaneously to changes in mortgage markets.

Kaplan et al. (2020) also study the implications of boom and bust cycles for first home owners and housing markets more broadly. They argue that changes in financial conditions, such as looser borrowing constraints, have little effect on house prices on their own. However, changes in financial conditions may induce a large fraction of households into home ownership, such as the three per cent increase in ownership during the mid-2000s housing boom. However, simultaneous changes in credit and optimism about the future leads to more household leverage, which increases housing demand and thus house prices. Garriga and Hedlund (2020) show that changes in credit conditions along with changes in income inequality can cause a large housing crash. Higher income risk that results in more unemployment can leave households with too little income to service a mortgage, and tighter credit conditions leave them unable to refinance those mortgages. The simultaneous impact of these developments on households means that large numbers of households are forced to sell houses, which puts significant downward pressure on house prices. On their own, however, mortgage credit shocks can only explain about one quarter of the decline in house prices and very little of the change in home ownership during the 2000s housing crisis.

2.1.5 Impact of COVID-19 on house prices

More recent analysis has sought to identify the effect of the COVID-19 pandemic on housing markets. Gamber, Graham and Yadav (2021) use a lifecycle model to study the US housing market during the pandemic. They find that while the conditions of the pandemic itself induced a large increase in housing demand, low mortgage interest rates explain around one-third of the overall increase in house prices during this period.

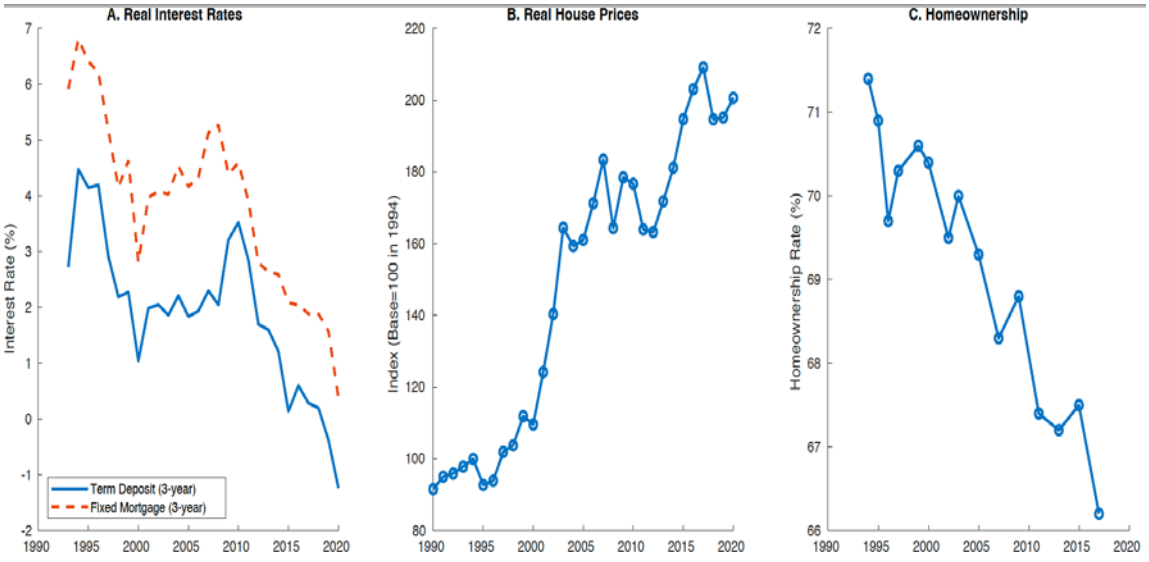
2.1.6 Australian macroeconomic models of the housing market

Finally, we note that there has been relatively little research using these macro-simulation models to study the Australian housing market. Day (2018) uses a two-period model of Australia to show that a growing population may explain rising Australian house prices if housing supply is limited. However, this model abstracts from lifecycle dynamics, household inequality and housing tenure choice. The paper also only provides theoretical observations, and does not make specific quantitative predictions about the Australian housing market. Fehr, Hoffman and Kudrna (2021) use a detailed lifecycle model to compare differences in home ownership rates across Germany, the US and Australia. They find that tax and pension policies can account for much of the cross-country differences in ownership. Cho, Li and Uren (2021a; 2021b) develop detailed lifecycle models to study the impacts of tax policies such as negative gearing and stamp duty on housing market outcomes in Australia. They find that stamp duty raises the cost of purchasing housing and mildly depresses the home ownership rate, while negative gearing policies for housing investors elevates market house prices and reduces the home ownership rate. Cho, Li and Uren (2021a) model a repeal of the negative gearing policy and find that house prices would fall by one and a half per cent and home ownership would rise by four per cent over 25 years.

2.2 Macro-simulation model

The purpose of our macro-simulation model is to understand the evolution in housing finance, house prices and home ownership rates in Australia over the last 30 years. Figure 1 illustrates the main trends in these variables over time. Panel A shows that real interest rates – on bank deposits and on mortgage interest rates – have fallen by around five percentage points since the 1990s. Panel B shows that real house prices have more than doubled since the early 1990s. And Panel C shows that over the same period, the home ownership rate has fallen from around 71 per cent of Australian households to just 66 per cent in recent years.

Figure 1: Interest rates, house prices and home ownership in Australia



Notes: Real interest rates are computed using nominal interest rates and subtracting market expectations of three-year inflation rates. House price data is the CoreLogic hedonic house price index for Australia. The real house price is computed by deflating the CoreLogic series by the CPI from the RBA to a base year of 1994, which is the start year of the model experiments. The home ownership rate is taken from the ABS Surveys of Income and Housing.

Sources: RBA interest rates and inflation rates, CoreLogic hedonic price index, and ABS Surveys of Income and Housing

In the simulation exercises conducted for the purpose of this report we take the changes in interest rates observed in the data as given. Treating the change in interest rates as exogenous in this way ensures the model remains tractable and can provide insights into the response of the housing market to this development. The model is designed to capture both outcomes at the individual or household level (such as home ownership), along with changes at the macro-economic level in the housing market, namely house prices. To accomplish this, our model is constructed by first assuming that individual households make optimal decisions subject to constraints. This is a standard approach in economics and means that the macro-economic and market outcomes of our modelling reflect many households making the best decisions for themselves given their circumstances. We refer to this coordination of behaviour of decisions across households in the economy as an equilibrium. In the model, equilibrium is brought about through changes in market-based house prices that ensures that the decisions of buyers and sellers of housing are consistent with one another.

The approach in this report is to develop a heterogeneous household model of the housing market. Heterogeneity in our context means that households are assumed to differ along several dimensions designed to reflect the different circumstances that shape observed behaviour and outcomes. In particular, households are assumed to differ in their age, income, assets, housing consumption and mortgage debt. Given their circumstances, households make decisions about their non-housing consumption, their level of savings, home ownership status, the size of their house (rented or owned), and the level of debt used to finance a house (if an owner). The model takes a life cycle approach so that after making decisions at any given 'age', the circumstances of each household are adjusted and a new set of decisions are made in subsequent periods, and so on over the life cycle. In this way, we model the dynamic decision-making process that households face and capture the lifecycle profile of home ownership.

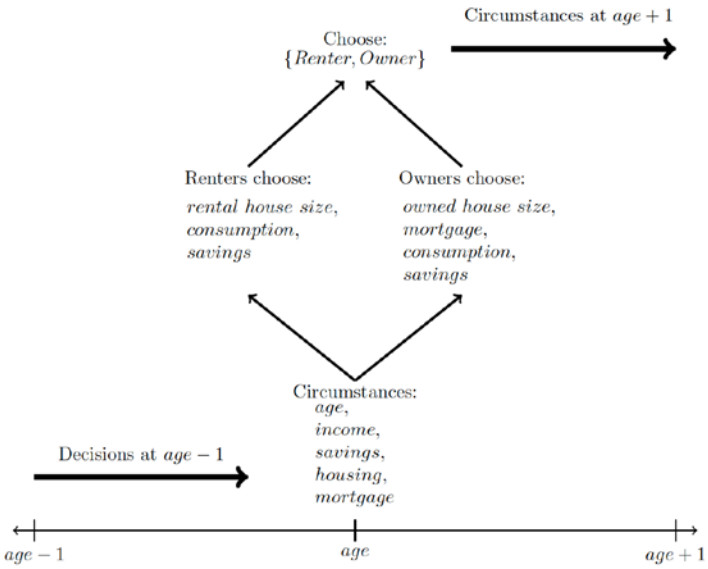
The decisions of individual households contribute to the broader outcomes experienced in the economy including in housing markets. In particular, housing market equilibrium requires that the price of housing adjusts to ensure that the total demand for houses equals the total supply of houses. This framework links the decisions of individual households and the macro-economic outcomes. Hence, it is possible to examine the effects of changing interests and the ability to borrow on both households and the housing market. In undertaking such simulations, it is important to emphasise that the model captures an important feedback loop in the economy. To the extent that the cost of housing finance changes when interest rates decline, household demand for housing increases, which requires an adjustment of house prices to ensure that the housing market equilibrium is maintained.

We use the model to study the long-run change in interest rates and house prices that took place between the mid-1990s and the mid-2010s. To maintain tractability of the modelling exercise, we assume that the change in interest rates was the only change to take place over these two decades. This simplification means that we must abstract from other important changes in the economy such as population growth, income growth and changes in housing supply conditions. This means that the results from the modelling should indicate how changes to interest rates in isolation contribute to changes in observed outcomes. Results from the modelling exercise indicate that the long-run decline in interest rates accounts for around one-third of the overall increase in house prices observed over this period. The macro-economic factors we set aside (population, income and housing supply growth) are likely to explain the remainder of the overall increase in house prices. The implication of this is that, although the cost of housing finance fell dramatically during this period, the price and up-front cost of housing rose dramatically. We study these changes separately and in combination to understand changes in housing affordability over the last quarter century.

2.2.1 Model details

We now describe the model features and assumptions in detail. The assumptions balance developing a tractable model that contains features consistent with patterns observed in the data. The economic circumstances and decision making process of our households is summarised in Figure 2, while details are discussed below.

Figure 2: Summary of household circumstances and decision-making process



Source: Authors.

Lifecycle

It is assumed that households begin life in the model at age 20, age one year at a time and die with certainty at age 85. In each year of life, there is a small probability of premature death in which case a household exits the model. Households are assumed to participate in the labour market from model entry until retirement at age 66.

Resources

Households begin life at age 20 without any wealth either in the form savings or housing. From age 20, households begin earning labour income, and do so up until they retire.

Labour income consists of two components. First, there is a deterministic lifecycle component of income. This reflects the fact that, on average, workers tend to receive promotions and move up the job ladder over time. As observed in the data, we assume the lifecycle component of income grows until it reaches a peak at age 50, and then declines slowly until retirement. Second, there is a random component of income. This reflects largely unpredictable changes in earnings such as career changes, bonuses, dismissals, and fluctuations in hours worked which may arise from business cycle developments. Rather than model these phenomena in detail, we use a simple statistical representation of the earnings process that is calibrated to annual earnings data (see Section 1.4 for details).

Upon retirement, households stop earning labour income and start receiving government provided pensions and begin to draw down on savings accumulated through their working life. To simplify this process, we assume that households simply earn a constant and fixed proportion of the labour earnings they received in the final period of their working life. This provides a simple proxy for the value of retirement income earned across households, since retirement savings balances often reflect the level of earnings received late in working life.

Note that we do not model the government tax and transfer system, nor do we model the receipt of gifts or bequests received from parents.

Preferences

The economic approach posits that households make the best possible choices subject to the constraints they face. We assume that household choices require decisions around the level of housing services purchased and the level of consumption goods. We follow the macro-economic literature closely and assume that households face 'Cobb-Douglas' preferences over consumption and housing, and that they have 'Constant Relative Risk Aversion' preferences over their total consumption bundle.[5] The implication of this assumption is two-fold. First, households are willing to substitute non-housing consumption goods for housing services at a constant rate even as housing costs vary. Second, households are concerned about fluctuations in their income that will affect the flow of goods and housing services they are able to purchase over time. For this reason, households would like to hold positive savings balances to be used in case their income drops unexpectedly.

In a life cycle framework one important choice for the household is how much to consume in total at any given age. Adopting the approach that is standard in the literature, we generate a preference for current consumption by assuming that households discount the future at a constant rate.

We also assume that households have a preference to leave behind some wealth when they die. This may be because of a desire to leave bequests for children, gifts for charity or simply because older households dislike spending in old age. In the model a key reason for this assumption is to ensure that households hold onto housing wealth until late in life (see Section 1.4). Without this mechanism, households would simply sell their houses in old age and consume all of their resources before they die. Importantly, this assumption is consistent with observed behaviour in that households in general often run down savings, especially housing wealth, in retirement.

Consumption and savings choices

Each period, households in the model decide how much to save in non-housing wealth. We assume that this wealth takes the form of a bank account or simple savings mechanism such as a bank bond or government bond. Savings accrue interest each period, which can be spent or re-invested in savings. Any resources that are not saved are spent on consumption goods or housing services.

Note that we do not model other forms of saving or investment. This means we abstract from investment in the stock market, private businesses and investor housing.

Housing choices

A key outcome of interest in the present analysis is household tenure choice. In the model households can choose whether to rent housing services or purchase houses directly, that is enter home ownership. Each of these choices are associated with different costs and benefits reflecting the circumstances faced across different tenures.

Renters decide on a rental house size each period, and they must pay their landlord a fixed per-unit price for their rental.[6] This means that the cost of renting is proportional to the size of a rental unit: doubling the size of a rental property doubles the rental cost paid by a renter. There are no costs associated with adjusting rental housing, so households can freely move to a larger or smaller rental unit each period. This means that rental housing retains some flexibility in the face of income shocks.

Home owners decide on a house size and purchase it at a fixed per-unit price. Unlike rental housing, owner-occupied housing is associated with a fixed cost of adjustment. If a household decides to change their home size, the sale of their existing house incurs a transaction cost. Such transaction costs capture fees charged by real estate agents or lawyers, and other costs associated with moving house. Since adjusting owner-occupied housing is costly, home owners generally choose not to change houses each period. Home owners are responsible for housing maintenance costs each period and these are assumed to be proportional to the total value of the house owned.

5 The Cobb-Douglas preferences assumption implies that consumption goods and housing services are neither complements nor substitutes. A recent empirical paper by Khorunzhina (2021) finds that consumption and housing are mild complements. Allowing for complementarity in our model would make little difference to our results, since we are not here concerned with the response of non-housing consumption to mortgage finance conditions.

6 Following the literature, we use 'house size' as a catch-all term, encompassing house size, house quality and local amenities.

To simplify the model we assume that there are a fixed number of possible house sizes to choose from. We assume that renters choose from a set of housing units that are smaller than the set of houses available to be purchased by home owners. In particular, the largest available rental size is equal to the smallest available owner-occupied property. We make this assumption because rentals are typically smaller than owner-occupied properties, and it is common for renters to share housing with other roommates or flatmates, thereby reducing the effective size of a property.

Each period, households compare the benefits and costs of renting against the benefits and costs of owning a house. Then, consistent with the economic approach to decision making, they then choose the best option for them given their circumstances.

Note that we assume that all housing characteristics are captured in the model through differences in 'house size'. This simplifies our analysis significantly, but it does mean that we do not separately capture differences in features such as house quality, house characteristics or neighbourhood amenities.

Mortgage choices

When a household chooses to become a home owner, they can secure a mortgage against the value of the house in order to provide finance for their purchase. We assume that mortgages are fully amortised long-term debts with constant payments over the life of the loan. We assume that the interest rate on mortgages is fixed for one year, which means that mortgage payments always depend on current interest rates. Hence, any potential changes in interest rates would affect the cost of mortgage finance within one year.

Households that finance house purchases with a mortgage are subject to two constraints on their borrowing. First, households cannot borrow more than is allowed by a maximum LTV ratio. This means that the size of a mortgage loan cannot be larger than a fixed fraction of the value of the house being purchased. Second, households cannot borrow more than is allowed by a maximum payment-to-income (PTI) ratio. This means that the required payments on a mortgage loan cannot be larger than a fixed fraction of a household's income. PTI constraints restrict the size of a mortgage loan implicitly by restricting the maximum size of payments that a household can commit to.

These constraints reflect bank and lender rules designed to avoid risky borrowing as well as government-imposed restrictions on borrowing such as those applied by the Australian Prudential Regulation Authority (APRA).

Market for rental properties

To simplify our model of the supply of rental properties, we assume that a rental company buys and sells houses in the housing market and leases them out to renters. The rental company must pay for the maintenance on their properties, but also faces a fixed cost of managing the properties. Rental properties are sold in the period following purchase, and so the company takes into account the present discounted value of the resale price of housing next period.

Given the per-unit house price and per-unit rental rate, the rental company decides how many rental houses to supply to households. The solution to the company's decision problem yields a simple relationship between house prices, interest rates, maintenance costs, management costs and the rental rate. Higher maintenance or management costs lead to an increase in the rental rate. A decrease in interest rates leads to an decrease in the per-unit rental rate. An increase in the current price of housing increases the rental rate, and an increase in the future price of housing decreases the rental rate.

Market for housing

The assumptions detailed above captured the behaviour of households or other agents in the model. There is also a requirement for the decisions to be compatible with one another and ensure that the housing market is in equilibrium. To ensure equilibrium in housing markets we assume that there is a fixed supply of housing in the economy. That is, we do not model the provision of new housing. Second, we assume that demand for housing is given by the sum of total rental properties and the sum of total owner-occupied properties.

In a housing market equilibrium, the demand for housing must equal the fixed supply of housing. To ensure that this is the case, house prices adjust until demand equals supply. If at any time, housing demand was larger than housing supply, the price of housing would increase until some home owners shifted back to renting, some home owners downsized their properties, and the total demand for housing decreased to match available housing supply.

2.2.2 Model calibration

Macro-economic models contain numerous parameters that must be chosen in order to make the model useful for policy analysis. We call this process of choosing parameters 'calibration'. First, we choose a subset of parameters to match information provided by external data sources and by other economic studies. Following this, we choose a subset of parameters to force the model to match some carefully selected economic and housing characteristics about Australian households. We describe this process in brief below.

We begin by setting a set of parameters that capture key demographic and housing characteristics of Australian households. Recall that in the model individuals begin their lifecycle at age 20 but face a probability of dying at every age. The probability of dying at any age used in the model is the population-weighted average of male and female mortality rates, as reported for 2017—2019 in the Australian Bureau of Statistics Life Tables (ABS 2022a). The overall size of the population and the size of each age group are taken from the 2016 Australian Census (ABS 2022b). Recall that following retirement, individuals are assumed to receive a fixed proportion of their salary at age 66. The fixed retirement income replacement rate of 65 per cent is the average Australian replacement rate as reported by the OECD (OECD Publishing 2020). We use the same lifecycle profile of income as Ma et al. (2021), where income grows by 50 per cent from age 20 to age 50, and then falls at the same rate until retirement. Labour income has a random component and as is standard in the literature, we assume that the random component of income during working life follows an auto-regressive process of order one .[7] This means that income is strongly persistent from year to year, but can also randomly move up or down across years. We take the parameters for this process from the Cho et al. (2021), who estimate this income model using Australian household-level income data from HILDA. As is standard in the literature, the risk aversion parameter in household preferences is set to two.[8] We assume that the cost of selling a house is 25 per cent of the value of the house, which reflects legal costs, real estate costs, and the high psychic costs of leaving one's own home or neighbourhood.[9] We also assume the cost of originating a new mortgage is one percent of the value of the mortgage. We assume that the maximum LTV ratio is 85 per cent and the maximum PTI ratio is 35 per cent. We also need to pin down the set of rental and owned house sizes that households can choose from. Both renters and owners can choose from three distinct house sizes. We determine the size of these houses by matching the observed dispersion in house values within Australian neighbourhoods. We take the 95th-to-5th percentiles of house values across Australian Level 2 Statistical Areas (SA2), and average these across SA2s in New South Wales in 1994 (Australian Property Monitors 2020). We then assume that the size of the largest owned house relative to the smallest owned house is given by the 95th-to-5th house value ratio from the data. Finally, we assume that the relative size of the largest-to-smallest rental house is also given by the 95th-to-5th house value ratio from the data.

The model is used to consider how housing outcomes evolve following the reduction in real interest rates over the two decade period beginning in the mid-1990s. Ideally, we want our initial calibration to match the Australian economy and housing market in 1994. This requires choosing parameters that match the characteristics of the

7 An autoregressive process is a statistical model that assumes that a variable is correlated through time. In our model, although income is buffeted by shocks each period, past income still predicts future income. This is a good approximation to real income dynamics when a large number of people do not experience large income fluctuations from year-to-year.

8 In these models, the coefficient of risk aversion is also equal to the inverse inter-temporal elasticity of substitution. This parameter governs the sensitivity of consumption choices to changes in interest rates. Therefore, our parameter choice implies that the sensitivity of household consumption to changes in the interest rate is 50 per cent. That is, a one per cent increase in interest rates is associated with a 0.5 per cent increase in consumption growth.

9 Many papers in the housing literature assume a housing transaction cost of around 6 per cent. This is approximately the size of sales costs and legal fees associated with a house sale. However, Nakamura et al. (2022) observe that households are extremely reluctant to move locations, even when there are large benefits to doing so. The high cost of moving in our model ensures that households do not shift back to renting in old age, something that we do not observe in the data (see Figure 2, Panel A).

Australian economy at the start of our study period. First, the interest rate on savings is set equal to the real three-year term deposit rate in 1994, using data from the Reserve Bank of Australia (2022). Further, the mortgage interest rate is set to match the real three-year fixed mortgage rate for owner-occupiers in 1994, using data from the RBA (2022). Real interest rates are computed from nominal rates and then subtracting the one-year ahead market economist expected inflation rate, again taken from RBA data (2022).

Next we choose a series of parameters that capture key household characteristics that determine their economic decision making. These choices include:

- the household discount rate
- the share of housing services in total consumption as determined by household preferences
- the desire to leave behind wealth at the end of life
- the cost of housing maintenance
- the minimum house size
- the rental company management cost.

To set these parameters, we try to minimise the discrepancy between a set of observed economic and housing statistics and the same statistics computed using our model. These statistics are:

- Total net worth relative to total labour income
- the average cost of rental housing relative to income for renters
- the home ownership rate for households aged over 75
- the average cost of owner-occupied housing relative to income for home owners without a mortgage
- total loans relative to total housing wealth
- the home ownership rate for all households.

Given that the model is used to provide insight into developments over the two decades to the mid 2010s, the initial calibration targets statistics computed with data from 1994.

Table 1 sets out the results from the calibration exercise by comparing our statistics as computed in the data and the model. Column 2 reports data from 1994, while Column 3 reports model statistics for the same year. Ideally the values of various statistics in the model will match closely the same values in the historical data. Note that we also report the values of the same statistics when we re-run the model using interest rates from 2017 (see Section 3.3 for more discussion). Overall, we can see that the model provides a good fit to the statistics observed in the data from 1994. This suggests that the model provides a reasonable characterisation of household circumstances with respect to the housing market as it was in 1994. In particular, household renters spent about 20 per cent of their income on rent (Row 2), households hold debt equal to approximately 20 per cent of the value of their houses (Row 4), and the overall home ownership rate is around 70 per cent (Row 6).

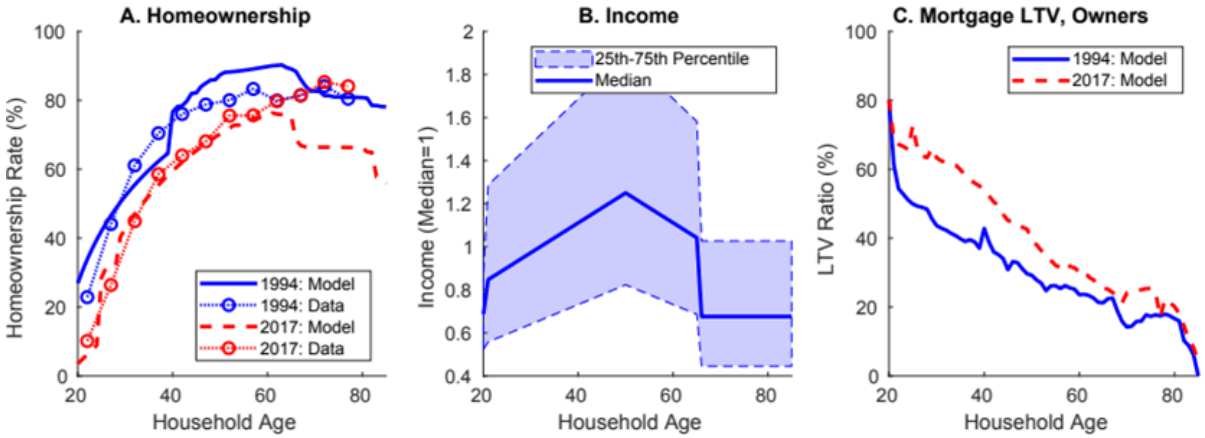
Table 1: Calibration statistics in data and model

Statistic	Data: 1994	Model: 1994	Data: 2017	Model: 2017
Net worth/Labour income	2.94	1.91	4.76	1.68
Housing costs/Income (renters)	0.20	0.20	0.20	0.14
Ownership: Age 75+	0.80	0.80	0.84	0.64
Housing costs/Income (outright owners)	0.03	0.04	0.03	0.04
Loans/Housing	0.23	0.20	0.33	0.35
Home ownership rate	0.71	0.72	0.66	0.56

Source: Authors' own calculations from the macro-simulation model and ABS Surveys of Income and Housing.

Figure 3 reports the lifecycle profiles of home ownership rates, household income and mortgage debt in the model. The solid blue line in Panel A represents the home ownership rate at different ages based on the initial calibration of the model. That is, the models prediction of the home ownership rate for households at different ages in 1994. For comparison, the blue circle markers show actual home ownership rates in five-year age groups for Australian households derived from the 1994 Surveys of Income and Housing (ABS 1995). We see that the model does a good job of generating the observed lifecycle profile of home ownership in 1994. The ownership rate for young households is very low, rises quickly as households enter their 30s and 40s, and then stabilises at around 80 per cent near retirement age.

Figure 3: Home ownership, income and mortgage debt over the lifecycle



Source: Authors' own calculations from the macro-simulation model and home ownership data from ABS Surveys of Income and Housing.

To help understand why the model generates the particular profile of home ownership that it does, consider the lifecycle profile of income in Panel B of Figure 3. Focusing on the income of the median household (the blue solid line), we observe that labour income grows steadily, on average, over an individual's working life. It declines slowly from middle age, and drops sharply at retirement. However, there is also significant inequality in incomes at each age as highlighted by the significant gap between the income of those at the 25th and 75th percentiles of the income distribution. This income inequality helps explain why not every household becomes a home owner immediately and why it takes several years for the home ownership rate to rise to the levels seen later in life. Recall that a household may earn different income from year to year. Some households will be unlucky many years in a row, earning very little during this period. These households will not be able to save enough to prepare a deposit for downpayment on a house. As a result, it takes some households much longer than others to move into home ownership, and indeed some households never become home owners.

Finally, consider Panel C of Figure 3, which presents mortgage LTV ratios for home owners over the lifecycle. Because households expect their income to grow over time, they would like to borrow when young to finance the purchase of their house. Most households save the minimum deposit necessary to purchase a house, and take out a mortgage close to the maximum allowable LTV ratio. As a result, young home owners begin with a large stock of mortgage debt, which they expect to repay over time. With the high interest rates of 1994, households effectively attempt to repay their mortgages quickly, and mortgage debt falls relatively rapidly over the lifecycle.

A key takeaway from this part of the analysis is that mortgages are the primary mechanism that households use to finance home purchases. As we will see in the next section, their ability to do this is significantly affected by the interest rate costs that mortgages accrue.

2.3 Effect of long-run decline in interest rates

We now turn to the first experiment we conduct with our model. Specifically, we seek to understand what happens to housing affordability and home ownership as long-run interest rates fall.

2.3.1 Changes in housing demand as interest rates decline

Our baseline model is calibrated to 1994 (see Table 1), when the interest rate on savings accounts was 4.48 per cent and the interest rate on mortgage loans was 6.81 per cent. We now solve our model using the interest rates observed in 2017: 0.29 per cent for savings accounts, and 1.89 per cent for mortgage loans. We solve the model under the assumption that these low interest rates persist into the foreseeable future.

Because the housing market equilibrium must hold in the model, when interest rates change, the price of housing must adjust until housing demand is equal to housing supply. In the new, low interest rate environment, the cost of financing housing declines and the opportunity cost of investing in housing—that is the interest that can be earned in savings accounts—also declines. As a result of the decline in cost of mortgage financing, demand for housing increases, which pushes up house prices.

Table 2 reports the changes in key housing market and economic parameters induced by the decline in interest rates. Column 2 reports the data and Column 3 reports the changes relative to the baseline model which assumed the significantly higher interest rates experienced in the mid-1990s persisted. In all our experiments, as in the data, interest rates on savings and mortgages fall by 4.19 per cent and 4.93 per cent, respectively. Column 3 shows that house prices in the model rise by 33 per cent under the low interest rate scenario compared to a rise of 109 per cent in the data. These model results suggest that the decline in interest rates accounts for around one-third of the rise in house prices observed in the data over the last 25 years. The discrepancy in the increase in house prices predicted by the model and those observed in the data reflect all other factors not incorporated into the model including changes in the supply of housing supply, income and population amongst other factors.

Table 2 indicates that the home ownership rate falls by 15.3 per cent in the model compared to just 5.2 per cent in the data. One reason for this discrepancy is that our model assumes that all households have been a part of the low interest rate environment for their entire lives. In reality, however, many older households in 2017 made the decision to enter home ownership in the 1990s when interest rates were significantly higher but house prices were much lower. One interpretation of the results on home ownership is that this is what we might expect to see in Australia if interest rates were to remain at record lows until today's young households enter old age.

Table 2: Change in interest rates, house prices and home ownership rates from 1994 to 2017, per cent

	Data	Model
Variable		
Savings rate	-4.19	-4.19
Mortgage rate	-4.93	-4.93
Real house price	109.17	32.81
Home ownership rate		
All	-5.20	-15.31
20-24	-12.71	-27.37
25-29	-17.70	-13.56
30-34	-16.19	-8.58

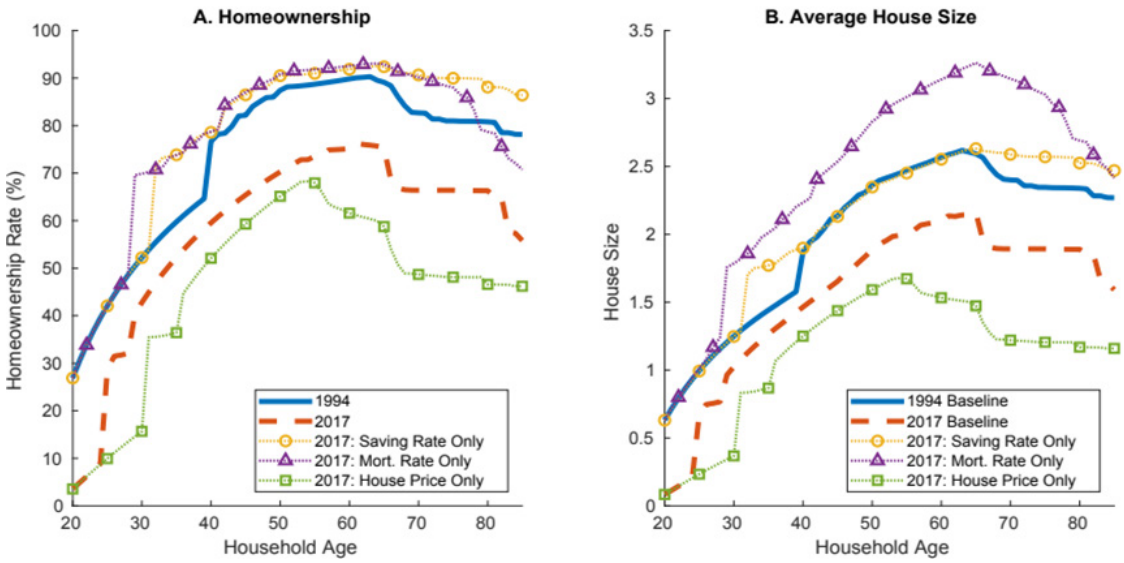
Source: Authors' own calculations from the macro-simulation model, ABS Surveys of Income and Housing, CoreLogic hedonic house price index, and ABS measures of CPI.

Figure 3 Panel A shows the lifecycle profile of home ownership under both the high- and low interest rate environments. We compare our model results to the lifecycle profiles of home ownership observed in the data in 1994 and 2017. In the data we observe home ownership rates fall for all age groups, with the largest changes for the youngest households. Note that our model overstates the decline in home ownership among the youngest household groups (ages 20—24), and somewhat understates the decline in home ownership among older groups (ages 30—34). This discrepancy arises in part because the model does target age-group specific home ownership changes. Instead, we calibrate the model to match the overall home ownership rates in 1994 (see Table 1), and simulate the model forward in time to observe its predictions about home ownership following the shock to interest rates. We now investigate the reasons for these changes.

Figure 4 compares home ownership rates (Panel A) and average house sizes (Panel B) for households in the model in 1994 (solid blue lines) and 2017 (thick red dashed lines). We then solve the model again by starting with the 1994 version of the model, and changing one feature at a time, leaving all other features as they are in 1994. First, we reduce the interest rate on savings accounts to its 2017 level. Predicted home ownership rates following this change are represented by the yellow circle markers. Next, we reduce the interest rate on mortgages to the lower 2017 level, with the predicted rate of home ownership indicated by the purple triangle markers. Finally, we increase house prices to their 2017 level with the new home ownership rates given by the green square markers. This exercise illustrates how housing choices respond to each of the changes to the model.

Panel A of Figure 4 highlights that the reduction in the saving rate and the reduction in the mortgage rate bring home ownership forward in time somewhat relative to the home ownership profile in 1994. The profiles indicated by the reduction in savings interest rates (yellow marker) and mortgage interest rates (purple marker) lie above the home ownership rates in the 1994 data (solid blue line). Young households enter home ownership somewhat earlier than they would have otherwise, due to the availability of cheaper mortgage loans. In contrast, the increase in house prices significantly reduces home ownership for all age groups. However, Panel B of Figure 4 shows that much of the response to changes in interest rates comes through changes in average house size. For example, the decrease in mortgage interest rates leads to a significant increase in average home sizes among home owners, especially after middle age.

Figure 4: Housing demand in response to interest rates and house prices



Source: Authors' own calculations from the macro-simulation model.

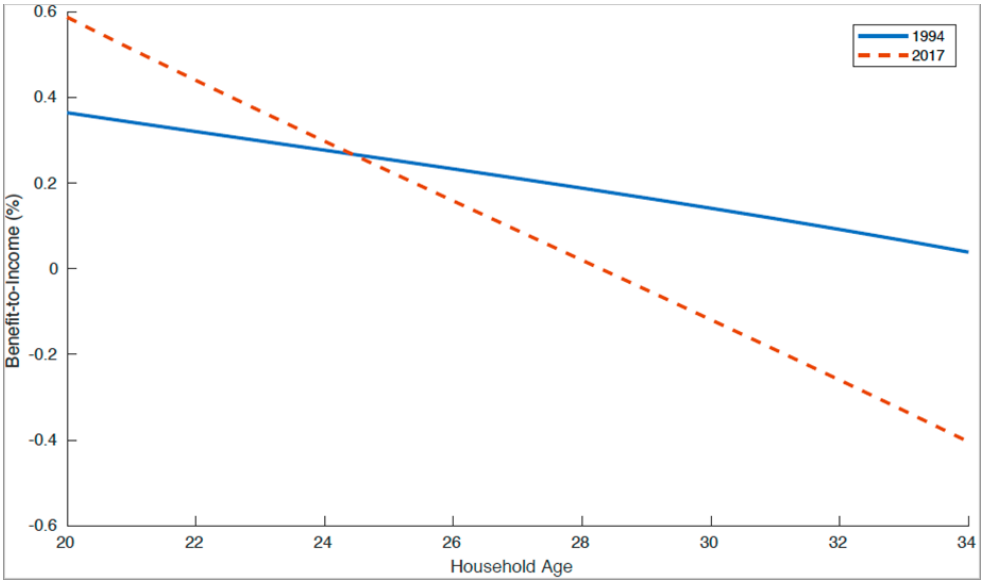
One way to interpret the results in Panels A and B of Figure 4 is that much of the increase in housing demand from a decline in interest rates is due to greater housing demand among those that would be home owners anyway, rather than due to large increases in the home ownership rate itself. Despite the decrease in the cost of financing a mortgage, young households still find it difficult to save for a deposit to enter home ownership. As a result, households do not enter home ownership much earlier than they would have in the high interest rate and low house price environment. This highlights the fact that the major barrier to home ownership for most households is the difficulty of raising the funds for a downpayment on a house.

In general, as interest rates fall, the desirability of home ownership rises significantly given the cost of mortgage financing falls. However, as interest rates decline, house prices increase, such that the net benefit of home *purchase* with declining interest rates will vary across household age groups. To see this, Figure 5 illustrates the net benefit of purchasing a house in the model for 1994 and 2017. The net benefit of purchasing a home rather than renting the same sized house can be expressed as:

> Savings on rental costs that do not need to be paid as a home owner + appreciation on owned housing) – (interest that could have been earned on home equity if kept in savings account + mortgage repayment costs + mortgage origination costs + housing maintenance costs)

In Figure 5 the net benefit for the smallest house size (i.e. the house that first home buyers are most likely to purchase) is reported for each household age, and we express this value as a fraction of average annual income. The fall in interest rates results in a small increase in the benefit of purchasing a house for the youngest households. For older households, the larger mortgage required at the new higher house price increases required mortgage payments, and reduces the net benefit of purchasing.

Figure 5: Changing benefits to home purchase with declining interest rates



Source: Authors' own calculations from the macro-simulation model.

2.3.2 Changes in components of mortgage finance as interest rates decline

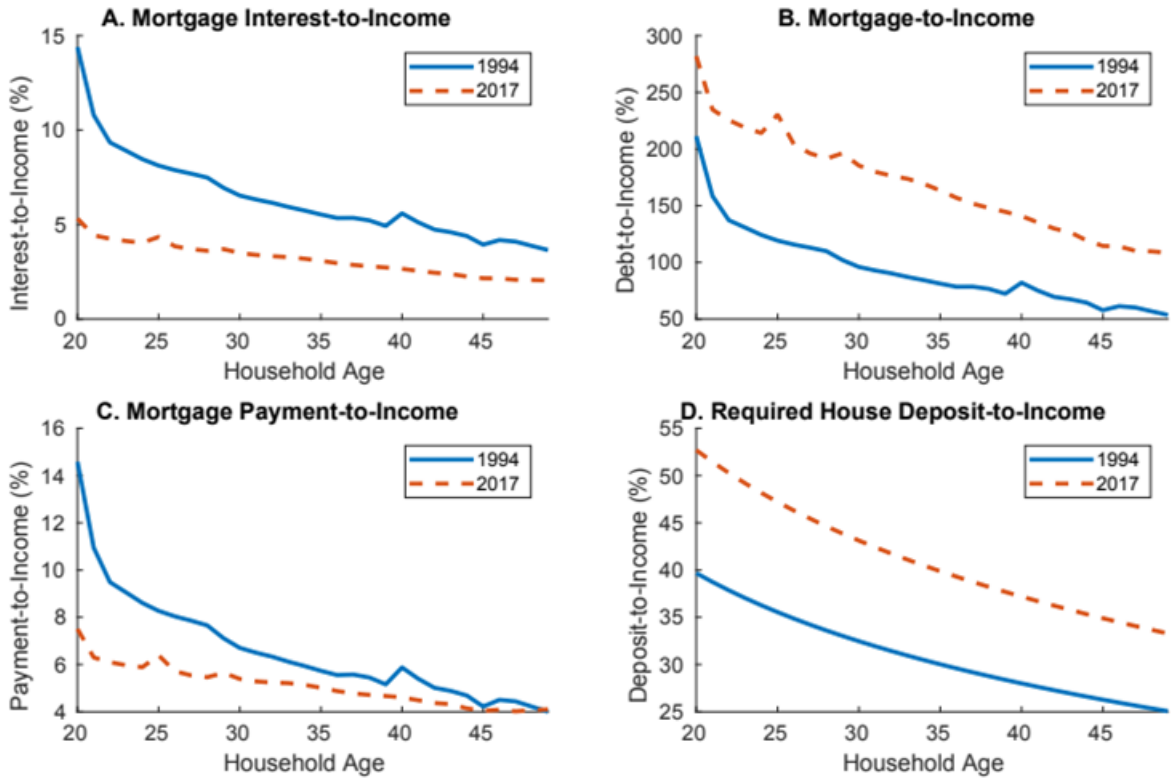
Changes in the costs and benefits of home ownership are closely related to the mortgages that households use to finance house purchase. Figure 6 decomposes changes in the various components of mortgage finance over time, and how this varies with household age.

Panel A shows the changes in the interest component of mortgage repayments between 1994 and 2017. Not only does the mortgage interest rate drop by nearly five percentage points, but there is less compounding of interest costs as the mortgage interest rate declines. Together, the effect of lower interest rates means that households are paying significantly less to finance their mortgages in 2017 than in the past. However, Panel B shows that home owners are taking out significantly larger mortgages in 2017 than 1994. This is entirely due to the much higher market price of housing in 2017. Because households cannot easily able to save more for a deposit, they must take out larger loans to finance house purchase. Panel C shows the size of combined mortgage interest and principal repayments that households are making in 1994 and 2017. These payments are larger than the interest costs alone, but the dramatic fall in interest costs does reduce overall mortgage repayments, despite larger mortgage balances. Finally, Panel D shows the deposit required at the maximum allowed LTV ratio in 1994 and 2017, and reports this value for each age as a fraction of average income. On average, the deposit required to make a downpayment on a house purchase rises by over 10 percentage points of average annual income. The deposit is even larger as a proportion of household incomes below the average, and is also bigger for deposits on larger houses.

Since we assume that household incomes are growing at the same rate in 2017 as in 1994, households cannot save any faster in 2017 than they did in 1994. In fact, building a deposit is more difficult in 2017 because deposit interest rates are also much lower, and savings earn interest at a much lower rate. It is this failure to build sufficient deposits when house prices are high that accounts for the entirety of the decline in the home ownership rate by 2017.

Overall, our analysis suggests that although falling interest rates have reduced the cost of mortgage finance for home ownership, rising house prices have offset these falling costs. In particular, rising house prices have increased the deposit required to purchase a house, and this has had a bigger impact on first time home buyers than has the decline in mortgage finance costs.

Figure 6: Mortgages, interest, payments and deposits with declining interest rates



Source: Authors' own calculations from the macro-simulation model.

2.4 Effect of borrowing constraints on housing affordability

We now turn to our second model experiment designed to understand changes in housing affordability over time. We now re-run the model with the fall in interest rates from 1994 to 2017. However, we first consider the effect of tighter borrowing constraints, and then consider the effect of looser borrowing constraints. To do this, we vary the maximum LTV ratio on mortgages used for financing house purchase which mimics changes to prudential regulations governing mortgage finance. While the maximum LTV ratio is initially 85 per cent, we re-run the model under LTV ratios of 60 and 100 per cent, respectively. These experiments show whether either preventing or encouraging more borrowing would have helped households with housing affordability as interest rates fell over the last 25 years.

Table 3 repeats the results of Table 2 and additionally reports the results of our experiments changing the maximum LTV ratio. Columns 4 and 5 show how changes in house prices and home ownership rates vary under the tighter and looser LTV ratios, respectively. With tighter LTV constraints house prices would have increased by less, while with more relaxed LTV constraints house prices would have increased by more. For example, house prices increase by 31.3 per cent when tighter LTV ratios are coupled with lower interest rates, in comparison to an increase of 32.8 per cent had the LTV ratio remained at 85 per cent. These changes follow intuitively from the role of debt financing in facilitating home ownership. A greater or lesser ability to leverage house purchases while interest rates are falling leads to greater or lesser increases in housing demand, respectively. Similarly, home ownership rates would have fallen by more if LTV constraints were tighter, and would have fallen by less if LTV constraints were looser.

The model highlights that it is younger households that are most heavily affected by changes to maximum LTV ratios. The final three rows of Table 3 show that home ownership rates for young households are extremely sensitive to borrowing conditions. When the maximum LTV ratio is low, fewer young households can afford to own a home as they do not have the resources to make a downpayment even though house prices are low. When the maximum LTV ratio is high, many more young households can afford home ownership as they need not have saved previously in order to make a downpayment on a house.

Table 3: Change in interest rates, house prices and home ownership rates from 1994 to 2017, per cent

	Data	Model	Model, Low LTV (60%)	Model, High LTV (100%)
Variable				
Savings rate	-4.19	-4.19	-4.19	-4.19
Mortgage rate	-4.93	-4.93	-4.93	-4.93
Real house price	109.17	32.81	31.25	34.38
Home ownership rate				
All	-5.20	-15.31	-25.91	-8.33
20-24	-12.71	-27.37	-27.43	-6.34
25-29	-17.70	-13.56	-34.11	-1.70
30-34	-16.19	-8.58	-24.09	-1.35

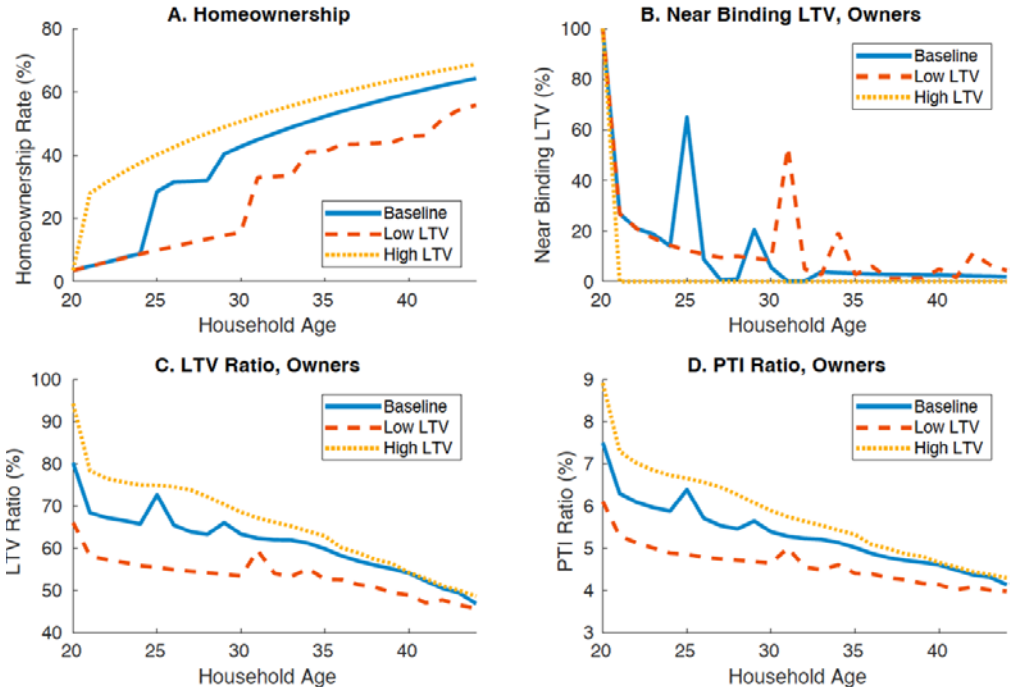
Source: Authors' own calculations from the macro-simulation model, ABS Surveys of Income and Housing, CoreLogic hedonic house price index, and ABS measures of CPI.

Figure 7 explores changes in home ownership and financing conditions for young households in response to these changes in borrowing conditions. Panel A of Figure 7 shows that home ownership rates decline (rise) across all age groups when maximum LTV ratios are lower (higher). Panel B computes the fraction of home owners that are near the maximum LTV ratio on their mortgages.[10] On average, more home owners are near their borrowing limit when maximum LTV ratios are lower, and this is true even though house prices are lower when maximum LTV ratios are lower. Conversely, fewer home owners are near their borrowing limit when maximum LTV ratios are higher, and this is true even though house prices are higher when maximum LTV ratios are higher. Panels C and D of Figure 7 highlight how average LTV and PTI ratios for home owners with a mortgage vary across the lifecycle. We find that average LTV and PTI ratios are lower (higher) when maximum LTV ratios are lower (higher).

Taken together, the results suggest that while tighter credit conditions would have prevented some of the build-up in mortgage debt and costs for borrowers, this would have come at the cost of lower home ownership rates for young households. This follows from the fact that because young households cannot easily build the deposit required to make a downpayment on a house, raising the required deposit size (via a lower maximum LTV) puts home ownership further out of reach. This is true despite the fact that tighter borrowing constraints lower the price of housing by reducing the total market demand for housing. In contrast, looser borrowing constraints associated with higher maximum LTV ratios would have enabled higher rates of home ownership, especially among young households. However, this would have come at the cost of higher house prices, higher mortgage debt burdens and greater mortgage repayments over time.

One note of caution about our analysis here. To simplify the model, we have set aside the risk that households might default on their mortgage contracts, and we have also ignored the possibly of unexpected recessions or declines in house prices. Both of these factors increase the risk of mortgage borrowing, and reduce the benefits of looser credit conditions. In a model without these risks, easier credit conditions are almost always better for potential home owners as there are few downsides to borrowing more to access housing.

Figure 7: Low interest rate environment with high and low LTV ratios



Source: Authors' own calculations from the macro-simulation model.

10 We define 'near' as having an LTV ratio on mortgage borrowing that is within 10 percentage points of the maximum allowable LTV ratio.

2.5 Summary and policy development implications

In Australia, the long-run decline in interest rates over the last 30 years has reduced the cost of borrowing, but increased the demand for housing. This higher demand has increased the market-based price of housing. Overall, these changes have significantly reduced the affordability of home ownership for young households. In this chapter, we show that this is because lower borrowing costs have been more than offset by the larger downpayments required when house prices are high.

In additional experiments, we find that easier mortgage credit in the form of higher maximum LTV ratios on borrowing could have improved housing affordability by allowing young households to borrow more against rising house values. We find that the expansion of mortgage borrowing does not excessively increase total housing demand. In addition, the resulting increase in house prices does not offset the ability of young households to purchase houses with larger mortgages.

Our results suggest that looser restrictions on mortgage borrowing may help to offset the difficulty of first home purchases in a low interest rate, high house price environment. Note that this finding is at odds with much of the recent discussion of counter-cyclical mortgage macro-prudential policies (APRA 2021). One of the reasons for this difference in recommendations is that our analysis in this chapter sets aside the greater risks associated with an increase in mortgage borrowing. This means that to the extent that first home ownership is desirable, there is a policy trade-off between housing affordability and financial stability in low interest rate environments. For this reason, further research should expand on our current analysis by exploring the risks of mortgage distress and default associated with increases in mortgage borrowing.

It is worth noting that the very low interest rate environment Australia has experienced in recent years may not persist into the future. As a result of rising inflation pressures following the COVID-19 pandemic, nominal interest rates in Australia and other countries have been rising rapidly. While it is too early to tell whether these changes signal an end to historically low interest rates, Australian house prices are now falling in response to tighter mortgage financing conditions. A persistent rise in interest rates and decline in house prices may yet see the return of young households to the housing market.

Finally, policy makers might consider the implications of our findings for more frequent, short-run fluctuations in interest rates. While mortgage borrowing costs have fallen by around five per cent over the last 30 years, interest rates regularly move up and down by several percentage points over the course of a typical business cycle, or boom and bust (usually around five to seven years). Although business cycles are typically associated with changes in employment and income, our research sheds some light on the effect of the interest rate channel in isolation. During a recession, for example, falling interest rates would contribute to higher housing demand, higher house prices, and lower home ownership than would otherwise be the case (i.e. absent interest rate changes). To the extent that lower incomes during a recession also disproportionately affect young households, we might expect even larger declines in home ownership during a recession episode. Our modelling approach allows us to analyse macro-economic channels – such as the effect of interest rates – in isolation, and this opens the door to further research studying changes in home ownership over the business cycle.

3. First home buyer assistance schemes and first home ownership

- Among rental tenants who prefer ownership and are aspiring first home buyers, 84 per cent face downpayment constraints and 71 per cent face repayment constraints.
- We apply a micro-simulation model to examine the extent to which first home buyer assistance schemes influence prospects for achieving home ownership.
- We simulate a mortgage guarantee scheme and shared equity scheme, modelled after the Home Guarantee and Help to Buy schemes respectively.
- The two schemes alter the housing finance conditions faced by first home buyers in different ways. A mortgage guarantee addresses the downpayment hurdle but not the repayment hurdle. A shared equity scheme addresses both hurdles.
- Of the 1.6 million rental income units that are aspiring first home buyers, 266,500 or 16 per cent are eligible for a mortgage guarantee, while 397,000 or 31 per cent are eligible for shared equity.
- Those who are eligible for either scheme are on average younger and healthier, but more likely to be living in low socioeconomic areas, than those who are ineligible.
- The shared equity scheme is more accessible to income units on lower incomes who have lower levels of education and labour force participation than the mortgage guarantee scheme.
- The microsimulation model suggests 22 per cent of eligible aspiring first home buyers would be assisted into home ownership by the mortgage guarantee scheme, and 41 per cent would be assisted by the shared equity scheme.

This chapter examines the extent to which first home buyer assistance schemes influence prospects for achieving home ownership by altering the housing finance conditions faced by first home buyers. We simulate two programs, modelled after two schemes currently in force in Australia. The first is a mortgage guarantee scheme designed to reduce downpayment or deposit constraints by lowering the upfront cost requirement of first home purchase, modelled after the Home Guarantee scheme for first home buyers. The second is designed to reduce both downpayment and repayment constraints, modelled after the Help to Buy shared equity program. This chapter is focused on outcomes and distributional effects at the income unit or micro level. Thus, our policy evaluation approach is based on microsimulation modelling.

We begin by providing an overview of the micro-simulation modelling literature in Section 3.1. In Section 3.2, we describe our micro-simulation model, including setting out the model details, calibration and key statistics. Section 3.3 describes the simulation parameters for the mortgage guarantee and shared equity schemes, highlighting how each scheme alters the housing finance conditions faced by aspiring first home buyers. The simulation findings are reported in Section 3.4, focusing on the distributional outcomes under each scheme. Section 3.5 offers some remarks on policy development implications.

3.1 Micro-simulation modelling literature

Micro-simulation models are policy simulation tools designed to mimic the existing or proposed social welfare system of a country or a region to assess their impact on individual and household outcomes. They are routinely used by policy makers and academics to measure the impact of a country's tax and transfer system but their functionality can also extended to other policy domains such as health (Li and O'Donoghue 2013; Thurecht et. al 2011; and Brown 2011), retirement (see Australia's RIMGROUP model) and childcare (Callan 2021). For the purposes of this report, we confine our review to micro-simulation models pertaining to tax and transfer systems.

Since the development of the world's first micro-simulation model SUSSEX (US) in 1961 (Orcutt et al. 1961), micro-simulation models around the world have undergone rapid and continuous development, particularly in developed countries. Innovations in computer technologies coupled with the availability of more detailed micro-level data has resulted in a burgeoning of micro-simulation models in Australia, the US and Europe. There is over a dozen current micro-simulation models covering these regions alone. These models typically fall into one of two broad categories: static or dynamic. We discuss these in turn below.

3.1.1 Static models

Static models are the most straightforward of micro-simulation techniques and are eponymously named because, in their standard form, the characteristics of a population and their behaviours are treated as exogenous and thus assumed to remain constant throughout the simulated period (Richiardi et al. 2021; O'Donoghue et al. 2014). They are commonly used to simulate the distributional and re-distributional impacts of current (Callan et al. 2006; De Agostini et al. 2016; and Causa and Hermansen 2018) or proposed (Wood et al. 2012; Duncan et al. 2018; Atkinson et al. 2000, 2002; Benczúr et al. 2018) policy schemes on individuals, particular demographic groups or the population at large. Other uses for static models include cameo analysis which are used to simulate policy impacts based on user-specified family attribute and income levels (Stevenson et al. 2017).

Static models have the advantage of being cost-effective and less complex than dynamic models. This is why they remain a popular model choice in Australia and the developed world, accounting for the majority of micro-simulation models (Creedy 2001; O'Donoghue et al. 2014; Li and O'Donoghue 2013). In Australia, one of the earliest examples of static micro-simulation models was the National Centre For Social And Economic Modelling's (NATSEM's) Static Incomes Model (STINMOD+). The model was released in the early 1990s and, until 2013, was used in partnership with the Australian Government to inform the latter on government policy. The Australian Government's Department of the Treasury has since developed their own general purpose static micro-simulation model titled Comparative Analysis of Personal Income Tax and Transfers in Australia (CAPITA) model, which was made publicly accessible in 2017. Other Australian examples of static micro-simulation models include the Centre for Social Research and Methods' PolicyMod.

Interest in static models is similarly unyielding overseas as evidenced by the wide range of static models that are currently in use there. For instance, the Organisation for Economic Co-operation and Development's (OECD's) TaxBen includes historical and current tax and benefit parameters covering over 40 member and non-member OECD countries (including Australia). This model enables cross-country comparisons of tax policies around the developed world (OECD 2020). Europe's EUROMOD is another static cross-country model encompassing 15 European Union (EU) members states and the UK. Appendix Table A1 provides a sample list of micro-simulation models in the developed world.

Notwithstanding the value of static models (for policy makers in particular) in modelling 'what if' counterfactual scenarios, their purely arithmetical approach to assessing policy impact has a number of shortcomings that deserve mention. First, they fail to capture the macro-economic feedback effects that might arise from (for example) a tax reform that endogenously shifts labour market behaviour to the extent that it leads to non-trivial feedback effects on tax revenues (Varga 2018). In this scenario static model simulations might overestimate the tax revenues generated from the tax reform since they ignore the behavioural changes that might be triggered by the reform. Behavioural micro-simulation models such as the Melbourne Institute Tax and Transfer Simulator (MITTS) and the Australian Government's Department of the Treasury CAPITA-B models are designed to address this limitation by embedding a behavioural component in an otherwise static model to predict the effect of policy reforms on labour supply changes (Herault and Kalb 2020; Marshall 2016).

Secondly, static models are designed to simulate the immediate or 'day after' effect of policies on individual outcomes. However, policy makers are often more concerned with the long-term implications of social policy. Static ageing techniques can proffer some flexibility in this regard. Through the adjustment of survey population weights one can 'age' the population within the data to make it correspond to shifting demographic trends such as changing age distributions or unemployment rates (Li and O'Donoghue 2013) without altering the characteristics themselves (Dekkers 2015).

3.1.2 Dynamic models

Dynamic models on the other hand simulate a population's characteristics year-on-year on the basis of their characteristics in the previous year (O'Donoghue 2001). Using probability modelling, dynamic models are used to assign individuals to a particular state in terms of factors such as their marital status, employment status and so on, thereby enabling them to forecast the government support eligibilities over the course of a lifetime and well into the future. This high level approach to data ageing is also capable of simulating the future implications of current (Johnson et al. 2019; Ballas et al. 2007; Flood 2007) and proposed (Geyer and Steiner 2010) government support programmes, taking into account the changing demographic and economic trends on the government budget. Supported by advancements in computer programming capabilities, improved econometric methods and high quality survey data, dynamic models have gained great traction in the last decade. However, while their capabilities are exciting in theory, in practise they are resource intensive and enormously complex to run (Li and O'Donoghue 2013), making static models a popular option.

Overall, there is general agreement in the field that there remains much scope for enhancing existing micro-simulation modelling approaches. Klevmarken (2022: 6) notes that:

> (I)n practice the large scale and complex structure of a typical micro-simulation model and the shortage of good micro data raise inference issues of particular relevance for micro simulation such as the choice of estimation criteria, calibration to benchmarks and model validation. Much in practice does not meet high scientific standards, but there is potential for a promising research program.

3.2 Micro-simulation model

We draw on AHURI-3M, a micro-simulation model developed to examine the impact of housing policy reforms (Wood and Ong 2008). As explained in Section 1.3.1, the model's key function is to analyse the housing outcomes of housing consumers under existing housing-related policy parameters, and to predict these outcomes under alternative reform scenarios.

AHURI-3M is operationalised using the 2018 HILDA Survey. Importantly for the present analysis, it contains detailed records of private income by income source, such as wage, interest income, dividend income and so on. These income sources are essential for calculating tax liabilities, income support payments and housing assistance payments. All these factors are intricately tied to housing consumers' ability to meet their housing costs while renting or owning. The HILDA Survey also contains a wealth module, which provides an array of variables on asset and wealth holdings, such as property assets, superannuation, business assets, bank accounts, property debt, credit card debt and so on. The wealth module is critical for determining the amount of liquid wealth that an aspiring home buyer possesses, which indicates if the home buyer can overcome downpayment constraints to access home purchase.

The HILDA Survey is longitudinal in nature, having tracked a representative sample of Australians from 2001 annually as they age. At the time of the analysis, the 2018 HILDA Survey is the most recent year that contains a wealth module (which has been repeated every four years since 2002). Cross-sectional population weights from 2018 are applied to produce population-level estimates for the year. This ensures that attrition of respondents from preceding years does not bias the representation of the cross-section of population in 2018.

3.2.1 Model details

The model structure, including its key modules, is described in Figure 8.

Housing market actors

Taxes and benefits affect both housing suppliers (upper left module) and housing consumers (upper right module). Housing suppliers are rental investor or landlord income units. Housing consumers encompass owners, private renters, public renters and rent-free income units.

Tax-benefit module

The tax-benefit module (upper centre) imputes income unit tax liabilities taking into account private income sources and entitlements for income support programs. Unlike prior versions, this latest release of AHURI-3M imports the parameters required to calculate tax liabilities from Release 18 of the HILDA Tax and Benefit Model (TBM). The TBM is used by the HILDA Survey team to estimate income taxes and family benefits and is updated on a yearly basis. For detailed information on the TBM, see the section *Income, tax and family benefits model* of the HILDA User Manual (Summerfield et al. 2019). Alongside tax liabilities, we also import Commonwealth Rent Assistance (CRA) parameters from the TBM, which are used to calculate CRA adjusted rents for each rental income unit.

Housing demand

Using a sample of recent owners in 2018, defined as income units that purchased within the last year, we estimate a property value regression as a function of the recent owners' characteristics. These characteristics include age, sex, country of birth, number of dependent children, marital status, years in paid work, highest qualification, income, residence in a major city and state (see Appendix A2). The coefficients from the regressions are used to predict the value of the property that renters would have if they were to purchase a property.

After-tax economic costs of owning (user cost)[11]

Economic theory predicts that rents will converge on the economic costs of holding an investment property. As such, for the supply side module, we measure the after-tax economic costs that investors incur when offering rental housing services from their properties.

We also measure after-tax economic costs for housing consumers. For owners these are their actual after-tax economic costs of holding a housing asset (the family home). For renters, we predict the value of the property that each renter income unit would demand based on the renter's characteristics (see Appendix A2). We then estimate what their after-tax economic costs of holding a property would be if they were to purchase a home set at this predicted value.

Economic theory proposes that *ceteris paribus* an income unit would be better off owning rather than renting if their after-tax economic costs as home owners are lower than the rent that they would be charged by landlords. This is the relative price rule that is applied in AHURI-3M to predict the preferred tenure choice of the housing consumer income units.

This after-tax economic cost measure includes operating costs such as maintenance and property tax rates, as well as other costs of holding a housing asset net of capital gains. The economic costs of investors and home owners are heavily influenced by Australian Government and state and territory government taxation arrangements, including negative gearing taxation provisions and Capital Gain Tax (CGT) discounts.

Mortgage markets and borrowing constraints

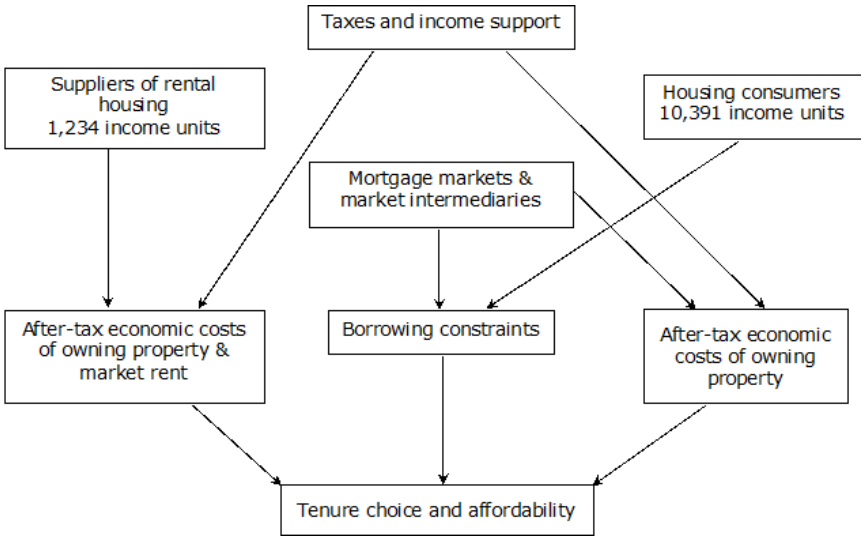
The operation of mortgage markets and borrowing constraints (middle module) are also important components of the model. Though the relative price rule is used to indicate the preferred tenure of housing consumers, that preferred tenure can be prevented by borrowing constraints. These constraints can be binding in two ways: if aspiring home buyers have insufficient liquid wealth to meet the required deposit (*downpayment constraint)*; or if aspiring home buyers have insufficient income to meet the lending criteria of the home loan lenders (*repayment constraint)*.

To determine the amount of downpayment a home buyer can afford, we construct measures of liquid wealth from the HILDA Survey. We define liquid wealth as the income units' total assets excepting non-liquid assets (such as superannuation, life insurance and trust funds if under 21 years of age). We also assume that home buyers are unwilling to depart with motor vehicles and business assets. If a home buyer's liquid wealth is less than 10 per cent of their predicted property value, the home buyer is classified as downpayment constrained.

The repayment constraint is calibrated based on the lending criteria of Australia and New Zealand (ANZ) Bank, specifically its online borrowing power calculator[12], which outputs the maximum loan that applicants can borrow. The calculator inputs the following characteristics of the income unit: income, household type (single versus joint), number of dependent children, living expenses, personal debt and credit card limits. If the maximum loan that the applicant can borrow is greater than 90 per cent of the predicted property value, then the home buyer is classified as repayment constrained.

11 The algebraic expressions and parameters of the after-tax economic costs of owning are detailed in Appendix A3.
12 https://www.anz.com.au/personal/home-loans/calculators-tools/much-borrow/

Figure 8: AHURI-3M model structure



Source: Wood and Ong (2008).

3.2.2 Model base statistics

Next, we report some key statistics from the model and data prior to applying any simulation parameters.

There are 10,560 housing consumer income units in the 2018 HILDA Survey, representing nearly 12 million income units in the population. For our purposes, a housing consumer is anyone that owns outright, owns with a mortgage, rents privately or publicly or is rent-free. Table 4 reports the sample frequencies for housing consumers. As expected, home ownership remains the majority tenure comprising over half of all income units. This is followed by renting, which comprises one-third of all income units.

Table 4: Sample and population estimates, by housing tenure of housing consumers, 2018

Income unit housing tenure	Sample count	Sample distribution	Population count	Population distribution
Outright owner	2,540	24%	2,702,526	23%
Owner purchaser	3,045	29%	3,370,696	28%
Private renter	3,348	32%	3,510,100	29%
Public renter	436	4%	438,922	4%
Rent free	1,191	11%	1,907,798	16%
Total	**10,560**	**100%**	**11,930,042**	**100%**

Source: Authors' own calculations from the micro-simulation model.

Of the housing consumer income units, 10,011 offer the necessary data for assigning them to their preferred tenure in AHURI-3M. As shown in Table 5, three-quarters (77%) of actual home owners also prefer to be home owners based on the relative price rule, while under one-quarter prefer to be renters. Similarly, the majority of public renters and rent free income units would prefer to be public renters and living rent free respectively. However, among private renters, a majority (70%) would actually prefer to be home owners under the relative price rule, while a comparably smaller 30 per cent would prefer renting.

Table 5: Actual versus preferred housing tenure, all income units

	Actual housing tenure				
Preferred housing tenure	Home owner	Private renter	Public renter	Rent-free	Total
Count based on sample (population)					
Home owner	3,970 (4,360,052)	2,125 (2,315,290)	25 (15,136)	0	6,120 (6,690,478)
Private renter	1,265 (1,339,950)	1,052 (984,790)	104 (102,425)	0	2,421 (2,427,165)
Public renter	0	0	279 (287,598)	0	279 (287,598)
Rent free	0	0	0	1,191 (1,907,798)	1,191 (1,907,798)
Total	**5,235 (5,700,002)**	**3,177 (3,300,080)**	**408 (405,159)**	**1,191 (1,907,798)**	**10,011 (11,313,039)**
Column per cent based on sample (population)					
Home owner	75.9 (76.5)	66. 9 (70.2)	6.1 (3.7)	0	61.1 (59.1)
Private renter	24.2 (23.5)	33. 1 (29.8)	25.3 (10.2)	0	24.2 (21.5)
Public renter	0	0	68.4 (71.0)	0	2.8 (2.5)
Rent free	0	0	0	100.0	12.0 (16.9)
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Authors' own calculations from the micro-simulation model.

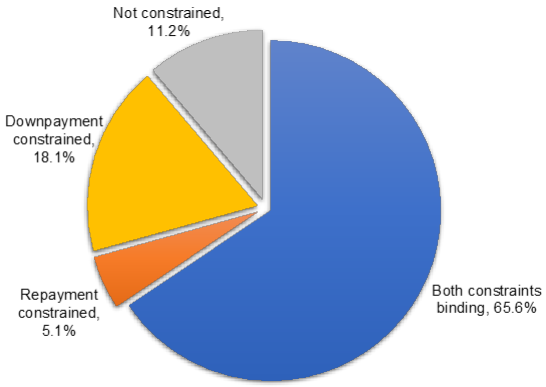
Given our focus is on the effectiveness of first home buyer schemes, we are particularly interested in renters (both private and public) who prefer home ownership under the relative price rules and who are aspiring first home buyers. As shown in Figure 9, there are 2.31 million private rental income units and 15,000 public rental income units who preference home ownership. From this sample of 2.33 million rental income units, we define a more targeted sample for our analysis, who meet all three following criteria: (i) living as rental income units, and (ii) prefer home ownership, and (iii) are aspiring first home buyers i.e. they have never bought a home before wave 18 of HILDA[13]. The final sample meeting all three criteria comprises 1.60 million income units.

However, despite the fact that the majority of renters would prefer to be home owners, most are unable to attain home ownership. When the first home buyer's liquid wealth is insufficient to meet the required upfront deposit, the home buyer faces a downpayment constraint. When a home owner's income is insufficient to meet mortgage repayment commitments, the home owner faces a repayment constraint. Potential first home buyers may be constrained by one or both of these requirements. They will not be able to secure a mortgage if they cannot meet the downpayment or meet the serviceability expectations of the lender.

13 Aspiring first home buyers were identified using a variable in the HILDA Survey which asks respondents 'At what age did you first acquire, or start buying, a residential property?'. This question is only asked to persons who own a home. Therefore, those who are not asked this question are treated as first home buyers.

Figure 9 shows that among rental tenants who prefer ownership and are aspiring first home buyers, only one-tenth (11%) would be able to achieve it. For two-thirds, both constraints are binding. The downpayment constraint is clearly the greater hurdle, with 84 per cent of aspiring first home buyers unable to access home ownership because they are unable to meet the downpayment requirements. An era of falling interest rates has cushioned affordability concerns for many established and potential first home buyers. However, rising dwelling prices have increased downpayment requirements, making access increasingly the binding constraint on ownership. However, the share who face repayment constraints is also significant at 71 per cent.

Figure 9: Borrowing constraints of rental income units that are aspiring first home buyers



Source: Authors' own calculations from the micro-simulation model.

3.3 Simulation parameters

We simulate two policy schemes – a mortgage guarantee scheme and a shared equity scheme – modelled after existing Federal government assistance schemes for first home buyers. The parameters of the simulated schemes are set out in Table 6 and described below.

3.3.1 Mortgage guarantee scheme

The first simulation – a mortgage guarantee scheme – is *modelled after* the Home Guarantee scheme for first home buyers. A key feature of the scheme is that it targeted towards first home buyers who have saved up for a deposit amounting to at least five per cent but less than 20 per cent of the property price.

Property and income thresholds apply to applicants of the scheme. The property thresholds have differed slightly across the scheme variants, so we apply the property thresholds of the New Home Guarantee (NHG). As expected, the property price limits are higher in cities facing more affordability pressures, in particular Sydney and Melbourne. Across all areas, these limits tend to approximate average house prices in each city, resulting in the scheme being targeted towards those purchasing in lower-priced housing markets. Income limits are also capped to target the scheme towards low-to-moderate income earners, at $125,000 for singles and $200,000 for couples.

It is important to make clear that the simulation does not exactly replicate all the parameters of the NHG. In particular, we deviate from the NHG design on two fronts. First, we assume the scheme is available to all eligible first home buyers, not just to 10,000 applicants. Second, we extend eligibility to purchasers of all dwellings, regardless of whether they are newly constructed or existing. Both reflect data limitations. Placing a cap on the size of the eligible population would render the survey sample too small for robust analysis, and it is not possible to determine whether an aspiring first home buyer would buy a newly constructed or existing dwelling. However, results of the mortgage guarantee scheme offer a close indication of the likely impacts of schemes that are similar to a policy such as the Home Guarantee scheme.

3.3.2 Shared equity scheme

The second simulation – a shared equity scheme – is modelled after the Help to Buy (HTB) shared equity scheme for home buyers. A key feature of the scheme is that it is targeted towards home buyers who have saved up for a deposit of at least two per cent of the property price. Property and income thresholds apply to applicants of the scheme. The property price limits for the HTB scheme are the same as those that apply under the NHG (see Table 6). However, stricter income limits apply to HTB than NHG. Specifically, income limits are capped at $90,000 for singles and $120,000 for couples to target low-income earners.

Under the HTB scheme, the Australian Government makes an equity contribution of up to 40 per cent of the purchase price of a new dwelling, or 30% for an existing dwelling. The HTB scheme is limited to 10,000 home buyers per year (Australian Labor Party n.d.). Under the shared equity scheme, we apply an Australian Government equity contribution of 35 per cent to all dwellings; we do not distinguish between old and new dwellings in the HILDA Survey. We also assume the scheme is available to all eligible first home buyers, not just to 10,000 applicants. These divergences from HTB reflect data limitations. It is not possible to determine whether an aspiring first home buyer would buy a new or existing dwelling in the HILDA Survey, and placing a cap on the size of the eligible population would render the survey sample too small for robust analysis.

In our shared equity scheme analysis, we focus on first home buyers even though HTB is available to both first and repeat home buyers. This is because the scope of this report revolves around first home ownership.

Table 6: New Home Guarantee and Help to Buy eligibility thresholds, 2021—2022

a. Property price thresholds

Region	Capital city and regional centres	Rest of state / territory	All areas
NSW	$950,000	$600,000	N/A
VIC	$850,000	$550,000	
QLD	$650,000	$500,000	N/A
WA	$550,000	$400,000	N/A
SA	$550,000	$400,000	N/A
TAS	$550,000	$400,000	N/A
ACT	N/A	N/A	$600,000
NT	N/A	N/A	$550,000
Jervis Bay Territory & Norfolk Island	N/A	N/A	$600,000
Christmas Island & Cocos (Keeling) Islands	N/A	N/A	$400,000

b. Taxable household income thresholds, deposit savings and other requirements

Household status	New Home Guarantee	Help To Buy
Taxable income		
Single	$125,000	$90,000
Couples	$200,000	$120,000
Deposit savings	At least 5% but less than 20% of property value	At least 2% of property value
Other	Must be Australian citizen of at least 18 years old; Applicants must be first home buyers who have not previously owned	Must be Australian citizen of at least 18 years old

Source: NHG thresholds obtained from https://www.nhfic.gov.au/media/1702/new-home-guarantee-fact-sheet-1-july-2021.pdf (accessed on 13 December 2021). HTB thresholds obtained from https://www.alp.org.au/policies/helping-more-australians-into-home-ownership (accessed on 6 May 2022).

3.4 Simulation findings

3.4.1 Profiles of eligible income units

The sample comprises rental income units who are aspiring first home buyers and who are Australian citizens aged at least 18 years old. An income unit is assigned as eligible for a scheme if: the income unit's predicted property value falls below the property price threshold applicable to their location; the income unit's taxable income falls below the income threshold applicable to its income unit type; and the income unit meets the deposit savings requirement. For the mortgage guarantee scheme, the deposit savings must be at least five per cent but less than 20 per cent of the property value. For the shared equity scheme, the deposit savings must be at least two per cent of the property value.

The ineligible income units can be broadly divided into two sub-groups:

- ineligible and restricted: those whose property prices and incomes fall under the scheme thresholds, but whose deposit savings fall below the minimum required (less than five per cent under the mortgage guarantee scheme and less than two per cent for the shared equity scheme)
- ineligible and unrestricted: those whose predicted home values exceed the property price thresholds for their location, or whose taxable incomes exceed the income thresholds applicable to their income unit type, or who have deposit savings of at least 20 per cent in the case of the mortgage guarantee scheme.

The two groups are differentiated because the former are much more likely to face restrictions to achieving first home purchase than the latter.

Table 7 reports the sample and population numbers of income units that are eligible for the mortgage guarantee and shared equity schemes. Of the 1.6 million rental income units that are aspiring first home buyers, we find that 266,500 income units or 16 per cent are classified as eligible under the mortgage guarantee scheme, while 496,800 or 31 per cent are classified as eligible for the shared equity scheme. These are represented by 214 eligible income units and 395 ineligible income units in the sample.

The shared equity scheme is accessible to a larger number of income units than the mortgage guarantee scheme. Recall that the two schemes have the same property thresholds. The income limits are higher under the mortgage guarantee scheme than the shared equity scheme. However, the mortgage guarantee scheme imposes a deposit savings range of five per cent to 20 per cent of the property value, while the shared equity scheme imposes a minimum deposit savings level of two per cent of the property value without an upper limit. The more generous deposit savings range of the shared equity scheme increases the number of income units that can access the scheme compared to the mortgage guarantee scheme despite the former having lower income limits.

Another obvious difference relates to those who are excluded from the schemes. Approximately 57 per cent of rental income units that are aspiring first home buyers are ineligible for the mortgage guarantee scheme. This is because their savings do not allow them to achieve the five per cent downpayment that is required, despite meeting the property value and income criteria. Only 26 per cent are excluded because they have property or income values that exceed the thresholds or they have deposit savings that exceed 20 per cent of the property value. On the other hand, the group that is ineligible for the mortgage guarantee scheme is more evenly spread between those who are likely to be restricted versus unrestricted. Thirty one per cent are unable to meet a two per cent deposit requirement, despite meeting the property value and income criteria. Another 36 per cent fail to meet both the property value and income criteria.

Table 7: Number of income units that are eligible and ineligible for the mortgage guarantee and shared equity schemes

	Mortgage guarantee		Shared equity	
	N	%	N	%
Eligible	266,503	16.46	496,784	31.08
Ineligible: restricted	927,725	57.29	525,292	32.86
Ineligible: unrestricted	425,013	26.25	576,549	36.07
Total	**1,619,241**	**100.00**	**1,598,625**	**100.00**

Notes: The 'ineligible: restricted' group comprises those whose property prices and incomes fall under the scheme thresholds, but whose deposit savings fall below the minimum required (less than five per cent under the mortgage guarantee scheme and less than two per cent for the shared equity scheme). The 'ineligible: unrestricted' group comprises those whose predicted home values exceed the property price thresholds for their location, or whose taxable incomes exceed the income thresholds applicable to their income unit type, or who have deposit savings of at least 20 per cent in the case of the mortgage guarantee scheme.

Source: Authors' own calculations from the micro-simulation model.

Table 8 sets out the demographic profiles of those who are eligible and ineligible for the two schemes. On average, those who are eligible for either scheme are younger and healthier than those who are ineligible, averaging 30 years of age and a six per cent incidence of a long-term health condition or disability.

Some differences exist between those eligible for each scheme. Couples make up over half of eligible income units under the mortgage guarantee scheme, compared to 28 per cent of eligible income units under the shared equity scheme. Nearly two-thirds of income units eligible for the shared equity scheme are single never married compared to 45 per cent of the income units that are eligible for the mortgage guarantee scheme.

It is also noteworthy that the shared equity scheme eligible income unit has a socio-demographic profile that looks very much like the profile of restricted income units who are ineligible for the shared equity scheme. For instance, both groups are in their early 30s, with similar shares in couple relationship (28%—30%), as well as similar shares having single never married status (around two-thirds). There are fewer similarities between income units that are eligible for the mortgage guarantee scheme and those restricted income units who are ineligible for the mortgage guarantee scheme. The findings suggest that despite there being no upper limit to the deposit savings range for the shared equity scheme, the application of lower income thresholds expanded access to more disadvantaged Australians under the shared equity scheme than the mortgage guarantee scheme. We explore this in further detail below.

Table 8: Demographic profile of eligible versus ineligible income units under each scheme

	Mortgage guarantee			Shared equity		
Characteristics	Eligible	Ineligible: restricted	Ineligible: unrestricted	Eligible	Ineligible: restricted	Ineligible: unrestricted
Mean age (years)	30	32	39	30	32	38
At least 1 person aged >35 years in income unit (%)	21.63	32.83	54.43	25.75	26.12	55.69
Couple (%)	52.35	34.85	46.34	27.62	30.38	61.63
Sole parent with dependents (%)	1.17	4.72	9.76	2.90	4.89	8.37
Single never married (%)	45.39	57.59	35.84	63.74	64.74	23.96
Suffers from long-term health condition (%)	5.99	9.61	12.67	5.88	12.89	10.57

Source: Authors' own calculations from the micro-simulation model.

The two eligible groups are similar across a number of dimensions. Both groups have comparable non-liquid wealth and personal loans levels. Both are equally likely to receive inheritances (around 2%) or parental transfers (10%—12%). However, there are numerous differences. Income units eligible for the mortgage guarantee scheme report higher average incomes than the shared equity scheme income units. This reflects larger shares of couples under the mortgage guarantee scheme and larger shares of singles under the shared equity scheme. Income units eligible for the mortgage guarantee scheme are more highly educated, with 42 per cent having attained a university degree compared to 36 per cent of income units eligible for the shared equity scheme. The former are also more likely to be working or seeking work, with less than two per cent being out of the labour force compared to four per cent of the latter. However, income units eligible for the shared equity scheme appear to be more predisposed to saving regularly or saving irregularly. Only seven per cent of income units eligible for the shared equity scheme do not save, compared to 12 per cent of income units eligible for the mortgage guarantee scheme.

However, the job security profile of the eligible cohort do raise some potential concerns regarding their exposure to repayment risks after accessing home ownership. In particular, those who are eligible under both schemes identify a 12 per cent chance of losing their job in the next 12 months, which is higher than the percentages raised by the ineligible groups.

Table 9: Income, wealth and human capital profile of eligible versus ineligible income units under each scheme

	Mortgage guarantee			Shared equity		
Characteristic*	Eligible	Ineligible: restricted	Ineligible: unrestricted	Eligible	Ineligible: restricted	Ineligible: unrestricted
Income						
Gross financial year income unit income ($)	89,545	70,976	106,337	56,462	52,359	112,555
Received bequest/inheritance in previous 12 months (%)	1.77	0.73	1.89	2.02	0.61	1.09
Received parental transfer in previous 12 months (%)	11.81	10.44	6.92	10.26	13.02	6.53
Wealth						
Non-housing income unit liquid wealth ($)	51,871	5,001	94,044	57,453	-1,649	42,776
Income unit personal loans ($)^	5,284	7,433	12,019	6,524	7,206	8,550
Savings habit						
Save regularly (%)	45.31	27.69	34.22	47.02	19.88	32.48
Save irregularly (%)	42.32	46.78	44.39	45.72	46.11	44.41
Do not save (%)	12.37	25.53	21.39	7.25	34.01	23.11
Highest educational qualification						
University degree (%)	42.42	30.34	41.47	36.08	22.04	46.36
Other post-school qualification (%)	33.47	31.93	28.14	28.09	33.05	32.20
Year 12 or below (%)	24.12	37.74	30.38	35.83	44.91	21.44
Labour force status						
Full-time employed (%)	66.49	71.90	68.19	73.17	66.05	70.32
Part-time employed (%)	30.07	19.68	17.62	20.11	23.32	19.56
Unemployed (%)	1.88	1.81	2.38	2.49	3.20	0.47
Not in the labour force (%)	1.56	6.59	11.81	4.22	7.41	9.65

Characteristic*	Mortgage guarantee			Shared equity		
	Eligible	Ineligible: restricted	Ineligible: unrestricted	Eligible	Ineligible: restricted	Ineligible: unrestricted
Job security (employed only)						
Respondent strongly agrees with statement 'My job is more stressful than I had ever imagined'	5.85	2.74	9.12	11.49	3.06	1.42
Respondent strongly agrees with statement 'I worry about the future of my job'	6.03	2.53	5.70	4.44	2.98	4.81
% Chance of losing job in next 12 months	11.56	9.30	10.93	12.98	9.08	7.79

*Notes: * Unless stated otherwise, all measures are drawn from the oldest member of the income unit in the case of a couple. ^Derived from a debt variable in the HILDA Survey which captures debt in the form of car loans, hire purchase agreements, investment loans, personal loans from a bank/financial institution, loans from other lenders, loans from friends/relatives and overdue personal bills.*

Source: Authors' own calculations from the micro-simulation model.

Will the schemes have varying spatial effects? Are they more likely to assist first home buyers in affordable or unaffordable housing markets? In Table 10, we analyse the geographical distribution of eligible and ineligible income units under each scheme via their capital city and rest of states residence, as well as by the ABS' Socio-Economic Indexes for Areas (SEIFA) quintiles that they reside in. The ABS provides several SEIFA measures to measure area socio-economic status (SES). We adopt the SEIFA Index of Relative Socio-economic Disadvantage, where a low score indicates relatively greater area disadvantage and a lack of advantage.

As shown in Table 10, metropolitan first home buyers are nearly equally represented among groups that are eligible for each scheme with around three-quarters of each of the eligible groups are residing in these areas. However, differences do exist across cities. Residents of more unaffordable housing markets – Sydney and Melbourne – form larger shares of income units eligible for the mortgage guarantee scheme. Residents of more affordable housing markets – Adelaide and Perth – form larger shares of income units eligible for the shared equity scheme.

Importantly, the distribution of eligible income units under each scheme is more skewed towards low SES areas. One-quarter of eligible income units under both schemes reside in the lowest SEIFA quintile. This trend parallels ineligible income units that are restricted, while the distribution of unrestricted ineligible income units is more skewed towards high SES areas. This suggests that both schemes benefit those living in more advantaged areas.

Table 10: Geographical profile of the eligible versus ineligible income units under each scheme, per cent by column

	Mortgage guarantee			Shared equity		
Location	Eligible	Ineligible: restricted	Ineligible: unrestricted	Eligible	Ineligible: restricted	Ineligible: unrestricted
Major statistical region						
Sydney	41.18	33.46	21.24	36.77	25.85	31.33
Rest of NSW	6.09	8.28	8.50	5.76	9.68	8.62
Melbourne	21.28	22.79	26.30	18.85	26.62	24.73
Rest of VIC	1.42	3.45	3.16	4.07	2.7	2.52
Brisbane	9.42	9.44	9.57	10.43	11.82	6.45
Rest of QLD	11.70	9.31	7.72	8.28	11.58	8.2
Adelaide	1.95	2.84	8.10	3.88	3.04	5.32
Rest of SA	0.28	0.41	0.54	0.95	0.31	0.09
Perth	0.38	3.44	8.35	1.67	2.61	8.06
Rest of WA	0.99	1.56	2.59	1.13	1.97	1.92
Tasmania	3.35	0.97	2.02	2.49	1.33	1.25
NT	1.03	2.28	0.23	4.06	0.69	0.05
ACT	0.93	1.77	1.69	1.66	1.8	1.45
All metro*	75.14	73.74	75.25	73.26	71.74	75.14
SEIFA quintile						
Lowest	25.67	21.78	16.47	25.24	21.59	16.67
2nd	17.87	20.08	19.25	18.64	21.53	19.09
3rd	20.77	22.67	26.46	24.70	24.31	20.99
4th	21.42	16.98	15.08	12.96	18.63	19.27
Highest	14.28	18.49	22.74	18.47	13.94	23.97

*Notes: * Metropolitan areas are Sydney, Melbourne, Brisbane, Adelaide, Perth and ACT combined.*

Source: Authors' own calculations from the micro-simulation model.

3.4.2 Among those eligible for each scheme, how many are assisted into first home ownership?

Among those who are eligible, not all will be assisted into home ownership. In this section, we investigate the extent to which eligible income units are assisted into home ownership under each scheme.

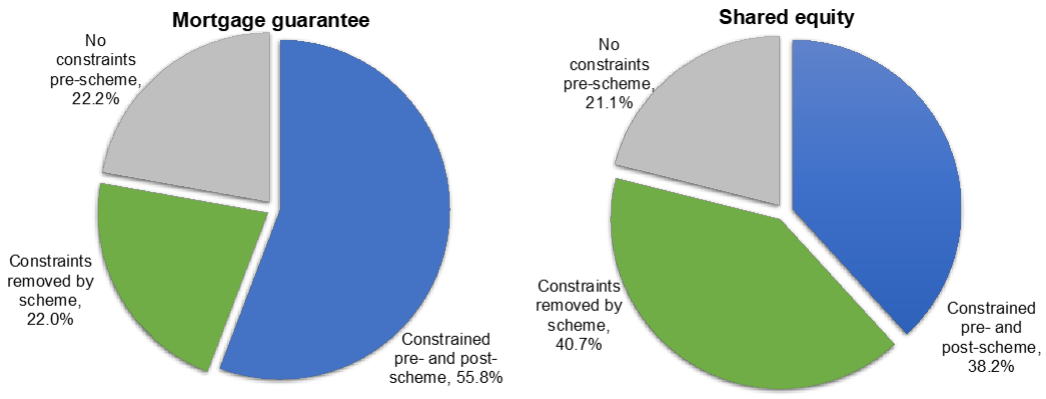
Figure 10 shows how the distribution of constraints changes from pre- to post-assistance for income units that are eligible for the mortgage guarantee and shared equity schemes. As shown in the 'total per cent' panel of the table, around one-fifth of eligible income units under each scheme have no constraints to begin, but are still able to access the scheme. Thus, nearly fourth-fifths of eligible income units have either a downpayment or repayment constraint prior to accessing the scheme. Those who are assisted by each scheme are income units facing either a downpayment constraint or a repayment constraint (or both constraints) before accessing the scheme, but have no constraints after accessing the scheme. Under the mortgage guarantee scheme, 22 per cent of all eligible income units are assisted by having their constraints removed. Under the shared equity scheme, 41 per cent of aspiring first home buyers are assisted into home ownership.

In Table 11, we delve further into the ways in which each scheme assists eligible income units into home ownership by examining each pre-assistance constrained group separately. Focusing first on the mortgage guarantee scheme, we observe that only those who have a downpayment constraint, but not a repayment constraint, are assisted into first home ownership. Those who have a repayment constraint, either on its own or in conjunction with a downpayment constraint, are not assisted by the scheme. This is because the mortgage guarantee scheme is designed to address the downpayment constraint only by lowering the minimum deposit savings requirement to five per cent of the property value. Among those who are downpayment constrained, the majority (94%) are assisted into home ownership. Six per cent remained downpayment constrained; their savings levels do not reach the five per cent threshold required. Among those who face both constraints prior to accessing the scheme, the majority (95%) find their downpayment constraints overcome. However, they are still unable to access home ownership because the scheme does not assist them to overcome repayment constraints. This suggests that the mortgage guarantee scheme is highly effective in helping aspiring first home buyers to bridge the deposit hurdle but its limitation is that it does not address the repayment hurdle.

The assistance rates observed under the mortgage guarantee scheme is much higher because the shared equity scheme is designed to address both constraints. Recall that the deposit requirement is lowered to a minimum of two per cent under this scheme, lowering the deposit hurdle significantly. Being a shared equity scheme, home buyers only own 65 per cent of the property value and therefore only have to take out a loan that covers 98 per cent of their share of the property value after paying the two per cent deposit. This lowers the repayment hurdle significantly.

The shared equity scheme is most effective among those who face downpayment constraints only; 94 per cent of these income units are assisted into home ownership by the scheme. Among those who face a repayment constraint only, a significant majority (85%) also achieve home ownership. Among those who face both constraints, 30 per cent are assisted into home ownership.

Figure 10: Pre- and post-scheme constraints of eligible income units under each scheme, total per cent and population counts



Notes: There are 266,503 (496,784) eligible income in total under the mortgage guarantee (shared equity) scheme.

Source: Authors' own calculations from the micro-simulation model.

Table 11: Pre- and post-scheme constraints of eligible income units under each scheme, row per cent

	Post-scheme				
Pre-scheme	Both constraints binding	Downpayment constrained	Repayment constrained	No constraints binding	All
Mortgage guarantee					
Both constraints binding	5.29%	0.00%	94.71%	0.00%	100.00%
Downpayment constrained	0.00%	6.25%	0.00%	93.75%	100.00%
Repayment constrained	0.00%	0.00%	100.00%	0.00%	100.00%
Shared equity					
Both constraints binding	17.08%	6.99%	46.15%	29.78%	100.00%
Downpayment constrained	0.00%	6.12%	0.00%	93.88%	100.00%
Repayment constrained	0.00%	0.00%	15.14%	84.86%	100.00%

Source: Authors' own calculations from the micro-simulation model.

3.5 Summary and policy development implications

Our findings indicate that the majority of aspiring first home buyers face borrowing constraints that prevent them from achieving home ownership. Eighty four per cent face downpayment constraints and 71 per cent face repayment constraints. Home buyers can face both types of constraints at the same time, and indeed two-thirds of aspiring first home buyers in our sample face both constraints.

The mortgage guarantee and shared equity schemes that we have simulated alter the housing finance conditions faced by first home buyers in different ways. A mortgage guarantee addresses the downpayment constraint but not the repayment constraint. A shared equity scheme addresses both constraints.

The simulation findings present some important implications for policy development. Firstly, the shared equity scheme is accessible by a larger segment of the population than the mortgage guarantee scheme. Of the 1.6 million rental income units that are aspiring first home buyers, we find that 266,500 income units or 16 per cent are classified as eligible under the mortgage guarantee scheme. In comparison, 496,800 or 31 per cent are eligible for the shared equity scheme. Twenty two per cent of eligible aspiring first home buyers are assisted into home ownership by the mortgage guarantee scheme, and 41 per cent are assisted by the shared equity scheme. This is because the shared equity scheme is designed to reduce both the downpayment and repayment constraints. While the mortgage guarantee scheme is highly effective in overcoming the downpayment hurdle for those who are downpayment constrained, it is not designed to address the repayment hurdle. Therefore, first home buyer assistance schemes are more effective in assisting transitions into home ownership if it alters housing finance conditions for the home buyer through both the downpayment and repayment routes.

Secondly, the shared equity scheme is more accessible to income units on lower incomes who have lower levels of education and labour force participation than the mortgage guarantee scheme. It would therefore appear that the design of a scheme that is subject to tight income caps is more effective in providing 'additionality' than a mortgage guarantee scheme. To explain, just because a first home buyer policy is successful in improving access or affordability, it may not provide 'additionality' (i.e. it may be ineffective at making ownership possible for first home buyers who would otherwise be excluded from the market). A common criticism of many landmark first home buyer policies in Australia is that they simply bring forward the decision to purchase or allow the purchase of a higher priced dwelling for those already on track to enter the market (Pawson et al. 2022; Yates 2012). These policies may then simply raise prices for residential properties, at the detriment of future first home buyers.

Third, both schemes are more accessible by first home buyers residing in lower SES areas than in higher SES areas. This is attributable to the property thresholds applicable to both schemes, which limit eligibility to those purchasing in more affordable housing markets. Both schemes will therefore likely boost demand for housing in entry markets. This demand has to be matched by an adequate supply of new housing to offset upward price pressures generated by the additional demand in these markets.

Finally, home buyers under both schemes report a higher chance of losing their job in the next 12 months than those who are not eligible for the schemes. This raises some potential concerns regarding their exposure to repayment risks after accessing home ownership, especially in an era of rising interest rates. Given that a goal of the shared equity scheme is arguably to improve the welfare of low-income individuals through home ownership, this exposure to repayment risk requires serious consideration in decisions regarding the continuity of the scheme as interest rates rise rapidly. Otherwise, unintended consequences via future mortgage foreclosures may ensue, which may be highly detrimental to the wellbeing of low-income households.

4. Policy development options

This report has addressed the need to better understand how policy settings affect first home buyer's ability to access and afford home ownership. We apply two simulation models:

- a macro-simulation model to predict how different housing finance conditions affect housing demand, home ownership rates and house prices at the market level
- a micro-simulation model to predict how first home buyer assistance programs can affect first home buyers' ability to overcome downpayment and repayment constraints.

Specifically, we address the following key research question:

> How might entry into home ownership evolve in response to specific policy settings and what are the implications of this for housing markets and the broader economy?

4.1 Housing finance conditions and the housing market for first home buyers (macro-simulation)

In Australia, interest rates have fallen by more than five percentage points over the last three decades. At the same time, real house prices have more than doubled. The home ownership rate has also fallen from over 70 per cent to 66 per cent in recent years.[14]

We run two experiments affecting housing finance conditions. First, we simulate the housing market's response to a shock that decreases the interest rate. Second, we simulate the market's response to changes in borrowing standards, which allows households to borrow more or less against the value of their homes.

We find that shocks that reduce interest rates do not directly increase home ownership rates, but they significantly increase housing demand conditional on owning. In turn, higher housing demand results leads to significantly higher market prices for housing, which drastically reduces the ability to purchase a first home. While the interest costs of mortgage finance are lower, high house prices raise overall mortgage payments and increase the size of the deposit required to purchase housing in the first place. Overall, lower borrowing costs have been more than offset by the larger downpayments required when house prices are high. However, we find that easier mortgage credit in the form of higher maximum LTV ratios on borrowing could improve housing affordability by allowing young households to borrow more against rising house values.

14 ABS Survey of Income and Housing, 2017-2018.

4.2 First home buyer assistance programs and home ownership prospects (micro-simulation)

Among aspiring first home buyers, 84 per cent face downpayment constraints and 71 per cent face repayment constraints. We simulate a mortgage guarantee scheme and shared equity scheme, modelled after the Home Guarantee and Help to Buy schemes respectively.

Of the 1.6 million rental income units that are aspiring first home buyers, we find that 266,500 income units or 16 per cent are classified as eligible under the mortgage guarantee scheme, while 496,800 or 31 per cent are classified as eligible for the shared equity scheme. We find that both schemes assist first home buyers who are on average younger and healthier, but more likely to be living in low socio-economic areas, than those who are ineligible. However, the shared equity scheme is more accessible to the financially disadvantaged than the mortgage equity scheme. In particular, the former scheme is more likely to assist those on low incomes with lower levels of education and labour force participation than the latter scheme.

In terms of effectiveness, 22 per cent of eligible aspiring first home buyers are assisted into home ownership by the mortgage guarantee scheme, and 41 per cent are assisted by the shared equity scheme. This is primarily because the two schemes adjust the housing finance conditions faced by first home buyers in different ways. A mortgage guarantee addresses the downpayment hurdle but not the repayment hurdle. A shared equity scheme addresses both hurdles.

4.3 Implications for policies for first home buyers

Our study confirms that the downpayment constraint is a key barrier for access to first home ownership. Changes in interest rates directly affect repayment constraints, but our modelling shows that a decline in interest rates will increase demand for housing overtime, which will in turn raise the market-based price of housing and significantly reduce the affordability of home ownership for young households. Importantly, lower borrowing costs are more than offset by the larger downpayments required when house prices are high.

Our simulation findings present some important implications for the development of policy reforms assisting first home buyers.

First, looser restrictions on mortgage borrowing may help to offset the access difficulty that first home buyers face in a low interest rate-high house price environment. We find that the expansion of mortgage borrowing does not excessively increase total housing demand, and the resulting increase in house prices does not offset the ability of young households to purchase houses with larger mortgages.

Second, the Australian Government has favoured demand-side assistance schemes to help households overcome downpayment constraints through grants, concessions, loans, guarantees and equity instruments. We model two such schemes: a mortgage guarantee scheme and shared equity scheme. We find that while the downpayment constraint is more widespread than the repayment constraint, a shared equity scheme may be accessible to larger numbers of constrained aspiring first home buyers because it is designed to address both the downpayment and repayment hurdles. On the other hand, the mortgage guarantee scheme only assists the downpayment constrained and is not designed to address the repayment hurdle.

Third, the design of a scheme targeted at low-income earners may be more effective in providing 'additionality' than a mortgage guarantee scheme. A common criticism of many landmark first home buyer policies in Australia is that they simply bring forward the decision to purchase and allow the purchase of a higher priced dwelling for those already on track to enter the market. These policies may then simply raise prices for residential properties, at the detriment of future first home buyers.

Fourth, a range of demand-side government measures including a decline in interest rates, relaxation of borrowing standards, and first home buyer assistance schemes all boost demand for housing in entry markets. This has to be matched by an adequate supply of new housing to offset upward price pressures generated by the additional demand in these markets.

Fifth, policy makers need to guard against unintended consequences when implementing policies that boost demand among low-income aspiring first home buyers. For instance, eligible home buyers under both the mortgage guarantee and share equity schemes modelled have more precarious employment than those not eligible for the schemes. Also, while looser restrictions on mortgage borrowing may help to offset the access difficulty that first home buyers face in a low interest rate-high house price environment, there may be higher risks associated with an increase in mortgage borrowing post-purchase especially when interest rates rise. This raises some potential concerns regarding low-income first home buyers' exposure to repayment risks after accessing home ownership, especially in an era of rising interest rates. Unintended consequences such as mortgage distress and mortgage default may be highly detrimental to the wellbeing of low-income households.

4.4 Final remarks

Our analysis has opened up important avenues for future investigations.

It is worth noting that the very low interest rate environment Australia has experienced in recent years may not persist into the future. As a result of rising inflation pressures following the COVID-19 pandemic, nominal interest rates in Australia and other countries have been rising rapidly. While it is too early to tell whether these changes signal an end to historically low interest rates, Australian house prices are now falling in response to tighter mortgage financing conditions. A persistent rise in interest rates and decline in house prices may yet see the return of young households to the housing market.

However, our analyses do not account for the higher risks associated with an increase in mortgage borrowing. For instance, first home buyer assistance schemes that are subject to income caps are more effective in providing additionality but this also raises some potential concerns regarding the assisted households' exposure to repayment risks after accessing home ownership, especially when interest rates rise.

This means that to the extent that first home ownership is desirable, there is a policy trade-off between housing affordability and financial stability in low interest rate environments. Thus, further research should explore the risks of mortgage distress and default associated with increases in mortgage borrowing.

Finally, we would note that the findings of this report are subject to the strict assumptions underlying the macro-simulation and micro-simulation models. If these assumptions do not hold, the robustness of the findings will be affected. Hence, there exists significant scope for implementing sensitivity analyses to test how the model findings would change if assumptions and restrictions were to change. Furthermore, there remains scope for applying extensions to the models to facilitate more sophisticated dynamic and behavioural analyses. For instance, while the micro-simulation model is useful for examining first round distributional effects of policy interventions, it does not estimate second round effects and impacts of the policy changes on future behaviours by aspiring home owners in the housing market.

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Appendix

Examples of micro-simulation models in different countries

Table A1: Sample list of current dynamic and static micro-simulation models used in select countries in developed world

Country	Model Name	Developer	Dynamic / Static	Behavioural / Non-behavioural
Australia	AHURI-3M	Australia, Housing and Urban Research Institute (AHURI)	Static	No
Australia	Static Incomes Model (STINMOD+)	NATSEM	Static	No
Australia	Comparative Analysis of Personal Income Tax and Transfers in Australia (CAPITA)	Australian Treasury	Static	No
Australia	Comparative Analysis of Personal Income Tax and Transfers in Australia (CAPITA-B)	Australian Treasury	Static	Yes
Australia	Melbourne Institute Tax and Transfer Simulator (MITTS)	Melbourne Institute of Applied Economic and Social Research	Static	Yes
EU	EUROMOD	Joint Research Centre (JRC) of the European Commission	Static	No
Germany	IZAΨMOD	Institute for the Study of Labor (IZA)	Static	Yes
OECD	TaxBEN	OECD	Static	No
Sweden	FASIT	Statistics Sweden (SCB)	Static	No
UK	Intra-Governmental Tax and Benefit Model (IGOTM)	Her Majesty's Treasury	Static	No
UK	TaxWell-B	Melbourne Institute/ New Zealand Treasury	Static	Yes
USA	Transfer Income Model, version 3(TRIM3)	Urban Institute	Static	Yes
Australia	Model of Australian Retirement, Incomes and Assets (MARIA)	Australian Treasury	Dynamic	Yes
Belgium	Microsimulation for the Development of Adequacy and Sustainability (MIDAS)	Federal Planning Bureau	Dynamic	Yes
France	DESTINIE2	French National Statistical Institute (INSEE)	Dynamic	Yes
Sweden	SESIM	Swedish Ministry of Finance	Dynamic	Yes
UK	PENSIM2	Institute for Fiscal Studies	Dynamic	Yes

Source: Authors' own compilation.

Property value regression model

Table A2: Property value regression

Explanatory variables	Coef.	Std. error
Log Age (oldest member of income unit)	0.0935	0.231
Sex (oldest member of income unit) (Male omitted)		
Female	0.0457	0.0849
Country of birth (oldest member of IU) (Australia omitted)		
Main English Speaking	0.134	0.143
Other	-0.0184	0.114
Log of number of dependent children in income unit	0.174**	0.0866
Marital status (Married omitted)		
De facto	-0.0118	0.113
Separated	0.0507	0.190
Divorced	0.00884	0.192
Widowed	-0.0892	0.198
Never married and not de facto	-0.130	0.153
Log of income unit's years of paid work (excludes dependents)	0.227**	0.103
Highest qualification (oldest member of IU) (Less than high school completion omitted)		
Completed high school	-0.0920	0.198
Other post-school qualification	0.0602	0.156
Bachelor's degree or higher	0.233	0.162
Log of income unit financial year regular gross income (excludes dependents)	0.148**	0.0642
Resides in a major city	0.527***	0.0830
State (NSW omitted)		
VIC	-0.205*	0.105
QLD	-0.504***	0.108
SA	-0.437***	0.145
WA	-0.420***	0.156
TAS	-0.154	0.250
NT	-0.0356	0.574
ACT	-0.469	0.295
Observations	226	
R^2	0.449	

*Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. A log-log regression is estimated on home owner income units who bought in the last year. The dependent variable is the log of property value of home owner income units that bought in the last year.*

Source: Authors' own calculations from the 2018 HILDA Survey.

Table A3: Predicted estimates from the property value regression

Measure	Sample	Median	Mean	Minimum	Maximum	N
Reported	Recent owners	522,500	653,658	1,400	5,200,000	226
Predicted	Buyers (renters)	377,802	425,639	16,409	1,635,306	4,697

Source: Authors' predicted values from the regressions in Table A2.

User cost expression

This appendix sets out the algebraic expressions for the after-tax economic cost of owning or user cost of an owner-occupier and rental investor. Further details of the user cost parameters are reported in Table A4.

Owner-occupiers

Following prior iterations of AHURI-3M, the user cost for income units of owning a property as an owner-occupied is expressed as:

$$UC = (1-\tau)i + \tau\alpha i + \frac{\tau\pi\alpha}{1-\tau} + OC - \pi + d + AMORT \times TC \qquad (1)$$

where

$AMORT$ = amortisation = $\frac{\delta}{(1-\tau)(e^{\delta T}-1)}$

TC^* = transaction costs = $\beta e^{\delta T}$
UC = user cost of home ownership
τ = marginal income tax rate (Income weighted average of income unit)
i = home loan interest rate
α = LTV at time of property purchase
OC = operating costs
π = house price appreciation rate
d = economic depreciation rate
T = holding period
β = brokerage fees as a fraction of asset price
$\delta = \pi -$

Note that stamp duty is accounted for within the calculation of deposit constraints.

Rental investors

To calculate the market rental rate for the supply module, we use the weighted average of rental investors' user costs of capital, applicable to all income units in our sample that own a rental property.

Investor user cost (also known as landlord's after-tax economic cost) is expressed as:

$$UC = \frac{i+OC}{1-\emptyset} - CAP + AMORT \times (CAPTAX + TC) \qquad (2)$$

where
CAP = capital gain = $\frac{\pi-d}{(1-\tau)(1-\emptyset)}$

$AMORT$ = amortisation = $\frac{\delta}{(1-\tau)(e^{\delta T}-1)(1-\emptyset)}$

$CAPTAX^*$ = capital gain tax = $0.5 \times \tau[(1-\beta)e^{\pi T}]e^{-(1-\tau)\_x0000\_}$
TC^* = transaction costs = $\beta e^{\delta T}$

UC = user cost of capital for rental investors
τ = marginal income tax rate (Income weighted average of income unit)
i = home loan interest rate
$\emptyset$ = property agent fees/commission as a fraction of asset value
OC = operating costs specific to rental investors as a fraction of asset value
π = house price appreciation rate
d = economic depreciation rate
T = holding period
β = brokerage fees as a fraction of asset value

Note that stamp duty is accounted for within the calculation of deposit constraints.

Table A4: User cost components – additional details

Marginal income tax rate	The MITR of the income unit is the income weighted average MITR of the home owner/landlord and (if applicable) his/her partner. This is because in Australia, couples file tax returns separately. For an income unit containing a partner the MITR is as follows: $$mtr = \frac{mtr_{ref} * c_{ref}}{c_{ref} + c_{partner}} + \frac{mtr_{partner} * c_{partner}}{c_{ref} + c_{partner}}$$ Income is financial year assessable (tax liable) income. The tax liabilities of each HILDA sample member are complex to calculate, and so are imported from Release 18 of the HILDA Tax and Benefit Model (TBM). The TBM is used by the HILDA survey team to estimate income taxes and family benefits and is updated on a yearly basis. For detailed information on the TBM, see Section 'Income, Tax and Family Benefits Model' of the HILDA User Manual. For 2017-18 progressive tax rates refer to the Australian Taxation Office: https://www.ato.gov.au/Rates/Individual-income-tax-for-prior-years/
Home loan interest rate	Interest on home loan debt is set at 5.22%. This is calculated as the 2017-18 financial year average of monthly standard variable owner-occupier lending rates for Australia. Source: Reserve Bank of Australia, (Table F5 – Indicator Lending Rates, column D), http://www.rba.gov.au/statistics/tables/index.html#interest_rates.
Loan-to-value ratio (LVR)	Not applicable to rental investors. Mortgage debt as a proportion of primary home value at the time the property was purchased. For non-owners, the LVR was predicted (refer to main text for details).
Operating costs	Is the sum of annual maintenance cost, property taxes, and building insurance premiums, and is expressed as a fraction of home/asset price. Includes land taxes for rental investors only. Annual maintenance costs are set at 0.38% of home/asset value. The ABS suggests that in 2017—18, the average weekly spend on repairs and maintenance by Australian home owners is $47, or $2,451 annually, while the average property value among home owners is $636,009. See Table A1 at: https://www.abs.gov.au/methodologies/housing-occupancy-and-costs-methodology/2017-18#appendix-housing-cost-measures Average property taxes as a percent of property value vary by location, as calculated from the ABS 2017—18 Survey of Income and Housing (SIH). Defined by annualising weekly general and water rates payments of home owner survey respondents and dividing by the estimated sale price of their dwelling at the household level. These observations are then averaged at the Greater Capital City Statistical Area (GCCSA) levels provided in the SIH and linked to our HILDA sample. For more information on the SIH and its components: https://www.abs.gov.au/ausstats/abs@.nsf/mf/6553.0 Annual building insurance premiums vary by state and are estimated from comparison website Canstar. At the time the estimates were derived, Canstar provided average home insurance premiums (excluding contents) by state*, assuming a building value of $550,000. The relevant ratio of insurance premium to property value was linked to our HILDA sample members and applied to their own building value^. * *Premiums for the ACT and NT were not available. We allocate these two territories the average of all other states and territories.* ^ *HILDA does not report building value and land value separate from primary home value. Therefore, following evidence provided in prior iterations of AHURI-3M, we assume that for those in major cities land value is typically 57% of property value, and 39% for other areas.* Parameters were derived from the Canstar website during July 2021: https://www.canstar.com.au/home-insurance/home-contents-insurance-cost/ Annual land taxes for rental investors vary by state. Land tax parameters for each state were sourced from the NSW Government's 2017—18 Interstate Comparison of Taxes: https://www.treasury.nsw.gov.au/sites/default/files/2018-04/TRP18-01%20Interstate%20Comparison%20of%20Taxes%202017-18.pdf

House price appreciation rate	Set at 3.5%. Keeping with prior iterations of AHURI-3M, we assume a real capital appreciation rate of 1.0%, which is added to the mid-point of the Reserve Bank of Australia's target inflation rate (2.5%). Also known as the nominal capital gain rate.
Economic depreciation rate	Set at 1.1%, as justified in the linked Reserve Bank of Australia working paper. Prior Australian literature has estimated that depreciation of structures subtracted an average 1.06% per year from house values from 1960 to 2005. See Appendix A.3 of: https://www.rba.gov.au/publications/rdp/2014/pdf/rdp2014-06.pdf
Holding period	We assume the number of years a property is held before sale is 10 years, as following prior iterations of AHURI-3M.
Brokerage fees	Brokerage fees are set at 3.0% of house/asset value, as justified in the linked Reserve Bank of Australia working paper. Represents selling costs including real estate agent commissions, advertising, legal and other costs. See Appendix A.5 of: https://www.rba.gov.au/publications/rdp/2014/pdf/rdp2014-06.pdf
Property agent fees or commission	Only incurred by rental investors. Set at 3.0% of house/asset value, as justified in the linked Reserve Bank of Australia working paper. See Table A2 of: https://www.rba.gov.au/publications/rdp/2014/pdf/rdp2014-06.pdf

Note: All parameters were derived from the relevant websites during May 2021.

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