HOUSING AND THE HOUSEHOLD WEALTH PORTFOLIO: THE ROLE OF LOCATION

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Abstract

There is little doubt that cities can provide many benefits, such as greater employment and business opportunities, which tend to result in higher income and wealth for urban households. In addition, there may be a number of non-pecuniary benefits, including greater access to education, infrastructure and services. But these benefits are accompanied by an urban premium on house prices, thus possibly affecting the composition of the asset portfolios of households living in different locations.

Using a recent cross-section of wealth data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey we test whether urbanisation, when controlling for other factors, has a significant effect on the share of assets that households hold in housing. For owner-occupiers, the effect is found to be significant and positive, suggesting that housing is more expensive in larger cities even once we allow for the higher incomes and asset holdings of these households. In fact, the effect is quite large with a 100 person per square kilometre increase in urbanisation increasing the share of assets held in the home by 0.4 percentage points, on average. Further, we find that this effect is not linear but declines at higher levels of urbanisation. Hence, for example, for an average owner-occupier household moving from Cairns to Brisbane city – an increase in urbanisation of around 2 000 persons per square kilometre – the increase in their housing share of total assets is estimated to be 5.6 percentage points.

JEL Classification Numbers: D31, R12, R21, R23
Keywords: HILDA, owner-occupiers, household survey, households, wealth shares

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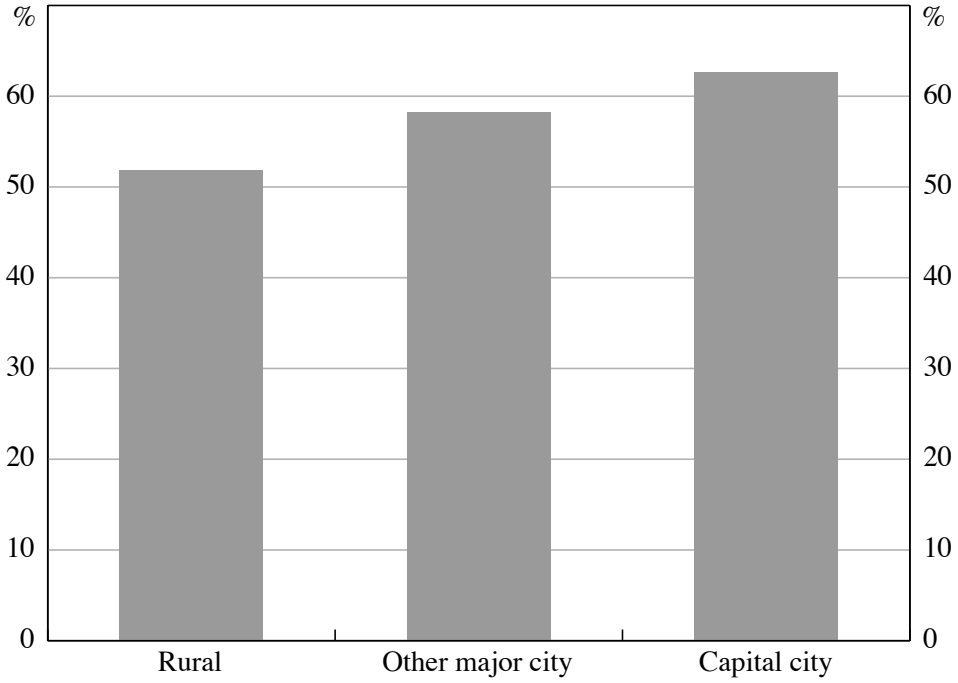
1. Introduction

For most Australian households the most valuable asset is their own home, with the average owner-occupier holding around 60 per cent of total assets in housing. This portfolio mix varies considerably across all households, and more specifically, it varies between urban and rural locations.

Based on wealth data for owner-occupiers in the 2002 Household, Income and Labour Dynamics in Australia (HILDA) Survey, Figure 1 shows that, on average, households in urban areas hold a higher share of their assets in their own home than do rural households (see the Appendix for a detailed description of the data and sources).

Figure 1: Average Share of Total Assets Held in Own Home

By residential city; all owner-occupiers



Source: HILDA 2002, Release 2.0

The question then is why might urban households be willing to allocate a higher share of their assets to housing? Presumably there must be some factor, or combination of factors, that can explain such behaviour, since by itself holding a higher share of assets in the own home is a costly exercise. This follows from the fact that a portfolio which is heavily concentrated in the own home would limit the benefits that might otherwise come from a more diversified portfolio of assets, such as lower risk and possibly higher income.

There are three possible benefits that might offset this cost. First, households may be willing to pay a higher price for a home in an urban area if the house itself is assessed as being of inherently higher quality. However, as we argue later, there is evidence to suggest that this is not the case, on average.

A second possibility is that higher dwelling prices in cities could reflect the well-known 'urban wage premium' (Glaeser 1999).[1] That is, controlling for household characteristics (their earning and saving capacity in particular), a household can expect, on average, to earn a higher income and accumulate more wealth in a more urban setting. Faced with a choice between an urban and rural setting, households should be willing to pay more for their home in order to secure access to the higher incomes which are generally available in cities.[2] In principle, this could lead households to hold a higher share of assets in their own home in more urban settings. However, this need not be the case and, as we discuss later, this effect could even work in the opposite direction.

A third possibility is that there is an 'urban premium' built into house prices reflecting the other (non-pecuniary) benefits that cities can provide, which could explain why households are willing to hold a higher share of assets in their own home. These benefits could include greater access to infrastructure and services (such as health and education), as well as the opportunities to interact with a larger pool of people. At the same time, however, there could be costs associated with

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1 Closely related to this, the greater employment and business opportunities in more urban areas will tend to reduce the variability of wage and business incomes, thereby offsetting some of the risk associated with a less diversified portfolio of assets.

2 While this discussion pre-supposes that households make the same tenure decisions independent of location, such an assumption seems reasonable given that home ownership rates are equally high across rural and urban locations, at around 70 per cent.

greater urbanisation related to congestion, including increased travel times, greater pollution and more crowded public facilities.

In short, the fact that urban households are willing to devote a larger share of their total assets to housing suggests that in net terms they value the urban setting. How much they value urbanisation, and whether this also reflects non-pecuniary benefits of cities, is the focus of this paper.

Using a recent cross-section of wealth data from the HILDA Survey, we examine how households living in different locations allocate their total asset holdings. Looking at owner-occupiers only, we test whether urbanisation is a significant predictor of the share of total assets held in property, once we control for income and other factors that can affect asset allocation. For owner-occupiers, this effect is found to be significant and positive, with a 100 person per square kilometre increase in urbanisation increasing the share of assets held in the home by 0.4 percentage points, on average. We also find that this effect is not linear but declines at higher levels of urbanisation. Hence, for example, for an average household moving from Cairns to Brisbane city – an increase in urbanisation of around 2 000 persons per square kilometre – the increase in their housing share of total assets is estimated to be only 5.6 percentage points.

We extend our analysis to account for two aspects of home ownership: the consumption of housing services and the investment decision. To shed some light on this distinction, and how location affects this, we analyse households that own their home and at least one other property. In this case, the effect of an increase in urbanisation is found to be (close to) linear for their own home. In contrast, the investment component of housing shows that there is a limit, albeit quite high, to the share of total assets that multiple property owners are willing to allocate to total property assets.

The remainder of this paper is structured as follows. In Section 2, we briefly examine previous studies related to the subject of our paper. Section 3 examines the role of housing in the household portfolio for our dataset. Section 4 discusses our choice of urbanisation measure and presents the estimation results. Section 5 concludes.

2. Literature Review

There is little doubt cities can provide benefits, such as employment and business opportunities, that result in higher income and asset holdings of their residents. The literature on urban economics, which studies the economics of agglomeration, goes back to von Thünen in the 19th century.[3] While this strand of literature initially focused on industrial agglomeration and the benefits derived from it, another focus has been on population density and the human capital benefits resulting from frequent contact between many people. This aspect has been especially prominent in literature analysing the earnings gap between urban and rural areas. Benefits such as the development of skills and the imitation and transfer of knowledge that arise from geographical concentration have been well documented in the recent urban economics literature, particularly Glaeser (1999) and Glaeser and Maré (2001). While these agglomeration effects can boost incomes, they also imply a higher cost of housing due to the relative scarcity of land in more densely populated areas (see, for example, Ellis and Andrews 2001, Gramlich 2002 and Voith 1999). A natural result of higher dwelling prices is that it can affect households' choice of asset allocation for those households that decide to own their home rather than rent. Two effects can be at work here. First, to secure access to the higher income (and the associated accumulation of wealth) that comes from city living – the urban wage premium – households should be willing to allocate at least some portion of their extra income/wealth to housing. Exactly how much depends on a number of factors, including the nature of household preferences and the extent to which housing services are divisible.[4] Ultimately, the

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3 For a detailed discussion refer to Fujita and Thisse (2002) or Krugman (1996).

4 Variation in income/wealth can occur along two dimensions. First, income/wealth can vary within a given location across households (reflecting variation in their earning capacities). If preferences are homothetic and housing services are perfectly divisible, variation in income/wealth should have no effect on the share of income/wealth devoted to housing. However, a positive or negative effect could occur under other types of preferences, or if housing services are sufficiently lumpy. The second dimension to consider is changes in income/wealth across locations for a given household (that is, with unchanged earning capacity and other characteristics). Again, it is easy to show that the effect on the share of income/wealth devoted to housing could be negative or positive depending on preferences and/or the lumpiness of housing services. The key here is that house prices in both locations will be determined endogenously so that in equilibrium the average household is indifferent between locations, assuming constant non-pecuniary benefits.

way in which the share of assets held in housing responds to variation in income and wealth is an empirical question.

The second effect is due to the possibility of additional (net) benefits that make households willing to allocate a greater share of their assets to housing in cities. These non-pecuniary benefits include greater amenities and lifestyle opportunities typically associated with cities. By itself, this second effect implies that households will be willing to hold a more concentrated portfolio of assets in order to access the benefits of city living.

There has been little previous work using household-level data linking the *share* of housing in households' assets with urbanisation. Some empirical work has shown that location matters for the housing tenure choice (Curcuru 2003 and Rapaport 1997), but the relevant factors in the tenure decision can have quite different effects from those in the asset allocation decision. Studies that look more generally at what determines household portfolio composition, such as health (Rosen and Wu 2004) or age (Ameriks and Zeldes 2001), typically focus on financial asset portfolios rather than property portfolios. Like other studies on household portfolio composition, such as King and Leape (1998), we focus on those households that own an asset, rather than modelling the participation decision, and we focus on housing assets, rather than net housing wealth, since we want to abstract from the financing decision.[5]

Micro-data studies that link urbanisation and wealth generally find a significant effect between the two. For example, a study by Fisher and Weber (2004), using data for the United States, finds that people living in non-metropolitan areas are up to 2 per cent more likely to be net worth poor than those living in large metropolitan areas. In a different context, using Swedish data, Goetzmann, Massa and Simonov (2004) find that under-diversification of equity portfolios in urban areas is strongly linked to the professional and geographical proximity of investors

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[5] Portfolio studies, especially of equity holdings, typically also include the rate of return of the asset as an explanatory variable. This is more difficult in the case of housing, since this asset combines an investment and a consumption decision. In the case of the location decision, it may also involve an employment decision, especially if comparable rental accommodation between locations is not readily available (as could be expected in countries with high home ownership rates, such as Australia).

to specific stocks. That is, rural investors, who have less intimate knowledge of specific stocks, tend to hold more diversified equity portfolios.

Such micro-data studies on household asset allocation decisions have not been attempted in Australia before, with household-level wealth data only becoming available quite recently with the 2002 HILDA Survey. At a macroeconomic level, Ellis and Andrews (2001) observe that Australians tend to hold more of their assets in housing than households in other countries. They suggest that this is due to the high average level of dwelling prices resulting from the unusual concentration of Australia's population in two large cities.

With disaggregated household asset data now available for Australia, we examine the share of total assets that owner-occupiers are willing to devote to their own home, across different urbanisation levels, controlling for wage-premium effects by means of income and wealth.

3. Property Holdings in the Household Asset Portfolio

Before we estimate a full model of the effects of urbanisation on the housing share of assets in Section 4, we examine the asset shares based on our HILDA Survey sample, without controlling for other factors. We restrict our analysis to those households that own their home. With home ownership rates around 70 per cent for both rural and urban regions, we capture a suitably large and equal share of the population in all regions.

Figure 2, which is based on the 2002 HILDA Survey, confirms that for owner-occupier households, average assets and income rise with urbanisation.[6] There are also notable differences in the composition of both financial and non-financial assets across different regions (Table 1 and Figure 3). Overall, the average portfolio of urban households appears to be less diversified than that of rural households. A key source of concentration in the urban portfolio is the larger share of property in total assets: for owner-occupiers, the average share of the own home is up to 11 percentage points higher in capital cities, and for households that own

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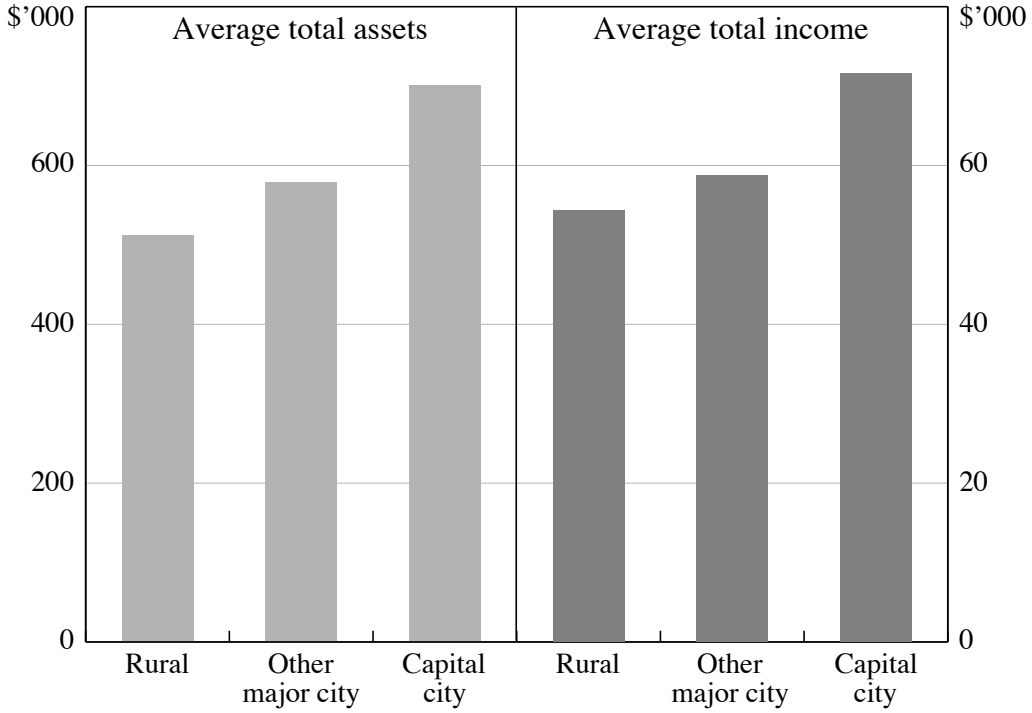
6 For this initial investigation, location is divided into three broad regions: capital cities, other major cities and rural areas. Capital cities are based on Sydney, Melbourne, Brisbane, Adelaide and Perth Statistical Divisions. Other major cities and rural areas are derived from the Accessibility/Remoteness Index of Australia scores from the 2001 Census (see the Appendix).

more than one property, the share of total property is up to 13 percentage points higher (Figure 3). Working in the other direction, urban households hold a smaller share of their assets in the form of business assets, vehicles, bank accounts and life insurance. For business assets and life insurance this may reflect the larger share of self-employed workers in rural areas (14 per cent) compared with capital cities (6 per cent).

Figure 2: Average Total Asset and Income of Owner-occupier Households

By residential city



Source: HILDA 2002, Release 2.0

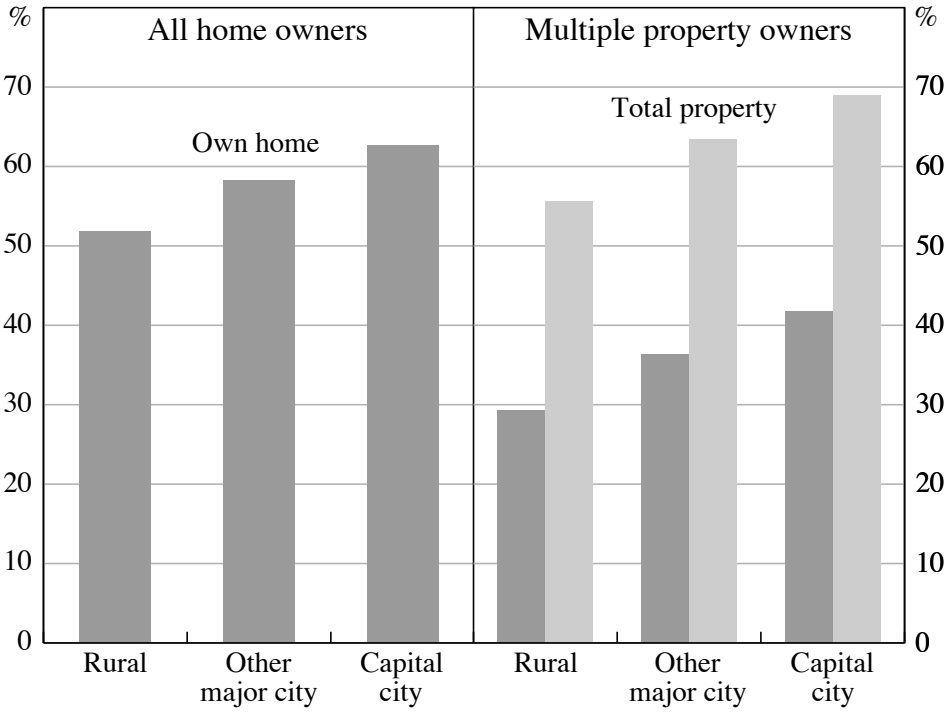
Table 1: Composition of Assets

	Own home	Other property	Business assets	Vehicles and collectibles	Superannuation and life insurances	Cash investments and equities
Rural area	51.9	5.3	7.6	8.1	15.4	11.8
Major city	58.3	5.2	4.2	6.2	14.6	11.5
Capital city	62.6	5.8	2.6	4.5	14.8	9.8

Source: HILDA 2002, Release 2.0

Figure 3: Average Property Share of Total Assets

By residential city



Source: HILDA 2002, Release 2.0

There is clearly a premium paid on owner-occupied property by households living in more densely populated locations. One explanation for this premium could be a higher quality of housing in urban areas. However, Table 2, which compares some housing quality indicators between urban and rural locations, suggests that this is not the case. We find that the average number of persons per bedroom is similar between capital cities and rural areas. Similarly, there is no appreciable difference in the condition of the home. The only difference that arises relates to the type of dwelling. In capital cities we find a lower share of the population living in separate houses, with semi-detached houses and apartments being more common. If anything, this suggests that the quality of housing in capital cities is lower than in rural areas because smaller semi-detached houses or apartments generally provide lower 'housing services' than free-standing houses. Yet, we find the typical value of the home for those living in capital cities is almost $150 000 more than for those living in rural areas. Hence, with little appreciable difference in housing quality, the difference in home values between urban and rural areas must be attributable to the wage premium and/or the (non-pecuniary) urban premium paid for living in more populous cities.

Table 2: Indicators of Housing Quality by Location

	Persons per bedroom	External condition of the home[(a)]	Proportion of households with separate house (per cent)
Rural area	1.6	1.9	92.2
Major city	1.6	1.9	91.9
Capital city	1.5	1.8	84.2

Note: (a) Observed by the interviewer. Ranked on a scale from 1 = very good/excellent to 5 = very poor/almost derelict.
Source: HILDA 2002, Release 2.0

A number of other household characteristics might also explain why city households choose to hold a higher share of assets in property, such as marital status or household size. If these characteristics are unevenly distributed across rural and urban locations, they could also lead to differences in housing shares in total assets. We will therefore proceed with the estimation of a model that controls for differences in these other factors.

4. Empirical Model and Results

Before we present the model and estimation results, we first discuss the choice of our central variable, a measure of urbanisation.

4.1 Measuring Urbanisation

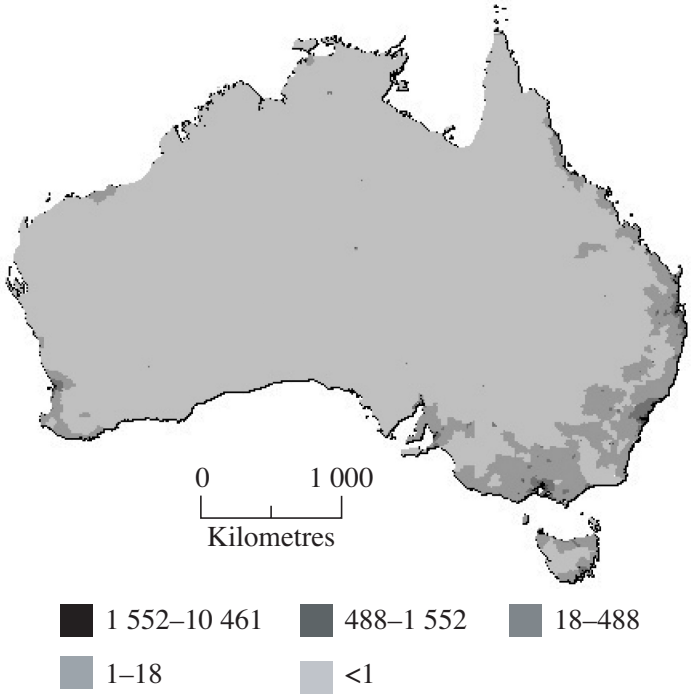
Previous urban economics literature gives us little guidance about the appropriate measure of urbanisation. Since we are especially interested in the effects on asset shares due to geographical concentration and the general benefits that cities provide, we confine our search to measures based on population and/or distance.

Population density is perhaps the most straightforward measure for the degree of ‘isolation’ of a local district. We measure population density for each household’s Statistical Local Area (SLA), which are government administrative areas. Population density has the advantage that it captures the urbanisation/geographical concentration of the place of residence and it gives a plausible representation

of the concentration of cities in Australia (Figure 4).[7] Glaeser (1999) argues that the benefits of living in larger cities are generated from interaction between individuals, while Marshall (1961) argues that intellectual flows between individuals depreciate over space. Hence, we choose population density as our preferred measure. However, it is comforting that other urbanisation measures provide similar empirical results.

Figure 4: Population Density

Persons per square kilometre by Statistical Local Area



Sources: ABS; RBA

One other common measure, which accounts for both population and remoteness, is the Accessibility/Remoteness Index of Australia (ARIA) for each household's SLA, compiled by the Australian Bureau of Statistics (ABS).[8] ARIA is a 'measurement of the physical road distance between where people live and the places those people travel to in order to obtain goods and services, and to enjoy the opportunities for social interaction' (ABS Cat No 1244.0 2001, p 11). As

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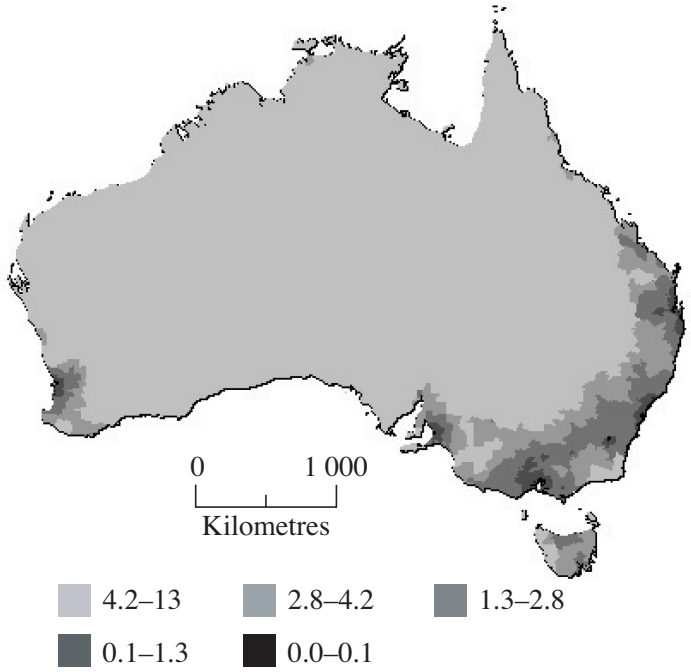
7 The maps (Figures 4 and 5) are divided into quintiles of SLAs. There are a greater number of SLAs in more urban areas.

8 Other measures we considered were population and simple dummy variables for location. Again, the results were robust to the use of these measures.

well as accounting for population, ARIA incorporates the relative distance the household must travel to access a full range of services.[9] The ARIA measure identifies relatively urbanised regions further inland than may have been expected for Australia (Figure 5). It is questionable whether the benefits of geographical concentration are sufficiently high in these areas to be driving up dwelling prices to an appreciable extent. Therefore, accessibility or remoteness measured in this way does not appear to be the best proxy for our urbanisation exercise.

Figure 5: Accessibility and Remoteness Index (ARIA)
By Statistical Local Area



Note: Index ranges from 0 (capital cities) to 13 (remote locations).
Sources: ABS; RBA

4.2 Model and Methodology

To test the relationship between urbanisation and property asset holdings in the portfolio, we regress the share of total assets held in the form of property on a measure of urbanisation, controlling for other variables that may affect the portfolio decision. We restrict ourselves to modelling only owner-occupiers for two reasons. First, renters have a zero share of housing assets in their

9 The index is only available for 1996 SLAs, thereby requiring some judgment in allocating the index into the appropriate 2001 SLAs.

portfolio, requiring a more complex modelling strategy such as the two-part models commonly used in the portfolio share literature. For such models, the first stage relates to tenure choice whereas the focus of our paper is on asset allocation. As pointed out in Duan *et al* (1983), households with a zero share of property in total assets are not missing shares, they simply tell us nothing about the difference in the property share of assets between urban and rural locations. Second, many renters may be unable to afford to buy their own home. In this case, not owning the home is not an asset allocation *choice*. This is supported by HILDA evidence that renter households tend to have less net wealth than owner-occupiers.[10] A final comment is that the omission of renter households is likely to make little difference as home ownership rates in Australia are similar between rural, other major city or capital city locations.

Because the portfolio shares are bounded between 0 and 100 (in percentage terms), an appropriate model is the logistic regression.[11] In this regression, the dependent variable is transformed and the model estimated using OLS[12], with the equations taking the form:

$$ln\left(\frac{share_i}{100-share_i}\right) = \beta_0 + \beta_1 popdens_i + \sum_{k=2}^{N} \beta_k X_{ki} + \varepsilon_i$$

where: $share_i$ is the percentage of assets held in property of household *i*; *popdens* is the population density of that household's Statistical Local Area (SLA); and *X* is a set of independent household characteristics.

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[10] Five households in our sample hold 100 per cent of their assets in the home and are also excluded. We drop these from our sample because they are small in number and, unlike more liquid financial assets, it is unusual for households to hold 100 per cent of their assets in the home; hence, these are likely to be data errors. In fact, Poterba and Samwick (2003) in their study of US financial assets choose a two-limit tobit estimator with truncation at zero and one. Instead of following this approach, Rosen and Wu (2004) employ the one-limit tobit model with truncation at zero for reasons of simplicity.

[11] In order to restrict the portfolio shares, the transformed dependent variable takes on values between $-\infty$ and ∞. Potentially, this could induce the problem of outliers in the transformed dependent variable for shares close to the boundaries of either 0 or 100 per cent. We choose to estimate shares between 5 and 95 per cent though this has little effect on the results.

[12] Because the dependent variable is a share, the variance of the error term is heteroskedastic. We therefore report the White heteroskedasticity-consistent standard errors.

4.3 Estimation Results for All Owner-occupiers

The results from the logistic regression for all owner-occupiers are presented in Table 3. From this table, the sign of the coefficient can tell us the direction of the relationship between a particular variable and the share of housing assets. However, the magnitudes of the coefficients in logistic regressions have no intuitive interpretation. Therefore, marginal effects are provided, evaluated at the sample means.[13]

4.3.1 Population density

Our model shows a strong relationship between urbanisation and the share of the own home in total assets. Even after controlling for household income, net wealth, and other household characteristics, we find that the degree of urbanisation increases the share of assets held in the own home. Figure 6 graphs the estimated housing share of total assets at various population density (urbanisation) levels. To do this, we increase population density by equal increments while setting all other explanatory variables to their average values. Figure 6 shows, for example, that for households residing in Cairns – a population density of around 5 600 persons per square kilometre – the share of assets that they hold in their own home is estimated to be 78 per cent, controlling for other factors. This is quite a large share, given that Cairns is not even a capital city, and thus highlights the sizeable effect that living in more agglomerated cities can have on home values.

Also of interest is the shape of the housing-share curve. This provides us with the marginal effects of urbanisation on the share of assets devoted to housing at each population density level. From Table 3 we know that the average marginal effect of population density on the share of housing wealth is quite large, with an increase in the population density of 100 persons per square kilometre increasing the share of housing assets by 0.4 percentage points, on average. However, Figure 6 also illustrates that this marginal effect is not constant across population density levels. For example, an average household moving from Cairns to Brisbane city – an increase in urbanisation of around 2 000 persons per square kilometre – will have an estimated increase in their share of total assets held in their own

[13] The marginal effects and their significance were calculated using the *predictnl* command in Stata/SE 9.0.

Table 3: Share of Total Assets Held in Own Home
All owner-occupiers; marginal effects at sample means

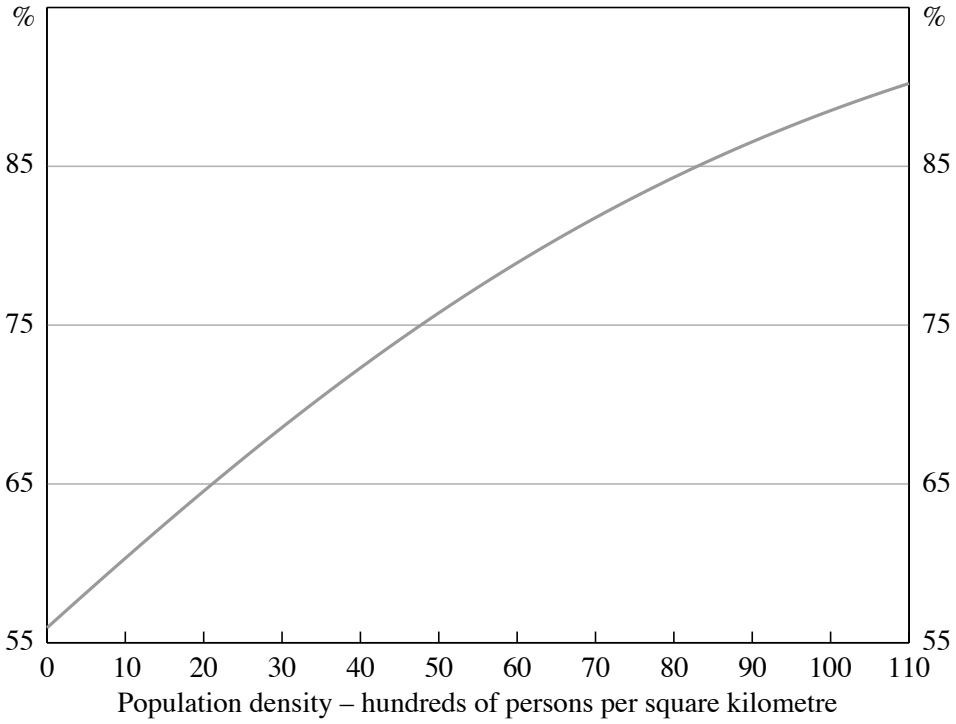
Variable	Coefficient	Sample mean	Selected unit	Marginal effect
Population density	0.02^{***}	963 persons per square kilometre	100 persons per square kilometre	0.43^{***}
Household income	$-2.30\times10^{-3***}$	$67 892	$1 000	-0.04^{***}
Household income squared	$3.15\times10^{-6***}$			
Net wealth	$-9.62\times10^{-4***}$	$555 982	$1 000	-0.02^{***}
Net wealth squared	$5.88\times10^{-8***}$			
Age	-0.05^{***}	50.10 years	1 year	-0.20^{***}
Age squared	$4.20\times10^{-4***}$			
Divorced	0.22^{***}	0.05	Compared with married	5.22^{***}
Separated	0.18^{*}	0.04	Compared with married	4.16^{*}
Widowed	0.25^{***}	0.09	Compared with married	5.77^{***}
Earns rental income	-0.55^{***}	0.18	Not earning rental income	-13.46^{***}
Gender	-0.08^{**}	0.64	Compared with female	-1.85^{**}
Tradesperson	0.09^{*}	0.10	Compared with professional	2.14^{*}
Intermediate production worker	-0.11^{*}	0.06	Compared with professional	-2.71^{*}
Not working	0.29^{***}	0.30	Compared with professional	6.75^{***}
Part-time employed	0.15^{***}	0.12	Compared with full-time employed	3.64^{***}
Couple with no children	-0.15^{***}	0.32	Compared with couple with children	-3.56^{***}
Lives alone	-0.26^{***}	0.27	Compared with couple with children	-6.30^{***}
Single parent	-0.19^{*}	0.03	Compared with couple with children	-4.53^{*}
Constant	2.34^{***}			

Number of observations = 4 422
R^2 = 0.36

Note: ***, ** and * represent significance at the 1, 5 and 10 per cent levels, respectively.

Figure 6: Share of Total Assets Held in Own Home

All owner-occupiers



home of 5.6 percentage points. Yet, a move between the less dense cities of Canberra and Perth – the same 2 000 persons per square kilometre increase in urbanisation – results in a larger increase in the housing share of total assets, of 8.0 percentage points.[14,15] In fact, the maximum marginal effect of population density on housing asset shares appears to occur at a population density level well

[14] Population densities of Cairns and the cities of Brisbane, Canberra and Perth are 5 641, 7 631, 968 and 2 904 persons per square kilometre, respectively.

[15] This experiment of changing population density while holding all other household characteristics constant ignores the potential link between income/wealth and urbanisation due to the wage-premium effect. One way to account for this is to include variables for the average income and wealth of each SLA in the regression analysis (while transforming individual income and wealth variables to be in terms of deviations from SLA averages). Doing so does not substantially alter the results, particularly with regards to population density. The coefficient estimate for average wealth is significant (at around -4.76×10^{-4}) but not the coefficient for average income. Now consider a household moving from SLAs with population densities similar to Canberra to SLAs with densities similar to Perth. Instead of holding wealth constant, assume that average wealth moves up according to the average of these SLAs. The housing share of total assets still rises, but by 2 percentage points less than the case when wealth is assumed to be constant across SLAs.

below our sample range; this is the point where the slope of the housing-share curve is at its steepest.[16]

The shape of the housing-share curve suggests that a given rise in urbanisation has a slightly larger effect on the holdings of housing assets for households living in more rural areas than for those living in more urban areas. Because we know from Table 2 that the quality of housing is not appreciably different between urban and rural areas and our regression results control for income and wealth, the additional benefits of urbanisation are likely to be due to such things as access to a fuller range of amenities and the depth and frequency of human interactions that a more populated city can bring. Hence, it is perhaps not unexpected that the marginal effect of this is greatest for rural areas. However, an alternative interpretation of the shape of the housing-share curve is that the marginal non-pecuniary benefits of urbanisation might be constant (or even rising) with population density, but the marginal costs associated with a more concentrated asset portfolio could be increasing. That is, households may become increasingly reluctant to increase their share of assets held in one house, thereby leading to the flattening shape of the housing-share curve. By extending our analysis to multiple property owners we will be able to determine whether it is non-linear portfolio concentration costs or non-linear urban-premium benefits that are dictating the shape of the owner-occupier housing-share curve (for their own home).

4.3.2 Household characteristics

Our estimated model in Table 3 controls for a range of other factors that could affect the housing share in total assets. Household income has a negative effect on the share of assets held in housing; at sample means, as the income of the households rises by $1 000, the share of housing assets is estimated to fall by 0.04 percentage points. One possible reason for this, supported by results found in Rosen and Wu (2004) for the US, is that households with higher incomes hold a higher share of their assets in superannuation because of their higher employment income. It is interesting, however, to compare this negative coefficient with results from probit models, which find that the probability of owning a house actually increases with income (Kohler and Rossiter 2005). In combination, these results support the idea that households want a certain level of housing services,

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16 Very remote parts of Australia are excluded from the HILDA Survey sample.

but beyond this a declining share of additional income is devoted to housing services.[17]

We also find that net wealth has a negative effect on the housing share of wealth, with an increase in net wealth of $1 000 decreasing the share of assets that households hold in their own home by 0.02 percentage points, on average.[18] This suggests that higher net wealth results in diversification into other assets, including, perhaps, other property assets.[19] This evidence is similar to that by Rosen and Wu (2004) who find for the US that superannuation, bonds and risky assets increase with net wealth, while safe financial assets decline with net wealth.

Consistent with life-cycle considerations, we find that the share of wealth in housing declines with age by 0.2 percentage points per year, on average. This is in line with results found by Fisher and Weber (2004), which suggest that the probability of holding a greater share of total assets in financial assets increases with age. Similarly for Australia, La Cava and Simon (2003) find that the probability of being financially constrained declines with age. Interestingly, there is a significant positive effect from the quadratic age term. This indicates that as households go into retirement (at around age 60), they no longer contribute to their holdings of other assets (such as superannuation) and in fact commence drawing them down, increasing the share of housing.

Male household heads were found to hold 1.9 percentage points less of their assets in the home than households headed by a female. As per the results for net wealth, this is likely to be related to the fact that male-headed households tend to be

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[17] The significant quadratic effect suggests that at very high income levels a greater share of assets are held in the home. However, this effect only begins to take effect for household total income levels greater than $365 000, an income level applicable to less than 0.4 per cent of our sample, and may therefore be a result of our assumed functional form rather than an exact empirical estimate.

[18] While average net wealth reported in Table 3 may appear quite high, this is a result of the skewness of the distribution of net wealth. Median net wealth is $362 000.

[19] There is also a significant quadratic effect suggesting that at very high wealth levels ($8 million, representing less than 0.1 per cent of our sample) households choose to hold a higher share of assets in their own home. But the very small sample size available to estimate this turning point makes this result imprecise.

more diversified in their asset holdings; Rosen and Wu (2004) find that female-headed households hold a higher share of their portfolio in safe assets rather than superannuation, bonds or risky assets. Including a variable which interacts gender and single person households (results not shown) lessened the negative effect of gender. Single male households tend to hold less of their assets in the home because these households tend to hold a higher share of their assets in vehicles and risky financial assets than other household types, on average.

It was not unexpected to find that households that earn rental income hold a smaller share of their assets in their own home, consistent with the fact that the majority of these households own another property. In fact, there may be some evidence of substitution between investment in the own home and in rental properties given that for households earning rental income, the share of assets devoted to their own home is 13.5 percentage points lower than it is for owner-occupier households not earning rental income.

4.4 Estimation Results for Multiple Property Owners

We have also estimated our model for a subset of households that own both their own home and additional residential property (which may be a holiday home or a rental property). The results for this group may allow us to shed more light on the effect of the different motives for holding housing assets, the consumption of housing services (including associated amenities available in the vicinity of that house) and investment in property assets. Unfortunately, we have no information about the location of the investment property. We therefore consider total property rather than investment property on its own. We compare these households' own home and total property wealth to get some idea as to their relative demand for housing services and benefits of living in an urban area, and the demand for investment in property assets. A comparative set of results to those given in Table 3 are presented in Tables 4 and 5.

4.4.1 Population density

Figure 7 shows the asset share of the own home and of all property holdings for owner-occupiers with multiple residential properties. This gives us some indication of the relative effects that urbanisation might have on each type of property share. First comparing the home owner results of Figure 6 with Figure 7,

Table 4: Share of Total Assets Held in Own Home
Multiple property owners; marginal effects at sample means

Variable	Coefficient	Sample mean	Selected unit	Marginal effect
Population density	0.02^{***}	1 102 persons per square kilometre	100 persons per square kilometre	0.40^{***}
Household income	$-1.65\times10^{-3**}$	$92 054	$1 000	-0.03^{**}
Household income squared	$3.01\times10^{-6**}$			
Net wealth	$-4.78\times10^{-4***}$	$978 045	$1 000	-0.01^{***}
Net wealth squared	$2.24\times10^{-8***}$			
Age	-0.03^{**}	49.64 years	1 year	-0.16^{***}
Age squared	$2.39\times10^{-4**}$			
Never married	-0.27^{***}	0.10	Compared with married	-6.07^{***}
Earns rental income	-0.19^{***}	0.64	Not earning rental income	-4.35^{***}
Associate professional	-0.16^{**}	0.13	Compared with professional	-3.58^{**}
Intermediate production worker	-0.19^{**}	0.05	Compared with professional	-4.34^{**}
Labourer	0.22^{*}	0.03	Compared with professional	5.23^{*}
Not working	0.16^{*}	0.19	Compared with professional	3.78^{*}
Part-time employed	0.14^{**}	0.14	Compared with full-time employed	3.36^{**}
Couple with no children	-0.20^{***}	0.36	Compared with couple with children	-4.65^{***}
Constant	0.88^{***}			
Number of observations = 921				
R^2 = 0.32				

Note: ***, ** and * represent significance at the 1, 5 and 10 per cent levels, respectively.

Table 5: Share of Total Assets Held in Property
Multiple property owners; marginal effects at sample means

Variable	Coefficient	Sample mean	Selected unit	Marginal effect
Population density	0.02^{***}	1 102 persons per square kilometre	100 persons per square kilometre	0.38^{***}
Household income	$-2.98\times10^{-3***}$	$92 054	$1 000	-0.04^{***}
Household income squared	$5.86\times10^{-6***}$			
Net wealth	$-5.60\times10^{-4***}$	$978 045	$1 000	-0.01^{***}
Net wealth squared	$3.01\times10^{-8***}$			
Age	-0.06^{***}	49.64 years	1 year	-0.17^{**}
Age squared	$5.05\times10^{-4***}$			
Earns rental income	0.21^{***}	0.64	Not earning rental income	4.66^{***}
Gender	-0.21^{***}	0.67	Compared with female	-4.45^{***}
Not working	0.22^{*}	0.19	Compared with professional	4.58^{**}
Part-time employed	0.17^{*}	0.14	Compared with full-time employed	3.67^{*}
Dependent	-0.80^{***}	$2.17\times10^{-3***}$	Compared with couple with children	-19.04^{***}
Couple with no children	-0.27^{***}	0.36	Compared with couple with children	-5.87^{***}
Constant	2.81^{***}			
Number of observations = 921				
R^2 = 0.27				

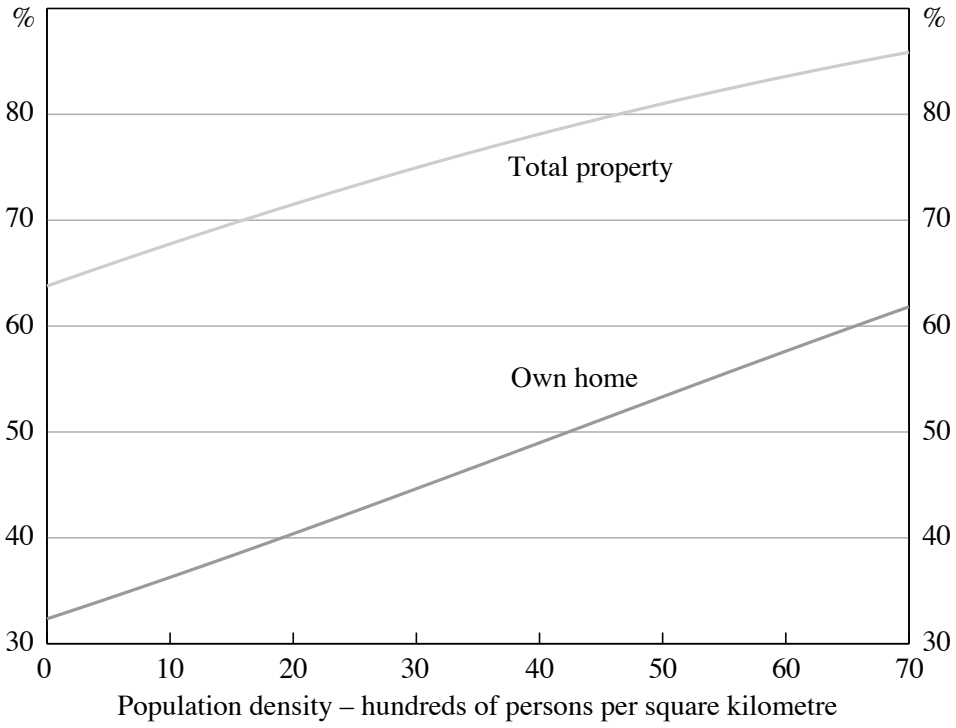
Note: ***, ** and * represent significance at the 1, 5 and 10 per cent levels, respectively.

we can see that when more than one property is owned by the household, the share of assets held in the own home is smaller; for example, for a population density of around 5 600 (Cairns) the share is now only 56 per cent of assets, compared with 78 per cent across all owner-occupiers. Also, for multiple property owners the consumption and investment preferences regarding property can be identified: their consumption preference through the choice of their own home and their investment decision through the purchase of other property – that is, the additional amount they wish to hold in total property assets (Henderson and

Ioannides 1983). Because these households are not likely to be constrained in their consumption decision, the slope of their own-home curve specifically gives us a measure of the benefits of living in a more populated city. Figure 7 shows that the own-home curve is now rising at a relatively constant rate over our sample of multiple property owners, by about 0.4 percentage points for every 100 persons per square kilometre.[20] This implies that the benefits of urbanisation increase linearly across the entire sample range of urbanisation levels. What this suggests for all owner-occupiers (Figure 6) is that the marginal benefit of living in more urban areas is not declining at higher population densities. Instead it seems that there is a rising marginal cost associated with holding an asset portfolio that is increasingly concentrated in housing.

Figure 7: Share of Total Assets Held in Property

Multiple property owners



This latter point is supported by the shape of the total property curve for multiple property owners in Figure 7. This shows that an increase in the population density of 100 persons per square kilometre results in a 0.4 percentage point increase in the total property share, on average. More importantly, and unlike for the own

[20] As restricted by the model, the share is bounded between 0 and 100 and hence will flatten out at very high levels of population density.

home, the slope of the curve for the share of assets held in total property is declining at higher levels of urbanisation.

4.4.2 Household characteristics

For multiple property owning households, income and net wealth have a negative, statistically significant and non-linear effect on the share of assets held in the home. The age variable is consistent with the life-cycle hypothesis; as before, a one year increase in age decreases the share of assets held in the own home by 0.2 percentage points, on average. Also as before, if the household earns rental income, there is a smaller share of assets held in the own home, though for multiple property owners the share is only 4.4 percentage points lower than it is for those not earning rental income, compared with the 13.5 percentage point difference when all owner-occupiers are examined.

Turning to the total property regressions, we find that household income, net wealth and age have broadly the same effects on the total property share as for the own home regressions. In contrast to the own home regressions, we find that those households that earn rental income (which is likely to come from an investment property) hold a higher share of assets in total property than multiple property holders without rental income.

5. Conclusions

In this paper we have used a cross-section of household-level data to estimate whether urbanisation has a significant effect on the share of assets that households hold in residential property. Our descriptive results, without controlling for household-specific factors, suggest that there is around an 11 percentage point difference in the share of wealth held in the own home between urban and rural areas. Further, some simple indicators of housing quality suggest that, if anything, the quality of housing in urban areas is lower than that in rural areas. This evidence tends to point to an ‘urban premium’ being paid for housing in populous cities for benefits such as education, infrastructure and more frequent contact with a larger pool of people. One outcome of this ‘urban premium’, in terms of asset allocation, is that households in urban areas tend to have a less diversified portfolio.

Similar to international studies using household-level data, our logistic regression results, which control for other household factors (including income and wealth), confirm that urbanisation has a significantly positive effect on the share of assets held in property. Our results also support the hypothesis suggested by Ellis and Andrews (2001), who use aggregate-level data for Australia, that a high share of wealth in Australia is concentrated in housing because a large proportion of the population is concentrated in urban cities.

For owner-occupiers, we find that a 100 person per square kilometre increase in population density results in a 0.4 percentage point increase in the share of total assets held in property, on average. However, this effect is not constant, with the marginal impact on the share of assets held in property declining at higher levels of urbanisation. This non-linearity appears to reflect the increasing marginal cost associated with having a more concentrated portfolio of assets. This insight follows from our extension to multiple property owners, which implied a linear relationship between the share of the households' own home in total assets and the level of urbanisation. That is, the benefits from urbanisation, over and above the higher income typically associated with cities, appear to rise linearly with population density.

Appendix A: Data Description and Sources

In this study we use data from Wave 2 of the HILDA Survey. HILDA is a household-based panel survey which aims to track members of a sample of households over an indefinite life. Its main focus is on topics of economic and subjective well-being, labour market dynamics, and family dynamics. HILDA is conducted by the Melbourne Insitute on behalf of the Department of Family and Community Services.

Wave 2 contains data from 13 041 individuals making up 7 245 households, interviewed in the second half of 2002 and into early 2003. Our main interest in Wave 2 is in the special wealth module, which provides, for the first time, household-level data on the composition of wealth of households. For this study we use the imputed income and wealth data.[21]

Dependent variables

(home value/assets) = home value as a share of household total assets.

(total property value/assets) = total property value as a share of household total assets.

Demographic variables

age = age of the household head in years.

gender = 1 if the household head is male and 0 if otherwise.

married = 1 if the household head is married and 0 if otherwise.

divorced = 1 if the household head is divorced and 0 if otherwise.

separated = 1 if the household head is separated and 0 if otherwise.

widowed = 1 if the household head is widowed and 0 if otherwise.

de facto = 1 if the household head is in a de facto relationship and 0 if otherwise.

single person = 1 if the household head lives alone and 0 if otherwise.

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[21] For further details on the income and wealth imputation, refer to Watson (2004).

couple with children = 1 if the household type is a couple with children and 0 if otherwise.

dependent = 1 if the household type is a dependent and 0 if otherwise.

couple with no children = 1 if the household type is a couple with no children and 0 if otherwise.

single parent = 1 if the household type is a single parent and 0 if otherwise.

lives alone = 1 if the household type is a person living alone and 0 if otherwise.

Occupation variables

The occupation variables are of the household head's main job and are in accordance with the 1997 Australian Standard Classification of Occupations (ABS Cat No 1220.0).

manager = 1 if the household head is a manager and 0 if otherwise.

professional = 1 if the household head is a professional and 0 if otherwise.

associate professional = 1 if the household head is an associate professional and 0 if otherwise.

tradesperson = 1 if the household head is a tradesperson and 0 if otherwise.

advanced clerical = 1 if the household head is an advanced clerical worker and 0 if otherwise.

intermediate clerical = 1 if the household head is an intermediate clerical worker and 0 if otherwise.

intermediate production worker = 1 if the household head is an intermediate production worker and 0 if otherwise.

elementary clerical = 1 if the household head is an elementary clerical worker and 0 if otherwise.

labourer = 1 if the household head is a labourer and 0 if otherwise.

not working = 1 if the household head is not working and 0 if otherwise.

The labour force status variables are of the household head's main job and are in accordance with the 2001 Labour Statistics, Concepts, Sources and Methods (ABS Cat No 6102.0).

full-time employed = 1 if the household head works full-time and 0 if otherwise.

part-time employed = 1 if the household head works part-time and 0 if otherwise.

not working = 1 if the household head is unemployed, marginally attached to the labour force or not marginally attached to the labour force, and 0 if otherwise.

Economic variables

household income = household financial year final income

net wealth = household total assets less household total liabilities.

earns rental income = 1 if someone in the household receives rental income and 0 if otherwise.

Urbanisation dummy variables

Definition: The urbanisation dummy variables are constructed by first identifying Sydney, Melbourne, Brisbane, Adelaide and Perth Statistical Divisions to give capital cities. The balance of the States are divided into other major cities and rural areas according to their scores for the ARIA.

Source: Australian Standard Geographical Classification ABS Cat No 1216.0; 2001 Census ABS Cat No 1216.0. Also refer to variables BHHMSR and BHHRA in the HILDA Survey.

ARIA

Definition: The Department of Health and Aged Care's Accessibility/Remoteness Index of Australia. ARIA scores range between 0 (capital cities) and 15 (Australia's most remote locations) for each 1996 SLA, based on the SLA's proximity to service centres of 5 different sizes.

Source: Australian Bureau of Statistics' Integrated Regional Database; *Australian Standard Geographical Classification* ABS Cat No 1216.0 (1996).

Population density

Definition: Persons per square kilometre.

Source: Australian Bureau of Statistics' Integrated Regional Database; 2001 Census; *Australian Standard Geographical Classification* ABS Cat No 1216.0 (2001).

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