University of South Australia

THE HOUSING MARKET EFFECTS OF USING SUPERANNUATION SAVINGS FOR HOUSING

The housing market effects of using superannuation savings for housing.

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Executive Summary

This report applies statistical and econometric methods to household survey and housing market data to better understand the implications of demand-side housing policy interventions. The report briefly reviews the history of such policies in Australia and internationally before moving on to consider a specific and more recent suggestion for policy reform linked to savings in superannuation. Recent policy proposals would permit prospective first homeowners to access part of their superannuation balance to speed up their acquisition of a first home loan deposit. This report adopts no ideological or political position but is focused on estimating the likely housing market impacts of such a policy change. Three econometric models are drawn upon. The first uses household survey data to estimate the statistical significance of savings to the probability of non-homeowners transitioning to become homeowners. Two alternative time series macro-econometric models of the Australian housing market are then specified and estimated. The combination of models predicts that the proposed policy change would inflate housing prices by between **7.4%** and **10.3%** after two years than would otherwise be the case.

1. Introduction

Home ownership is often described as the 'Australian Dream', despite the pronounced, declining chances of attaining this outcome. The financial and emotional appeal of homeownership have contributed significantly to the long history of demand-side subsidies in Australian housing policy. Perhaps the most prominent of such polices, at least hitherto, have been the various first homeowner grant schemes. These have undoubtedly been popular with the electorate and, by extension, with politicians. Yet, economic theory guides us to expect inflationary pressures on prices when interventions increase demand without also inducing either a corresponding increase in supply, or a reduction of demand elsewhere in the system.

There are several published research studies that have explored the inflationary effects of demand side housing policy interventions, but in Australia these have tended to focus on profiling the beneficiaries of those taking up grants and subsidies. Internationally, more sophisticated quantitative methodologies have been employed. For example, Krolage (2022) studied the impact of first homeowner grants in Bavaria, exploiting the fact that this state had a more generous subsidy scheme than available at the Federal level which applied to the rest of Germany. This study found that the subsidy was fully capitalised into housing prices, although it also found support for the idea that low-density residential construction activity was slightly raised by the policy. Interestingly, the analysis also showed evidence that apartment construction activity was partially crowded out as a result.

Carozzi et al (2024), examining the UK Help to Buy scheme, found that the policy inflated housing prices in areas where supply elasticity is low (Greater London in their study) rather than elastic. This study also exploits spatial discontinuities to aid the analysis. In this case, the border between England and Wales is used as a comparator for the Greater London Authority boundary analysis. The former is an area in which land supply and planning constraints are relatively benign compared to the difficult supply conditions and very unaffordable nature of the GLA study area. The England/Wales border study area also makes it possible to compare outcomes between the two countries, which had different policy arrangements. The study concludes that in the supply constrained and unaffordable study area (Greater London), the Help to Buy scheme did little to stimulate additional housing supply, but did inflate housing prices. Meanwhile, there were no discernible price effects in the control study area, which suffered from much less serious supply and affordability problems, but a noticeable increasing in housing supply. The authors conclude, overall, that the policy promoted supply in the wrong places, and exacerbated affordability problems where they were already most acute.

The evidence for Australia is more mixed, even though the First Homeowner Grant (FHOG) scheme was first introduced in 2000 – nearly 25 years ago. It was originally as a cash grant of AUD $7,000, ostensibly to offset the impact of the newly implemented Goods and Services Tax (GST) on home buyers. It applied to both newly built and existing dwellings (Dungey, Wells, and Thompson, 2011). However, as Martin and Pawson (2024) note, the predecessor of this scheme actually dates back to 1965 and is arguably Australia's most prominent cash grant. In response to the Global Financial Crisis (GFC) in 2008, the grant was increased to $14,000 for an existing home purchase, and to $21,000 for purchase of a new-build dwelling. This boost to the scheme ran for a year before being scaled down in late 2009 to $10,500 for existing homes and $14,000 for a new build. By early 2010, it had reverted to its original $7,000 level. Since federal funding for the scheme ended in 2010, state and territory governments have continued the FHOG, focusing largely on newly built homes and with price caps, but without income restrictions. Grant amounts varied between $10,000 (NSW, Vic, and WA) and $30,000 (Tasmania) according to Martin and Pawson (2024).

While grants for first home buyers may have provided an incentive for purchasing homes, Milligan and Pinnegar (2010) criticised the policy for inflating demand and contributing to rising house prices without addressing structural issues including housing supply. Blight, Field, and Henriquez (2012) supported this critique, finding that the grant directly and indirectly raised median house prices in Australia between 2000 and 2010, with an estimated increase of $57,321 (or 18.8%). Similarly, Martin and Pawson (2024) analysed the introduction of the grant in 2000 through to more recent data and concluded that the grants have largely increased housing demand while also contributing to rising house prices (see also Lee and Reed, 2014).

Other studies have found that while the scheme can help first-time buyers overcome borrowing constraints (including down payments), it mainly brought forward or accelerated purchase decisions rather than significantly increasing overall homeownership rates (Day, 2019; Guest, 2005; Kupke and Rossini, 2014; Wood, Watson, and Flatau, 2006). Similarly, Martin and Pawson (2024) found that the grant benefited those already close to affording homes rather than extending access to a wider range of people further from the margins of home ownership. Some studies suggest that the schemes had a stronger effect on medium and high-density properties or affordable suburbs (Kupke and Rossini, 2011, 2014; Lee and Reed, 2014; Randolph, Pinnegar, and Tice, 2013). Furthermore, the majority of grants were used for purchasing existing homes rather than new construction (Kupke and Rossini, 2014; Randolph, Pinnegar, and Tice, 2013).

Yet, there are other studies that have shown the inflationary effects of demand side policies to be more debateable. For example, Bugden, Waschik, Fraser, and Racine (2016) analysed housing prices in Melbourne from 1992 to 2002. Their initial parametric analysis suggested that the FHOG influenced house prices by compensating buyers for GST-related price increases. Their more advanced nonparametric methods revealed no significant long-term impact of the FHOG on house prices, indicating that it primarily offset GST effects rather than driving substantial price increases. Similarly, Kupke and Rossini (2014) found that the influence of FHOG on housing prices is modest compared to fundamentals such as interest rates and mortgage availability. Others have pointed out that the FHOG has a limited impact on the housing market overall because demand tends to be stimulated only at the lower end of the market (Randolph, Pinnegar, and Tice, 2013).

More recently, policy interest has turned away from first homeowner grants, perhaps because their ability to influence the transition to first home ownership has diminished as housing affordability has deteriorated. There is a broad, but not universal, consensus in the literature that demand-side subsidies tend to become capitalised in housing prices. Yet, as property values have continued to escalate, this effect will most likely have weakened. The more recent policy debate concerns the idea that individuals' (and their households') cash savings for a home loan deposit could be augmented by allowing access to superannuation balances.

Demand-side policy interventions - that are not accompanied by commensurate measures to either increase supply or reduce demand from other cohorts – should be expected to increase prices. Yet, the empirical evidence in the research literature is somewhat thin, with most published studies having pursued relatively narrow or technical goals rather than setting the scene for assessing such a specific policy idea.

The goal of this report is to set out a robust methodology for estimating the possible housing market consequences of a change to policy settings that would permit the use of superannuation balances to provide a first home loan deposit.

There are essentially six parts to the methodology followed in this report, as follows:

- A review of the literature designed to identify time series economic or econometric models of the Australian housing system that have potential to reveal the price effects of a change to policy settings;
- Data collection and re-estimation of the preferred time series models identified by the first part of the work;
- Development of a behavioural econometric model which helps us understand the role played by factors such as demography, income, relationship status and cash savings in determining the decision by individuals to move into homeownership;
- A review of the number of Australian adult individuals not living independently, or living independently but not in home ownership. This is also accompanied by an analysis of the cash savings and superannuation balances of these individuals and households.
- A microsimulation in which a new policy scenario (allowing access to superannuation to contribute to a home loan deposit) can be analysed. Specifically, the impact on the number of new households entering home ownership flows from this microsimulation.
- Finally, a feedback loop to the time series model(s) in the second part of the methodology can be undertaken. By connecting the predicted number of new households entering home ownership to their borrowing requirements, the inflationary effect of the policy change on the housing market can be forecast.

2. Modelling the impact of home loan finance on the housing system

In this section we briefly review the literature to identify previously published models relevant to understanding the economics of the Australian housing market. We searched the literature systematically using several bibliographic databases including Google Scholar, Semantic Scholar, OpenAlex, Scopus, PubMed and Web of Science. This resulted in a long list of 4,921 references that appeared relevant to the key words 'housing demand', 'Australia' and 'model'. After reading each abstract, the list was narrowed to 46 references to articles that included at least one econometric model using Australian data. We further narrowed the search by including only articles with a high number of citations (60 or more) and at least one highly cited author (with an h-index of 30 or higher). In all, 12 articles were read in depth. This revealed that there are two common approaches used in terms of modelling the Australian housing market:

- Studies using OECD data that attempt to test either for common trends between OECD countries (Adams and Füss, 2010), or test for the existence or persistence of housing market bubbles (Caldera and Johansson, 2013);
- VAR or SVAR modelling approaches of the macroeconomy, but with an added housing system component (Fry et al, 2010).

The design and specification of the models from these studies varies depending both on the theoretical standpoint of the author(s) and the motivation for each study. For example, there are several studies that use OECD data to test for housing market bubbles. Evidence of accelerating divergence between housing prices and fundamental is often taken as evidence of bubbles. Other studies begin by assuming that bubbles are not present, and this permits the authors to examine the same data and test for similarities in housing market trends and behaviour between countries. For example, Adams and Füss (2010) found that the 15 OECD countries they studied could be categorised in two distinct groups that differ in terms of the housing market reaction to macroeconomic shocks. They also concluded that the housing system takes considerably longer than previously thought to fully adjust to economic shocks (up to 14 years in total).

The Adams and Füss (2010) modelling approach tests the relationship between housing prices and a small set of explanatory variables (economic activity, long run interest rates and construction costs). However, 'economic activity' is a composite variable created by running factor analysis and reducing larger set of variables (real money supply, real consumption, real industrial production, real GDP and employment).

The VAR / SVAR (vector autoregression and structural VAR) modelling approach is quite different conceptually and empirically from the reduced form or single equation method used in other studies of the housing system such as that demonstrated by Adams and Füss (2010). A clear and highly cited example is a study published by Fry et al (2010). VAR models exploit correlation and lead-lag relationships between time series economic variables and are estimated as an endogenous system. The value of every variable in the system in each period *t* is assumed to be a function of its own lagged values together with the contemporaneous and lagged values of all other variables in the system. VAR models are often very effective for the purpose of forecasting but are difficult to interpret given that they are empirical or atheoretical. SVAR models allow either short or long run constraints to be added to the relationships between variables. The constraints are guided by economic theory, so this effectively improves the theoretical rigour of the approach while retaining the empirical benefits of the VAR approach.

In our review of the literature, we also examined the more recently published Saunders and Tulip (2020) model of the Australian housing market. This is a more complex and carefully specified multi-equation system than the other models reviewed above. We noted that the model has since been used by the National Housing Supply and Affordability Council to forecast housing supply (National Housing Supply and Affordability Council, 2024), and it is well-suited for this purpose. However, given the focus of our study on the demand side of the housing system, we decided not to apply their methodology in this study.

3. Home loan deposit and the propensity to enter homeownership

In Australia, entering home ownership is hindered by three principal barriers: the high and escalating cost of housing, affordability constraints or loan serviceability criteria, and the requirement for a down payment. Policy settings that might permit non-homeowners to access or borrow funds from their superannuation balance would target the latter of these financial barriers. The effect of such a policy change would be to reduce the time taken for prospective homeowners to save for a deposit.

In this section of the report, we explore the potential implications for housing demand arising from such a policy change. The analysis is based on the Household Income and Labour Dynamics Australia (HILDA) survey. Specifically, we use waves 7 through 22 (which relate to calendar years 2007 through 2022). We estimate an econometric model designed to capture the factors affecting the probability of transitioning from being a 'non homeowner' to being a homeowner from one wave to another:

$$log\left(\frac{(P(y=1))}{1-P(y=1)}\right) = \beta_0 + \beta_1 X_1 + \cdots + \beta_m X_m + u_i + u_t \qquad (1)$$

Where, the βs are coefficients to be estimated and the Xs are explanatory variables. The u_i term is an error which is specific to the individual, while the u_t error term can be understood as a more generic error common to all observations in each time period. In a fixed effects model, the latter drops out and the unobservable pooled errors are absorbed into the u_i term.

The results of the econometric estimation are shown in table 1[1]. State level effects suggest that there are significant differences within Australia that are not readily explained by demographic factors, income or housing prices. The demographic variables show that individuals in a relationship, and particularly those 'acquiring' a partner between waves, have a higher propensity to enter home ownership. This is also true for individuals with children, and those with a long-term health problem. Income increases the propensity to

[1] In fact, these results are reproduced from past but recent research projects in which models of transition to homeownership were estimated for other policy applications

enter home ownership, as might be expected, but the negative coefficient on the squared income variable suggests that this effect levels off at higher income levels. In other words, there is a threshold effect with individuals becoming more likely to become homeowners are a certain income level, but the advantage of further income beyond this threshold drops away.

Housing prices are measured at the SA3 geographic level and attached to the individuals' data in the HILDA survey. This measure of housing costs therefore varies both over time and across space (by SA3). The variable is statistically significant and shows that in areas (or years) with higher housing prices, the propensity of individuals to become new homeowners is reduced. Perhaps the most important variable (from the perspective of this study) relates to the cash savings of the individual (and their partner, if they have one). This variable is strongly statistically significant, with a non-trivial coefficient. The results show that individuals who are not living independently, or households not living as homeowners, are much more likely to transition to home ownership when they have attained a cash deposit. The results show that the deposit needs to be at least equivalent to 10% of the median house price in the area in which they live. This is an important finding in the context of this study, because it is focused on the housing policy suggestion that allowing non-homeowners to 'create' a home loan deposit by accessing superannuation savings could ease access into first homeownership. The results of the HILDA model support the idea that this could be the case.

Table 1 A model of the propensity to transition into homeownership

Variable	Estimate	
Constant	-07412	***
Victoria	0.075156	***
Queensland	0.052195	
South Australia	0.087174	**
Western Australia	0.185427	***
Tasmania	0.020183	
Northern Territory	-0.23593	**
Australian Capital Territory	0.12585	*
De facto	-0.4963	***
Separated	-0.26752	***
Divorced	-0.19227	**
Widowed	-0.03072	
Never married	-0.96251	***
Has partner	0.360695	***
Acquired partner	0.530353	***
Became separated	0.100216	
Acquired first child	-0.02704	
Female	-0.0035	
Student	-0.71202	***
Children	0.124273	***

Long term health problem	0.184008	***
Real disposable income	1.85E-06	***
Real disposable income sq	-9.82E-13	***
Log real median house price	-0.15682	***
Had 10% deposit last year	0.412632	***
LR chi square	5417.55	***
N	100774	
Groups	16678	
Waves	16	

*Note: *** significant at 1% and ** significant at 5% levels*

We return to the HILDA model later in the report because it is central to the methodology for simulating the possible take-up of the option for non-homeowners to channel funds from their superannuation accounts to a home loan deposit. In the next two sections we examine time series models of the Australian housing market with a view to establishing a credible framework for simulating the impact of such a policy on housing prices.

4. A single equation approach to estimating house price elasticity to bank lending

In this section we examine the results of the first of two time series models of the Australian housing market. The first is based on the work by Adams and Füss (2010) which was referred to earlier in the report. The model is a dynamic ordinary least squares time series model (DOLS) and is estimated using data drawn from the OECD databank, the Australian Bureau of Statistics (ABS) and the Reserve Bank of Australia (RBA). One benefit of using the OECD data series is that variables are available from the mid-1970s, thus providing a longer time series than available using Australian data sources. The specification of the model assumes that the variables are cointegrated. Therefore, the first step in the analysis is to test for the presence of a unit root in the dependent and independent variables. The results of these tests are shown below, in table 2:

Table 2 Unit root test results

	Log real	**Log real differences**	**Log real differences (trend)**
House price index	-2.737	-4.995 ***	-4.972 ***
Real GDP	-2.491	-5.753 ***	-5.733 ***
Industrial production	-2.195	-5.791 ***	-5.807 ***
Money supply	-2.227	-3.885 **	-3.310 **
Employment	-3.132	-2.073	-2.279
Mortgage interest rates	-2.457	-5.560 ***	-5.569 ***
Long term interest rates	-3.320	-4.964 ***	-4.979 ***
Construction cost index	-2.929	-4.869 ***	-4.472 ***
Bank lending (OECD)	-1.089	-3.570 ***	-3.706 **
Bank lending (ABS)	-4.040	-3.033 **	-12.741 ***

Other than the interest rate variables (long term and mortgage rate), all the economic variables in the model are converted to real terms using the consumer price index and transformed to natural logarithms. The unit root tests show that we cannot reject the null hypothesis of a unit root for any of the variables in log levels. Apart from employment, we can reject the null hypothesis for all variables when we take log differences. This is true whether we specify a time trend in the unit root test, or not. Interestingly, employment continues to show evidence of a unit root even in log differences.

After converting the data to real terms, and taking a logarithmic transformation, there is a pronounced upward trend over time with respect to industrial production and housing prices (see figure 1).

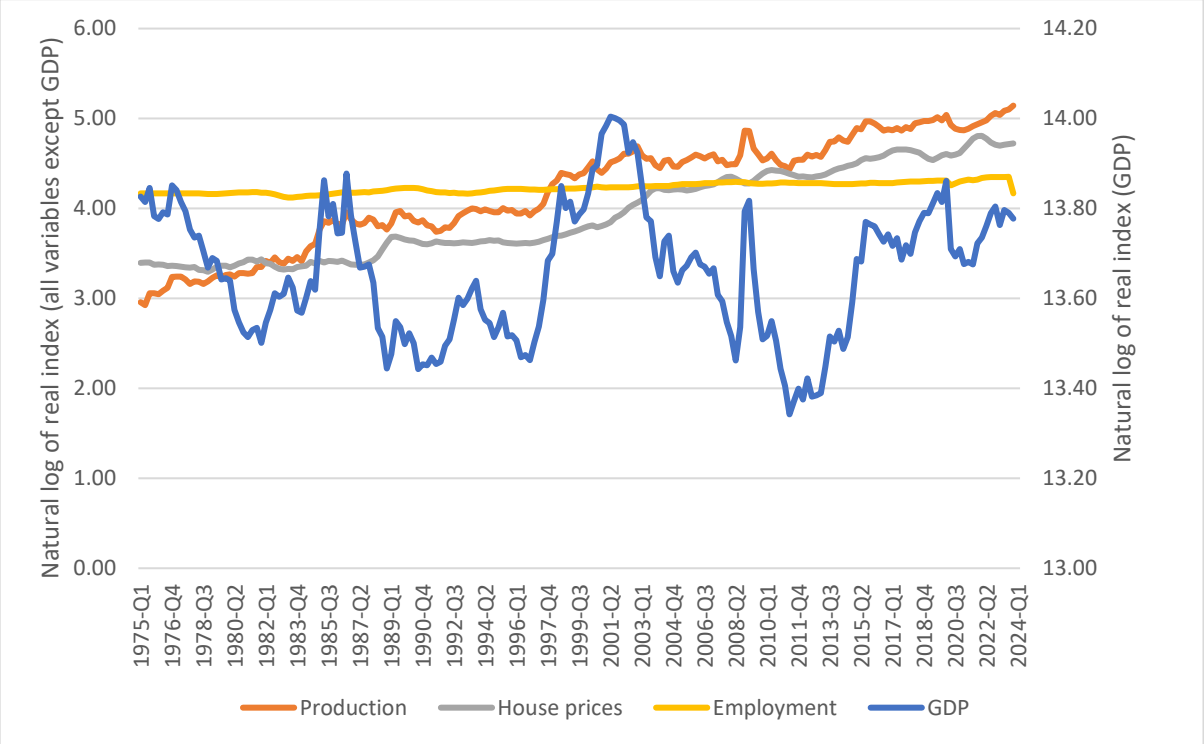


Figure 1 **Housing prices and key economic variables over time**

Figure 2 demonstrates the long run relationship between interest rates and housing prices. The end of a period of high interest rates between the late 1970s and early 1990s ushered in a long period of declining interest rates and persistent growth in housing prices in Australia. Over time, the significance of bank lending has increased in line with, but arguably at a higher level than, housing prices. This is shown in figure 3. This is at least suggestive that the volume of bank lending is a potentially important determinant of housing price change. Surprisingly, there are no published models of the Australian housing market that take account of this factor.

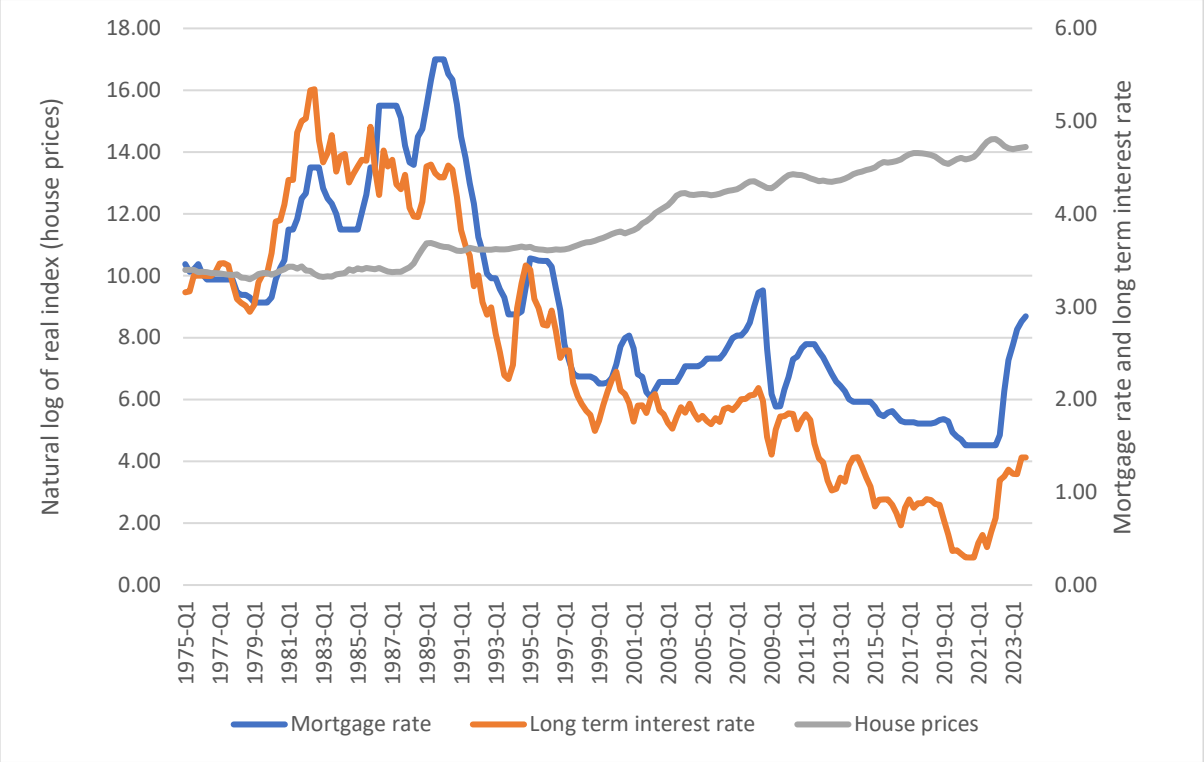


Figure 2 **Interest rates and Australian housing prices**

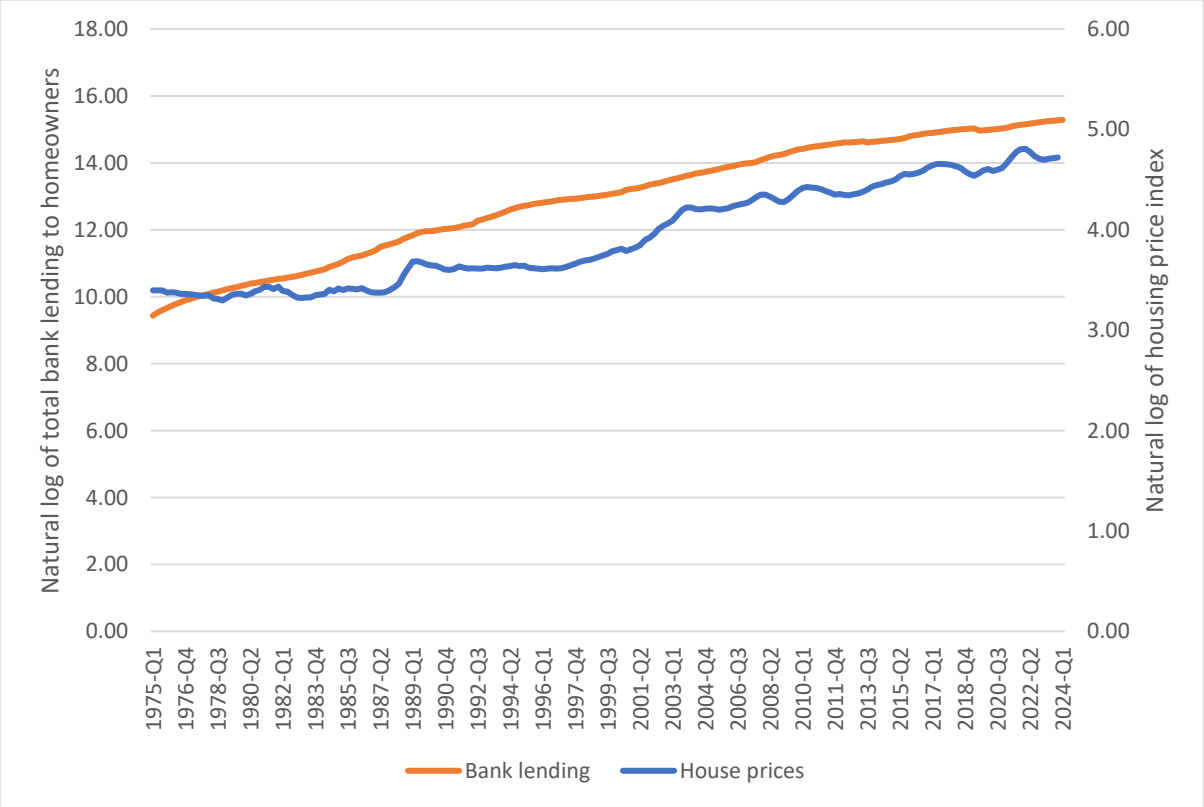


Figure 3 **Bank lending and housing prices**

Following the Adams and Füss (2010) methodology, we undertake principal component analysis on the main set of economic activity variables prior to the econometric estimation. This is done to reduce the risk of introducing multicollinearity – a statistical issue that can cause unreliable and/or difficult to interpret coefficients. The results of the analysis are shown in table 3. The results show that 94% of the variance (i.e. information) contained in

the five original, untransformed, variables can be explained by two uncorrelated principal components or factor scores. We can see that the first factor score loads heavily on industrial production, employment and money supply, and negatively on the long-term interest rate. The second factor score loads mainly on GDP.

Table 3 Principal component analysis results

Variable	Component 1	Component 2	Component 3	Component 4	Component 5
GDP	0.044	0.976	0.185	0.100	0.020
Industrial production	0.512	-0.091	0.124	0.270	0.801
Employment	0.498	-0.051	0.525	-0.664	-0.181
M3	0.507	-0.097	0.113	0.632	-0.567
Long term interest rate	-0.480	-0.162	0.814	0.277	0.069
Eigenvalue	3.670	1.034	0.183	0.084	0.030
Cumulative proportion of variance	0.734	0.941	0.977	0.994	1

The model estimation proceeds as follows (see the appendix for the full statistical results):

- First, the optimal lag structure is chosen. The information criteria suggest either 2 lags (quarters), or 6, depending on which information criteria are chosen. The empirical performance of the 6-lag model is superior, and so 6 quarterly lags are chosen.
- The appropriate rank of the vector error correction model (VECM) is chosen, using the identified lag structure. A model with 3 cointegrating equations is found to be optimal.
- The VECM is estimated. This reaffirms that the variables are cointegrated or share a long-run relationships. When variables deviate from the long-run relationship, short-run error correction processes revert the variables back to the long-run relationship.

From the results summarised in the appendix, we can see that the adjusted R squares of the short-run equations range from 0.29 (GDP) to 0.89 (investment). The adjusted R square for the house price equation is 0.69. The results show that with two quarterly lags, the elasticity of house price change with respect to change in the level of new bank lending is approximately 0.26. However, given the complexity of the model, and the many interactions between variables and equations in the system, it is not straightforward to use the elasticity directly in this case to form a judgement about the housing price effect of a change to bank lending. We return to this exercise later in the report.

5. Results from a VAR / SVAR approach

We now turn to the second time series model, which follows the methodology set out by Fry et al (2010). The Vector Autoregression (VAR) model regresses each variable in the system on its own lagged values together with lagged values of all other variables in the system (see Leishman and Goel, 2024, for a more detailed review of econometric methods in housing research). As noted earlier, VAR models often provide a high level of predictive accuracy and are therefore ideal for forecasting a small number of time periods into the future. However, one of the drawbacks of this approach is that interpreting the model coefficients can be difficult given that there are multiple equations and, often, numerous lags. However, there are accompanying methods that can be used to simulate the likely impact of a change in the value of a variable – or shock – on other variables in the system. We examine this later in the section.

As an initial step, we conducted Granger Causality tests (with 4 quarterly lags) on each pairwise combination of variables in the dataset. The data are sourced from the ABS and

RBA, as noted earlier. However, the GDP and bank lending variables in this dataset are sourced from the ABS rather than OECD. Given the limitations on availability of Australian data, this model is estimated using 2002 through 2024 data rather than the longer study period used in the first model (using OECD data). The results of the Granger Causality tests are shown in a simple summary form in table 4:

Table 4 Sequencing order of variables in the system

		GDP	Australian shares	Inflation	House prices	Bank lending	Interest rates	Housing investment
This variable Granger Causes the column variable	GDP							
	Australian shares			leads				
	Inflation						leads	
	House prices							leads
	Bank lending		leads		leads			
	Interest rates		leads					
	Housing investment			leads			leads	

Granger Causality tests work by regressing a variable on its past values (1 through 4 quarterly lags in this case) and on the past values of a different variable. If the latter is found to be significant then the test variable is said to 'Granger Cause' the first variable in the model. Although dubbed a test of causality, technically what is being tested is simply precedence or sequencing of shocks between variables, rather than causality itself. The results table, together with some inference based on economic theory, suggests that the variables in the system follow the following order:

- GDP
- Bank lending
- Housing investment
- Australian shares
- Inflation
- Interest rates

In other words, the logic of the model is that economic growth is the first variable to adjust when there is a shock to the system, such as an increase in demand arising from the global economy. This is then followed by an increase in bank lending, which would reflect an increase in housing demand caused by the increase in wider economic activity. New construction follows next, followed by a rise in performance in equity markets. Later in the cycle still, inflation responds to the demand shocks, and interest rates respond later still.

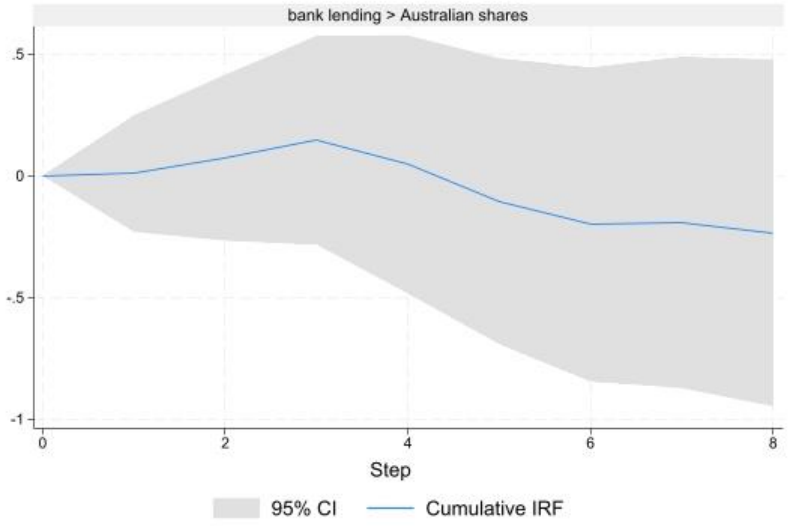
The Granger Causality tests, in addition to theoretical expectations, are important to the development of the model because the Fry et al (2010) methodology involves the estimation of a structural VAR (SVAR), which is a variant of the VAR approach in which some of either the short and/or long run parameters may be subject to constraints. For example, economic theory informs us that while interest rates may shock GDP in the short run, there should be no permanent or long run impact of a change in interest rates to economic output. We follow the Fry et al (2010) long run constraint matrix in its entirety but replace housing investment with bank lending. This permits us to model the relationship between bank lending and housing prices directly. None of the model parameters are constrained in the short run. The constraints matrix is summarised below:

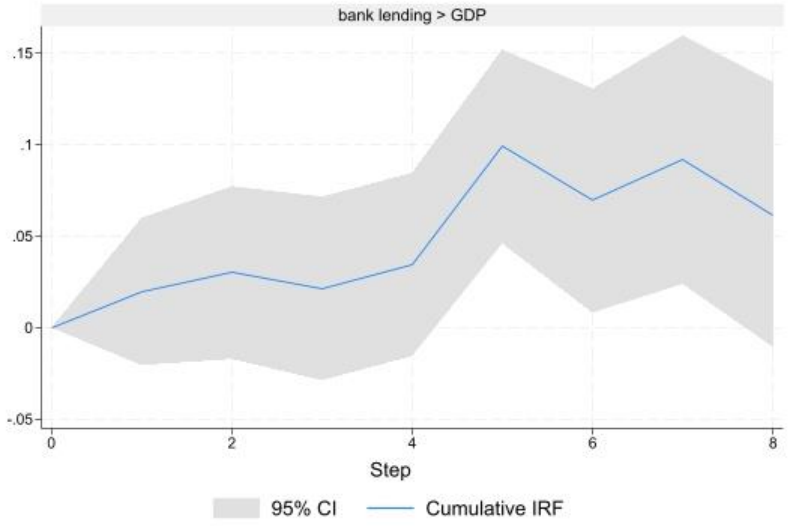
	GDP	Bank lending	House prices	Australian shares	Inflation	Interest rates
GDP	1	0	0	0	0	0
Bank lending	0	1	.	0	0	0
House prices	.	.	1	.	0	.
Australian shares	0	0	0	1	0	.
Inflation	0	.	.	0	1	.
Interest rates	0	0	0	0	0	1

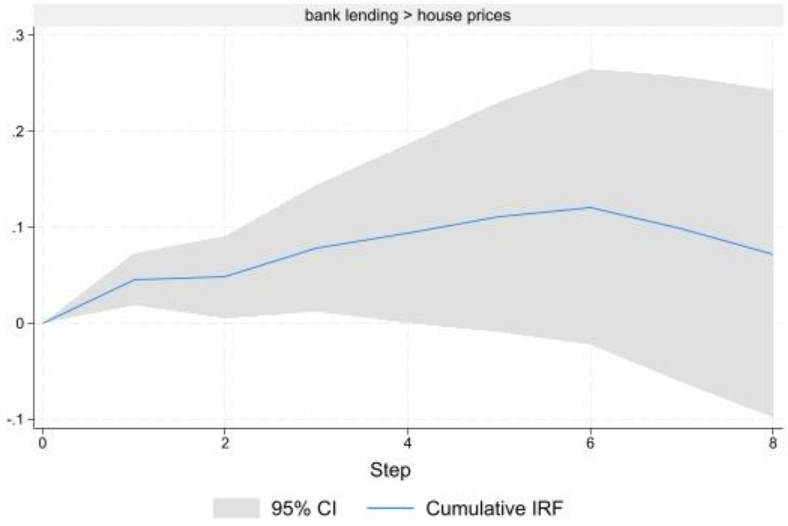
As in the case of the first model, we used the information criteria to choose the correct lag specification as is standard modelling practice. A choice of 1 through 6 quarterly lags minimised the Akaike Information Criterion (AIC) and likelihood ratio (LR). This specification also maximises the empirical performance of the house price equation in the system.

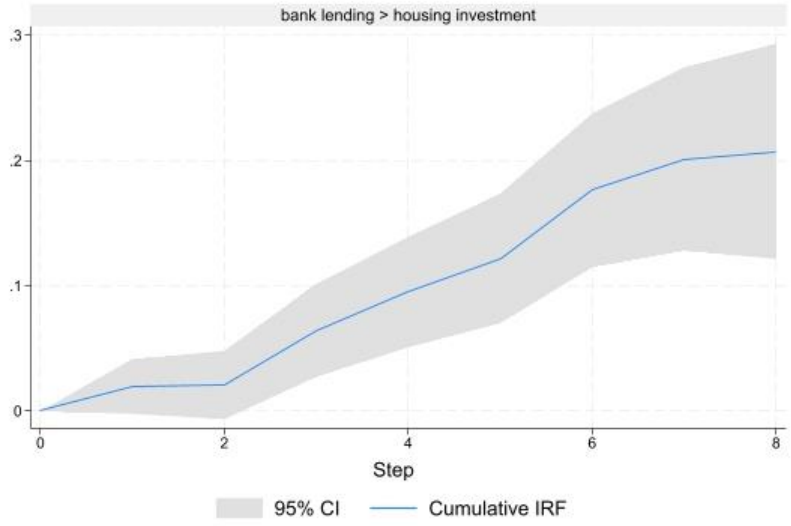
The full estimations results are shown in the appendix. The table of results is lengthy given that there are six equations, and six quarterly lags estimated first as a VAR, then a constrained SVAR model in line with the constraints matrix above. Given that the data are in log differences, the explanatory power of the equations is quite high, with adjusted R-square ranging between around 0.47 to 0.99. Of particular interest in the house price equation are the positive and statistically significant coefficients on the first, third, fourth and sixth lags of bank lending to owner occupiers. Given that the data are expressed in logarithms, these can be interpreted directly as an elasticity when summed (they sum to approximately 0.18. Therefore, a 10% increase in bank lending leads to an increase of approximately 1.8% in terms of housing prices.

Given that the six equations are estimated as a system, each variable and its respective lags have impacts on the dependent variables in all equations. The net effects of a change or shock can be demonstrated using impulse response functions (IRFs). The IRF shocks of a change to bank lending are summarised graphically below.


bank lending > Australian shares
.5
0
-.5
-1
0
2
4
6
8
Step
95% CI
Cumulative IRF


bank lending > GDP
.15
.1
.05
0
-.05
0
2
4
6
8
Step
95% CI
Cumulative IRF


bank lending > house prices
.3
.2
.1
0
-.1
0
2
4
6
8
Step
95% CI
Cumulative IRF


bank lending > housing investment
.3
.2
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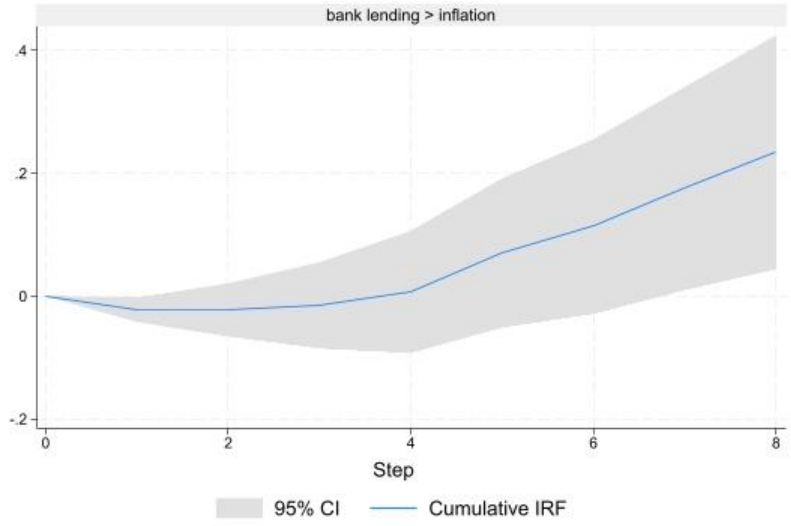
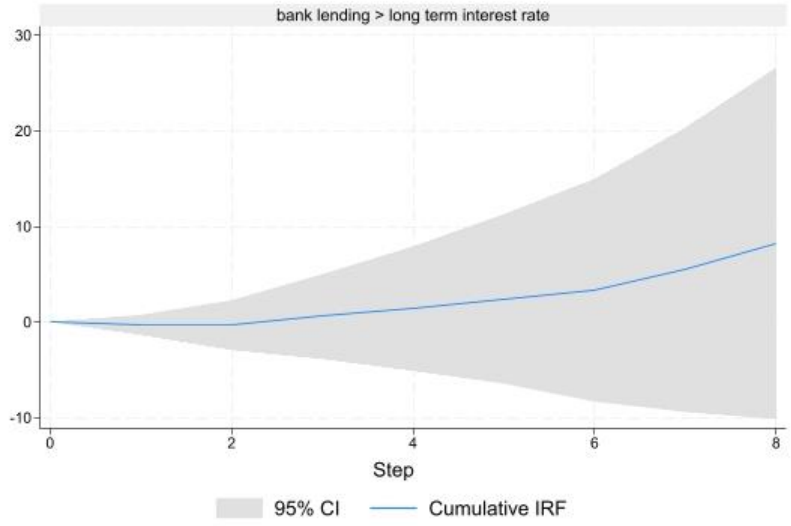
0
0
2
4
6
8
Step
95% CI
Cumulative IRF


bank lending > inflation
.4
.2
0
-.2
0
2
4
6
8
Step
95% CI
Cumulative IRF


bank lending > long term interest rate
30
20
10
0
-10
0
2
4
6
8
Step
95% CI
Cumulative IRF

The cumulative impulse response function for the bank lending to housing prices channel is summarised in table 5. The results suggest that a shock to lending initially has a muted effect initially, but gradually builds to 0.12 after 6 quarters before gradually declining. The elasticity cannot be compared directly to that derived from the first model estimation (Adams) given the fact that a different bank lending variable has been used. To estimate the impacts of a change to bank lending on housing prices we need to carry out a micro-simulation, as shown in the next section.

Table 5 Cumulative impulse response function of bank lending on housing prices

Step	CIRF
0	0
1	0.046
2	0.048
3	0.078
4	0.093
5	0.110
6	0.121
7	0.098
8	0.072

6. Microsimulation: what would super for home loan deposits do to housing prices?

In this section, the results of three models are brought together to generate a view on the possible housing market effect of a change to policy that would permit superannuation to be used as a home loan deposit. The methodology is as follows:

- Use wave 22 of HILDA to estimate how many adults and households have the potential to become homeowners, consisting of:
  - Existing heads of household who are not in homeownership
  - Adults who are not heads of household, and their partner (if they have one) is also not head of household, i.e. people living with parents or sharing housing
  - People / households who do not currently have cash savings equivalent to a 10% home loan deposit
  - People / households who do currently have combined superannuation balance equivalent to a 10% home loan deposit (note that the amount required for a 10% deposit is calculated with respect to both the lower quartile and median price in the SA3 geography in which the individual lived in 2022).
- The HILDA model shown in section 3 is then used to predict how many new homeowners there would have been in 2022 if the 10% deposit have been available to them as cash savings rather than a superannuation balance.
- In line with current policy proposals, we assume that the maximum amount that an individual could withdraw from their superannuation balance is the lower of $50,000 or 40% of the total balance.
- Where an individual in HILDA is flagged as having a spouse, the same rules are used to assess the maximum amount that could be withdrawn to add to the combined savings of both individuals.

Using HILDA together with its self-contained population weights, the predicted number of new homeowners in 2022 is:

- 148,500 (if they were to purchase at the lower quartile house price)
- 130,000 (if they purchased at the median price)

By assuming that each new homeowner borrows 90% of the purchase price, this implies additional bank lending of:

- $90,400 Million (if they were to purchase at the lower quartile)
- $99,000 Million (if they were to purchase at the median house price)

Our choice of an assumed 90% loan to value ratio is justified by data analysis published by the RBA (Alfonzetti, 2022) which shows that the bulk of first homeowner LTVs are clustered around the 80-85% and the 90%+ ranges, with the latter slightly higher. Given that the policy proposal examined in this study targets individuals and their households without sufficient savings for a home loan deposit, the choice of 90% LTV for the simulation seems intuitive.

The remainder of the methodology feeds the microsimulation results into the two time series models (based on Adams and Füss, 2010, and , 2010) respectively. The models are estimated using data to the end of 2023. To carry out the simulation, bank lending is assumed to increase from the beginning of 2022 and to persist at that higher level until the end of 2023 (model 1). For model 2, the increase in lending is assumed to take place gradually (because the explanatory variable is in log differences). The increase in lending is therefore converted to a quarterly growth rate and spread over the period 2022 through 2023. The predicted increase in housing prices that arises is:

Method / House Price	Lower quartile	Median
Adams and Füss	10.0%	10.3%
Fry et al	7.4%	8.1%

In addition to the results summarised above, additional scenarios were simulated but have not been reported here. For example, ABS lending statistics were examined and used as the basis for assuming aggregate new loan amounts for new homeowners. The results were similar to those produced by our own assumptions. One advantage of the latter is that the assumptions are directly linked to observable housing prices (at either the lower quartile or median) survey respondents' area of residence. The closeness of estimates when comparing the lower quartile and median house price assumptions also reflects that there are counteracting effects when we choose one house price measure over the other. Assuming the median, for example, increases the average loan amount but reduces the number of individuals able to purchase.

Concluding remarks

The analysis in this report follows the most robust and highly cited approaches identified through a staged search of the international literature. The Household Income and Labour Dynamics (HILDA[2]) survey is perhaps Australia's most heavily used datasets in housing research, having been cited by hundreds of academic and government sponsored studies. Macro-econometric models of the housing market are, by comparison, less well developed in Australia. The literature analysis identified two leading models that had potential for predicting demand side shocks, such as an increase in bank lending, on the housing market. The analysis reported here confirms that the updated and re-estimated versions of these models have a strong empirical or predictive performance.

In economics, it would be uncontroversial to predict that an increase in demand arising from a policy shift will increase market prices unless accompanied by either (i) a corresponding increase in supply, or (ii) another policy change which leads to a reduction in demand elsewhere in the system. For example, a policy designed to increase demand from prospective first homeowners could potentially be neutral if accompanied by another policy that reduced demand from existing homeowners or investors.

This study set out to estimate what the housing market effect would be if a policy change led to an increase in housing demand, but without corresponding supply side or demand reduction interventions.

By using the HILDA model together with the survey's population weights, we estimated that in the first year of the policy between 130,000 and 148,500 additional individuals could have brought forward their first home purchases, had they been permitted to withdraw the equivalent of a 10% deposit from their superannuation balance. We calculated the implied increase to new bank lending to homeowners based on this estimate and traced this number through to the subsequent models.

We used two different models of the Australian housing market which each had a different source of house price data and estimation approach. Interestingly, we found that the shorter time series (from the early 2000s to present) using Australian data predicts a smaller housing price effect (around 7 to 8%). The longer time series (from 1970s) using OECD house price data predicts around 10%. The difference between estimates from the two approaches may reflect measurement differences between the sources of house price data. Alternatively, the results might suggest that the importance of bank lending to housing price growth has weakened over time. Further research would be needed to explore this idea.

Significantly from the perspective of this study, the very close range of estimates despite different data and methodologies increases our confidence in concluding that the proposal to allow superannuation savings to promote additional housing demand – would be inflationary.

[2] For full details on the survey design please see Watson and Wooden (2012)

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Appendix – full VECM and VAR estimation results

VECM results (Adams and Fuess)

Lag selection criteria

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-199.129				3.70E-07	2.21761	2.25994	2.32206
1	1985.92	4370.1	36	0	3.00E-17	-21.0153	-20.719	-20.2842
2	2181.69	391.54	36	0	5.4e-18	-22.7426	-22.1923	-21.3848
3	2203.74	44.11	36	0.166	6.20E-18	-22.5918	-21.7876	-20.6074
4	2232.6	57.708	36	0.012	6.80E-18	-22.5146	-21.4564	-19.9035
5	2258.63	52.072	36	0.041	7.60E-18	-22.4069	-21.0947	-19.1691
6	2315.52	113.76	36	0	6.20E-18	-22.6326	-21.0664	-18.7682
7	2346.4	61.763	36	0.005	6.60E-18	-22.5773	-20.7571	-18.0862
8	2369.88	46.959	36	0.104	7.80E-18	-22.4419	-20.3678	-17.3242

Cointegration rank selection

Maximum rank	Parameters	LL	Eigenvalue	Trace statistic	Critical value (5%)
0	222	2290.813	.	153.6645	114.9
1	234	2316.356	0.24017	102.5788	87.31
2	244	2333.477	0.16814	68.3371	62.99
3	252	2347.405	0.1391	40.4796	42.44
4	258	2355.307	0.08145	24.6769	25.32
5	262	2362.329	0.07273	10.6321	12.25
6	264	2367.645	0.05556		

Short run results

Equation	RMSE	R-sq	chi2	P>chi2
House prices	0.014195	0.6904	323.4156	***
Economic activity	0.131319	0.4002	96.7549	***
GDP	0.313008	0.2926	59.98796	**
Investment	0.005635	0.8908	1183.085	***
Mortgage rate	0.035373	0.6054	222.4401	***
New lending	0.013676	0.7809	516.8116	***

	Coefficient	Std. err.	z	P>z
House prices				
_ce1				
L1.	-0.0734626	0.017	-4.32	0
_ce2				
L1.	0.0166428	0.0082983	2.01	0.045
_ce3				
L1.	0.0031279	0.0019124	1.64	0.102
House prices				
LD.	0.5782243	0.07915	7.31	0
L2D.	0.2758879	0.0849684	3.25	0.001
L3D.	-0.327135	0.0886626	-3.69	0
L4D.	-0.078147	0.0891296	-0.88	0.381
L5D.	0.3583227	0.0872159	4.11	0
L6D.	-0.1278072	0.0827185	-1.55	0.122
Economic activity				
LD.	-0.0121543	0.0146785	-0.83	0.408
L2D.	0.0197008	0.0147465	1.34	0.182
L3D.	-0.0180303	0.0147471	-1.22	0.221
L4D.	-0.0204769	0.0140488	-1.46	0.145
L5D.	-0.0137739	0.0138512	-0.99	0.32
L6D.	-0.0241929	0.0134734	-1.8	0.073
GDP				
LD.	-0.0105939	0.0041236	-2.57	0.01
L2D.	-0.0000873	0.004208	-0.02	0.983
L3D.	-0.0031395	0.0040599	-0.77	0.439
L4D.	-0.0016776	0.0040387	-0.42	0.678
L5D.	0.0063818	0.0040006	1.6	0.111
L6D.	-0.0052283	0.0039686	-1.32	0.188
Investment				

LD.	0.206252	0.2089147	0.99	0.324
L2D.	-0.4123677	0.2239989	-1.84	0.066
L3D.	0.4745483	0.2216079	2.14	0.032
L4D.	-0.2348208	0.2266505	-1.04	0.3
L5D.	0.5320548	0.2183308	2.44	0.015
L6D.	-0.0942602	0.1994434	-0.47	0.636
Mortgage rate				
LD.	-0.0752474	0.0341248	-2.21	0.027
L2D.	-0.0727147	0.0389357	-1.87	0.062
L3D.	0.03421	0.0396019	0.86	0.388
L4D.	-0.0204772	0.0379598	-0.54	0.59
L5D.	-0.0937274	0.0375245	-2.5	0.012
L6D.	0.0176083	0.0390116	0.45	0.652
Bank lending				
LD.	-0.0790521	0.0919725	-0.86	0.39
L2D.	0.2594586	0.1011533	2.57	0.01
L3D.	-0.0813418	0.104797	-0.78	0.438
L4D.	-0.0287796	0.1073858	-0.27	0.789
L5D.	-0.0577893	0.1081858	-0.53	0.593
L6D.	0.0506246	0.0957362	0.53	0.597
_cons	0.0226514	0.0056794	3.99	0
Economic activity				
_ce1				
L1.	0.1781097	0.1572686	1.13	0.257
_ce2				
L1.	-0.1185006	0.0767685	-1.54	0.123
_ce3				
L1.	0.0330653	0.0176915	1.87	0.062
House prices				
LD.	-0.503717	0.7322246	-0.69	0.491

L2D.	-0.2152341	0.7860509	-0.27	0.784
L3D.	-1.051295	0.8202264	-1.28	0.2
L4D.	-0.6875023	0.8245464	-0.83	0.404
L5D.	1.276191	0.8068429	1.58	0.114
L6D.	0.3755441	0.7652369	0.49	0.624
Economic activity				
LD.	0.1099551	0.1357927	0.81	0.418
L2D.	0.1586119	0.1364211	1.16	0.245
L3D.	0.1832423	0.1364269	1.34	0.179
L4D.	0.1067755	0.1299669	0.82	0.411
L5D.	0.0002379	0.1281385	0	0.999
L6D.	0.2530729	0.1246434	2.03	0.042
GDP				
LD.	-0.0226104	0.0381482	-0.59	0.553
L2D.	-0.0523802	0.038929	-1.35	0.178
L3D.	0.0072972	0.0375586	0.19	0.846
L4D.	0.0162027	0.0373626	0.43	0.665
L5D.	-0.0581674	0.0370103	-1.57	0.116
L6D.	-0.0560896	0.0367141	-1.53	0.127
Investment				
LD.	3.04787	1.93269	1.58	0.115
L2D.	1.227327	2.072236	0.59	0.554
L3D.	-2.916787	2.050116	-1.42	0.155
L4D.	-0.3726275	2.096765	-0.18	0.859
L5D.	-0.3593799	2.0198	-0.18	0.859
L6D.	-1.529889	1.84507	-0.83	0.407
Mortgage rate				
LD.	0.1478026	0.3156918	0.47	0.64
L2D.	-0.2066311	0.3601983	-0.57	0.566
L3D.	0.3237552	0.366361	0.88	0.377
L4D.	-0.4155375	0.3511694	-1.18	0.237
L5D.	-1.807896	0.347143	-5.21	0
L6D.	0.304384	0.3609002	0.84	0.399

Bank lending				
LD.	0.6185777	0.8508469	0.73	0.467
L2D.	-1.21241	0.9357787	-1.3	0.195
L3D.	1.024425	0.9694867	1.06	0.291
L4D.	-1.311105	0.9934366	-1.32	0.187
L5D.	-0.5654008	1.000838	-0.56	0.572
L6D.	-0.0677432	0.8856652	-0.08	0.939
_cons	-0.0086916	0.0525403	-0.17	0.869
GDP				
_ce1				
L1.	0.3654829	0.3748603	0.97	0.33
_ce2				
L1.	-0.1658252	0.182983	-0.91	0.365
_ce3				
L1.	-0.0147952	0.0421688	-0.35	0.726
House prices				
LD.	-2.279326	1.745307	-1.31	0.192
L2D.	-1.813182	1.873606	-0.97	0.333
L3D.	1.544797	1.955065	0.79	0.429
L4D.	-0.9322077	1.965362	-0.47	0.635
L5D.	-0.8460979	1.923165	-0.44	0.66
L6D.	0.1254184	1.823994	0.07	0.945
Economic activity				
LD.	0.0072516	0.323671	0.02	0.982
L2D.	0.1861097	0.3251689	0.57	0.567
L3D.	0.5744435	0.3251828	1.77	0.077
L4D.	0.1095114	0.3097849	0.35	0.724
L5D.	0.1312843	0.3054268	0.43	0.667
L6D.	-0.2333848	0.297096	-0.79	0.432
GDP				

LD.	0.144672	0.0909289	1.59	0.112
L2D.	-0.0983303	0.09279	-1.06	0.289
L3D.	0.0543844	0.0895235	0.61	0.544
L4D.	-0.0502791	0.0890563	-0.56	0.572
L5D.	0.0473175	0.0882166	0.54	0.592
L6D.	0.0116537	0.0875107	0.13	0.894
Investment				
LD.	1.073073	4.606699	0.23	0.816
L2D.	4.023976	4.939315	0.81	0.415
L3D.	-6.867358	4.88659	-1.41	0.16
L4D.	3.749292	4.997783	0.75	0.453
L5D.	-2.48692	4.81433	-0.52	0.605
L6D.	-2.262216	4.397851	-0.51	0.607
Mortgage rate				
LD.	0.8438524	0.7524729	1.12	0.262
L2D.	0.5216469	0.8585572	0.61	0.543
L3D.	0.6204699	0.8732463	0.71	0.477
L4D.	-0.6548908	0.8370363	-0.78	0.434
L5D.	-0.1678381	0.827439	-0.2	0.839
L6D.	-0.1469738	0.8602302	-0.17	0.864
Bank lending				
LD.	0.8179609	2.028052	0.4	0.687
L2D.	-1.714464	2.230492	-0.77	0.442
L3D.	3.010492	2.310838	1.3	0.193
L4D.	1.335455	2.367924	0.56	0.573
L5D.	-1.128967	2.385565	-0.47	0.636
L6D.	-7.794607	2.111043	-3.69	0
_cons	0.0083116	0.1252334	0.07	0.947
Investment				
_ce1				
L1.	-0.0048499	0.0067486	-0.72	0.472

_ce2				
L1.	0.0151016	0.0032943	4.58	0
_ce3				
L1.	-0.0026026	0.0007592	-3.43	0.001
House prices				
LD.	0.0433506	0.0314209	1.38	0.168
L2D.	0.0195532	0.0337306	0.58	0.562
L3D.	0.0440639	0.0351972	1.25	0.211
L4D.	0.0106289	0.0353825	0.3	0.764
L5D.	-0.0034867	0.0346228	-0.1	0.92
L6D.	-0.0127272	0.0328375	-0.39	0.698
Economic activity				
LD.	-0.0128951	0.0058271	-2.21	0.027
L2D.	-0.0089343	0.005854	-1.53	0.127
L3D.	-0.0087605	0.0058543	-1.5	0.135
L4D.	-0.0116859	0.0055771	-2.1	0.036
L5D.	-0.0126581	0.0054986	-2.3	0.021
L6D.	-0.0066666	0.0053486	-1.25	0.213
GDP				
LD.	0.0037278	0.001637	2.28	0.023
L2D.	-0.0005039	0.0016705	-0.3	0.763
L3D.	0.0006577	0.0016117	0.41	0.683
L4D.	0.001362	0.0016033	0.85	0.396
L5D.	-0.0002699	0.0015882	-0.17	0.865
L6D.	0.0013843	0.0015755	0.88	0.38
Investment				
LD.	0.5159099	0.0829347	6.22	0
L2D.	0.0148925	0.0889228	0.17	0.867
L3D.	-0.0904162	0.0879736	-1.03	0.304
L4D.	0.1904261	0.0899754	2.12	0.034
L5D.	-0.2494141	0.0866727	-2.88	0.004
L6D.	-0.0513238	0.0791748	-0.65	0.517

Mortgage rate				
LD.	0.0074558	0.0135468	0.55	0.582
L2D.	0.022532	0.0154567	1.46	0.145
L3D.	-0.0101445	0.0157211	-0.65	0.519
L4D.	0.0022435	0.0150692	0.15	0.882
L5D.	0.0156938	0.0148964	1.05	0.292
L6D.	0.0295599	0.0154868	1.91	0.056
Bank lending				
LD.	-0.025783	0.0365111	-0.71	0.48
L2D.	0.0722594	0.0401557	1.8	0.072
L3D.	0.057925	0.0416021	1.39	0.164
L4D.	0.0821982	0.0426299	1.93	0.054
L5D.	0.051242	0.0429475	1.19	0.233
L6D.	-0.0000765	0.0380052	0	0.998
_cons	0.0061983	0.0022546	2.75	0.006
Mortgage rate				
_ce1				
L1.	-0.0102854	0.0423631	-0.24	0.808
_ce2				
L1.	0.0057826	0.020679	0.28	0.78
_ce3				
L1.	-0.0107699	0.0047655	-2.26	0.024
House prices				
LD.	-0.1204285	0.1972377	-0.61	0.541
L2D.	0.433607	0.2117367	2.05	0.041
L3D.	0.3013387	0.2209425	1.36	0.173
L4D.	-0.384317	0.2221062	-1.73	0.084
L5D.	0.4253935	0.2173374	1.96	0.05
L6D.	-0.1429842	0.2061301	-0.69	0.488
Economic activity				

LD.	-0.0475228	0.0365782	-1.3	0.194
L2D.	0.0081796	0.0367474	0.22	0.824
L3D.	-0.0359525	0.036749	-0.98	0.328
L4D.	0.0038043	0.0350089	0.11	0.913
L5D.	-0.0061255	0.0345164	-0.18	0.859
L6D.	-0.0228308	0.0335749	-0.68	0.497
GDP				
LD.	-0.018821	0.0102759	-1.83	0.067
L2D.	0.0086116	0.0104862	0.82	0.412
L3D.	0.0043261	0.0101171	0.43	0.669
L4D.	0.0130207	0.0100643	1.29	0.196
L5D.	0.0069528	0.0099694	0.7	0.486
L6D.	0.003847	0.0098896	0.39	0.697
Investment				
LD.	-0.027085	0.5206043	-0.05	0.959
L2D.	0.5144066	0.5581933	0.92	0.357
L3D.	0.0900801	0.552235	0.16	0.87
L4D.	0.1146525	0.5648009	0.2	0.839
L5D.	1.119161	0.5440688	2.06	0.04
L6D.	-0.2859661	0.4970023	-0.58	0.565
Mortgage rate				
LD.	0.5137349	0.0850372	6.04	0
L2D.	0.0280181	0.0970258	0.29	0.773
L3D.	-0.0637186	0.0986858	-0.65	0.518
L4D.	0.094743	0.0945937	1	0.317
L5D.	-0.0642651	0.0935091	-0.69	0.492
L6D.	0.0398551	0.0972149	0.41	0.682
Bank lending				
LD.	0.0928827	0.2291907	0.41	0.685
L2D.	-0.3430752	0.2520686	-1.36	0.174
L3D.	0.3267204	0.2611484	1.25	0.211
L4D.	0.0412007	0.2675997	0.15	0.878
L5D.	0.1670259	0.2695933	0.62	0.536

L6D.	0.36163	0.2385696	1.52	0.13
_cons	-0.0340711	0.0141527	-2.41	0.016
Bank lending				
_ce1				
L1.	0.0411216	0.0163782	2.51	0.012
_ce2				
L1.	-0.0210473	0.0079948	-2.63	0.008
_ce3				
L1.	0.0031823	0.0018424	1.73	0.084
House prices				
LD.	0.1344919	0.0762552	1.76	0.078
L2D.	-0.0625404	0.0818608	-0.76	0.445
L3D.	-0.0059524	0.0854199	-0.07	0.944
L4D.	0.0522241	0.0858698	0.61	0.543
L5D.	-0.0692933	0.0840261	-0.82	0.41
L6D.	-0.0393825	0.0796932	-0.49	0.621
Economic activity				
LD.	0.0197493	0.0141417	1.4	0.163
L2D.	0.0077978	0.0142071	0.55	0.583
L3D.	0.0097629	0.0142077	0.69	0.492
L4D.	0.007064	0.013535	0.52	0.602
L5D.	0.0011919	0.0133446	0.09	0.929
L6D.	0.0049811	0.0129806	0.38	0.701
fs_gdp				
LD.	-0.0034708	0.0039728	-0.87	0.382
L2D.	0.000718	0.0040541	0.18	0.859
L3D.	0.0008469	0.0039114	0.22	0.829
L4D.	-0.0008845	0.003891	-0.23	0.82
L5D.	0.0029684	0.0038543	0.77	0.441
L6D.	-0.0000511	0.0038235	-0.01	0.989

Investment				
LD.	0.0259478	0.2012739	0.13	0.897
L2D.	0.1501453	0.2158064	0.7	0.487
L3D.	-0.0853807	0.2135028	-0.4	0.689
L4D.	0.0218197	0.218361	0.1	0.92
L5D.	0.0249792	0.2103456	0.12	0.905
L6D.	-0.089153	0.192149	-0.46	0.643
Mortgage rate				
LD.	-0.066403	0.0328767	-2.02	0.043
L2D.	-0.0122186	0.0375117	-0.33	0.745
L3D.	-0.002803	0.0381535	-0.07	0.941
L4D.	0.0019794	0.0365714	0.05	0.957
L5D.	-0.001484	0.0361521	-0.04	0.967
L6D.	-0.0261771	0.0375848	-0.7	0.486
Bank lending				
LD.	0.4749942	0.0886087	5.36	0
L2D.	-0.1110998	0.0974537	-1.14	0.254
L3D.	-0.0187962	0.1009641	-0.19	0.852
L4D.	0.1200679	0.1034583	1.16	0.246
L5D.	-0.0211925	0.1042291	-0.2	0.839
L6D.	-0.0480519	0.0922348	-0.52	0.602
_cons	-0.0035508	0.0054716	-0.65	0.516

Long run results

beta	Coefficient	Std. err.	z	P>z
ce1				
House prices	1	.	.	.
Economic activity	2.78E-17	.	.	.
GDP	-6.94E-18	.	.	.
Investment	-0.161	0.219501	-0.73	0.463
Mortgage rate	0.245906	0.177063	1.39	0.165
New lending	-0.40381	0.120962	-3.34	0.001
Constant	-2.712	.	.	.
ce2				
House prices	0	(omitted)		
Economic activity	1	.	.	.
GDP	-2.78E-17	.	.	.
Investment	-0.99648	0.53611	-1.86	0.063
Mortgage rate	0.951792	0.432461	2.2	0.028
New lending	-1.21713	0.295439	-4.12	0
Constant	4.263233	.	.	.
ce3				
House prices	0	(omitted)		
Economic activity	0	(omitted)		
GDP	1	.	.	.
Investment	-5.55784	1.938548	-2.87	0.004
Mortgage rate	7.632173	1.563758	4.88	0
New lending	3.415549	1.068293	3.2	0.001
Constant	-1.24052	.	.	.

SVAR results (Fry et al model)

Information criteria

Lag	LL	LR	p	FPE	AIC	HQIC	SBIC
1	1306.91	.	49	.	1.10E-22	-30.6806	-30.1032
2	1391.42	169.03	49	0	4.80E-23	-31.5469	-30.3921
3	1467.35	151.86	49	0	2.60E-23	-32.2037	-30.4715
4	1524.21	113.72	49	0	2.50E-23	-32.3953	-30.0857
5	1603.73	159.04	49	0	1.40E-23	-33.1397	-30.2527
6	1657.29	107.12*	49	0	1.80E-23	-33.2509*	-29.7865

Model fit

Equation	Parameters	RMSE	R-sq	chi2	P>chi2
GDP	43	.010545	0.6494	151.878	0.0000
Lending	43	.054554	0.8972	715.594	0.0000
House prices	43	.007105	0.8690	544.153	0.0000
Investment	43	.005733	0.8073	343.527	0.0000
Australian shares	43	.06319	0.4704	72.848	0.0022
Inflation	43	.005148	0.9383	1246.808	0.0000
Long term interest rate	43	.267628	0.9917	9840.053	0.0000
Sample	2002q1 through 2024q3				
N	82				
AIC	-33.57851				
HQIC	-30.03163				
SBIC	-24.74409				

Full set of coefficients

	Coefficient	Std. err.	z	P>z
Equation: house prices				
Variable: house prices				
L1.	0.457703	0.122467	3.74	0
L2.	0.545388	0.150008	3.64	0
L3.	-0.12309	0.1514	-0.81	0.416
L4.	-0.44588	0.152104	-2.93	0.003
L5.	0.406932	0.16564	2.46	0.014
L6.	-0.16128	0.119761	-1.35	0.178
Variable: GDP				
L1.	-0.06412	0.077837	-0.82	0.41
L2.	0.065394	0.077722	0.84	0.4
L3.	0.012367	0.08399	0.15	0.883
L4.	0.141826	0.093803	1.51	0.131
L5.	0.063352	0.094855	0.67	0.504
L6.	-0.01519	0.076915	-0.2	0.843
Variable: bank lending				
L1.	0.045767	0.013735	3.33	0.001
L2.	-0.00491	0.011214	-0.44	0.661
L3.	0.029896	0.010354	2.89	0.004
L4.	0.055631	0.012421	4.48	0
L5.	0.014761	0.012282	1.2	0.229
L6.	0.054322	0.012981	4.18	0
Variable: housing investment				
L1.	-0.76259	0.188178	-4.05	0
L2.	-0.12018	0.177596	-0.68	0.499
L3.	-0.21085	0.174177	-1.21	0.226
L4.	0.33723	0.167876	2.01	0.045
L5.	0.119245	0.167136	0.71	0.476
L6.	-0.3598	0.184934	-1.95	0.052

Variable: Australian shares				
L1.	0.000592	0.01295	0.05	0.964
L2.	0.028069	0.015244	1.84	0.066
L3.	0.004096	0.017255	0.24	0.812
L4.	-0.00078	0.017474	-0.04	0.964
L5.	-0.05197	0.017595	-2.95	0.003
L6.	-0.05709	0.015411	-3.7	0
Variable: inflation				
L1.	-0.42192	0.199771	-2.11	0.035
L2.	1.195527	0.36231	3.3	0.001
L3.	-0.50112	0.272551	-1.84	0.066
L4.	-0.15873	0.218489	-0.73	0.468
L5.	0.186207	0.213422	0.87	0.383
L6.	-0.14994	0.150003	-1	0.318
Variable: long term interest rate				
L1.	-0.00104	0.00318	-0.33	0.743
L2.	-0.00325	0.004917	-0.66	0.509
L3.	0.000769	0.005634	0.14	0.891
L4.	0.004232	0.005336	0.79	0.428
L5.	0.00833	0.004854	1.72	0.086
L6.	-0.00964	0.002924	-3.3	0.001
_cons	-0.0005	0.00314	-0.16	0.874
Equation: GDP				
Variable: house prices				
L1.	0.043404	0.181764	0.24	0.811
L2.	-0.22667	0.222639	-1.02	0.309
L3.	0.038162	0.224705	0.17	0.865
L4.	0.291528	0.225749	1.29	0.197
L5.	-0.51361	0.245839	-2.09	0.037
L6.	0.306766	0.177747	1.73	0.084
Variable: GDP				
L1.	-0.24169	0.115524	-2.09	0.036

L2.	-0.30061	0.115354	-2.61	0.009
L3.	-0.45755	0.124657	-3.67	0
L4.	-0.21521	0.139221	-1.55	0.122
L5.	-0.04804	0.140782	-0.34	0.733
L6.	-0.14953	0.114156	-1.31	0.19
Variable: bank lending				
L1.	0.019677	0.020385	0.97	0.334
L2.	0.001585	0.016643	0.1	0.924
L3.	0.000841	0.015367	0.05	0.956
L4.	-0.00282	0.018435	-0.15	0.878
L5.	0.027608	0.018229	1.51	0.13
L6.	0.025825	0.019266	1.34	0.18
Variable: housing investment				
L1.	0.408431	0.279291	1.46	0.144
L2.	0.692224	0.263585	2.63	0.009
L3.	-0.45893	0.258511	-1.78	0.076
L4.	0.260167	0.249158	1.04	0.296
L5.	0.075168	0.248061	0.3	0.762
L6.	-0.29584	0.274475	-1.08	0.281
Variable: Australian shares				
L1.	0.056393	0.019221	2.93	0.003
L2.	0.006941	0.022625	0.31	0.759
L3.	0.001442	0.025609	0.06	0.955
L4.	0.009107	0.025934	0.35	0.725
L5.	-0.03741	0.026114	-1.43	0.152
L6.	0.020079	0.022873	0.88	0.38
Variable: inflation				
L1.	-0.40425	0.296496	-1.36	0.173
L2.	0.5042	0.537734	0.94	0.348
L3.	-0.57158	0.404516	-1.41	0.158
L4.	0.449049	0.324278	1.38	0.166
L5.	0.075489	0.316757	0.24	0.812
L6.	-0.06822	0.222631	-0.31	0.759

Variable: long term interest rate				
L1.	0.010355	0.004719	2.19	0.028
L2.	-0.01021	0.007297	-1.4	0.162
L3.	0.0102	0.008362	1.22	0.222
L4.	-0.01001	0.00792	-1.26	0.206
L5.	0.001445	0.007203	0.2	0.841
L6.	0.000742	0.00434	0.17	0.864
_cons	0.007557	0.004661	1.62	0.105
Equation: bank lending				
Variable: house prices				
L1.	0.273566	0.940349	0.29	0.771
L2.	-0.88492	1.151816	-0.77	0.442
L3.	1.798272	1.162503	1.55	0.122
L4.	1.338887	1.167907	1.15	0.252
L5.	-2.39054	1.271841	-1.88	0.06
L6.	0.578807	0.91957	0.63	0.529
Variable: GDP				
L1.	-1.33292	0.597661	-2.23	0.026
L2.	-1.54144	0.596779	-2.58	0.01
L3.	-3.32006	0.644906	-5.15	0
L4.	-3.89271	0.720255	-5.4	0
L5.	-2.39759	0.728333	-3.29	0.001
L6.	-0.48531	0.590583	-0.82	0.411
Variable: bank lending				
L1.	-0.15973	0.105461	-1.51	0.13
L2.	-0.04292	0.086102	-0.5	0.618
L3.	-0.31932	0.0795	-4.02	0
L4.	0.496647	0.095372	5.21	0
L5.	-0.10292	0.094308	-1.09	0.275
L6.	-0.07109	0.099672	-0.71	0.476
Variable: housing investment				

L1.	-0.00911	1.444902	-0.01	0.995
L2.	2.569941	1.363648	1.88	0.059
L3.	-0.96975	1.337396	-0.73	0.468
L4.	0.03286	1.28901	0.03	0.98
L5.	3.371874	1.283333	2.63	0.009
L6.	0.028922	1.419987	0.02	0.984
Variable: Australian shares				
L1.	0.434492	0.099437	4.37	0
L2.	0.467577	0.117051	3.99	0
L3.	0.01067	0.132489	0.08	0.936
L4.	0.016101	0.134171	0.12	0.904
L5.	0.102314	0.135102	0.76	0.449
L6.	-0.18707	0.118334	-1.58	0.114
Variable: inflation				
L1.	-1.97829	1.533912	-1.29	0.197
L2.	2.788816	2.781948	1	0.316
L3.	-0.15893	2.092748	-0.08	0.939
L4.	-1.63346	1.677641	-0.97	0.33
L5.	-0.60043	1.638729	-0.37	0.714
L6.	0.994807	1.151775	0.86	0.388
Variable: long term interest rate				
L1.	-0.08665	0.024415	-3.55	0
L2.	0.05712	0.037751	1.51	0.13
L3.	0.077013	0.043258	1.78	0.075
L4.	-0.0369	0.040972	-0.9	0.368
L5.	0.082081	0.037267	2.2	0.028
L6.	-0.08158	0.022452	-3.63	0
_cons	0.060609	0.024111	2.51	0.012
Equation: housing investment				
Variable: house prices				
L1.	0.134721	0.098817	1.36	0.173
L2.	0.194819	0.121039	1.61	0.107

L3.	-0.14884	0.122162	-1.22	0.223
L4.	-0.25254	0.12273	-2.06	0.04
L5.	0.266073	0.133652	1.99	0.047
L6.	-0.05175	0.096634	-0.54	0.592
Variable: GDP				
L1.	0.045809	0.062806	0.73	0.466
L2.	0.07113	0.062713	1.13	0.257
L3.	0.095625	0.06777	1.41	0.158
L4.	0.164458	0.075688	2.17	0.03
L5.	-0.01839	0.076537	-0.24	0.81
L6.	-0.03399	0.062062	-0.55	0.584
Variable: bank lending				
L1.	0.019548	0.011083	1.76	0.078
L2.	0.008758	0.009048	0.97	0.333
L3.	0.044379	0.008354	5.31	0
L4.	0.047119	0.010022	4.7	0
L5.	0.007545	0.00991	0.76	0.446
L6.	0.032001	0.010474	3.06	0.002
Variable: housing investment				
L1.	-0.14825	0.151838	-0.98	0.329
L2.	-0.0212	0.1433	-0.15	0.882
L3.	0.016674	0.140541	0.12	0.906
L4.	0.296548	0.135456	2.19	0.029
L5.	-0.38932	0.13486	-2.89	0.004
L6.	-0.31671	0.14922	-2.12	0.034
Variable: Australian shares				
L1.	-0.03792	0.010449	-3.63	0
L2.	-0.03253	0.0123	-2.64	0.008
L3.	-0.02509	0.013923	-1.8	0.072
L4.	-0.01704	0.014099	-1.21	0.227
L5.	-0.04167	0.014197	-2.94	0.003
L6.	-0.02208	0.012435	-1.78	0.076

Variable: inflation				
L1.	0.445753	0.161192	2.77	0.006
L2.	0.229822	0.292343	0.79	0.432
L3.	-0.51935	0.219918	-2.36	0.018
L4.	-0.02288	0.176296	-0.13	0.897
L5.	-0.00296	0.172207	-0.02	0.986
L6.	-0.02151	0.121035	-0.18	0.859
Variable: long term interest rate				
L1.	-0.00683	0.002566	-2.66	0.008
L2.	0.012172	0.003967	3.07	0.002
L3.	-0.00377	0.004546	-0.83	0.407
L4.	0.00053	0.004306	0.12	0.902
L5.	0.004249	0.003916	1.08	0.278
L6.	-0.00792	0.002359	-3.36	0.001
_cons	0.002363	0.002534	0.93	0.351
Equation: Australian shares				
Variable: house prices				
L1.	-2.34684	1.089213	-2.15	0.031
L2.	1.542531	1.334157	1.16	0.248
L3.	-0.65226	1.346536	-0.48	0.628
L4.	1.138056	1.352795	0.84	0.4
L5.	-0.17313	1.473183	-0.12	0.906
L6.	-0.27708	1.065144	-0.26	0.795
Variable: GDP				
L1.	0.511147	0.692275	0.74	0.46
L2.	0.516273	0.691253	0.75	0.455
L3.	1.189337	0.747	1.59	0.111
L4.	-0.64669	0.834276	-0.78	0.438
L5.	-0.49734	0.843633	-0.59	0.556
L6.	-0.04532	0.684077	-0.07	0.947
Variable: bank lending				
L1.	0.00861	0.122157	0.07	0.944

L2.	0.065073	0.099732	0.65	0.514
L3.	0.12354	0.092086	1.34	0.18
L4.	0.014873	0.110469	0.13	0.893
L5.	0.058036	0.109237	0.53	0.595
L6.	0.119538	0.115451	1.04	0.3
Variable: housing investment				
L1.	-1.54867	1.673641	-0.93	0.355
L2.	0.245693	1.579523	0.16	0.876
L3.	1.139735	1.549115	0.74	0.462
L4.	-2.65407	1.49307	-1.78	0.075
L5.	2.927105	1.486493	1.97	0.049
L6.	-0.2827	1.644782	-0.17	0.864
Variable: Australian shares				
L1.	0.242509	0.115179	2.11	0.035
L2.	-0.00492	0.135581	-0.04	0.971
L3.	0.217029	0.153463	1.41	0.157
L4.	0.059755	0.155411	0.38	0.701
L5.	0.20727	0.156489	1.32	0.185
L6.	0.01776	0.137067	0.13	0.897
Variable: inflation				
L1.	-5.83517	1.776741	-3.28	0.001
L2.	6.843735	3.222351	2.12	0.034
L3.	-1.74103	2.424045	-0.72	0.473
L4.	1.589166	1.943224	0.82	0.413
L5.	-0.8374	1.898152	-0.44	0.659
L6.	0.759385	1.334109	0.57	0.569
Variable: long term interest rate				
L1.	0.011917	0.02828	0.42	0.673
L2.	-0.05402	0.043727	-1.24	0.217
L3.	0.021124	0.050106	0.42	0.673
L4.	0.018059	0.047459	0.38	0.704
L5.	-0.02992	0.043166	-0.69	0.488
L6.	0.028864	0.026006	1.11	0.267

_cons	-0.01025	0.027928	-0.37	0.714
Equation: inflation				
Variable: house prices				
L1.	0.202461	0.08873	2.28	0.023
L2.	-0.22975	0.108683	-2.11	0.035
L3.	-0.0923	0.109692	-0.84	0.4
L4.	0.492466	0.110202	4.47	0
L5.	-0.57373	0.120009	-4.78	0
L6.	0.178603	0.086769	2.06	0.04
Variable: GDP				
L1.	-0.03331	0.056394	-0.59	0.555
L2.	-0.02406	0.056311	-0.43	0.669
L3.	-0.03518	0.060852	-0.58	0.563
L4.	-0.08009	0.067962	-1.18	0.239
L5.	-0.01685	0.068724	-0.25	0.806
L6.	0.024331	0.055726	0.44	0.662
Variable: bank lending				
L1.	-0.02238	0.009951	-2.25	0.025
L2.	0.016453	0.008124	2.03	0.043
L3.	-0.00143	0.007502	-0.19	0.849
L4.	-0.0108	0.008999	-1.2	0.23
L5.	0.025495	0.008899	2.87	0.004
L6.	-0.02076	0.009405	-2.21	0.027
Variable: housing investment				
L1.	0.257422	0.136339	1.89	0.059
L2.	0.041985	0.128672	0.33	0.744
L3.	0.06837	0.126194	0.54	0.588
L4.	0.192841	0.121629	1.59	0.113
L5.	0.04898	0.121093	0.4	0.686
L6.	0.012643	0.133988	0.09	0.925
Variable: Australian shares				

L1.	0.021673	0.009383	2.31	0.021
L2.	0.007217	0.011045	0.65	0.513
L3.	0.019491	0.012501	1.56	0.119
L4.	-0.03823	0.01266	-3.02	0.003
L5.	0.024385	0.012748	1.91	0.056
L6.	0.017448	0.011166	1.56	0.118
Variable: inflation				
L1.	1.463425	0.144737	10.11	0
L2.	-0.83496	0.2625	-3.18	0.001
L3.	0.195977	0.197468	0.99	0.321
L4.	-0.15023	0.158299	-0.95	0.343
L5.	0.155616	0.154628	1.01	0.314
L6.	-0.05905	0.10868	-0.54	0.587
Variable: long term interest rate				
L1.	0.002956	0.002304	1.28	0.2
L2.	-0.00627	0.003562	-1.76	0.078
L3.	0.007324	0.004082	1.79	0.073
L4.	-0.00174	0.003866	-0.45	0.652
L5.	-0.00184	0.003516	-0.52	0.601
L6.	0.000334	0.002119	0.16	0.875
_cons	0.003639	0.002275	1.6	0.11
Equation: long term interest rate				
Variable: house prices				
L1.	-4.00038	4.613141	-0.87	0.386
L2.	9.655512	5.650553	1.71	0.087
L3.	-2.38073	5.702982	-0.42	0.676
L4.	12.19043	5.729491	2.13	0.033
L5.	-5.27812	6.239369	-0.85	0.398
L6.	2.45832	4.511203	0.54	0.586
Variable:GDP				
L1.	-1.13368	2.931992	-0.39	0.699
L2.	12.07128	2.927662	4.12	0

L3.	6.956438	3.163766	2.2	0.028
L4.	4.873097	3.533408	1.38	0.168
L5.	7.64298	3.573039	2.14	0.032
L6.	10.17771	2.897268	3.51	0
Variable: bank lending				
L1.	-0.26408	0.517369	-0.51	0.61
L2.	0.643419	0.422395	1.52	0.128
L3.	0.298292	0.39001	0.76	0.444
L4.	-0.29459	0.467871	-0.63	0.529
L5.	0.649943	0.462653	1.4	0.16
L6.	-0.28459	0.48897	-0.58	0.561
Variable: housing investment				
L1.	-12.9341	7.088368	-1.82	0.068
L2.	9.437664	6.689752	1.41	0.158
L3.	-1.43316	6.560963	-0.22	0.827
L4.	-11.5932	6.323596	-1.83	0.067
L5.	20.49442	6.295742	3.26	0.001
L6.	-2.04042	6.96614	-0.29	0.77
Variable: Australian shares				
L1.	1.674049	0.487817	3.43	0.001
L2.	-0.39404	0.574228	-0.69	0.493
L3.	1.822546	0.649962	2.8	0.005
L4.	0.653899	0.658211	0.99	0.32
L5.	1.350864	0.662779	2.04	0.042
L6.	0.102468	0.580518	0.18	0.86
Variable: inflation				
L1.	-3.06147	7.525027	-0.41	0.684
L2.	17.10172	13.64762	1.25	0.21
L3.	-13.3144	10.26655	-1.3	0.195
L4.	9.495672	8.230132	1.15	0.249
L5.	18.2018	8.039238	2.26	0.024
L6.	-8.61464	5.650351	-1.52	0.127

Variable: long term interest rate				
L1.	1.347211	0.119776	11.25	0
L2.	-0.88497	0.185195	-4.78	0
L3.	0.432016	0.212215	2.04	0.042
L4.	-0.19393	0.201001	-0.96	0.335
L5.	0.033244	0.182822	0.18	0.856
L6.	0.157665	0.110143	1.43	0.152
_cons	-0.5704	0.118283	-4.82	0