

# Home Advantage: The home bias in residential real estate\*

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## Abstract

Do home-biased residential real estate investors purchase and perform differently than those investors who look for opportunities further away? We identify a large sample of investors in the property market and measure the proximity of their purchase from their existing residential location. It is hypothesised that, in line with the results of home bias in other investment markets such as equities, there is a preference among residential real estate investors to buy nearby and that this bias affects their returns. The home bias can be used to optimise housing market lending criteria and to inform housing investment policy. It should also be considered in household portfolio allocation decisions and has broad implications for how psychology affects financial decision-making.

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# 1 Introduction

Why do buyers of residential real estate exhibit a preference for properties that are geographically proximate to their current address? The "home bias" is a well-documented puzzle in equities markets, in which investors are observed to overweight portfolios towards domestic securities over international securities (French and Poterba (1991)), and locally headquartered companies over companies with distantly located headquarters (Coval and Moskowitz (1999)). In this paper, we examine the prevalence, determinants and outcomes of the home bias in a residential real estate market.

There is limited research into the home bias preference among property buyers. While variation in purchase price between local and non-local residential property buyers is explored in Clauretie and Thistle (2007) and Ihlanfeldt and Mayock (2012), these papers do not consider a home bias effect. More recently, Badarinza et al. (2018) document a bias based on common nationalities of agents in commercial real estate transactions.

To study the home bias in residential real estate we obtain a large, proprietary sample of over 1 million residential property mortgage loan applications across Australia. The high proportion of investors in Australian residential real estate is a distinguishing feature of the market. The Reserve Bank of Australia (RBA) estimates that investors account for around 25 percent of residential real estate holdings.<sup>1</sup> The data sample includes the borrowers' characteristics including their current address, as well as the location of the newly property purchased. This allows identification of local and non-local buyers. We are also able to distinguish between borrowers

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<sup>1</sup>'Submission to the Financial System Inquiry,' Reserve Bank of Australia, March 2014. <http://www.rba.gov.au/publications/submissions/financial-sector/financial-system-inquiry-2014-03/pdf/financial-system-inquiry-2014-03.pdf>

who are owner-occupiers (the property owner resides in the property) and property investors (the property owner rents the property to a third-party tenant). This is an important delineation, as we expect that owner-occupiers are more location 'sticky' than investors, due to personal situations such as employment, education and community connections. Overall, our sample indicates that the majority of purchases are for local properties (84.2 percent). After controlling for a range of borrower characteristics, we find that owner-occupiers are approximately 13 percent more likely than investors to exhibit home bias.

Restricting our analysis to residential real estate investors, we also identify several determinants of home bias. Our results indicate that the home bias is associated with longer tenure in current address and employment, consistent with the argument for familiarity driving this behavior. Further, we find that investor sophistication has a mitigating effect on the home bias further supporting the behavioral explanation.

We explore possible rational explanations for the home bias. Following Clauretie and Thistle (2007) we test whether strong price appreciation in a buyer's current market gives them a purchasing power advantage in non-local markets. Contrasting with their results, we find investors are more likely to exhibit a home bias when their local market has outperformed. We attribute this to possible momentum-chasing behaviour and further evidence of behavioural biases influencing residential real estate.

Residential real estate presents an interesting setting for behavioural economics research. Residential property is the largest financial decision, consumption good and concentration of wealth for most individuals Flavin and Yamashita (2002). It should arguably follow that residential property purchase decisions are exercised with above average diligence. However, the presence of behavioural biases in the

market is widely acknowledged. To explain the persistence of behavioural biases in residential real estate, Salzman and Zwinkels (2013) suggest that, ‘...Although many theoretical and empirical studies stress the presence and importance of behavioural biases, the awareness of cognitive limitations in the housing market is not wide spread...’ (p.15). The prevalence of a home bias in residential real estate exacerbates known issues in real estate investment diversification, as outlined in Seiler et al. (1999).

Our study makes four key contributions to the extant literature. Firstly, we present previously unexplored analysis of the characteristics of property buyers who exhibit home bias and, in particular, demonstrate a difference between owner-occupier and property investors. Secondly, we study the investment performance of local and non-local buyers as a new approach to measuring their relative purchasing power as rational explanations for the home bias. Though our evidence does not support a rational explanation for home bias, our approach overcomes some of the confounding factors in previous studies such as non-local buyers limited search times (Clauret and Thistle (2007)), relative bargaining power (Ihlanfeldt and Mayoock (2012)), and sample selection bias (Devaney and Scofield (2017)). Thirdly, our detailed longitudinal sample of residential property purchases from across multiple cities and states of Australia overcomes further limitations in previous research. Specifically, we can identify and control for properties with joint ownership, where past studies focusing on multi-family and commercial properties face the non-trivial task of separating beneficial interest and effective control; as identified by Lizieri et al. (2011). Finally, we are able to contemporaneously study home bias across the set of national housing sub-markets. By contrast, data limitations in previous research have limited their focus to local and non-local buyer inflow to a single

market.

There are implications of this research for housing market lending practice and regulation. The size of Australia's housing market and its interconnectedness to the financial system through bank lending channels links make it a potential source of systemic risk. Housing debt in Australia is disproportionately held by residential real estate investors, who are less incentivised to reduce their mortgage loan-to-value ratio, and consequently at greater risk of negative equity events (RBA, 2014). Geographically concentrated investor markets resulting from the home bias could exacerbate this effect. The current research provides a platform for future research into this line of inquiry.

The remainder of this paper is structured as follows. In section 2 we review the home bias literature as it relates to both financial markets and real estate, and derive a set of hypotheses. In section 3 the research design and methodology are outlined. Section 4 describes the data sources and presents preliminary statistics. Section 5 presents the results of our analysis. Section 6 concludes.

## **2 Literature Review and Hypothesis Development**

The home bias is well-documented in equity markets. French and Poterba (1991) demonstrate that traders in the U.S. allocate an overwhelmingly large portion of their portfolios to U.S. securities, far in excess of the U.S. markets relative weighting in the global market. They report consistent results for equities market holding by investors in Japan and the U.K..

Coval and Moskowitz (1999) extend this research to demonstrate that the home bias puzzle extends to a preference for local domestic securities in investors' equities portfolios. Using the location and holdings of large U.S. money managers in 1995, they measure the geographical distance between investors and U.S. company headquarters to show that domestically, the home bias of U.S. investors is further concentrated into preferences for locally headquartered firms.

There are a number of explanations put forward for the home bias. The first is linked to institutional barriers (incentives) to foreign (domestic) investment. Despite institutional barriers to international investment, additional costs and potentially adverse tax implications of such a strategy – Black (1974) and Stulz (1981), French and Poterba (1991) conclude that investor preferences drive the home bias, as investor constraints alone can not explain the size of the observed bias.

The second explanation for home bias is that an information asymmetry exists between local and non-local investors. The relative superiority of knowledge that local investors possess of proximate investments motivates overweighting of investment to local securities; Ivković and Weisbenner (2005), Kang and Stulz (1997) and Ahearne et al. (2004). The real estate literature provides some support for the superior knowledge of local investors as a driver of home bias, with a number of studies demonstrating that non-local investors tend to overpay in property purchases relative to local investors; Lambson et al. (2004), Chinloy et al. (2013) and Lin and Viswanathan (2015). In a study of commercial, multi-family apartment building transactions, Lambson et al. (2004) identify that geographically distant buyers pay, on average, 5.52 per cent more than geographically proximate buyers. Their sample covers sales in Phoenix from 1990 to 2002 that consists of approximately equal numbers of in-state (1,415) buyers and out-of-state (1,439) buyers. The out-of-state

buyer price premium is supported in studies by Chinloy et al. (2013) and Clautrie and Thistle (2007). Ling et al. (2016) demonstrate that buyer distance from property, whether in- or out-of-state, is positively linked to the transaction price, while earlier research by Miller et al. (1988) finds a significance price premium in purchases of single-family residential homes in Hawaii by Japanese investors from January 1986 to February 1988.

An alternative explanation for home bias comes from the behavioral economics literature and attributes investor preferences for local assets to familiarity; Kilka and Weber (2000) and Fellner-Röhling and Maciejovsky (2003). Familiarity bias leads to overconfidence in beliefs about known situations, and under-estimation of risks. This is partly demonstrated in the estimation of investors expected domestic market returns in each of the countries studied by French and Poterba (1991), which yields a relative optimism (pessimism) towards securities in the domestic (foreign) market. Seiler et al. (2013) and Seiler et al. (2008) present survey evidence of real estate owners that supports the presence of familiarity bias.

Further, the relative bargaining power of the buyer and seller may explain the home bias. Ihlanfeldt and Mayock (2012) argue that in a thin market, such as real estate, distant buyers are in a weak position to local sellers. They empirically demonstrate, using a large sample of Florida housing transactions, a positive relationship between sale price and the distance of the buyers new home from their previous home.

Our first hypothesis draws on the above arguments and evidence for a home bias. We expect to find that buyers of residential property are more likely to purchase properties that are geographically close over properties that are geographically distant. We specifically test whether owner-occupiers demonstrate a stronger home

bias than property investors:

**Hypothesis 1 (H1).** *Owner-occupiers have higher propensity than property investors to purchase properties in the same locality as their current address*

Part of the home bias literature also considers the role of investor sophistication. In equity markets it is shown that ‘sophisticated’ investors outperform less sophisticated investors; Grinblatt and Keloharju (2000). Graham et al. (2009) and Bose et al. (2015) demonstrate that the persistence of the home bias in equities markets is linked to investor education levels, while investor sophistication is shown to limit the impact of the home bias in equity markets; Karlsson and Nordén (2007) and Kimball and Shumway (2010).

In the following hypotheses, we restrict our consideration to property investors, to minimise the effect of confounding factors in the owner-occupiers property purchase decision on our analysis. That is, owner-occupiers are more likely than property investors to buy and reside in a similar location to existing property due to lifestyle preference (school/work/family/social connections), and also because that is the area in which they have been hedged to price returns (assumes current property price change has a closer relationship to price changes of properties in similar locations compared to properties further away). Our second hypotheses similarly expects that investor sophistication is negatively linked to the likelihood of a home bias in real estate purchases:

**Hypothesis 2 (H2).** *More sophisticated investors are more likely to invest non-locally than less sophisticated investors.*

Our third hypothesis considers a possible rational explanation for investors’ decisions to purchase locally or non-locally, based on the relative performance of their

current address. If an investor's home property market has outperformed, they will have higher purchasing power in property markets that have underperformed relatively.<sup>2</sup> This leads to Hypothesis 3:

**Hypothesis 3 (H3).** *Property investors have a lower propensity to purchase properties in the same locality as their current address when their current market has outperformed.*

Support for this hypothesis would suggest that observed home bias may not be driven purely by behavioural biases, since it may result from investors being "priced out" of non-local markets due to poor price performance in their home market. The following section outlines the research design we take to test these hypotheses.

### 3 Research Design

In order to explore home bias, we must first define local and non-local property buyers. To make this distinction we determine whether the property buyer's residential address at the time of the mortgage application and the address of the property being purchased with the mortgage are in the same locality.<sup>3</sup> In this research, locality is determined by whether the Statistical Local Area (SLA) of the property purchased with the mortgage is the same as the SLA of the residential address of

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<sup>2</sup>An alternative view on this position is that investors in an outperforming market have "anchored" their price expectations higher than prevailing prices in relatively underperforming markets. Viewing the underperforming markets as cheap, they are more motivated to buy non-locally. We thus consider whether relative purchasing power can explain local and non-local property purchases. This argument is explored by Lambson et al. (2004) though the results are inconclusive.

<sup>3</sup>In our study, we assume that the property market to which an individual is 'home biased' is the locality in which they currently reside. It could be argued that individuals also have some knowledge of areas in which they work, or socialise. Due to data limitations, consideration of these alternatives is beyond the scope of this study.

the mortgage applicant.<sup>4 5</sup>

To explore H1, we utilise the whole sample of mortgage applicants. We consider the following binary model for non-local housing purchases, where the mortgage borrower chooses to buy property locally or not. We assume that  $y_i = 1$  if mortgage applicant  $i$  chooses to buy non-locally (in a different SLA) and  $y_i = 0$  otherwise. We are interested in estimating the conditional probability of buying non-local housing property,  $\mathbb{P}(y_i = 1 \mid I_i)$ , as well as the determinants of this probability; where  $I_i$  is the information set at mortgage application time that contains market variables, borrower characteristics, and property characteristics. Specifically, we consider the Logit model of the form,

$$\mathbb{P}(y_i = 1 \mid I_i) = \Lambda(\alpha + X_i'\beta + W_i'\gamma + Z_i'\delta) \quad (1)$$

where  $(\alpha, \beta', \gamma', \delta)'$  is an unknown coefficient vector;  $X$  contains market control variables;  $W$  includes borrowers' characteristics variables;  $Z$  includes specific investor buyer sophistication variables; and  $\Lambda(\cdot)$  is the cumulative density function (*cdf*) of a logistic distributed random variable.

The variable of interest to address H1 included in  $W$  is whether the mortgage applicant is a residential property investor (RIPL) or not, where  $RIPL = 1$  if the mortgage applicant takes a residential property investment loan, and  $RIPL = 0$  otherwise. We expect a statistically significant positive sign for the coefficient of  $RIPL$ , as the probability of investing non-locally should be greater for residential investors, relative to owner-occupiers.

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<sup>4</sup>We use ABS SLA4 2011 <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1259.0.30.001July%202011?OpenDocument>.

<sup>5</sup>For robustness, we also perform our analysis using postcodes and states and territories as the locality definition. Our results are qualitatively similar across all definitions.

To test H2, we restrict our analysis to the subsample of residential property investors in the dataset. We estimate 1 again but only for the property investor subsample; because of that we exclude *RIPL* as a relevant exogenous variable in  $W$ . The variables of interest included in  $W$  to test H2 which proxy for financial sophistication are the following: whether the investor holds shares and the value held in shares; whether the investor already received rent income at the time of applying for an investment property loan; and the size of the previous mortgage. Previous work use the level of educational attainment or the occupation as a financial literacy proxy; see . We do not have information on borrower’s educational level but can control for certain property investors’ occupations, such as professionals, managers, small business proprietors and self-employed.

In studies of behavioural bias and investor characteristics, proxies for investor sophistication are found to attenuate the size of biases. Calvet et al. (2009) document an inverse relationship between ‘financial mistakes’ and financial wealth, education and, to a lesser degree, disposable income. This follows work by Dhar and Zhu (2006) that links investor wealth, income and professional employment with less biased investment decisions. They argue that in addition to the expected greater financial literacy of these individuals, they are also more likely to access professional outside financial advice. As another proxy for investment sophistication we have built a dummy variable that identifies whether residential investors invest in properties above the all-property median property price for the given SLA.

To test H3, we construct a variable that compares changes in property price indexes at each SLA. We define out-performance in an SLA’s housing market if we observe the SLA’s property price index change is in the highest 50 percent of all SLAs across a state. We measure the index changes at lags of 3-, 6-, 12-, 24- and

36-months. Our Indicator variables equal  $I_k = 1$  if the SLA return (measured as change in median all-property index price) over the prior  $k$  months is above the state-wide median SLA return (that is, in the top half of SLAs by return), at the  $k = 3, 6, 12, 24,$  and 36 months.

## 4 Data background

The primary data used in this study is sourced from a major bank in the Australian mortgage market. The dataset comprises 1,149,484 residential mortgage applications from owner-occupiers and property investors for the period 1 January 2003 to 31 May 2009.<sup>6</sup> Of this sample, property investors account for approximately 23 percent of observations. The bank has provided extensive information it collects on borrower and loan characteristics in the mortgage application process which will be incorporated into our analysis.<sup>7</sup>

Figure 1 plots the monthly proportion of non-local property purchases over our sample period. We observe that both owner-occupiers and property investors more frequently purchase properties in the same region as their current residence.

Panel A of Figure 2(b) shows how preference for non-local properties has trended higher over the sample. Though most properties are purchased in the home market, the non-local proportion has increased from around 15 percent early in the sample, to around 17 percent at the end of the sample. Panel B of Figure 2(b) shows the relative proportions of owner-occupiers and property investors is reasonably constant over the sample.

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<sup>6</sup>Unfortunately this dataset can not be updated due to data restrictions from the source bank.

<sup>7</sup>A detailed description of the institutional setting for housing loans in Australia and this dataset is provided in Dungey et al. (2018).

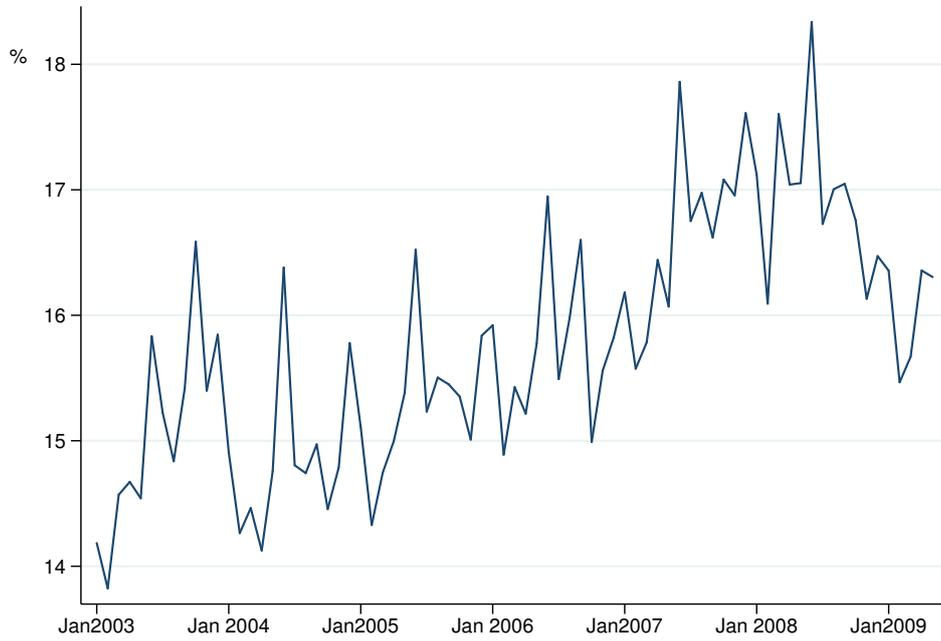
In Figure 2, the composition of non-local property purchases between owner-occupiers and investors is plotted in 3(a) Seasonality, particularly financial-year tax effects, seems prominent. Panel B 3(b) shows how investors and owner-occupiers split their purchases between home and non-local markets.

Table 1 present summary statistics for mortgage applicants discerning those buying a residential dwelling locally and those purchasing non-locally. Locality is determined by whether the Statistical Local Area (SLA) of the property purchased with the mortgage is the same as the SLA of the residential address of the mortgage applicant, as explained in Section 3.

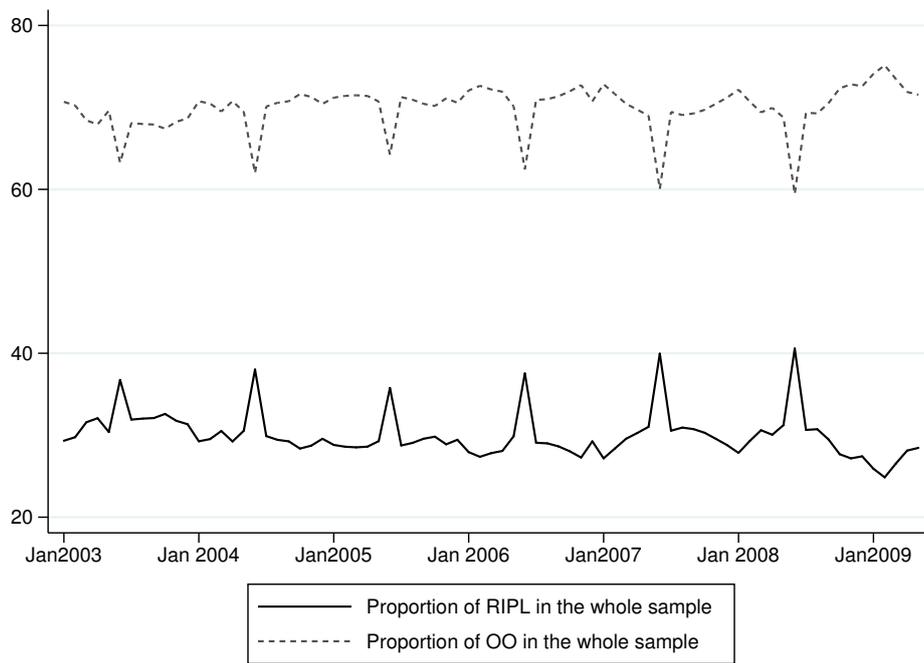
Table 1 shows that in the cross-section non-local buyers are more likely to be male, single, younger, apply as a single applicant, and have fewer dependants than those buying locally. There are proportionally more first time home buyers purchasing non-locally than buying locally (which may be driven by affordability concerns). Moreover, there are proportionally more borrowers applying for a residential investment property loan who buy non-locally than those residential investors buying locally. In particular, of those who buy a residential dwelling in a different SLA to their current neighbourhood 42 percent are residential investors, while of those who purchase a property in the same SLA where they reside only 17 percent are residential investors. These initial descriptive statistics support our first hypothesis H1 and motivates further investigation.

Additionally, those buying locally have spent, on average, longer at their current address and at their current employment than those buying non-locally, suggesting lower mobility and indicative of home bias. Interestingly, there is a larger proportion of professionals and management workers that purchase non-locally relative to those purchasing dwellings locally; the opposite is true for skilled trade and unskilled trade

Figure 1: Proportion of purchases over time.

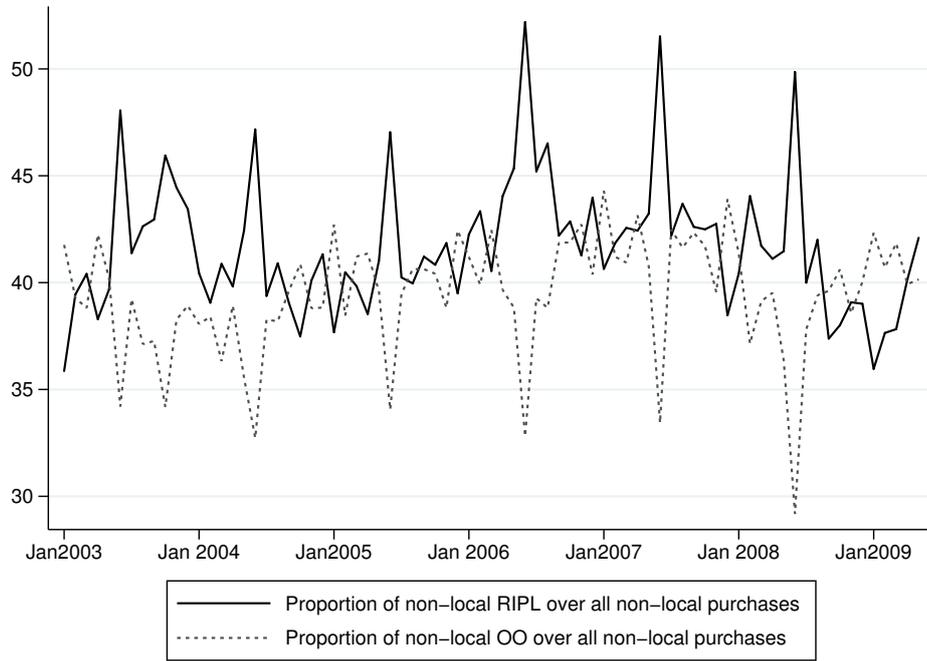


(a)

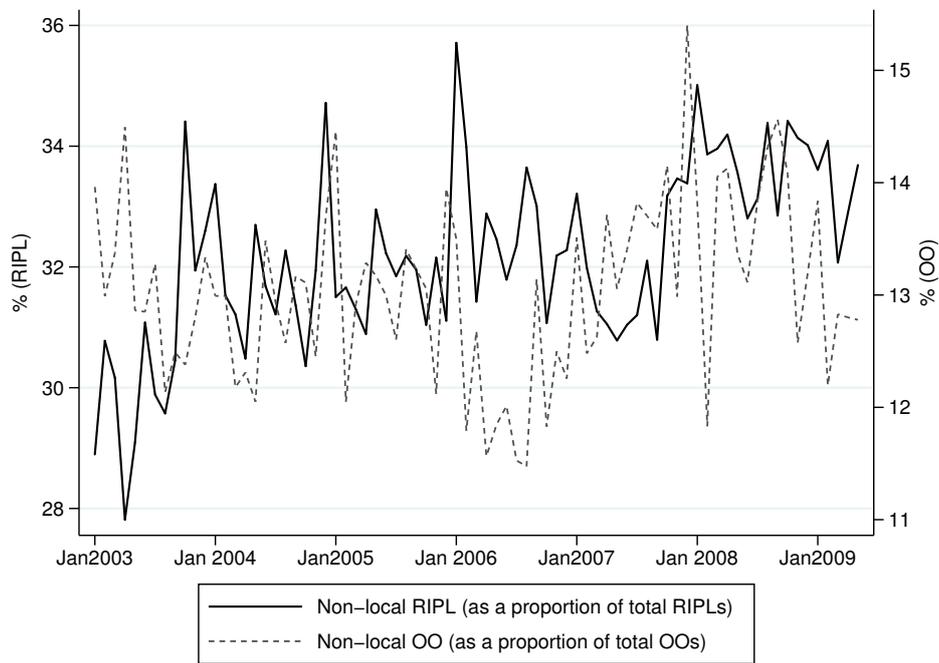


(b)

Figure 2: Proportion of non-local RIPLs over time.



(a)



(b)

occupations and unemployed mortgage applicants.<sup>8</sup> Moreover, 26.5 percent of those buying non-locally are purchasing property in a different state.

Table 1: Descriptive statistics for mortgage borrowers

	<i>All</i>		<i>RIPL</i>	
	<i>Local</i>	<i>Non – local</i>	<i>Locals</i>	<i>Non – locals</i>
<b>Borrower characteristics</b>				
Age	42.1yrs.	41yrs.	43.6yrs.	42.4yrs.
Under 30 yrs.	12%	16%	8.9%	12.1%
Between 30-39 yrs.	32%	33.9%	28.3%	31.5%
Between 40-49 yrs.	31%	26%	32.8%	28.6%
Between 50-59 yrs.	19%	18%	23.4%	21.3%
60 yrs. and over	6%	6%	6.6%	6.5%
Females	30%	28.9%	26.4%	27.6%
Married	72%	63.1%	74.3%	66.9%
Co-borrower	70.%	58.7%	65.5%	54.4%
Number of dependents	0.8	0.5	0.7	0.6
First-time buyers	4%	8.6%		
RIPL	16.6%	41.9%		
Years at current address	7yrs.	6yrs.	7.6yrs.	6.7yrs.
Years at current employment	7.2yrs.	6.6yrs.	8.4yrs.	7.5yrs.
<b>Employment characteristics</b>				
Professionals	14.8%	22.6%	18.4%	23.6%
Management	14.8%	19.1%	17%	20.1%
Skilled trade	13.5%	9.7%	11.7%	8.7%
Unskilled trade	8.4%	4.6%	5.5%	3.8%
Small business proprietor	9.9%	9.3%	14.3%	11%

Table 6 in Appendix B provides the definition for all variables used.

<sup>8</sup>Self-employed category is a distinct category from the occupation categories and can overlap with some of them.

Table 1 – continued from previous page

	<i>All</i>		<i>RIPL</i>	
	<i>Locals</i>	<i>Non – locals</i>	<i>Locals</i>	<i>Non – locals</i>
Other occupation	38.6%	34.6%	33%	32.7%
Self-employed	20.6%	19.4%	29.1%	22.7%
<b>Property characteristics</b>				
Interstate	0%	26.5%	0%	31.9%
Inter-postcode	14.3%	100%	24.2%	100%
<b>Financial characteristics</b>				
Rent income	0.5%	1.1%	1.5%	1.9%
Rent/board monthly income	\$407	\$1,061	\$1,302	\$1,681
Monthly net income	\$7,040	\$8,738	\$9,301	\$10,059
Total assets	\$879,313	\$1,174,646	\$1,398,317	\$1,545,456
Property Value	\$698,383	\$1,049,003	\$1,097,235	\$1,287,177
Hold shares	4.4%	5.2%	6.1%	5.9%
Value of total shares	\$2,627	\$4,213	\$5,012	\$5,734
Total net wealth	\$634,720	\$840,323	\$1,006,079	\$1,083,109
Loan Size	\$206,467	\$272,896	\$303,253	\$300,966
LTV	60%	66.2%	62.7%	66.8%
Total obs.	968,114	181,370	160,306	75,972
Proportions	84.2%	15.8%	67.8%	32.2%

Table 6 in Appendix B provides the definition for all variables used.

H2 and H3 consider residential investors specifically. We identify the subsample of residential property investors in the dataset. Excluding owner-occupiers removes noise that may be introduced by property purchases motivated by ‘need’ or mobility; for example, the best property to invest in may not be located near jobs, schools and community that owner-occupiers want to be near. We observe basic non-parametric

statistics to show that property investors tend to purchase properties in the same region as their current residence.

The two last columns in Table 1 show summary statistics for the residential investor subsample only. Table 1 shows that those investors investing non-locally are slightly younger than those investors investing locally. There are lower proportions of married investors and investors applying for credit with a coborrower when buying non-locally than locally. Non-local residential investors also tend to have less dependants. There is a larger proportion of female investors buying non-locally than locally. Residential investors buying non-locally tend to have spent less time on average on their current address and their current employment. Although both local and non-local investors tend to purchase mainly existing houses, non-local investors tend to buy a higher proportion of new houses and vacant land than local investors.

By construct in our definition of a local purchase, local investors purchase property in the same state where they reside, and all non-local investors purchase a property in a different postcode to the one they reside in at the time of accessing housing finance. Interestingly, local investors take slightly larger housing loans than non-local investors, suggesting that those residential investors that invest further away follow similar house prices. This is also observed for property valuation, as those properties in further SLAs have lower value than the ones on the same SLA of residence. Although average monthly repayments don't differ much between investors, investors purchasing non-locally have higher average total loan payments and higher average monthly expenses. However, non-local investors have higher average income, larger asset value and net wealth position, consistent with our expected results under H2.

To measure price performance of different localities, we use monthly aggregated

index data supplied by CoreLogic accessed through Sirca.

## 5 Results

### 5.1 H1: investors vs owner-occupiers

Table 2 presents the results of estimating Equation 1 to test H1. The table shows the explanatory variables on the first column, and three models that specify the probability of purchasing with a mortgage a residential property non-locally (at a different SLA to the purchaser’s SLA of residence) following eq(1). Model (1) mainly concentrates on  $W$  control variables, model (2) adds  $X$  and  $Z$  control variables, while model (3) adds to model (1) state and year dummies.

The main variable of interest to test H1 included in  $W$  is whether the borrower purchasing a residential property with a mortgage is a residential investor (*RIPL*). The coefficient for *RIPL* is always positive and statistical significant, showing that residential investors financing their investment with a mortgage (relative to owner-occupiers and other borrowers) are around 13 percent more likely to purchase a property located in a different SLA to the SLA where they reside relative to a homeowner. This result strongly supports our first hypothesis H1.

Results in Table 2 also show that residential property purchasers that have lived at their current address for a longer period and those that have worked at their current employment for a longer time – proxyng for low mobility – are less likely to purchase non-locally. In a similar manner, residential property purchasers with a higher number of dependants and applying with a co-borrower – suggesting more ‘settled’ households – are less likely to purchase non-locally.

Mortgage borrowers with higher net income are more likely to purchase non-

locally, while those with higher net wealth are less likely to purchase non-locally. First-time home buyers are more likely to purchase non-locally, while females, who represent around a third of all mortgage borrowers, are also less likely to purchase non-locally.

Although market variables are all statistically significant, they don't have a strong economic significance in the model, and this may be due to the fact that they are all relevant at a national level.

Table 2: Logit Marginal Effects

	$P(\text{non} - \text{locals}) = 1$		
	(1)	(2)	(3)
Residential investment	0.136***	0.127***	0.135***
property loans (RIPL)	[0.001]	[0.001]	[0.001]
First-time	0.100***	0.105***	0.100***
home buyer	[0.001]	[0.001]	[0.001]
Years at current	-0.002***	-0.002***	-0.002***
address	[0.000]	[0.000]	[0.000]
Years at current	-0.001***	-0.001***	-0.001***
employment	[0.000]	[0.000]	[0.000]
Monthly net	0.105***	0.097***	0.105***
income (logarithm)	[0.001]	[0.001]	[0.001]
Net wealth	-0.016***	-0.010***	-0.016***
(logarithm)	[0.000]	[0.000]	[0.000]
Age < 30 years	0.022***	0.027***	0.023***
	[0.001]	[0.002]	[0.001]
30 ≤ Age < 40 years	0.019***	0.020***	0.019***
	[0.001]	[0.001]	[0.001]
50 ≤ Age < 60 years	0.012***	0.009***	0.011***

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B provides the definition for all variables used. All monetary variables are in logarithms and deflated by CPI of the corresponding SLA state capital city for Q1-2006.

Table 2 – continued from previous page

	$P(\text{non} - \text{locals}) = 1$		
	(1)	(2)	(3)
	[0.001]	[0.001]	[0.001]
Age $\geq$ 60 years	0.036***	0.030***	0.035***
	[0.002]	[0.002]	[0.002]
Female	-0.004***	-0.003**	-0.004***
	[0.001]	[0.001]	[0.001]
Co-borrower	-0.070***	-0.067***	-0.070***
	[0.001]	[0.001]	[0.001]
Number of dependants	-0.023***	-0.022***	-0.023***
	[0.000]	[0.000]	[0.000]
Interbank rate		-0.003***	
		[0.001]	
Unemployment rate		-0.001*	
		[0.000]	
% $\Delta$ Dwelling index		-0.000***	
		[0.000]	
State dummies	NO	NO	YES
Year dummies	NO	NO	YES
Adj. $R^2$	0.0972	0.0943	0.0996
$AIC$	887,833	798,294	885,458
$BIC$	888,000	798,496	885,780
$N$	1,130,263	1,062,423	1,130,263

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B provides the definition for all variables used. All monetary variables are in logarithms and deflated by CPI of the corresponding SLA state capital city for Q1-2006.

## 5.2 H2 Sophisticated investors

Table 3 shows the results that test H2. This hypothesis posits that sophisticated investors will want to access diversification gains, and then be less affected by home bias. In addition, obtaining information from non-local markets may be less costly for sophisticated investors.

The first column in the table shows the control variables added in each model. The models in the rest of the columns replicate the estimations in model (3) of Table 2, but only for the property investor sub-sample, and new exogenous variables are added to control for investor sophistication. As presented in Table 2,  $W$  includes the years at current address and current employment, monthly net income and net wealth (in logarithmic form), age brackets, female dummy, co-borrower dummy and number of dependants. Model (A) adds some control variables that may proxy for sophistication, such as: whether the residential property investor held a prior mortgage, holds shares, and already receives rent/board income. Model (B) considers investor's selected occupations that may be related to financial knowledge and experience such as: professionals, management positions, small business proprietors, self-employed. We have included some occupations where we expect lower financial sophistication, such as professional skilled trades and unskilled trade. Finally, in model (C) we add a control variable that identifies whether the purchase price of investment residential property financed with a mortgage was above the median SLA house price.

Table 3: Logit Marginal Effects

	$P(\text{non} - \text{locals}) = 1$		
	(A)	(B)	(C)
Held a prior mortgage	-0.029*** [0.004]	-0.031*** [0.004]	-0.032*** [0.004]
Hold shares	0.024*** [0.005]	0.018*** [0.005]	0.018*** [0.005]
Receive rent income	0.042*** [0.007]	0.052*** [0.007]	0.050*** [0.007]
Professionals		0.027*** [0.003]	0.027*** [0.003]
Management positions		0.016*** [0.003]	0.016*** [0.003]
Skilled trade		-0.058*** [0.004]	-0.057*** [0.004]
Unskilled trade		-0.074*** [0.005]	-0.073*** [0.005]
Small business proprietors		-0.010** [0.004]	-0.010** [0.003]
Self-employed		-0.044*** [0.003]	-0.044*** [0.003]
Purchased above the median house price			0.023*** [0.002]
$W_i$ controls	YES	YES	YES
State dummies	YES	YES	YES
Year dummies	YES	YES	YES
Adj. $R^2$	0.0308	0.0353	0.0357
$N$	231,774	231,774	231,774

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B provides the definition for all variables used.

As presented in Table 3 most proxies used for residential property investor sophistication increase the likelihood of investing non-locally. These results support the conjecture that more sophisticated investors are more likely to invest non-locally than less sophisticated investors.

Investors who hold shares are 1.8 percent more likely to purchase a residential investment property non-locally. Investor who already receive rent/board income, and presumably have other real estate investment, are 5 percent more likely to invest in real estate at a different SLA to their current residence SLA. We however find that investors who already held a prior mortgage are less likely to invest non-locally.

Residential property investors who are professionals or hold management positions are more likely to invest non-locally, while residential property investors who work in the skilled or unskilled trade industry, or who are self-employed or a small business proprietor are more likely to invest locally. Moreover, investors who pay above the median house price for the investment property they are purchasing, and therefore can afford the top market, are 2.3 percent more likely to purchase non-locally.

These findings relating to investor sophistication proxies are consistent with Campbell (2006), who comments that investment mistakes are more commonly made by less wealthy and less well educated individuals. He argues that as a result, less sophisticated investors come to know their limits and avoid more complex or sophisticated investment situations. Graham et al. (2009) apply this argument to the home bias in equity market investing, finding that investor's own perception of competence limits their likelihood to invest non-locally. Our results provide further evidence to support this argument.

### 5.3 H3 out-performing markets

Table 4 tests H3 by considering the market performance of the investors current address, i.e. their home market. For consistency with our definition of local and non-local purchases, we use CoreLogic price index data aggregated to the SLA level in this analysis.<sup>9</sup> The estimation uses the same control variables as in model (B) of Table 3, however we add a new exogenous variable that identifies outperforming markets. That is, estimation results not reported in Table 4 include  $W$  – the years at current address and current employment, monthly net income and net wealth (in logarithmic form), age brackets, female dummy, co-borrower dummy and number of dependents – and  $Z$  – whether investors held a prior mortgage, hold shares, receive rent income, professionals, management positions, small business proprietor, self-employed, professional skilled trade, and unskilled trade. The new variable in  $X$  of eq(1) now also includes the estimation results presented in Table 4. *Above median growth* is a dummy that takes the value of one if the house price growth (measured as change in median all-property index price) in the SLA where the investor resides – their home market – over the prior  $k$  ( $k = 3, 6, 12, 24, 36$ ) months is above the state-wide median all-property SLA house price growth (that is, the price growth in the location is in the top half of all state SLAs).

Table 4: Logit Marginal Effects

	$P(\text{non} - \text{locals}) = 1$				
	(1)	(2)	(3)	(4)	(5)
Above median growth	-0.005*				
(3 months, home market)	[0.002]				

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B

<sup>9</sup>Consistent definition for all variables used, provides the definition for all variables used, other geographical definitions such as postcode.

Table 4 – continued from previous page

	$P(\text{non} - \text{locals}) = 1$				
	(1)	(2)	(3)	(4)	(5)
Above median growth (6 months, home market)		-0.013*** [0.002]			
Above median growth (12 months, home market)			-0.020*** [0.002]		
Above median growth (24 months, home market)				-0.030*** [0.002]	
Above median growth (36 months, home market)					-0.039*** [0.002]
$Z_i$ controls	YES	YES	YES	YES	YES
$W_i$ controls	YES	YES	YES	YES	YES
State dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
$Adj R^2$	0.0344	0.0345	0.0348	0.0352	0.0358
$N$	206,821	206,821	206,821	206,821	206,821

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B provides the definition for all variables used.

Table 4 shows that investors whose home market (current SLA market of residence) outperform the state market are more likely to invest locally. For example, in an environment where the home market house prices has had relatively strong price growth over the preceding 12 months, investors are 2 percent less likely to invest non-locally, and therefore more likely to invest in the same area as their current residence.

This finding runs contrary to our expectation in H3. Rather than use their

relatively strong purchasing power to invest non-locally following strong property prices in their home areas, investors follow their home market's trend. This result may be indicative of momentum chasing. If investors want to chase a rising market, they would have more familiarity of strong price appreciation in their home market, supporting home bias.

Interestingly, this effect is stronger when performance is measured at longer time intervals. The marginal effects considering prior 24 months price appreciation in home market indicates a near-doubling of the likelihood that investors will choose the home market following home market outperformance.

As a further robustness test of the relative purchasing power hypothesis, we consider the price performance of the non-local market (that is, the market into which the investors buy). To do this we add an analogous *Above median growth* dummy variable for the "buy" market. The results from this analysis provide further support for a momentum-chasing effect. The home market coefficient estimate remains negative and statistically significant, while the buy market coefficient estimate is positive and, at performance measurement periods greater than or equal to 12 months, statistically significant. For brevity the full results are presented in Table 5 in Appendix A.

## 6 Conclusion and Future Research Directions

In this paper we analyse the home bias in a previously unexplored setting: residential real estate. This setting provides unique insights, given the breadth of access across demographic groups and other known inefficiencies. It also warrants exploration in the context of investment concentration, where regulators have commented on

the increase in systemic financial risks potentially created by undiversified property investments.

We document a large home bias across both owner-occupier and property investor cohorts. Using a large and detailed mortgage-application level database, we find that non-local property purchases account for 15.8 percent of all purchases in the sample. After controlling for a range of buyer characteristics and market and economic factors, we show that owner-occupiers are more disposed to home bias than investors. Investors are around 13 percent more likely to buy property in a different area to their current address. The home bias among investors is partially mitigated through the investor's level of sophistication. Proxies for investor sophistication, such as prior investment knowledge, wealth, and education, increase the likelihood that the investor will purchase in a non-local market. Finally, we consider whether the relative price performance of home and non-local markets influences the home bias. We argue that if an investor's home market has outperformed, then they have higher purchasing power in non-local markets. However, if their home market has underperformed, a rational explanation for the home bias might be observed. Our results suggest the opposite. Strong local price performance increases the home bias. Investors are observed to prefer their home market when it has outperformed, and will prefer non-local markets when their home market underperforms.

There are several areas of this study that we have yet to explore. An interesting question that our findings raise is, does the home bias have a negative impact on investors' performance? If this phenomenon is driven by behavioural biases we would expect underperformance. We may also consider the risks of home bias and investor concentration, given the practical implications of this aspect of our research. Due to current data limitations, we have not considered whether at the property purchase

level whether non-local buyers overpay (as in Clauretje and Thistle (2007)). We also do not include property market forecasts that may drive demand, such as market expectations for rental yield and housing approvals). These data are observed ex-post, and ex-ante forecasts are unavailable for our sample period. Importantly, this study does not consider tax effects. Though important in property investment decisions, we do not expect that it would influence our work, as the largest tax considerations for investment property in Australia are set nationally, not at different jurisdictional levels. However, this is a further area for future work into the drivers of residential real estate investment.

## References

- Ahearne, A. G., W. L. Grier, and F. E. Warnock (2004). Information costs and home bias: an analysis of us holdings of foreign equities. *Journal of international economics* 62(2), 313–336.
- Badarinza, C., T. Ramadorai, and C. Shimizu (2018). Nationality bias at home and abroad: Theory and evidence from commercial real estate.
- Black, F. (1974). International capital market equilibrium with investment barriers. *Journal of Financial Economics* 1(4), 337–352.
- Bose, U., R. MacDonald, and S. Tsoukas (2015). Education and the local equity bias around the world. *Journal of International Financial Markets, Institutions and Money* 39, 65–88.
- Calvet, L. E., J. Y. Campbell, and P. Sodini (2009). Measuring the financial sophistication of households. *American Economic Review* 99(2), 393–98.
- Campbell, J. Y. (2006). Household finance. *The journal of finance* 61(4), 1553–1604.
- Chinloy, P., W. Hardin III, and Z. Wu (2013). Price, place, people, and local experience. *Journal of Real Estate Research* 35(4), 477–505.
- Clauret, T. M. and P. D. Thistle (2007). The effect of time-on-market and location on search costs and anchoring: the case of single-family properties. *The Journal of Real Estate Finance and Economics* 35(2), 181–196.
- Coval, J. D. and T. J. Moskowitz (1999). Home bias at home: Local equity preference in domestic portfolios. *The Journal of Finance* 54(6), 2045–2073.

- Devaney, S. and D. Scofield (2017). Do foreigners pay more? the effects of investor type and nationality on office transaction prices in new york city. *Journal of Property Research* 34(1), 1–18.
- Dhar, R. and N. Zhu (2006). Up close and personal: Investor sophistication and the disposition effect. *Management Science* 52(5), 726–740.
- Dungey, M., F. D. Tchatoka, and M. B. Yanotti (2018). Endogeneity in household mortgage choice. *Economic Modelling*.
- Fellner-Röhling, G. and B. Maciejovsky (2003). The equity home bias: Contrasting an institutional with a behavioral explanation.
- Flavin, M. and T. Yamashita (2002). Owner-occupied housing and the composition of the household portfolio. *American Economic Review* 92(1), 345–362.
- French, K. R. and J. M. Poterba (1991). Investor diversification and international equity markets. *American Economic Review*.
- Graham, J. R., C. R. Harvey, and H. Huang (2009). Investor competence, trading frequency, and home bias. *Management Science* 55(7), 1094–1106.
- Grinblatt, M. and M. Keloharju (2000). Distance, language, and culture bias: The role of investor sophistication.
- Ihlanfeldt, K. and T. Mayock (2012). Information, search, and house prices: Revisited. *The Journal of Real Estate Finance and Economics* 44(1-2), 90–115.
- Ivković, Z. and S. Weisbenner (2005). Local does as local is: Information content of the geography of individual investors' common stock investments. *The Journal of Finance* 60(1), 267–306.

- Kang, J.-K. and R. M. Stulz (1997). Is bank-centered corporate governance worth it? a cross-sectional analysis of the performance of Japanese firms during the asset price deflation. Technical report, National Bureau of Economic Research.
- Karlsson, A. and L. Nordén (2007). Home sweet home: Home bias and international diversification among individual investors. *Journal of Banking & Finance* 31(2), 317–333.
- Kilka, M. and M. Weber (2000). Home bias in international stock return expectations. *The Journal of Psychology and Financial Markets* 1(3-4), 176–192.
- Kimball, M. S. and T. Shumway (2010). Investor sophistication and the home bias, diversification, and employer stock puzzles.
- Lambson, V. E., G. R. McQueen, and B. A. Slade (2004). Do out-of-state buyers pay more for real estate? an examination of anchoring-induced bias and search costs. *Real Estate Economics* 32(1), 85–126.
- Lin, M. and S. Viswanathan (2015). Home bias in online investments: An empirical study of an online crowdfunding market. *Management Science* 62(5), 1393–1414.
- Ling, D. C., A. Naranjo, and M. T. Petrova (2016). Search costs, behavioral biases, and information intermediary effects. *The Journal of Real Estate Finance and Economics*, 1–38.
- Lizieri, C., J. Reinert, and A. Baum (2011). Who owns the city 2011: Change and global ownership of city of London offices. Technical report, Real Estate Finance Group, University of Cambridge.

- Miller, N., M. Sklarz, and N. Real (1988). Japanese purchases, exchange rates and speculation in residential real estate markets. *Journal of Real Estate Research* 3(3), 39–49.
- Salzman, D. and R. Zwinkels (2013). Behavioral real estate.
- Seiler, M., V. Seiler, S. Traub, and D. Harrison (2008). Familiarity bias and the status quo alternative. *Journal of Housing Research* 17(2), 139–154.
- Seiler, M., J. Webb, and N. MYER (1999). Diversification issues in real estate investment. *Journal of Real Estate Literature* 7(2), 163–179.
- Seiler, M. J., V. L. Seiler, D. M. Harrison, and M. A. Lane (2013). Familiarity bias and perceived future home price movements. *Journal of Behavioral Finance* 14(1), 9–24.
- Stulz, R. (1981). A model of international asset pricing. *Journal of Financial Economics* 9(4), 383–406.

## A Figures and Tables

Table 5: Logit Marginal Effects

	$P(\text{non} - \text{locals}) = 1$				
	(1)	(2)	(3)	(4)	(5)
Above median growth	-0.013				
(3 months, buy market)	[0.013]				
Above median growth	-0.013				
(3 months, home market)	[0.013]				
Above median growth		0.006			
(6 months, buy market)		[0.013]			
Above median growth		-0.066***			
(6 months, home market)		[0.013]			
Above median growth			0.105***		
(12 months, buy market)			[0.013]		
Above median growth			-0.169***		
(12 months, home market)			[0.013]		
Above median growth				0.163***	
(24 months, buy market)				[0.013]	
Above median growth				-0.257***	
(24 months, home market)				[0.013]	
Above median growth					0.268***
(36 months, buy market)					[0.014]
Above median growth					-0.377***
(36 months, home market)					[0.014]
_cons	-3.469***	-3.438***	-3.442***	-3.412***	-3.401***
	[0.093]	[0.093]	[0.093]	[0.093]	[0.093]
Financ. Sophist.	YES	YES	YES	YES	YES
$W_i$ controls	YES	YES	YES	YES	YES

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B

provides the definition for all variables used.

Table 5 – continued from previous page

	$P(\text{non} - \text{locals}) = 1$				
	(1)	(2)	(3)	(4)	(5)
State dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
$AdjR^2$	0.0344	0.0345	0.0350	0.0358	0.0374
$N$	206,821	206,821	206,821	206,821	206,821

[Standard errors]. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Table 6 in Appendix B

provides the definition for all variables used.

## B Variables

Table 6: Definitions for Variables

Variable	Description
Non-locals	Dummy for applicant's residence (SLA4) different to property's location (SLA4).
RIPL	Residential Investment Property Loan. The base are all other loans (mainly owner occupiers).
FHB	Dummy for first-time home buyer main borrower. The base is a repeat-buyer.
Time at current address	Time spent in years at the current residential address as reported by the main borrower at application time.
Time at current employment	Time spent in years at the current employment as reported by the main borrower at application time.
$\log(\text{Net wealth})$	Logarithm of real surplus/net wealth at application, deflated by corresponding capital city CPI 2006 Q1. Difference between real total assets and real total liabilities.
$\log(\text{Net monthly income})$	Logarithm of net monthly income for main applicant, deflated by corresponding capital city CPI 2006 Q1. Income from part-time and overtime work and commission, interest/dividends, rent received, government benefits or pensions, and other monthly income.
$\log(\text{Total value of shares})$	Stock of real value of shares at application, deflated by corresponding capital city CPI 2006 Q1. Zeros for no owned shares.
Shares	Dummy for borrowers who hold shares in their asset portfolios.
Rent income	Dummy for borrowers who receive rent income as part of their income.
Government benefits income	Dummy for borrowers who receive government benefits income as part of their income.

Note. Observations falling into a particular quarter are matched to the relevant quarterly data.

All monetary values are expressed in 2006Q1 AUD \$.

Table 6 – continued from previous page

Variable	Description
Prior Mortgage	Dummy for the presence of a prior mortgage. Base is no prior mortgage.
log(Total value of properties)	Logarithm of real value of properties in portfolio at application, deflated by corresponding capital city CPI 2006 Q1. Zeros for no owned shares.
LTV	Loan-to-value ratio (%).
Age < 30 yrs., Age 30-39 yrs., Age 50-59 yrs., Age $\geq$ 60 yrs.	Dummies for borrower age group. The base is a borrower between 40-49 years old.
Female	Dummy for female main borrower. The base is a male borrower.
Co-borrower	Dummy for applications with joint borrowers.
Number of dependents	Number of dependents as reported by main borrower. Dependent may be children or older adults.
Occupation dummies	Dummies indicating occupation categories as follows: Professional, Management, Service, Office, Skilled Trade, Unskilled trade, Agriculture, Retired, Unemployed and Small business proprietor.
Self-employed	Dummy for self-employed main borrower. The base is an employee borrower.
Married	Dummy for married, or under de-facto relationship, main borrower. The base is a single borrower.
Interbank rate (RBA)	Monthly interbank rate reported by the RBA, F1 Interest Rates and Yields - Money Market.
Unemployment rate	Monthly unemployment rate by corresponding capital city reported by the ABS, Cat. No.6202.0 G7 Labour Force, unemployed persons as a percentage of labour force.

Note. Observations falling into a particular quarter are matched to the relevant quarterly data.

All monetary values are expressed in 2006Q1 AUD \$.

Table 6 – continued from previous page

Variable	Description
% $\Delta$ Dwelling Index	Percentage change in the dwelling index reported by the Westpac-Melbourne Institute Survey on Consumer Sentiment. This index tracks responses on ‘whether now is a good time to buy a dwelling’.
Interstate	Dummy for borrower’s whose current residential state is different to the state where the property under the mortgage contract is located.
Inter-postcode	Dummy for borrower’s whose current address postcode is different to the postcode of the property under the mortgage contract.
Property Status	Dummy variables for existing house, to-be-built house, new house, or vacant land.
State dummies	Regional dummies for Australian States and Territories: ACT, NSW, QLD, SA, TAS, VIC, WA.

Note. Observations falling into a particular quarter are matched to the relevant quarterly data. All monetary values are expressed in 2006Q1 AUD \$.