# An Impossible Triangle? The Impact of Housing Policy on Affordability, Accessibility, and Efficiency

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# An impossible triangle? The impact of housing policy on affordability, accessibility, and efficiency

Jason Nassios[1], James Giesecke[2], Xianglong Locky Liu[3]

**Abstract**

While the impact of housing-related tax instruments on economic efficiency and housing markets has been widely studied, the impact of expenditure instruments has received less attention. Housing grants, transfer duty concessions, shared equity schemes, and rental assistance, are several such expenditure instruments that generate debate regarding their efficacy in achieving housing policy aims. This study examines the impact of these instruments on the housing market. We find that each instrument addresses a specific housing policy aim, but cannot simultaneously improve affordability, accessibility, and efficiency. This finding reinforces the need for policymakers to establish clear and targeted objectives to guide housing policy choices.

**Keywords:** First homeowner grant; Shared equity; Transfer duty concession; Homeownership; Housing affordability; Housing prices; Excess burden.

**JEL Codes:** C68; E62; H2; H71; R38

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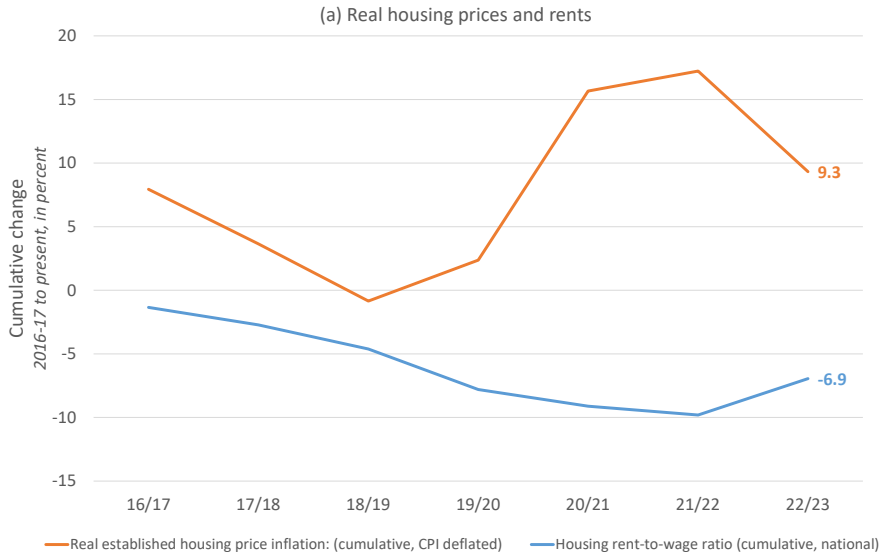
# Contents

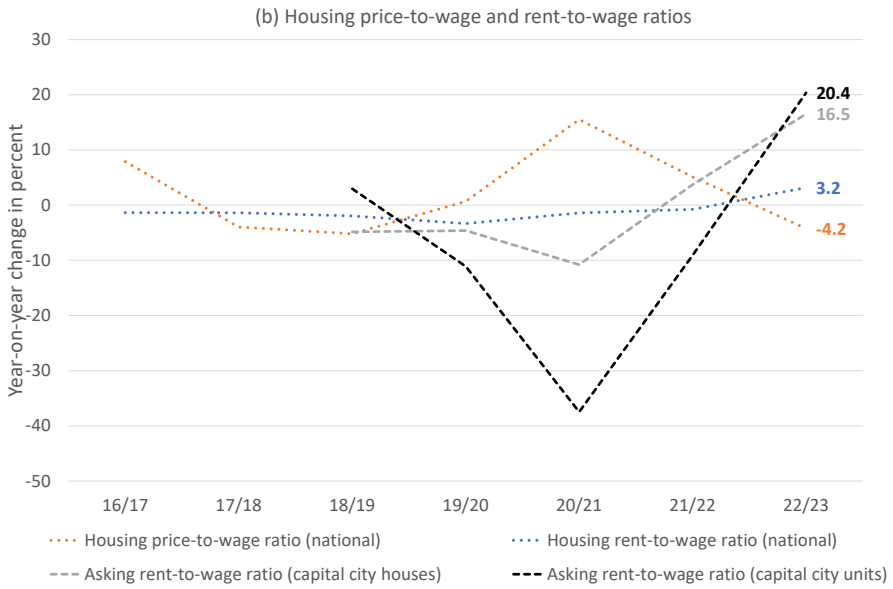
## Executive Summary

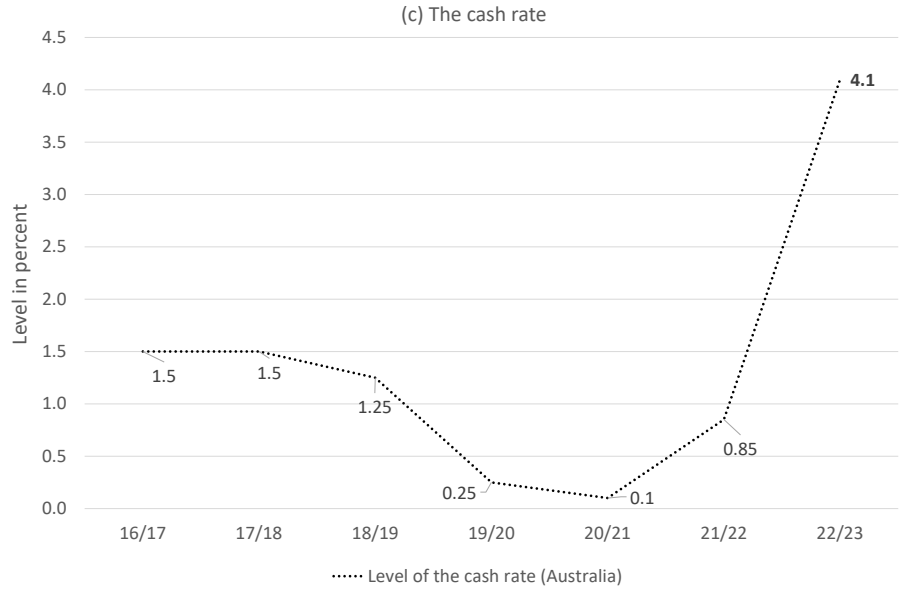
Policymakers worldwide are grappling with how to make housing more affordable. Households face rising housing prices, coupled with a widening gap between wage growth and rental price inflation. Australians are not immune; as shown in Figure 1(a), real housing prices grew strongly over 2019 – 2021 [orange line, Figure 1(a)]. While aggregate housing rents contracted relative to CPI over this period [blue line, Figure 1(a)], an uptick in aggregate rental growth occurred in 2022/23, caused by a rise in advertised rents; see the grey and black dashed lines in Figure 1(b), and Agarwal *et al.* (2023) for a discussion. While the housing price-to-wage ratio fell in 2022/23, this was in response to rapid monetary tightening, and is thus not reflective of material improvements in affordability [see Australia's cash rate in Figure 1(c)].

**Figure 1**: Various measures of housing affordability in Australia, 2016/17 to 2022/23.[4]




[4] CPI is taken from the ABS June 2023 release. Housing rents are based on CPI housing rents from the ABS, with the series therefore a function of existing rental agreements. Established housing prices are calculated using ABS 6432.0 Table 2. Wage inflation is based on Ordinary time hourly rates exc. bonuses at the national level, reported in ABS 6345.0.




Governments deploy a range of housing policy instruments to pursue the aims of housing affordability, ownership accessibility, and economic efficiency. We study four such instruments in this paper. Three of these instruments are aimed at reducing acquisition costs for purchasers, namely: (i) policies to reduce new housing construction costs; (ii) policies to reduce property transfer costs; and (iii) policies to facilitate access to owner finance. The fourth instrument that we study is aimed at assisting renters with their rent payments.

With a long history in the provision of housing assistance by government and publicly available data on the topic, Australia serves as the focus of our analysis. In Australia, there are three primary forms of acquisition assistance:

(i) first home owner grants (FHOGs) on new housing purchases, designed to reduce the purchaser's price of new housing;

(ii) first home buyer stamp duty exemptions and concessions (FHODEs), which reduce property transfer duty liabilities (and thus acquisition costs) incurred by first home buyers; and

(iii) shared equity schemes (SESs), in which the government takes an equity stake, alongside the private homebuyer, in the purchase of a new or existing owner-occupied home, with the aim of reducing the private homebuyer's down payment burden.

We also study rent assistance programs (RAPs), specifically rental subsidies. Operationally, RAPs are social security payments that can be claimed by certain groups of citizens. The canonical Australian example is Commonwealth Rent Assistance (CRA), which is paid by the federal government to recipients of other social security payments, e.g., the aged pension, disability support, etc. Our work contributes to a recent literature on housing affordability and rental assistance. For example, Rohe (2017) discuss affordability for owner-occupiers and renters in the United States, while Lorga *et al.* (2022) study affordability pressures in Lisbon. Pawson *et al.* (2022) contrast global housing policy with Australian policies, while contemporary works by ViforJ *et al.* (2022) and ViforJ *et al.* (2023) study rent assistance, mortgage guarantees and Australia's economy-wide *Help to Buy* shared equity scheme.

We explore the capacity of FHOGs, FHODEs, SESs and RAPs to improve housing affordability, ownership accessibility, and economic efficiency. While the concept of housing affordability can encompass many dimensions, in this study we measure changes in *housing affordability* using two measures most associated with affordability: the *housing price to income ratio*, and the *housing rent to income ratio*. Changes in housing prices relative to income affect affordability for owner-occupiers, while changes in housing rents relative to income affect affordability for renters. In contrast, to

separate the concerns of owner-occupiers from other groups, we use the term *ownership accessibility* to describe the ability of renters to become owner-occupiers. This aligns with the convention in the Australian policy debate and academic studies such as Gabriel *et al.* (2005), Richard (2008), and Cava *et al.* (2017). We measure changes in ownership accessibility by tracking and reporting the housing sector's owner-occupation rate (hereafter, the OOR). Finally, to study impacts on economic efficiency, we calculate the dollar-change in welfare for each policy, relative to the dollar-change in expenditure, i.e., we report *marginal excess burdens* of expenditure for each policy.

We run and report on four policy experiments. Each experiment involves equivalent dollar-value expansions of FHOGs, FHODEs, SESs, and RAPs, holding all other taxes, grants and subsidy rates fixed at their baseline settings. The expanded schemes remain in place for a period of four years. We examine two funding assumptions: (1) budget neutrality, where the policy-related outlays and tax expenditures are funded by a rise in direct taxation; and, (2) deficit financing, where the policy-related outlays and tax expenditures are financed by debt. The results under assumption (2) are broadly equivalent to the results under assumption (1) with the addition of the effects of short-run fiscal stimulus generated by the deficit financing assumption. We present results under assumption (1) in Table 7, and under assumption (2) in Table 8.

Overall, we find that none of the four forms of government intervention can simultaneously lift housing affordability, ownership accessibility, and economic efficiency. This is illustrated in Figure 2, a heat map comparing the impact of FHOGs, SESs, FHODEs, and RAPs on efficiency, affordability (both for owners and renters), and accessibility. As shown in Figure 2, each of the four measures is individually well-suited to improving *either* housing affordability (for one of owner-occupiers or renters), ownership accessibility, or economic efficiency, rather than collectively advancing all three objectives.

**Figure 2:** Key results from Table 7 represented as a heat map.[5]

| | Efficiency[a] | Affordability *owners*[b] | Affordability *renters*[c] | Ownership accessibility[d] |
|---|---|---|---|---|
| FHOG | 18 | -0.53 | -0.21 | 0.02 |
| SES | 19 | -0.06 | -0.21 | 0.08 |
| FHODE | -35 | 0.55 | -0.03 | 0.04 |
| RAP | 5 | 0.42 | -0.34 | -0.48 |

[a] ***Efficiency:*** *measured via marginal excess burden of expenditure.*
[b] ***Affordability, owners:*** *measured via housing price response.*
[c] ***Affordability, renters:*** *measured via housing rent response.*
[d] ***Ownership accessibility:*** *measured via owner occupation rate.*

Via Figure 2, if the primary aim of policymakers is to improve housing affordability for owners, then a budget-neutral expansion of FHOGs is the best choice. FHOGs also improve ownership accessibility, but these instruments are not the best choice for improving accessibility (SESs are). RAPs can improve housing affordability for renters, but detract from achievement of ownership affordability and ownership accessibility. In contrast, SESs are best placed to improve ownership accessibility, while FHODEs are preferred if the aim is to improve economic efficiency (accessibility also improves, but not by as much as if an SES is introduced). Trade-offs exist for each instrument. For example, whilst FHODEs improve economic efficiency, they generate housing price inflation in excess of the resulting rise in household incomes, diminishing housing affordability.

When the policy objective is specific (e.g., improve housing affordability for owner-occupiers or renters, enhancing economic efficiency, or raising ownership accessibility), then there is one of the four instruments best-placed to fulfil the objective. The corollary of this finding is that policymakers aiming to expand housing program expenditure face trade-offs. Hence, program objectives should be clearly defined to guide selection of appropriate policy instruments. With a well-defined objective, results like those in Tables 7 and 8 can be used to inform the appropriate policy response.

[5] In Figure 2, we use the results for the marginal excess burden of expenditure (MEBE) in Table 8 to rank FHOGs, SESs, FHODEs, and RAPs according to their impact on *efficiency*. The impact of each policy on *Affordability (owners)*, *Affordability (renters)*, and *Accessibility* are then ranked using the impact on (respectively) Average housing prices after taxes, subsidies and grants; nominal housing rents for low-density housing including taxes, subsidies and grants; and, the owner-occupation rate for low-density housing, all from Table 8 (respectively).

# 1. Introduction

Countries worldwide are grappling with how to make housing more affordable. Households are facing rising housing prices, coupled with a widening gap between wage growth and housing rental price inflation. There are a variety of government housing market interventions available for policymakers to enhance the affordability of residential housing for owners and for renters, improve housing market accessibility for homebuyers, and boost economic efficiency. Policies to achieve such objectives can take many forms, but broadly speaking are classified into two groups: demand-focused and supply-focused programs. Demand-focused programs enhance the purchasing power of aspiring homeowners or supplement the capacity of renters to meet their rent payments. Supply-side programs augment or stimulate the production of new units of owner-occupied or rented housing capital.[6]

In this paper, we are concerned with examining the capacity of demand-focused housing policies to address issues such as housing affordability, ownership accessibility, and economic efficiency. Being demand-focused, the housing market interventions we study are designed to either reduce acquisition costs for purchasers, or assist with servicing rental payments for renters. There are three ways to categorise assistance directed at reducing acquisition costs: (i) assistance to reduce new housing construction costs; (ii) assistance to reduce transfer costs, and (iii) assistance to reduce financing or down payment costs. Our study examines four housing policy instruments. Three address the acquisition cost channels mentioned above, while the fourth addresses rental affordability.

Our study focuses on Australia, a country with a long history in the provision of government housing assistance, dating back to the *War Service Homes Act 1918* [Dungey *et al.* (2011)]. It also has extensive publicly available data on the topic.

Our motivations are two-fold. First, recent studies of the tax system have quantified the economic efficiency costs and broader impacts of various tax instruments; see for example Nassios *et al.* (2019a, b) and Nassios and Giesecke (2022a, b). To date, how governments spend tax revenue has not been

[6] See Pawson et al. (2022) for a summary of active demand- and supply-side first homebuyer assistance schemes in Australia and selected international countries.

similarly benchmarked. This paper illustrates how large-scale computable general equilibrium (CGE) models, like those applied to study the effects of tax revenue collection, can be applied to assess the economic efficiency and broader macroeconomic effects of taxation expenditures.

Second, strong growth in housing prices and recently, housing rents, have motivated calls for expansions in homebuyer and rental assistance. For prospective owner-occupiers, over the 2020/21 and 2021/22 financial years housing prices rose by 15.5% and 5.1% relative to annual wage growth [orange dotted line, Figure 1(b)]. While prices eased slightly relative to wages in 2022/23, this was driven by rapid monetary tightening and growing debt burdens [Figure 1(c)], rather than an improvement in housing supply. The growth in housing rents has accelerated, despite monetary tightening, and is particularly evident in the rapid growth of advertised housing rents over 2022/23. This is evident in Figure 1(b), where we show that the median price of new housing and unit rentals in Australia's capital cities grew by 16.5 percent and 20.4 percent relative to wages over this time.

We focus on four existing assistance schemes in Australia. Three of these four schemes provide acquisition cost relief. These are: (i) first home owner grants (FHOGs) on new housing purchases, designed to reduce new housing construction costs; (ii) first home buyer stamp duty exemptions and concessions (FHODEs), which reduce property transfer duty liabilities and thus acquisition costs incurred by first home buyers; and (iii) shared equity schemes (SESs), where government takes an equity stake in the purchase of a new or existing owner-occupied home to reduce down payment burdens. We also study rent assistance programs (RAPs), modelled as social security payments that tied to the consumption of rented housing. Australia's state and territory governments operate their own versions of (i) – (iii), while Australia's federal government operates an RAP similar to that studied herein, called Commonwealth Rent Assistance (CRA). We describe (i) – (iv) in section 2.5.

Our discussion focuses on the capacity of FHOGs, FHODEs, SESs and RAPs to improve housing affordability, ownership accessibility, and economic efficiency. We measure changes in housing affordability using: (i) the housing price to income ratio, and (ii) the housing rent to income ratio. Changes in housing prices relative to income affect affordability for owner-occupiers, while changes in housing rents relative to income affect affordability for renters. In contrast, to separate the concerns

of owner-occupiers from other groups, we use the term "ownership accessibility" to describe the ability of renters to become owner-occupiers. This aligns with the convention in the Australian public policy debate and academic studies such as Gabriel *et al.* (2005), Richard (2008), and Cava *et al.* (2017). We measure changes in ownership accessibility by tracking and reporting on the housing sector's owner-occupation rate (hereafter, the OOR). Finally, to study impacts on economic efficiency, we calculate the dollar-change in welfare for each policy, relative to the dollar-change in expenditure, i.e., we report the marginal excess burden of expenditure (MEBE) for each policy.

In our analysis, we identify that none of the four interventions exhibit the ability to concomitantly enhance housing affordability, facilitate ownership accessibility, and bolster economic efficiency. Each of these interventions demonstrates suitability in improving singular facets of housing affordability, ownership accessibility, or economic efficiency. Should the policy focus be narrow, such as the government's objective to enhance housing affordability for either owner-occupiers or renters, promote ownership accessibility, or fortify economic efficiency, each of the four programs holds the potential to optimally achieve the specified policy objective.

Specifically, first homeowner grants (FHOGs) excel in enhancing housing affordability for new owners, rent assistance programs (RAPs) prove most effective in improving housing affordability for renters, shared equity schemes (SESs) emerge as pivotal in augmenting ownership accessibility, while first home buyer stamp duty exemptions and concessions (FHODEs) stand out in advancing economic efficiency. However, trade-offs inherently accompany each intervention. For instance, while FHODEs enhance economic efficiency, they trigger housing price inflation that surpasses the resultant escalation in household incomes, diminishing housing affordability. These trade-offs warrant consideration, as the adoption of two or more of these policies is likely to counteract the progression of one or more overarching policy objectives. Implementing all four policies concurrently might lead to a state of policy inconsistency. Clearly defining program objectives can guide the selection of an appropriate policy response, however. With a clear objective in place, our housing policy assessment results, summarised in Tables 7 and 8, can inform the correct policy choice.

Previous simulation-based assessments of homebuyer and renter assistance programs have relied on microsimulation models, which emphasise household cohort detail as opposed to sectoral detail, e.g., see Wood *et al.* (2006); Wood and Ong (2008); ViforJ *et al.* (2022). While well equipped to assess distributional consequences, such as the impact of policy changes on income inequality, the absence of sectoral detail means the efficiency effects of tax expenditures are not standard outputs in such models. This prevents evaluation of the efficiency effects of tax expenditures like the FHOGs, SESs, FHODEs and RAPs.

The remainder of the paper is structured as follows. Section 2.1 introduces the core features of our model. In addition to impacts on measures of efficiency, affordability, and accessibility, we evaluate other variables of interest to policymakers, such as new housing construction costs and consumer price levels. In section 2.4, we describe how theory developed to study the housing price effects of property taxation by Nassios and Giesecke (2022a) can be extended to assess the effects of tax expenditures on housing prices, land prices, and housing price-to-income ratios. Results are summarised in Tables 7 and 8 and discussed in section 3. We summarise our findings and conclude in section 4.

# 2. Model description

## *2.1. The Victoria University Regional Model with Tax Detail (VURMTAX)*

VURMTAX is a 91-industry computable general equilibrium model of Australia based on VURM [Adams *et al.* (2015)]. The model is designed for detailed taxation analysis and is described in Nassios *et al.* (2019a). Herein, we use a two-region (Victoria [VIC] and the Rest of Australia [RoA]) aggregation of the core eight-region database. To parameterise VURMTAX, we rely on data from a variety of sources, including Australian Bureau of Statistics (ABS) Census data, Agricultural Census data, State accounts data, and international trade data. The core VURMTAX model is based on the ABS 2017/18 input-output data release, national and state accounts aggregates, together with government financial statistics data from ABS cat. No 5512.0 and various state and federal government budget papers.

Each region in VURMTAX has a single representative household and a state/local government. The taxing and spending activities of the national federal government are also modelled within each region. The foreign sector is described by export demand curves for the products of each region, and by supply curves for international imports to each region. Supply and demand for each regionally produced commodity is the outcome of optimising behaviour. Regional industries are assumed to use intermediate inputs, labour, capital, and land in a cost-minimising way, while operating in competitive markets. Region-specific representative households purchase utility-maximising bundles of goods, subject to given prices and disposable income. Regions are linked via interregional trade, interregional migration and capital movements, and governments operate within a fiscal federal framework.

Investment in each regional industry is positively related to expected rates of return on capital in each regional industry, and negatively related to required rates of return on capital. VURMTAX identifies two investor classes: local investors (i.e., domestic households and government) and foreign investors. Capital creators assemble, in a cost-minimizing manner, units of industry-specific capital for each regional industry. Ownership of the capital in each regional industry is divided between local and foreign owners, with differential local/foreign ownership concentrations identified across industries. For example, the dwelling industry is overwhelmingly locally-owned, while the mining sector has high foreign ownership.

In solving VURMTAX, we undertake two parallel model runs: a baseline simulation and a policy simulation.[7] The baseline simulation is a business-as-usual (BAU) forecast for the period of interest (see section 2.2). The policy simulation is identical to the baseline simulation in all respects, other than the addition of shocks describing the policy under investigation. We report results as cumulative deviations away from base case in the levels of variables in each year of the policy simulation.

Previous applications of VURMTAX include analyses of the excess burden of taxation in Australia [Nassios *et al*. (2019a)], the goods and services tax [GST, see Giesecke and Tran (2018); Giesecke *et al.* (2021)], company tax [Dixon and Nassios (2018)], land tax [Nassios *et al.* (2019b)], stamp duty

[7] The model is solved with the GEMPACK economic modelling software [Horridge et al. (2018)].

[Nassios and Giesecke (2022a)], personal income tax [Nassios and Giesecke (2022b)], fuel taxes [Liu *et al.* (2024)], and levies on international student tuition fees [Liu *et al.* (2023)].

### *2.2. Baseline forecast*

The baseline forecast is constructed by imposing the forecasts of key macroeconomic indicators from the October 2022-23 Commonwealth Budget. These include real GDP growth, and national forecasts for the national consumer price index (CPI), the workforce participation rate, the unemployment rate, and the population growth rate.

**Table 1:** Year-on-year forecasts for key economic indicators from the October Commonwealth Budget 2022-23

| **Financial year forecast** | **2022-23** | **2023-24** | **2024-25** | **2025-26** |
|---|---|---|---|---|
| | | *Forecast* | | |
| Real GDP growth (annual %-change) | 3.25% | 1.5% | 2.25% | 2.5% |
| National unemployment rate (Level) | 3.75% | 4.5% | 4.5% | 4.25% |
| Workforce participation rate (Level) | 66.75% | 66.5% | 66.5% | 66.5% |
| National CPI (annual %-change) | 5.75% | 3.5% | 2.5% | 2.5% |
| Population Growth (annual %-change) | 1.4% | 1.4% | 1.4% | 1.4% |

For 2017/18 – 2021/22, year-on-year deviations for each of the variables/levels reported in Table 1 are aligned to realised movements sourced from the ABS.

In addition to the above, the national terms of trade is exogenous and unshocked throughout the baseline, accommodated via endogenous determination of the position of foreign demand schedules for Australian exports. Labour-saving technical change is endogenous throughout the baseline, and adjusts each period to accommodate the real GDP forecast in Table 1. In the counterfactual, we revert to a traditional closure, with technological progress exogenous and held at its baseline forecast level.

As we shall discuss, in updating VURMTAX from 2017/18 to 2021/22, we also target expenditure on FHOGs, FHODEs, SESs, andRAPs, aligning each to realised state and federal government expenditures from 2017/18 – 2021/22 (see section 2.5 for details).

The numeraire in the baseline and all counterfactuals is the national CPI.

### *2.3. Policy simulation*

The policy simulation is identical to the baseline simulation in all respects, other than the addition of shocks describing the policy scenarios under investigation. We report results as percentage (and in some cases, A$m) deviations in the values of variables in each year of the policy simulation, away from their baseline values.[8] All policy simulations conducted herein are undertaken under the following policy closure of the model:

(1) Regional labour markets are characterised by short-run wage stickiness, with endogenous regional unemployment rates, transitioning to a long-run environment of regional wage flexibility with exogenous regional unemployment rates.

(2) Rates of inter-regional migration are sticky in the short run but adjust gradually in response to movements in inter-regional relativities in real wages to ensure that such income relativities are gradually returned to baseline values. See Giesecke and Madden (2013) for a full description.

(3) Regional participation rates adjust to deviations in region-specific real consumer wages, as described in Giesecke *et al.* (2021).

(4) National private consumption spending is the sum across regions of regional private consumption. Within each region, private consumption spending is fixed relative to regional disposable income.

(5) Public consumption spending undertaken by state and local governments moves in line with regional population growth.

### *2.4. Housing prices in VURMTAX*

VURMTAX includes equations for the market price of existing housing capital and housing land, and tracks these prices for two housing types, low-density housing and high-density housing ($i \in \{\text{DwellingLow}, \text{DwellingHigh}\}$), in each region $q$ across time $t$.[9] The present value of a housing

[8] See Dixon and Rimmer (2002) for a thorough review of the construction of baseline and policy simulations with a detailed CGE model.

[9] Based on the classification of the housing stock in ABS 4130.0 Table 12.5, herein we define low-density housing as separate houses, while high-density housing is defined as semi-detached, row or terrace houses, townhouses, flats or apartments.

structure of density type *i* in region *q* at time *t* ( $PVS_{i,q,t}$ ) is expressed as the sum of the market price of a unit of housing capital and housing land, i.e., the present value of a housing structure is the sum of the present value of the building capital ( $PVC_{i,q,t}$ ), and the present value of the land upon which the building is located ( $PVL_{i,q,t}$ ). $PVC_{i,q,t}$ and $PVL_{i,q,t}$ are each functions of:

- transaction taxes (e.g., property transfer duty levied at a progressive rate, $RTD_{i,q,t}$, on the taxable base), and stamp duty concessions, (e.g., first home buyer duty exemptions and concessions at a (negative) rate, $RSDC_{i,q,t}$ ).
- the present value of future post-tax income from these assets (defined as $PV\_CAPINC_{i,q,t}$ for post-tax capital income, and $PV\_LNDINC_{i,q,t}$ for post-tax land income, respectively); and,
- the present-value of the proceeds from selling the house at some future date ( $PV@SALE\_C_{i,q,t}$ and $PV@SALE\_L_{i,q,t}$ for housing capital and housing land, respectively).

Suitable general forms for $PVC_{i,q,t}$ and $PVL_{i,q,t}$ are thus:

$$PVC_{i,q,t} = \left( -RSES\_P_{i,q,t} - \frac{\left( RTD_{i,q,t} + RSDC_{i,q,t} \right)}{2} \right) \cdot PVC_{i,q,t} + PV\_CAPINC_{i,q,t} + PV@SALE\_C_{i,q,t}, \quad \textbf{(1)}$$

$$PVL_{i,q,t} = \left( -RSES\_P_{i,q,t} - \frac{\left( RTD_{i,q,t} + RSDC_{i,q,t} \right)}{2} \right) \cdot PVL_{i,q,t} + PV\_LNDINC_{i,q,t} + PV@SALE\_L_{i,q,t}. \quad \textbf{(2)}$$

In (1) and (2), $RSES\_P_{i,q,t}$ is the upfront co-contribution by government to the purchase of the property, under a shared equity scheme (SES). It takes strictly negative values that are less than 1 in magnitude, i.e., it is a negative rate. It appears in (1) and (2) accompanied by a minus sign, and hence $-RSES\_P_{i,q,t}$ is to be interpreted as a positive rate. Note that in (1) and (2) we assume that half the transfer duty payable on an existing home and levied at the progressive rate $RTD_{i,q,t}$ (and similarly,

half the stamp duty concessions paid at the rate $\text{RSDC}_{i,q,t}$), is borne by (or benefits) the buyer, and the other half is incident on the seller. The half borne by the buyer appears as $\left(\text{RTD}_{i,q,t}+\text{RSDC}_{i,q,t}\right)/2$ in the first term on the right-hand-side of (1) and (2). The half that is borne by the seller is embedded in $\text{PV@SALE\_C}_{i,q,t}$ and $\text{PV@SALE\_L}_{i,q,t}$, in the third term on the right-hand-side of (1) and (2). The $\text{PV@SALE}_{i,q,t}$ terms for housing capital and land are separately reported in equations (3) and (4). As shown in (3) and (4), they can be written as functions of $\text{RTD}_{i,q,t}$, the tax at sale due to repayment of the SES, $\text{RSES\_S}_{i,q,t}$, the book value or replacement cost of a new unit of physical capital $\text{CON\_COST}_{i,q,t}$, and two discount factors $\text{LRDFACT}_{\text{CAP},i,q,t}$ and $\text{LRDFACT}_{\text{LND},i,q,t}$:

$$\text{PV@SALE\_C}_{i,q,t}=\left(1-\frac{\left(\text{RTD}_{i,q,t}+\text{RSDC}_{i,q,t}\right)}{2}-\text{RSES\_S}_{i,q,t}\right)\cdot\text{LRDFACT}_{\text{CAP},i,q,t}\cdot\text{CON\_COST}_{i,q,t}, \quad \textbf{(3)}$$

$$\text{PV@SALE\_L}_{i,q,t}=\left(1-\frac{\left(\text{RTD}_{i,q,t}+\text{RSDC}_{i,q,t}\right)}{2}-\text{RSES\_S}_{i,q,t}\right)\cdot\text{LRDFACT}_{\text{LND},i,q,t}\cdot\text{PVL}_{i,q,t}. \quad \textbf{(4)}$$

These two discount factors are themselves functions of the real discount rate and holding period for each housing type *i* in each region *q* at time *t*, and are derived in Nassios and Giesecke (2022). Importantly, while $\text{RSES\_P}_{i,q,t}$ is a negative rate, $\text{RSES\_S}_{i,q,t}$, which captures repayment at sale of the government co-contribution, functions as a tax and is thus equal in magnitude but opposite in sign to $\text{RSES\_P}_{i,q,t}$, i.e., $\text{RSES\_S}_{i,q,t}=-\text{RSES\_P}_{i,q,t}$.

### *2.5. Modelling housing policies in VURMTAX*

We study four housing assistance schemes: (i) first homeowner grants (FHOGs); (ii) shared equity schemes (SESs); (iii) first homebuyer stamp duty exemptions and/or concessions (FHODEs); and, (iv) rent assistance programs (RAPs). In sections 2.5.1 – 2.5.3, we provide a synopsis of how each of (i) – (iii) function in one Australian state: Victoria. In 2.5.4, we describe how we model RAPs.

#### 2.5.1. First homeowner grants (FHOGs)

Households buying or building a new home of A$750K or less in Victoria, which will become their principal place of residence (PPR) for a period of at least one year, may be eligible for a Victorian

FHOG of A$10K. Existing homeowners are not eligible to claim the FHOG, and first home buyers purchasing existing homes are also not eligible to claim the FHOG. Previous assessments of FHOGs in Australia, e.g., by Wood *et al.* (2006), have utilised microsimulation models to study the distribution consequences of Australia-wide FHOG schemes. The approach we apply herein is distinct, in that we study FHOGs in a single Australian state (Victoria) and utilise a multi-regional CGE model, facilitating an assessment of the economic efficiency of the grants.

Because the FHOG is payable on new homes only, it operates as a subsidy on the purchase of new homes, reducing their post-tax cost. If housing land is in fixed supply, however, a subsidy on new housing construction will have implications for both housing investment, and housing land rentals. The degree to which the subsidy stimulates housing investment, rather than housing land rents, is determined by the substitutability between housing land and housing capital. If the substitution elasticity is close to zero, i.e., housing land and capital are not substitutable, then housing investment is entirely a function of land supply, and the impact of a construction subsidy will be to elevate land rentals and housing prices. As discussed by Erol and Güzel (2006), there is little evidence to support very low capital-land substitution elasticities for large cities in developed economies.

Two housing sectors are modelled in VURMTAX: low-density and high-density. These sectors are cost-minimising combinations of density-specific capital and land, i.e., low-density housing land/capital cannot be redeployed as high-density housing land/capital. The low- and high-density housing production functions are each modelled as constant elasticity of substitution (CES) functions. The substitution elasticity between housing capital and land is set at 0.4, consistent with studies of the U.S. housing market by Polinsky and Ellwood (1979) and follow up work by Jackson *et al.* (1984) for one U.S. city. Low- and high-density housing land supply are both fixed at baseline forecast levels in all counterfactual scenarios studied herein. Because land and capital are weak substitutes, expansions in housing investment can occur in response to changes in post-tax construction costs, with partial pass through into relative increases in housing land-to-capital rentals, and prices.

In the equation system in section 2.4, FHOGs appear in the variable $CON\_COST_{i,q,t}$ (the purchaser's

value of a new unit of housing capital) in equation (3) as negative taxes (subsidies); see also equation (5) below.

$$CON\_COST_{i,q,t} = P0_{i,q,t} \cdot \left(1 + RTDN_{i,q,t} + RSDC_{i,q,t} + RSES_{i,q,t}\right) + FHOG\_P_{i,q,t}. \quad \textbf{(5)}$$

In (5), $RTDN_{i,q,t}$ is the rate of transfer duty paid on new units of housing of density type *i* in region *q*; $RSDC_{i,q,t}$ and $RSES_{i,q,t}$ are the (negative) rates of FHODEs and government co-payments under the SES payable on new units of housing of density type *i* in region *q;* $FHOG\_P_{i,q,t}$ is the (negative) value of FHOGs payable on new units of housing of density type *i* in region *q*; and $P0_{i,q,t}$ is the price of a new unit of housing capital, inclusive of all input costs and indirect taxes except residential TD on new housing.

To distribute the FHOGs across low-density dwellings, and high-density dwellings in the base year (2017/18), we source aggregate FHOG payment data from the State Revenue Office of Victoria (SRO VIC), and split this total across density type using housing approval shares from Table 2 of ABS 8731.0 (see Table 2 below). By 2021/22, the scale of FHOG payments in Victoria had expanded, with a greater share of payments to purchasers of low-density housing than in 2017/18 (see Table 3). This is also accommodated in our baseline forecast, such that the FHOG data arrays appropriately reflect the size and distribution of the scheme in 2021/22.

**Table 2:** Author calculations for FHOG expenditures in 2017/18 by housing density and vintage in Victoria (A$m)

| **FHOGs** By density and vintage 2017/18 | **Existing housing (FHOG exempt)** | **New housing** | *Total* |
|---|---|---|---|
| **Low-density** | 0 | 82.8 | *82.8* |
| **High-density** | 0 | 75.6 | *75.6* |
| *Total* | *0* | *158.4* | ***158.4*** |

**Table 3:** Author calculations for FHOG expenditures in 2021/22 by housing density and vintage in Victoria (A$m)

| **FHOGs** By density and vintage 2021/22 | **Existing housing (FHOG exempt)** | **New housing** | *Total* |
|---|---|---|---|
| **Low-density** | 0 | 133.6 | *133.6* |
| **High-density** | 0 | 79.6 | *79.6* |
| *Total* | *0* | *213.2* | ***213.2*** |

In addition to modelling the impact of the subsidies on low- and high-density housing construction costs, we also account for the impact of exemptions, i.e., FHOGs can only be claimed by purchasers intending to owner-occupy the property for at least one-year. We follow a similar approach to Nassios *et al.* (2019b), who study owner-occupied exemptions from state land tax. Whereas most CGE treatments of household demand for housing treat the sector as a homogeneous good, VURMTAX identifies two dwelling types (low-density and high-density) and two tenure possibilities (ownership or tenancy). This is modelled by first identifying two dwelling industries, distinguished by dwelling type: high-density dwellings, and low-density dwellings (hereafter *DwellingHigh* and *DwellingLow*). These two industries each offer two tenure choices to households (ownership or tenancy). Hence, VURMTAX identifies four dwelling service commodities: high-density tenancy (*DwelHighRent*), high-density ownership (*DwelHighOwn*), low-density tenancy (*DwelLowRent*) and low-density ownership (*DwelLowOwn*). Each industry assigns its dwelling services output across the two tenure choices in a constrained revenue-maximising way. That is, we assume each dwelling production sector (*DwellingHigh* and *DwellingLow*) faces a constrained transformation process (described by industry-specific constant elasticity of transformation (CET) functions) for allocating its output across the tenure choices (respectively, *DwelHighRent* and *DwelHighOwn*, and *DwelLowRent* and *DwelLowOwn*). This establishes the supply side of the market for the four residential service types.

We model dwellings demand as a staged decision process. At the top level of the process, households demand a single commodity *Shelter*, which is undifferentiated by dwelling type or tenure choice. Each regional household's first decision problem is to choose utility maximising consumption of 98 commodities, of which *Shelter* is one, taking as given prices and the available consumption budget.

Having determined utility-maximising demand for *Shelter*, the household's second problem is to minimise the cost of acquiring *Shelter*, by choosing in a constrained optimising fashion, alternative dwelling density types. More formally, we assume that the household views *Shelter* as a constant elasticity of substitution (CES) combination of high- and low-density dwellings. The second stage of the household's decision problem therefore requires the household to minimise the cost of acquiring the utility maximising level of *Shelter* by choosing across two types of dwellings, *DwellingLow* and *DwellingHigh*, subject to the CES function and given prices.

In the final stage of the housing decision problem, households minimise the cost of acquiring the cost-minimising levels of *DwellingLow and DwellingHigh* via a tenure choice decision, e.g., given the cost-minimising level of *DwellingLow* consumption, households minimise the cost of acquiring this by choosing between *DwelLowRent* and *DwelLowOwn*.[10] For reasons outlined in Nassios *et al.* (2019b), the substitution elasticity between dwelling density types is set at a relatively low level (at 0.5), and the tenure choice elasticity is set at a relatively high level (at 3.66). This establishes the demand-side of the market for the four types of residential service (comprising two dwelling types cross-classified by two tenure types). These four markets clear via endogenous movements in prices.

While FHOGs stimulate investment activity because they bring down the installation cost of new housing relative to its market value, households who receive a FHOG are also compelled to owner-occupy for at least one year. To model this compelled behaviour on the part of FHOG recipients in VURMTAX, we introduce revenue-neutral tax-subsidy instruments into the tenancy choice nests. These cause a twist in consumer tenancy choice towards more owner occupancy and less rental by levying a tax on renting that subsidises owner occupancy. We calibrate the shocks to these paired tax-subsidy instruments by noting that one-year of owner-occupation is worth the value of interest saved by households on a mortgage that would otherwise be A$10K larger. These tax-subsidy pairs last for one year only, because thereafter the FHOG is not forfeit should the recipient choose to rent rather than own their home. In simulations in which we change FHOG subsidy rates, this ensures that

[10] Likewise, households minimise the cost of acquiring their *DwellingHigh* consumption by choosing between DwelHighRent and *DwelHighOwn* in a constrained cost-minimising way.

increases (decreases) in FHOGs drive down (up) the rented tenure share. The size of the change in the owner-occupancy rate is also a function of the elasticity of substitution between rented and owner-occupied housing, which is derived by Nassios *et al.* (2019b).

The total tax wedge between owner-occupied and rented housing is set equal to the value of the subsidy. We model the subsidy as acting proportionately to reduce demand for rented housing, and stimulate demand for owner-occupied housing, i.e., there is a sales tax imposed on *DwelLowRent* and a subsidy on *DwelLowOwn* whose total magnitude is equal to aggregate FHOG payments. The sales tax/subsidy combination is revenue neutral, and the aggregate size of the price wedge between the different tenures of housing is equal to one year of mortgage interest savings, i.e., it is equal to the number of FHOG grants each year multiplied by the size of each grant (A$10K) and the assumed rate of interest on a mortgage (5% per annum). Revenue neutrality holds throughout the baseline forecast and counterfactual VURMTAX simulations.

#### 2.5.2. Shared equity schemes (SESs)

Shared equity schemes (SESs) were introduced to assist households purchase their own homes. The Australian Commonwealth Government runs an SES that is available to residents across all Australian states/territories, called *Help to Buy*. This scheme is not the focus herein. For more detail on this SES, see ViforJ *et al.* (2023). In all states/territories other than the Northern Territory, regional governments offer their own SES. In what follows we describe the active SES program in Victoria, the principal state of interest herein, which is called the Victorian Homebuyer Fund (HBF). As we shall describe, there are four main economic channels via which SESs impact the economy: (i) the impact of upfront co-contributions by government; (ii) the impact of repayments of the co-contribution at sale; (iii) the impact of Lenders Mortgage Insurance (LMI) waivers that typically apply to SES participants; and, (iv) the impact of ongoing reporting and maintenance obligations for SES participants. Our modelling explicitly accounts for (i) and (ii).

Under Victoria's SES, the state government makes a financial contribution of up to 25% to the purchase of a homeowner's property, in exchange for a proportional ownership share. Under the terms of the SES, banks waive Lenders Mortgage Insurance (LMI) and are willing to accept homeowner

deposits of 5% from each of the successful applicants. LMI is an upfront cost paid by households whose deposits are less than 20% of the purchase price of a house.[11] Successful applicants are subject to ongoing obligations, such as annual reviews and maintenance requirements, with modifications and renovations exceeding A$10K in value subject to approval. Under certain conditions, buyouts of the government equity stake must be made before the property is sold. Herein, we assume that all buyouts are made from sale proceeds, i.e., at the conclusion of the purchasers' holding period.

The SES described here operates alongside the FHOG in Victoria. As distinct from the FHOG, the SES is not exclusive to new homes, or to first home buyers. Purchase price caps apply to the SES, and are broadly consistent with those that apply to the FHOG. SES applicants cannot own other property in Australia or overseas, but may have owned and sold other property prior to application.

In modelling an SES herein, we recognise that operationally these schemes can differ across regions within Australia, and internationally. We model a scheme that is consistent with the Victorian scheme, and thus consists of both (i) a contribution at purchase time by government, which is effectively an interest-free loan whose principal value is tied to the housing price; and (ii) a repayment of the contribution/interest-free loan at the time of sale.

As previously discussed, there are two additional channels that we do not account for herein. The first of these two channels is the impact of reduced upfront transaction costs for participants in addition to the savings recognised under channel (i). These savings arise because SES participants are typically entitled to an LMI waiver. We do not model this channel herein, because it is partially, fully or more-than-offset by the fourth channel of incidence, with participants in an SES also encumbered by ongoing reporting obligations, maintenance requirements and renovation approval constraints (effectively, administrative expenses).

[11] The Australian Prudential Regulatory Authority (APRA) collate statistics from Australia's Mortgage insurers [APRA (2022)]; these statistics show that in the year ended June 2018, 160 000 mortgage insurance contracts were written in Australia, with aggregate gross earned premiums of A$955m or A$5 938 on average. Higher premiums are charged to those with smaller deposits, i.e., those with lower deposits pay more than the average reported here.

Each SES transaction therefore carries four components that impact decision making. We model the two of these four channels and their impact on housing prices herein, specifically: (i) we introduce a new transaction subsidy $RSES\_P_{i,q,t}$ (a negative tax) to model the co-contribution by Government at time of purchase in equations (1) and (2); and, (ii) we introduce a new tax on existing properties that is collected at sale time $RSES\_S_{i,q,t}$ in equations (3) and (4), to reflect buyout of the government equity holding at sale.

At the time of writing, Victoria's SES had been active in 2021 and 2022. Because the base year of our model is 2017/18, the SES is not active in our initial solution. To introduce the scheme in our model baseline, we required information on (i) the scale of the program in terms of total annual expenditure; and, (ii) expenditure shares to allow us to split total expenditure by housing density (low-versus-high) and vintage (new-versus-existing). The program scale over 2021 and 2022 was A$350m and A$150m, respectively.[12] To calculate expenditure shares across vintage, we rely on Property Sales Statistics from Land Victoria. These statistics report property sale counts and average prices in Victoria each year for existing houses and apartments, and vacant land. Using this data for 2021 and 2022, we calculate the land value share of total residential property and land sales in Victoria, and take a simple weighted average of the land value share for 2021 and 2022. The final result is 5%, yielding a 95/5 split between existing and new housing; see the column totals reported in row 3 of Table 4. To split the 95% existing housing claim share across housing density type, i.e., the low/high split in column 1 of Table 4, we rely on the low-to-high density housing transaction share over the time period in question, sourced from ABS 6432.0 Table 2. This 63.2/36.8 split allows us to distribute populate all cells in column 1 of Table 4. We adopt a 60/40 low-to-high density split for new housing, based on the ratio of the median of (new) detached dwellings to apartments/semi-detached dwellings built over 2021 and 2022, as reported in ABS 8701.

With the shares in Table 4 and the scheme size known for 2021 and 2022, we introduce the SES into the baseline via endogenous determination of up-front subsidies (government-provided interest-free

[12] This was noted in a press release by the Victorian Premier, see https://www.premier.vic.gov.au/11-billion-homebuyer-fund-boost-deliver-more-dreams

loans under the SES, with $RSES\_P_{i,q,t}$ negative and determined by the model given the size of the SES on existing housing) and increases in future costs (buyouts at sale now required, with $RSES\_S_{i,q,t}$ set initially to be identical in magnitude to $RSES\_P_{i,q,t}$ but opposite in sign). The cost shares for the counterfactual simulation SES are identical to the cost shares in Table 4.

**Table 4:** Author calculations for SES expenditure shares by housing density and vintage in Victoria, applicable for baseline forecast years 2021/22 and 2022/23

| **Budget cost shares**<br>SES<br>2021/22 and 2022/23 | **Existing housing** | **New housing** | *Total* |
|---|---|---|---|
| **Low-density** | 0.60 | 0.03 | *0.63* |
| **High-density** | 0.35 | 0.02 | *0.37* |
| *Total* | *0.95* | *0.05* | ***1*** |

Irrespective of whether the property purchased is new or existing, or of low- or high-density, the SES can only be claimed by owner-occupiers.[13] The prerequisite period of owner-occupation is the holding period of the property, i.e., SES participants cannot rent out the property at any stage. Therefore, households who participate in the SES are also compelled to owner-occupy for as long as they hold the property. In VURMTAX, we set one-year of owner-occupation to be worth the value of interest saved by households on a mortgage that would otherwise be up to 33% larger. To model this cost saving in VURMTAX, we follow a similar approach to that described in section 2.3.2 and introduce revenue-neutral tax-subsidy sales taxes to ensure that SES recipients are compelled to owner-occupy their new home as opposed to renting it. In contrast to the approach adopted to model the FHOG however, these tax-subsidy pairs accumulate until properties are sold, because the SES is forfeit if the tenure choice is altered. Because the simulation time horizon is four years (2024 – 2027), we assume no SES participants entering the expanded scheme exit it over the simulation time horizon. Because expected holding periods by SES recipients exceed the time horizon of our counterfactual, this seems reasonable. This means that the subsidy value on the purchase of *DwelLowOwn* continues to

[13] In limited circumstances, we understand that Victorian SES participation agreements allow participants to rent out their properties for no more than 48 months in aggregate over their holding period. All modelling presented herein assumes no participants rent out their property.

accumulate over the baseline and counterfactual simulations, as new participants enter the SES. An identically sized tax on consumption of *DwelLowRent* grows in fixed proportion.

#### 2.5.3. First home buyer duty exemptions and concessions (FHODEs)

First home buyer duty exemptions and concessions (FHODEs) reduce stamp duty liabilities for first home buyers. Similar to SESs and unlike FHOGs, FHODEs can be claimed on the purchase of new and existing homes, up to a certain property value. Unlike SESs however, only first home buyers are eligible to claim FHODEs. To be eligible, claimants cannot have owned residential property before.

Nassios and Giesecke (2022) describe how to model transaction taxes on new and existing homes, and their impact on the housing market. Herein, we model the FHODEs claimed by purchasers of existing homes as transaction subsidies, i.e., a transaction tax with an opposite sign; see the negatively-signed $\text{RSDC}_{i,q,t}$ in equations (1) – (5). We model the FHODEs claimed by purchasers' of new housing in an identical fashion to the FHOG described earlier, i.e., as an investment subsidy. This housing policy therefore has two transmission channels: (i) it raises existing housing transaction volumes because it can be claimed on purchases of existing homes; and, (ii) it stimulates new housing investment and housing land rentals because it can be claimed on the purchase of new homes.

To distribute FHODE expenditures across density and vintage in the model's base year (2017/18), we relied on three data sources:

- We source aggregate FHODE expenditure from the SRO VIC[14]. In 2017/18, total FHODE claims in Victoria were A$551.7m.
- The SRO VIC reports total claim counts, by metropolitan (26 179 in 2017/18) and regional (9 094 in 2017/18) Victoria (total: 35 270 in 2017/18). In addition, the SRO VIC lists the ten top postcodes for claims. These top ten postcodes account for 8 385 or 23.8 percent of total claims, and are all in new land release areas. To split total expenditure across vintage, we assume all of these FHODE

[14] See https://www.sro.vic.gov.au/first-home-buyer-ppr-duty-concessions-statistics

claims to be for new housing purchases, with the remainder being claims against the purchase of an existing home. This sets the new housing FHODE share at 23.8 percent for 2017/18.

- To split FHODE expenditure on new housing across low- and high-density, we rely on housing approval shares from Table 2 of ABS 8731.0, and thus utilize the FHOG expenditure shares for this vintage in our year of interest.
- To split FHODE expenditure on existing housing across low- and high-density, we rely on ABS 6432.0 Table 2 and the SRO VIC data on FHODE claims in 2017/18. We use ABS 6432.0 to calculate the low-versus-high density transfer shares across metropolitan and regional Victoria; in general, these differ over time, with a higher proportion of metropolitan transfers being of high-density housing. This data is reported on a quarterly basis, so we calculate the median over 2017/18. We then use the SRO VIC data on metropolitan-versus-regional FHODE claim shares to weight the aforementioned low-versus-high density transfer shares. Using this approach, we find the low-density FHODE claim share for existing housing to be 65.54 percent, with the remaining 34.46 percent reflecting FHODE claims for the purchase of existing high-density housing.

The final expenditure profile for 2017/18 is summarised in Table 5.

**Table 5:** Author calculations for FHODE expenditures in 2017/18 by housing density and vintage in Victoria (A$m)

| **FHODEs** By density and vintage 2017/18 | **Existing housing** | **New housing** | *Total* |
|---|---|---|---|
| **Low-density** | 275.5 | 68.6 | *344.1* |
| **High-density** | 144.9 | 62.7 | *207.6* |
| *Total* | *420.4* | *131.3* | ***551.7*** |

In contrast to our analysis of the FHOG and Victorian SES, the most recent financial year with a full set of publicly available data for FHODE claims was 2020/21, where FHODE expenditures totalled A$885m; the top ten postcodes for claims accounted for 28.6 percent of total claims, which is the assumed 2020/21 claim share for new housing; and the low-density FHODE claim share for existing housing had fallen slightly, to 62.8 percent. Our baseline forecast is constructed so as to align FHODE expenditures in 2020/21 to match these statistics; see Table 6 for an expenditure summary.

**Table 6:** Author calculations for FHODE expenditures in 2020/21 by housing density and vintage in Victoria (A$m)

| **FHODEs** By density and vintage 2020/21 | **Existing housing** | **New housing** | *Total* |
|---|---|---|---|
| **Low-density** | 396.8 | 158.7 | *555.5* |
| **High-density** | 235.0 | 94.5 | *329.5* |
| *Total* | *631.8* | *253.2* | ***885.0*** |

Irrespective of whether the property purchased is new or existing, or of low- or high-density, the FHODEs can only be claimed by purchasers intending to owner-occupy the property for at least 12 months, which is similar to FHOGs. In VURMTAX, we set one-year of owner-occupation to be worth the value of interest saved by households on a mortgage that would otherwise be larger by the value of the FHODEs received. To model this cost saving, we follow a similar approach to that described in section 2.3.2 and introduce revenue-neutral tax-subsidy sales taxes to ensure that FHODE recipients are also compelled to owner-occupy their home, as opposed to renting it. In simulations in which we change FHODE subsidy rates, this ensures that increases (decreases) in FHODEs drive down (up) the rented tenure share. The size of the change in the owner-occupancy rate is also a function of the elasticity of substitution between rented and owner-occupied housing, which is derived by Nassios *et al.* (2019b) as described in section 2.5.1.

The total tax wedge between owner-occupied and rented housing is set equal to the value of the FHODE. We model the FHODE as acting proportionately to reduce demand for rented housing, and stimulate demand for owner-occupied housing, i.e., there is a sales tax imposed on *DwelLowRent* and a subsidy on *DwelLowOwn,* with the total magnitude of the tax and subsidy equal to aggregate FHODE payments. The sales tax/subsidy combination is revenue neutral, and the aggregate size of the price wedge between the different tenures of housing is equal to one year of mortgage interest savings, i.e., it is equal to the value of FHODEs multiplied by the assumed rate of interest on a mortgage (5 percent per annum). Revenue neutrality holds throughout the baseline forecast and counterfactual VURMTAX simulations.

### 2.5.4. Rent assistance programs (RAPs)

Australia has a diverse mix of RAPs, most of which are small-scale state-level programs designed to complement Commonwealth Rent Assistance (CRA) [ViforJ *et al.* (2022)]. CRA is a federally administered social security payment to tenants of private or not-for-profit rented housing providers [ViforJ *et al.* (2022)]. The dollar value of CRA received by an individual is dependent on the rent they pay, and their family situation [Productivity Commission (2005)]. It is paid at the rate of 75 cents for every dollar of rent paid by a tenant above a minimum threshold, subject to an upper bound on the quantum of assistance. As discussed by ViforJ *et al.* (2022), other developed countries, e.g., Germany, Ireland, New Zealand and the UK, operate similar RAPs that involve fixed sum transfers or co-payments to renters.

Herein, we study the impact of rental subsidy payments to tenants; in this sense, the scheme is modelled on dominant RAPs in Australia, New Zealand, Germany, Ireland, and the UK. A key feature of our modelling is unpacking the scale and regional distribution of Australia's existing RAP, the CRA. Because the CRA is paid to tenants and not landlords, it is considered a form of income support by the Australian Bureau of Statistics (ABS), and is thus absent from the taxation matrices that form a key component of Australia's national input-output tables. This is problematic when it comes to modelling the impact of changes in the quantum of CRA on the housing sector using a CGE model. To overcome this, we disaggregated CRA from other income support payments and treat CRAs as subsidies on the dwelling services industry. This split was complicated by opacity in reporting of CRA payments; with the capacity to claim CRA being tied to the receipt of twelve other social security payments in Australia, total CRA payments are not typically carved out and separately reported.

To determine how much of each social benefit payment can be attributed to CRA, we rely on Social Services budget papers (Commonwealth Government 2022). Once split, we treat remaining non-CRA social benefits in the usual way, as transfers or income support payments from government to regional households. CRA payments are modelled as dwelling service subsidies paid by the Commonwealth government, to regional households. The regional split of CRA payments is aided by data from the

Productivity Commission (2023), which identify CRA claims by Australian state/territory, on a year-by-year basis. This ensures the impact of existing subsidy price wedges is correctly represented in the initial solution of our analysis. As we shall discuss, all counterfactual simulations we perform then involve expansions of RAPs in on Australian region: Victoria.

## 3. Evaluating the impact on the Victorian housing market of four housing policies

We study the economic impacts of expanding (A) FHOGs; (B) SESs; (C) FHODEs; and, (D) RAPs, by A$500m per annum in Victoria from 2024. Henceforth, we refer to these as simulations (A) – (D), respectively. The higher level of annual expenditure remains in place through to 2027 (the final year of all simulations herein). Key results for simulations (A) – (D) in the final year (2027) of the simulation time horizon are summarised in Tables 7 and 8.

In constructing the simulations that underpin Table 7, we assume that the additional A$500m in annual expenditure is funded by new direct taxes levied on households that preserve government budget balance. That is, households are asked to fund the expanded government expenditures. The simulations that underpin Table 8 assume that the additional expenditures are deficit financed by government. That is, the nation delays paying for the larger government deficits that arise when government expenditures increase. Because the simulation time horizon is four years, these deficits feed into net debt and are not paid off. Differences between Tables 7 and 8 can therefore be envisaged as short-run income effects, with the results in Table 8 reflecting a boost in disposable income in the short-run due to increased net debt.

### 3.1. Background

For each of the four policies (A) – (D), under assumptions of both budget neutrality (Table 7) and deficit-financing (Table 8), we report results for eight key variables. For each variable, Tables 7 and 8 also report a colour-coded ranking of each policy in terms of its relative impact on the variable in question.

The first variable reported in Tables 7 and 8 is the marginal excess burden of tax expenditure (MEBE) (see column 1). We calculate the MEBE of tax expenditure instrument *e* via:

$$\mathrm{MEBE}_{e}^{t} = 100\left[\frac{\Delta \mathrm{GNI}_{e}^{t} + \sum_{q} \Delta \mathrm{VLEIS}_{e,q}^{t}}{\sum_{g} \Delta \mathrm{LST}_{e,g}^{t}}\right]. \qquad \textbf{(7)}$$

where

$\mathrm{MEBE}_{e}^{t}$ is the marginal excess burden of tax expenditure instrument *e* in time *t*;

$\Delta \mathrm{GNI}_{e}^{t}$ is the deviation between the year *t* counterfactual and BAU forecast value of real gross national income (deflated by a gross national expenditure Divisia price index), measured in A$m, generated by varying tax expenditure instrument *e*;

$\Delta \mathrm{VLEIS}_{e,q}^{t}$ is the deviation in the value of leisure time in region *q* in year *t*, caused by varying tax expenditure instrument *e*; and,

$\Delta \mathrm{LST}_{e,g}^{t}$ is the value at time *t* of the budget-balance neutralising lump sum tax implemented by government *g* to fund tax expenditure instrument *e*.[15]

Because (7) carries an implicit assumption that expenditure changes are financed via direct taxation, MEBEs are calculated for the budget-neutral simulations only (see variable [1], Table 7).

The remaining seven variables on which we report in Tables 7 and 8 are:

- The owner-occupation rate (OOR) (variable 2).
- The market price of existing housing by density type (variable 3). We report results both before and after any applicable taxes, subsidies and grants (TSGs).

[15] This follows the form of the marginal excess burden of a tax instrument described in Nassios *et al.* (2019a; 2019b; 2022) and Adams *et al.* (2020).

- The state CPI, reported as a benchmark price response (variable 4).
- The average land price response, by housing density type (variable 5).
- New housing construction costs by density type (variable 6). We report results both before and after any applicable TSGs.
- Housing rents by density type (variable 7), a key measure of rented tenure housing affordability. We report results on an after RAP basis.
- The ratio of average existing housing prices to household income (variable 8), a key measure of owner-occupied tenure housing affordability.

In section 3.2, we compare the impact of each of the four housing policies across these eight variables.

## 3.2. Results

We begin in Section 3.2.1 with a discussion of the budget-neutral scenario results (Table 7). In section 3.2.2, we discuss the deficit-financed results (Table 8).

### 3.2.1. Budget-neutral expansion of housing affordability programs

We begin by focusing on the budget-neutral scenario results in Table 7. These represent pure housing policy responses, undistorted by the effects of the fiscal expansion implicit in deficit financing.

In row [A] of Table 7, we report the impact of expanding FHOGs by A$500m per annum for four years in Victoria, holding all other tax rates and structural variables at their baseline forecast levels. We report results for simulation [B] (SES expansion by A$500m per annum, all else at baseline), simulation [C] (FHODE expansion by A$500m per annum, all else at baseline), and simulation [D] (RAP expansion by A$500m per annum, all else at baseline), in rows [B], [C] and [D], respectively.

Down the each of the columns, we summarise model outputs for the eight variables we introduced earlier. MEBEs for simulations [A] – [D] are calculated using equation (6) and reported in rows [A] –

[D] in the column labelled variable [1].[16] Under the column labelled variable [2], we report the cumulative deviation from baseline of the OOR for low- and high-density housing. The columns under variable [3] summarise the cumulative deviation from baseline in before- and after-tax low-density, high-density, and average housing prices in Victoria. Because these housing price responses are nominal variables, variable [4] reports scenario-specific state CPI responses. As shown in Table 7, state CPI responses are very similar across simulations [A] – [C], which lends weight to direct comparison of the nominal housing price responses for these simulations. The CPI response differs for simulation [D] but lies one order of magnitude below the housing price response. Variables [5] – [8] are also included in subsequent columns of Table 7.

Down each of columns in Table 7, we shade the results for simulations [A] – [D] from most favourable (in green) to least favourable (in red) for each variable. Implicit in our shading of these columns are the following assumptions:

i. For variable [1], negative MEBEs are preferred to positive MEBEs. A negative MEBE indicates that the fully-funded tax expenditure increases welfare. The largest, positive MEBE is thus shaded red, while the largest magnitude negative MEBE is in green. This means that while only small differences are apparent between the MEBEs for FHOGs (18 cents per dollar) and SESs (19 cents per dollar), the SES result for variable [1] in row [B] of Table 7 is shaded red because it is higher than the corresponding results for the FHOG, FHODE, and RAPs in rows [A], [C] and [D], respectively;
ii. In colour-coding relative results for variable [2], we assume that larger increases in OOR rates are preferred to smaller ones. The largest, positively signed result is thus shaded green; and,
iii. For variables [3] – [8], we assume reductions are preferred to increases. Negatively signed results are thus shaded green.

With these assumptions and shading conventions in place, Table 7 provides a dashboard that can be used to assess the relative impacts of each of the four housing affordability measures studied herein.

[16] All MEBEs derived using equation (6) and appearing in Table 8 do not reflect administrative costs of running expanded versions of FHOG, SES, FHODE and RAP.

Scanning across each of the four rows, it is immediately clear that none of the four measures are strictly dominant. Instead, each represents a locally optimal strategy for a targeted policy initiative, i.e., each of the four measures has merit in the context of a particular policy objective. In what follows, we expand on this in short discussions of the efficiency, affordability, and ownership accessibility implications of each policy.

**Efficiency:** If the objective is to boost tax system efficiency, then FHODEs dominate FHOGs, SESs and RAPs. This is because FHODEs are the only one of the four expenditures studied that have a negative MEBE (see result for variable [1] in row [B] of Table 7), the corollary of which is that FHODEs are welfare-improving. Why? Because the concessions act as partial offsets to highly distortionary property transfer duty payments. Nassios and Giesecke (2022a) showed that each of the four channels via which property transfer duties impact the real economy carry their own distinct MEB of taxation. The MEBE for FHODEs is not equal to the negative of the MEB for property transfer duty reported by Nassios and Giesecke (2022a), however. This is in part a result of the expenditure shares for FHODEs from Tables 5 and 6, which differ in general from transfer duty collection shares described by Nassios and Giesecke (2022a).

For other tax expenditures studied herein, the MEBEs are generally positive for the same reason MEBs of taxation are generally positive, i.e., taxes and subsidies alter consumption choices and resource allocations, introducing allocative inefficiencies. There are some differences, once again due to interactions with other elements of the tax system. For example, RAPs have an MEBE of 5 cents per dollar of expenditure and are less distortionary than FHOGs and SESs, which carry MEBEs of 18 cents and 19 cents per dollar of expenditure, respectively. RAPs act to partially offset the impact on rented tenure housing costs caused by personal income and state land tax exemptions for owner-occupied housing. This contrasts with FHOGs and SESs, which both reinforce these exemptions by providing additional tax incentives for households to access owner-occupied housing. By reinforcing distortions introduced by the tax system, FHOGs and SESs carry the largest MEBE of the expenditures studied herein.

**Affordability:** Also of note are the trade-offs evident when studying the differential responses for variables [3] and [8] across the four tax expenditures: looking across row [B] of Table 7 we see that, while economically efficient, FHODEs trigger housing price inflation in excess of the rise in household incomes. This phenomenon is explained by Nassios and Giesecke (2022a), who show how transfer duty reductions (which is the effect of FHODEs) generate land price (and thus housing price) inflation, because land prices are reflective of transfer duties payable over the full life of a non-depreciable long-lived land parcel. See also equations (2) and (4) herein. If policymakers place higher weight on affordability than economic efficiency, then expansion of FHOGs is the optimal strategy (see row [A], variable [3]). In contrast, expansions in RAPs are preferred if the objective is to improve rented tenure housing affordability: while housing rents fall relative to baseline for simulations [A] – [D] (see variable [7]), the fall is largest for RAPs.

**Ownership accessibility:** If the policy aim is to boost OOR, then SESs rank as the most preferred of the four policy measures (see row [B], variable [2]). SESs boost OORs by more than FHOGs, FHODEs and RAPs, indeed with the latter reducing rather than raising OORs.

### 2.1.1. The impact of fiscal expansions

Table 8 reports the impacts of the four instruments under deficit financing. The effects of deficit-financing can be seen by comparing the results in Table 6 with those in Table 7. For example, consider variable [5] in Tables 7 and 8. Comparing the land price responses for rows [A] – [D] between the two tables, we see the results in Table 8 are all positive, and lie approximately 0.2 to 0.3 percent higher than those in Table 7. This is a short-run income effect, brought about by the increase in national debt used to fund the housing policy expenditures. This debt, which is not repaid over the simulation time horizon, lifts rents relative to the budget-neutral scenario (compare variable [7] in Table 8 to that in Table 7), and boosts land prices.[17]

[17] The result in row [D] for variable [7] is reported on a post-RAP basis, i.e., it represents the purchasers' price of rented housing. Excluding the RAP, housing rents rise when RAPs rise, meaning housing is more affordable for those who have access to the RAP, but less affordable to those who do not.

For variable [6] in Table 8, we see deficit-financing also elevates housing construction costs before TSGs across all scenarios. The size of the subsidies and grants for new housing are however sufficient to offset this rise in construction costs in each case, as we also show in reporting after TSG values for variable [6] in Table 8. However, with land prices and housing construction costs elevated for each scenario under deficit-financing, new housing prices for purchasers who do not qualify for the expended FHOGs, SES, or FHODEs will rise, crowding out some investment that otherwise would have occurred. This is also true for FHODEs under a budget-neutral scenario, because of the sharp rise in average land prices; see the results in row [C] for variables [5] and [6] in Table 7.

**Table 7:** Performance dashboard for budget-neutral A$500m expansions of four housing policies.

| Performance dashboard* *Budget-neutral* **Shock-year:** 2024 **Results year:** 2027 | | Variable [1] | Variable [2] | | Variable [3] | | | | | | Variable [4] | Variable [5] | | Variable [6] | | | | Variable [7] | | Variable [8] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MEBE[2027] *cents-per-dollar* | Owner-occupation rate *%-change from baseline* | | Average housing price response *%-change from baseline* | | | | | | State CPI *%-change from baseline* | Average land price response *%-change from baseline* | | New housing construction costs *%-change from baseline* | | | | Nominal housing rents *%-change from baseline* | | Housing price-to-income ratio *%-change from baseline* |
| | | | *Low-density* | *High-density* | *Low-density* | | *High-density* | | *Average*** | | | *Low-density* | *High-density* | *Low-density* | | *High-density* | | *Low-density* | *High-density* | |
| | | | | | *Before TSGs**** | *After TSGs**** | *Before TSGs**** | *After TSGs**** | *Before TSGs**** | *After TSGs**** | | | | *Before TSGs**** | *After TSGs**** | *Before TSGs**** | *After TSGs**** | *Inc. CRA* | *Inc. CRA* | |
| [A] | FHOGs exp. | 18 | 0.02 | 0.15 | -0.31 | -0.31 | -0.96 | -0.96 | -0.53 | -0.53 | -0.08 | -0.21 | -0.21 | -0.01 | -0.89 | -0.01 | -1.73 | -0.21 | -0.22 | -0.36 |
| [B] | SESs exp. | 19 | 0.08 | 0.52 | -0.06 | -0.06 | -0.05 | -0.05 | -0.06 | -0.06 | -0.09 | -0.02 | 0.08 | -0.04 | -0.08 | -0.04 | -0.13 | -0.21 | -0.22 | 0.14 |
| [C] | FHODEs exp. | -35 | 0.04 | 0.28 | 0.97 | 0.73 | 0.47 | 0.19 | 0.81 | 0.55 | -0.08 | 1.35 | 1.55 | 0.00 | -0.25 | 0.00 | -0.49 | -0.03 | -0.03 | 0.62 |
| [D] | CRAs exp. | 5 | -0.48 | -2.00 | 0.18 | 0.18 | 0.89 | 0.90 | 0.42 | 0.42 | -0.02 | 0.16 | 1.67 | 0.01 | 0.01 | 0.01 | 0.01 | -0.34 | -0.30 | 0.47 |

* *Results are reported as cumulative deviations from the baseline forecast level in the counterfactual, relative to the baseline. For example, if the level of the low-density housing price in 2027 under our business-as-usual forecast is A$1m in Victoria, and we report that the low-density housing price deviation for simulation (A) in Table 7 as -0.31, this means that in 2027 the housing price would be A$0.9969m instead of A$1m.*

** *Averages are calculated as transaction-volume weighted sums of low- and high-density price responses reported here.*

*** *TSGs is an acronym for taxes, subsidies, and grants*

**Table 8:** Performance dashboard for deficit-financed A$500m expansions of four housing policies.

| Performance dashboard**** *Deficit-financed* **Shock-year:** 2024 **Results year:** 2027 | | Variable [2] | | Variable [3] | | | | | | Variable [4] | Variable [5] | | Variable [6] | | | | Variable [7] | | Variable [8] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner-occupation rate *%-change from baseline* | | Average housing price response *%-change from baseline* | | | | | | State CPI *%-change from baseline* | Average land price response *%-change from baseline* | | New housing construction costs *%-change from baseline* | | | | Nominal housing rents *%-change from baseline* | | Housing price-to-income ratio *%-change from baseline* |
| | | *Low-density* | *High-density* | *Low-density* | | *High-density* | | *Average*** | | | *Low-density* | *High-density* | *Low-density* | | *High-density* | | *Low-density* | *High-density* | |
| | | | | *Before TSGs**** | *After TSGs**** | *Before TSGs**** | *After TSGs**** | *Before TSGs**** | *After TSGs**** | | | | *Before TSGs**** | *After TSGs**** | *Before TSGs**** | *After TSGs**** | *Inc. CRA* | *Inc. CRA* | |
| (A) | FHOGs exp. | 0.02 | 0.16 | -0.05 | -0.05 | -0.80 | -0.80 | -0.30 | -0.30 | 0.01 | 0.09 | 0.06 | 0.03 | -0.85 | 0.03 | -1.69 | 0.03 | 0.02 | -0.32 |
| (B) | SESs exp. | 0.08 | 0.52 | 0.18 | 0.18 | 0.10 | 0.10 | 0.15 | 0.16 | -0.01 | 0.26 | 0.33 | 0.00 | -0.04 | 0.00 | -0.09 | 0.01 | 0.00 | 0.18 |
| (C) | FHODEs exp. | 0.05 | 0.29 | 1.11 | 0.87 | 0.56 | 0.28 | 0.93 | 0.67 | -0.03 | 1.51 | 1.69 | 0.03 | -0.22 | 0.03 | -0.47 | 0.10 | 0.10 | 0.63 |
| (D) | CRAs exp. | -0.47 | -1.98 | 0.36 | 0.36 | 1.00 | 1.00 | 0.58 | 0.58 | 0.04 | 0.37 | 1.85 | 0.04 | 0.04 | 0.04 | 0.04 | -0.18 | -0.14 | 0.50 |

**** *Results are reported as cumulative deviations from the baseline forecast level in the counterfactual, relative to the baseline. For example, if the level of the low-density housing price in 2027 under our business-as-usual forecast is A$1m in Victoria, and we report that the low-density housing price deviation for simulation (A) in Table 8 as -0.05, this means that in 2027 the housing price would be A$0.9995m instead of A$1m.*

## 4. Concluding remarks

In this paper, we study the economic and housing price impacts of four demand-focused housing affordability policies: first homeowner grants (FHOGs) on new home purchases, shared equity schemes (SESs), first home buyer duty exemptions and concessions (FHODEs) and rent assistance programs (RAPs).

We used a multi-regional computable general equilibrium model to analyse a set of benchmark results that policymakers can use to understand how these housing market interventions differentially affect housing affordability (for both owner-occupiers and renters), ownership accessibility, and economic efficiency. Our results are summarised in Table 7 (assuming expenditures are budget-neutral) and Table 8 (deficit-financed). When additional expenditures are financed in a lump-sum budget neutral fashion, none of the four housing affordability measures studied herein simultaneously improve housing affordability (both for owner-occupiers and renters), enhance ownership accessibility, and boost economic efficiency. Rather, each of the four measures is best suited to addressing one of the four issues. This means that if the policy objective is targeted, e.g., the policy objective is to either improve housing affordability for owner-occupiers, *or* for renters, *or* enhance economic efficiency, *or* boost ownership accessibility, then one of the four programs will be best placed to fulfil the policy objective. The corollary of this finding is that policymakers seeking to expand housing expenditures are faced with trade-offs, and program objectives should be clearly defined to help motivate the choice of policy response. With a well-defined objective, our assessment of housing policies can be used to select the appropriate policy response.

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