

Final Report

**Trends in home
ownership rates in
Australia:
the relative importance
of affordability trends
and changes in
population composition**

authored by

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EXECUTIVE SUMMARY

Based on trends obtained from census data to 2001, a fall in rates of home ownership has been observed among Australians aged less than 35 years. Debate has arisen as to whether this fall is due to:

1. Changing affordability with the implication that, in the future, a much higher percentage of Australians will never be able to afford to purchase a place of their own (Yates 1999, 2002), or
2. Delays in family formation among young Australians, effectively changes in their characteristics, with the implication that those that wish to become home owners will be able to do so later in life at least to the same levels as previous generations of Australians (Mudd et al. 2001; McDonald and Baxter 2003).

In this report, we argue the case for the second of these alternative explanations. We contend that there are deficiencies in conventional (census-based) analyses of trends in home ownership in Australia. The deficiencies are inherent in the use of tenure data collected in the Australian censuses. Census data are inadequate because:

- The census question does not identify which member(s) of the household owns the house and, in recent censuses, it is not guaranteed that the owner is actually a usual resident of the household.
- The tenure of the dwelling is arbitrarily attributed to the census 'household reference person', a person also somewhat arbitrarily defined.
- Analysis of ownership relates not to all Australians but only to those who are household reference persons. Women are particularly unlikely to be recorded as household reference persons.
- The census does not identify persons who own a dwelling elsewhere but are renting the dwelling in which they live. Such situations are becoming increasingly common.
- The census measures only current homeownership status. It does not address whether a residential property has been owned by this person sometime in the past.
- Census analyses tend to examine results in broad age groups. For events that occur over a relatively short age range (in this case between about age 25 and age 40), analysis by single years of age is preferable.
- Most importantly, census analyses compare successive cross-sections of people (comparative statistics analysis) rather than the alternative used in this report of considering the home ownership histories of people across their lifetimes (discrete time event history analysis).

Some recent data collections have obtained information for all Australians on whether or not they have ever owned a residential property and, if so, when they first purchased a residential property. From these data, we can examine for successive birth cohorts, the proportion that had purchased a house by each age (single years of age). This could be termed an accretion curve of home ownership. The comparison of cohorts across time, from older to younger, shows clearly whether the shift into home ownership is being delayed and whether successive cohorts are likely to have higher or lower lifetime achievement of homeownership compared to previous cohorts.

This report provides analysis of data from two surveys: the 1999 ABS Australian Housing Survey and the 1997 and 2000 waves of the Negotiating the Life Course Survey. First, the analysis shows that the two surveys indicate highly consistent results for the accretion of home ownership by age and sex for successive Australian cohorts. Second, for cohorts aged 25-49 in 1999 (born from 1950 to 1975), rates of home

ownership achievement by given ages are almost unchanged across time. There is some evidence of a small fall off in home ownership at young ages (in the twenties) for recent birth cohorts but also that this fall has tended to be made up during the early thirties.

On the hypothesis that home ownership rates have been affected by continuing delays in family formation among young Australians over the period, 1975-2000, we have analysed the Negotiating the Life Course Survey data using a life history approach. In this analysis, various characteristics of the person are controlled, especially their family formation characteristics, while their rates of home ownership are examined according to the year of birth of the person. Effectively, the year of birth is taken as the indicator of changing affordability across time, an equivalent approach to the use of current age as the indicator of affordability in the comparative statics approach.

The findings of this analysis are as follows:

- once other characteristics are controlled, there is no indication at all of falls in home ownership across birth cohorts. If anything, more recent birth cohorts are more likely to be home owners than earlier cohorts, especially among males,
- the most significant factor associated with home ownership is marriage, meaning formal marriage,
- those who are cohabiting (living together but not married) and those who are single but not living with their parents are much less likely to be home owners than those who are married but much more likely to be so than those who are single and living with parents,
- having controlled for relationship status, home ownership rates fall as the number of children rises.

More than any other factor, trends in home ownership rates among Australians aged less than 35 years are related to changes in relationship status and living arrangements. To the extent that there will be increases in the proportion of people who never marry across their lifetime, this analysis would predict falls in home ownership related to this trend. On the other hand, as people have fewer children, home ownership rates would increase. To the extent that year of birth can be used as an indicator of changing affordability, however, the analysis indicates that this has not been a major determinant of rates of home ownership in Australia up to the year 2000.

It is planned to include a question on the timing of first home purchase in the forthcoming (fourth) round of the HILDA longitudinal survey. HILDA contains a range of other variables that could be used in a similar analysis to the one conducted in this research. For example, its wealth data collected in the second round of HILDA indicates whether the person owns a house elsewhere but is currently renting. We also planned in this study to make use of the age of the youngest child, but this proved to be too complex.

The analysis conducted in this report relates to the period up to the year 2000. It remains possible that there have been changes in affordability since that time that may contribute to lifetime falls in levels of home ownership. Analysis of the fourth round HILDA data would give at least a preliminary assessment of this possibility.

1 INTRODUCTION

A number of recent studies have examined aspects of changing housing tenure in Australia (Hughes 1996, Yates 1998, Landt 1998, Percival 1998, Yates 1999, Winter and Stone 1998, Winter and Stone 1999, Mudd, Tesfaghiorghis and Bray 2001, and Yates 2002). The central theme of these studies is investigation of falls in home ownership rates between the mid 1970s and the mid 1990s. Yates (1999) indicates that falls in home ownership between 1975 and 1994 were associated with low income and being a couple with children. In more general terms, rates of home ownership have fallen at younger ages (under age 35 years). Yates (1999) also points to a fall in home ownership among high income, older couples without children. At a regional level, Yates (2002) shows that home ownership rates, particularly at younger ages, fell more sharply between 1986 and 1996 in the larger cities. This trend, she suggests, was associated with large increases in median house prices in the larger cities. Her central conclusion is that housing has become less affordable for young people and this is the main reason that home ownership rates have fallen. Furthermore, she concludes that this lack of affordability is not temporary but will extend across people's lifetimes unless policy intervenes in some way.

Using census data for the years 1981 to 1996, Mudd et al. (2001: viii) draw a somewhat different conclusion. They conclude that 'the aggregate trends of declining rates of home ownership reflect a deferral of home ownership, rather than a reduction in the lifetime achievement of home ownership'. Counter to Yates, these authors conclude after an assessment of affordability changes in Australia that tenure in Australia is 'largely a product of historical outcomes and future expectations, rather than short-term prevailing market conditions' (Mudd et al. 2001: 26).

The issues then are:

1. To what extent have rates of home ownership fallen in Australia?
2. Do falls in home ownership represent deferral or reduction in the lifetime achievement of this tenure?
3. Respectively, what are the reasons for deferral or lifetime non-achievement?
4. If ownership rates are falling, what are the implications for society and for policy, in other words, how should falling rates be interpreted?

These issues have taken on a new salience with the referral by the Prime Minister to the Productivity Commission of an enquiry into housing affordability, with an emphasis on first homebuyers. However, the Commission's enquiry focuses primarily upon aspects of the supply side of housing whereas this report focuses more upon the demand side.

2 PROBLEMS IN THE USE OF CENSUS DATA TO MEASURE HOME OWNERSHIP RATES

Both Yates and Mudd et al. use census data for their analysis of rates of home ownership. To be precise, what they measure is the extent to which persons designated in the census as 'the household reference person' live in dwellings reported in the census as being owned or purchased. There are three problems with this approach as described in the following sections.

2.1 Australian Censuses do not identify the owner of the dwelling

Housing tenure questions used at the last four Australian Censuses have not identified which individual in the household owns or is purchasing the dwelling¹. At the 1986 and 1991 Censuses, the tenure question asked whether the dwelling was rented or whether it was owned or being purchased by 'you or any usual member of this household'. With this wording, it is evident that the person holding the tenure can be any person in the household. Conventional analysis of the type conducted by Yates (2002) and Mudd et al. (2001) then allocates the tenure of the dwelling to the person that ABS designates as the household reference person. The ABS allocates the status, household reference person, mainly on the basis of family characteristics, not according to who owns the dwelling – and, indeed, the owner of the dwelling cannot be identified from among those present in the household. Even more obviously, where the person holding the tenure is temporarily absent from the household on census night, this person cannot be the household reference person. Nevertheless, from the 1986 and 1991 Censuses, we at least know that the person holding the tenure is a usual resident of the dwelling. Even this is not necessarily the case at subsequent censuses.

The housing tenure question in Australian censuses was changed very significantly between the 1991 and 1996 Censuses. With the 1996 wording, used also in 2001, the question no longer specifies that the owner or renter of the dwelling must be a usual resident of the household. The question asks simply: Mark the box which best describes this dwelling. And the responses are: fully owned, being purchased, etc. It is possible that the vagueness of this question could lead to confusion on the part of the respondent. For example, if a 27 year-old is living rent-free in a dwelling that is being purchased by his parents, how is he likely to answer this question? There is at least a fair chance that he would answer that the dwelling is being purchased rather than the 'correct' response, being occupied rent-free. He would then be recorded in the analysis as a home purchaser. When it is not specified that the person holding the tenure is a usual resident of the dwelling, there are a range of other possible errors of interpretation of the question.

In conventional census home ownership analyses, the tenure of the dwelling is somewhat arbitrarily attributed to a person also somewhat arbitrarily defined as the household reference person, usually the person listed as Person 1 on the household form. Greater difficulties of attribution occur when the members of the household fill out individual census forms as distinct from being included together on one household form.

¹ The tenure questions used at the 1986, 1991, 1996 and 2001 Censuses of Population and Housing are shown in McDonald (2003, 3-4).

2.2 Census-based home ownership refers only to household reference persons

Rates of home ownership in the two papers (Yates 2002, Mudd et al. 2001) are rates for household reference persons rather than rates for all persons. Suppose there was a strong trend towards young people staying at home longer with their parents because independent living had become increasingly unaffordable. In general, these young people would not be recorded as household reference persons and so this highly significant trend would go unobserved using the methods applied by Yates and Mudd et al. It may even be the case that as 'headship' rates fell, headship might become selective of those who could afford to buy. If so, analysis of the type conducted by Yates and Mudd et al. would show an increased tendency towards home ownership, the wrong result. While the vast majority of 15-24 year olds in Australia are not household reference persons, we are presented with analysis of home ownership trends for people of this age group but only for those who are household reference persons. This is highly misleading but is easily addressed by simply dividing the household reference person owners by the total population in the age group rather than by the total household reference persons in the age group. Analysis of measures of this type while still inadequate would provide more reliable assessment of the aggregate trends.

There is a further problem: the use of the household reference person approach precludes analysis by sex because only one person in a couple relationship can be the household reference person, and men are considerably more likely to be that person than women. To ignore the gender dimension of home ownership is tantamount to accepting that home ownership policy should be based on the male breadwinner model of the family. In an improved analysis of home ownership among individuals, it would be preferable to define each of the persons in a couple relationship as the reference person or as the tenure holder. However, this could also be misleading, because the presumption of joint ownership may be incorrect, especially for younger, cohabiting couples.

2.3 Ownership of housing by census renters

The census does not record whether a person owns or is purchasing a property elsewhere but is renting in their present place of residence. There are many types of people who could fit into this category. First, there are people who have been transferred or taken jobs at some distance from where they live. They may rent out the dwelling that they own while they rent themselves in their new location. People may have had a recent separation and may be renting pending a property settlement. Young people may live at home with parents but own a house elsewhere. They may either plan to live in this house at a later point or they may use the house as an investment. More generally, 'rational renters' may rent their present dwelling while investing in residential accommodation elsewhere. Mudd et al. (2001) were aware of this problem and referred to a study by King and Baekgaard (1996) in which it was estimated that 8 per cent of Australian households that were private renters in 1993-94 had an interest in investment property compared with just 3 per cent in 1981-82. Mudd et al. (2001: 28), using the 1999 Australian Housing Survey, place this estimate in 1999 at 10.2 per cent. The change of 7 percentage points between 1981-82 and 1999 in the percentage of renters who were owners elsewhere is significant compared to the observed falls in home ownership in the same period based on the census data.

A thorough analysis of rates of home ownership in Australia requires individual level data rather than vague household data as obtained at the census. Each person needs to be asked whether or not he or she is currently a home owner, whether he or she has ever been a homeowner and when he or she first became an owner. This study

provides an analysis of Australian data sources that have obtained individual-level data on home ownership.

2.4 A life course approach to analysis is superior to a comparative statics approach

The use of individual level data also enables the researcher to examine how home ownership fits into the individual's life course. Examining rates of home ownership at successive censuses is known as a comparative statics approach: a static situation at the time of each census is compared across time. This does not allow us to examine how home purchase relates to other important life cycle events such as leaving the parental home, obtaining a job, entering a relationship, getting married and having children. It has long been accepted that home purchase is related to these other life course transitions (Winter and Stone 1999, Merlo and McDonald 2002), although the sequence of each event may have become less predictable. It is also well known that family transitions (marriages and births) have been significantly delayed in the life course of Australian individuals and that this has been associated with longer durations of education and later entry to the first main job. It is possible that the delays of employment, marriage and childbearing to older ages may have produced a delay in home purchase to older ages. If this is the case, a comparative statics analysis would show only that home ownership rates had fallen at younger ages. It would not associate this fall with delay of other life cycle events. For example, in the comparative statics approach, a couple aged 30-34 with children in 1976 is compared with a couple with the same characteristics in 1996 although their histories of education, work, relationships and childbearing are very different on average.

The important point here is that a fall in home ownership at young ages may indicate deferral of home purchase rather than permanent exclusion from home ownership. This is a crucial distinction and should be investigated in any analysis of changing rates of home ownership at young ages.

The issue of deferral as opposed to lifetime achievement is the bread and butter of technical demography. Demographers refer to changes in the timing of lifetime events as 'tempo' changes and changes in the lifetime achievement of such events as 'quantum' changes. The methodology that demographers apply to these concepts is the life table. Because events such as commencement of first main job, marriage, first birth and first home purchase tend to be concentrated in relatively short age ranges, demographers conventionally examine transitions by single-year of age units, very much in contrast to the very wide age ranges often used in comparative static studies.

In keeping with the demographic approach, the principal focus of the report is upon whether or not individuals have ever purchased a dwelling and at what age they first purchased the dwelling. This includes the purchase of a dwelling in which the individual may never have lived and the acquisition of a dwelling by means other than purchase (inheritance, marriage). While the time at which a person acquired a dwelling may appear to be a straightforward matter, response problems can arise for various reasons. For example, there may be confusion where the respondent's partner owned the house and, over time, the respondent has taken on rights of ownership. The same can apply when the house was purchased by parents but at some point was passed to the respondent.

2.5 Analysis by birth cohorts and by sex

The standard life course methodology is to follow the experience of people across their lifetimes by grouping them into birth cohorts. A birth cohort is a group of people who share the same birth year(s). We then follow them through their lifetime and record the age at which they purchased a dwelling for the first time. Experience for the birth cohort is then accumulated up to their age at the time of the survey. For persons who are aged 50 at the time of the survey, we would measure the proportion who had entered home ownership at each earlier age up to age 50. If they were aged 30 at the time of the survey, we can do this only to age 30. Because the timing of life cycle events tends to differ for men and women, this should be done separately for each sex.

3 ENTRY TO FIRST HOME OWNERSHIP: Comparison Of Results From The Australian Housing Survey And The Negotiating The Life Course Survey

3.1 The Australian Housing Survey 1999 (AHS)

The 1999 AHS contained a question relating to year of first home ownership, but the question was not asked of all respondents. Effectively, the survey identified for all respondents whether or not they had ever owned a residential property but the time of purchase of the first home was only obtained for current homeowners. Specifically, those who had owned residential property in the past but did not own at the time of the survey were not asked the year that they had purchased their first house. However, they were asked other questions that enabled the time of first purchase to be estimated with a greater degree of accuracy. In order to get estimates of age of first home ownership for all individuals, it was possible to derive estimates for those persons who were not asked the question. These people constituted 10.2 per cent of all AHS respondents. The derived values were calculated for these respondents using the method outlined in Attachment 1.

In addition, the current age variable in the AHS was available in five-year ranges only, making it impossible to obtain estimates of age of first home ownership by single years of age as would be preferable. Exact year of home ownership could be calculated (and replacement values for missing values derived) separately for each sex-age cohort group. The AHS age groups used were from 20-24 to 70-74 years.

Given the current age group and actual year of first home ownership, it is a relatively straightforward matter to calculate age group at first home ownership. Persons who had not bought a house by the time of the survey were treated as censored cases, that is, their experience is taken into account up to their age at the time of the survey after which they are dropped from the analysis. A few records were excluded because they had missing responses to the home ownership questions.

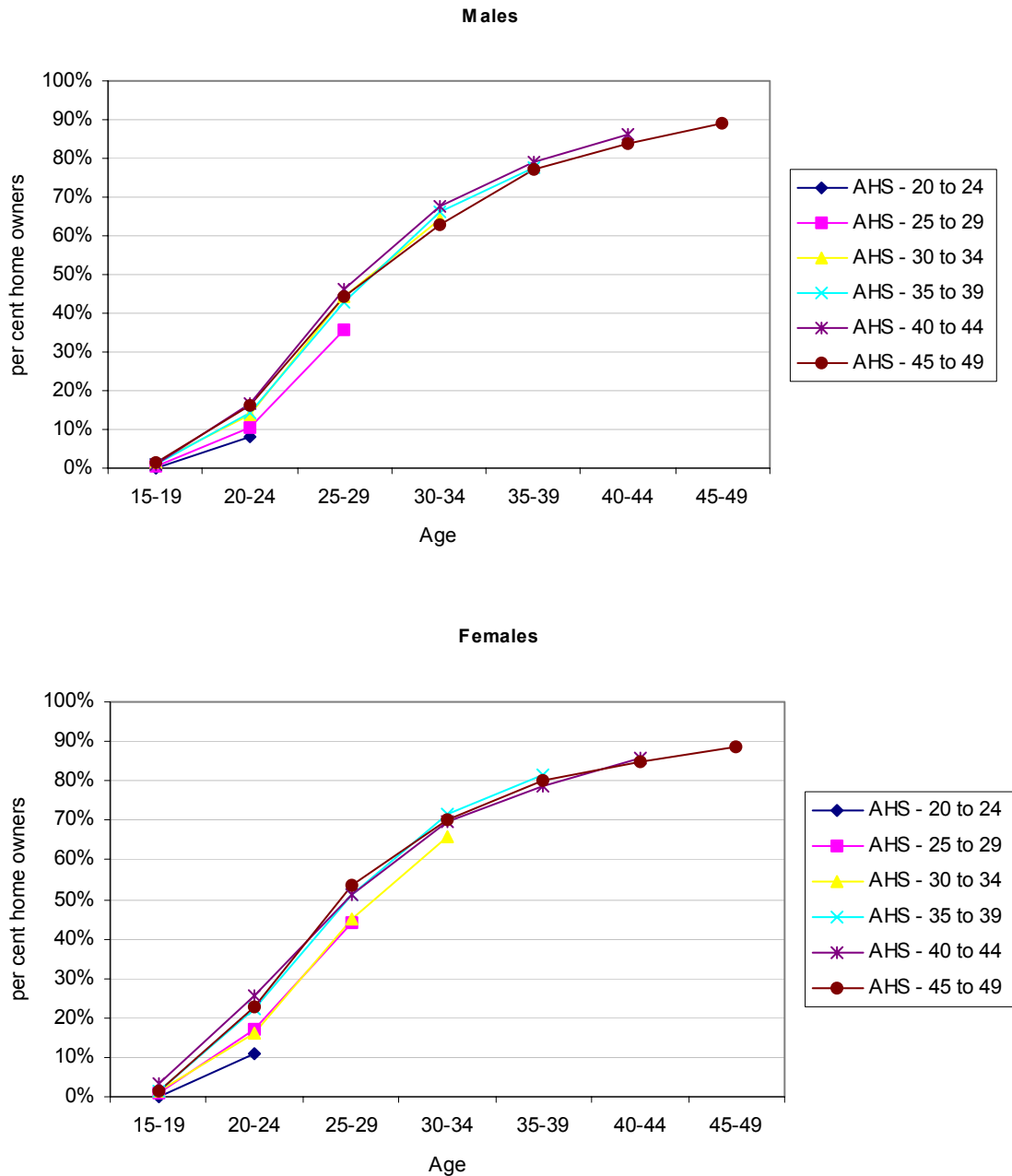
Figure 3-1 shows two charts, one for males and one for females, of the timing of first home ownership by age cohort based on the AHS results. For males, the age at first home ownership is remarkably similar for all age cohorts aged 30-49 in 1999 (those born between 1950 and 1970). However, it does appear that in the two most recent age cohorts, those aged under 30, there has been some decline in home ownership at the younger ages. For females, the pattern is similar but there is evidence of declining home ownership amongst those aged under 35 in 1999, although the 30 to 34 age cohort appears to be catching up while in their early 30s.

Thus, there is evidence of a fall-off in entry to first home ownership for those aged less than 30 in 1999. However, there is also evidence based on those aged 30-34 in 1999 that, at least for this cohort, the drop in ownership while they were in their twenties was largely made up when they were in their early thirties. This is suggestive of delay of homeownership rather than a fall in lifetime achievement.

The AHS has limitations for the purposes of this report because it does not provide ownership estimates by single years of age and because it does not obtain information that enables an analysis of the associations between first entry to home ownership and other significant life cycle events such as leaving the parental home, partnering, marrying and having children. The central purpose of including results from the AHS in this report is to compare the results from this nation-wide ABS survey with the results of the Negotiating the Life Course Survey (NLC) because this latter survey will be the basis of more intensive analysis in Chapter 4. The NLC Survey is a national random panel survey of Australians who were aged 18-54 years in 1997. The sample is re-

interviewed once every three years. The second round interviews were completed in 2000 and third round interviews were conducted late in 2003 and early in 2004. The year of first home purchase is asked of all individuals in the survey at each round². Comparison of the results from NLC with those from AHS provide an evaluation of the reliability of both data sets but especially of NLC which will be used much more intensively in further analysis.

Figure 3-1: Home Ownership by Sex and Age Cohort, AHS Data (1999)



² Details of the survey can be found at: <http://lifecourse.anu.edu.au/>

3.2 The Negotiating the Life Course Survey

The home ownership questions asked of the respondents in NLC include questions about current home ownership and ones about any previous home ownership. The latter is covered by the questions “have you ever owned a place of your own” and if yes (or if current home owner) “in what year did you first buy a place of your own?” The questions about current home ownership ask about the respondent and partner, if applicable. It is therefore possible that the current home is owned, but was bought by the partner, in which case the respondent may answer “never owned a place of my own” when asked timing of home purchase or, if they feel they are now a co-owner of the house, they may answer in some other way.

Table 3-1: Housing tenure history, Negotiating the Life Course 1997 and 2000

	<i>In 1997</i>	<i>In 2000</i>
Has owned a house	1591	1379
Has not owned a house	636	352
Missing Values	4	37
Non-response		463
Total	2231	2231

Similar questions were asked in both the 1997 and 2000 waves. Thus, first purchases that were made by respondents in the years between the two surveys are able to be included. For those that had bought a house before the first wave of the survey, a comparison of the year of home ownership responses shows that on the whole respondents give the same, or very close to the same response in both waves, as would be expected³.

For analysis purposes, a combination of the 1997 and 2000 responses is used according to the selection rules shown in the flowchart in Attachment 2. The 1997 data are used if the respondent had owned a home before the first wave of the survey; if they had not bought by Wave 1 but had by Wave 2, then the response from the second wave was used. Non-respondents at Wave 2 who had not bought by Wave 1 were censored at the age they were in Wave 1, as were those with responses in Wave 2 that differed from those provided in Wave 1. Those that had not bought by Wave 2 were censored at their age in Wave 2. To analyse the data by cohort, respondents were grouped according to their age in 1997.

The data from the two surveys was compared to validate the accuracy of the NLC data. As mentioned earlier, to make the charts comparable, first the mid-point of each age group was used in the AHS, and this was compared to the equivalent exact age in the NLC. For example, home ownership at age 25 to 29 was assumed to represent the level of home ownership at the mid-point of this range, age 27. This was compared to the home ownership rate at exact age 27 from the NLC. Note however differences still exist in the age cohorts, with the AHS using age at 1999 and the NLC using age at 1997.

³ Of the 1,267 respondents who provided a year of first purchase in both waves of the survey, 46% repeated exactly the same year. A further 34% gave a year that was different by only one or two years, 9% by three to five years and the remaining 11% by six or more years.

The charts in Figure 3-2 contain comparisons for females and the charts in Figure 3-3 contain comparisons for males. The main conclusion to be drawn is that the two surveys provide very similar results for both sexes. This is particularly the case with the older cohorts aged 35-49 years. This provides a general confidence in the reliability of the data from both sources. The main exception to this conclusion is that, for males, the NLC data show no fall in home ownership levels at younger ages while some fall is evident from the AHS data. In NLC, successive cohorts of Australian men show almost precisely the same history of home ownership, age by age.

Figure 3-2: Comparison of Home Ownership, NLC and AHS, Females

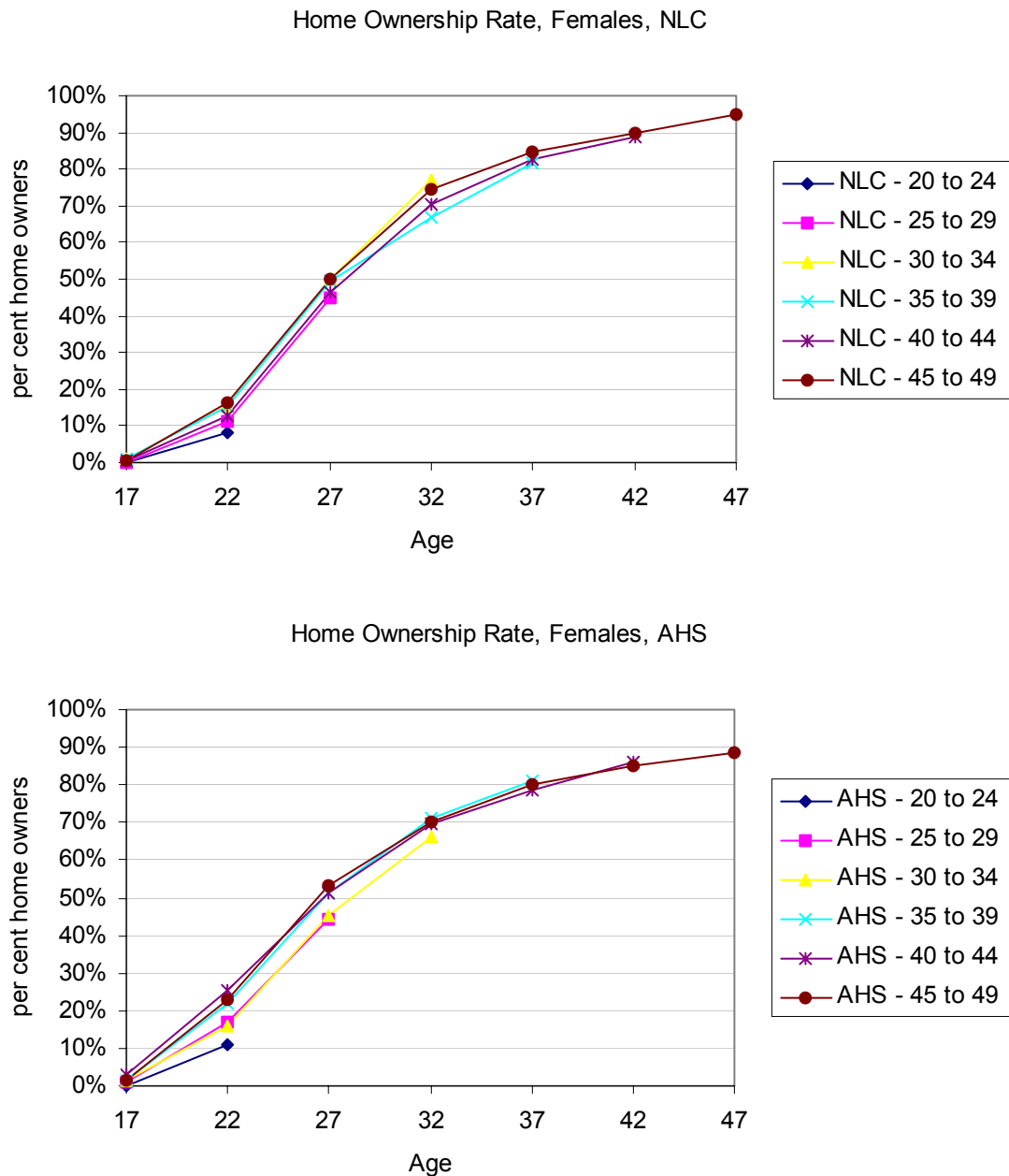
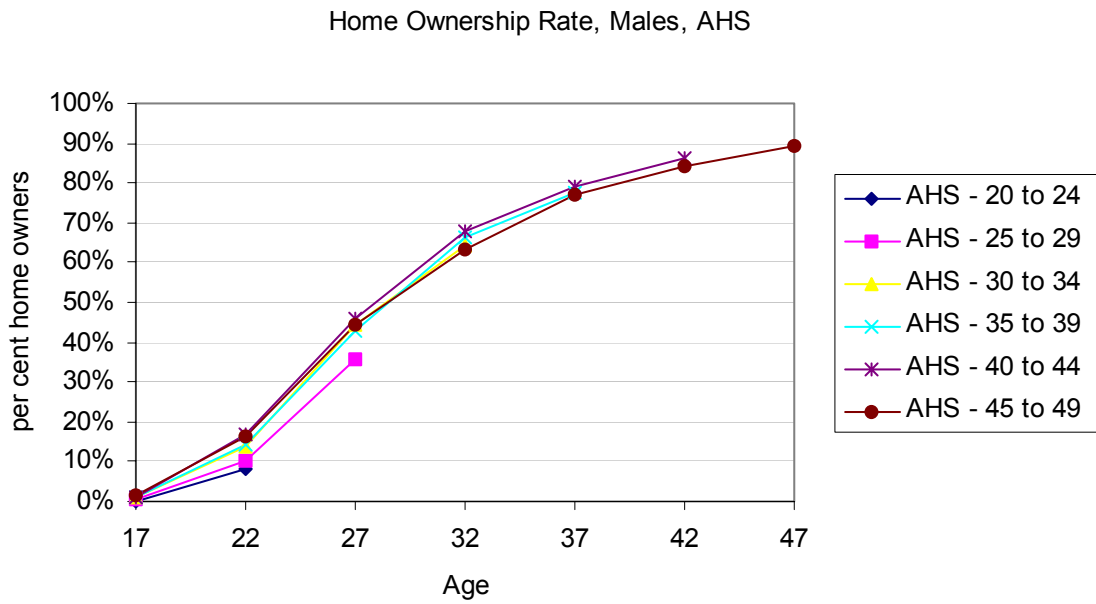
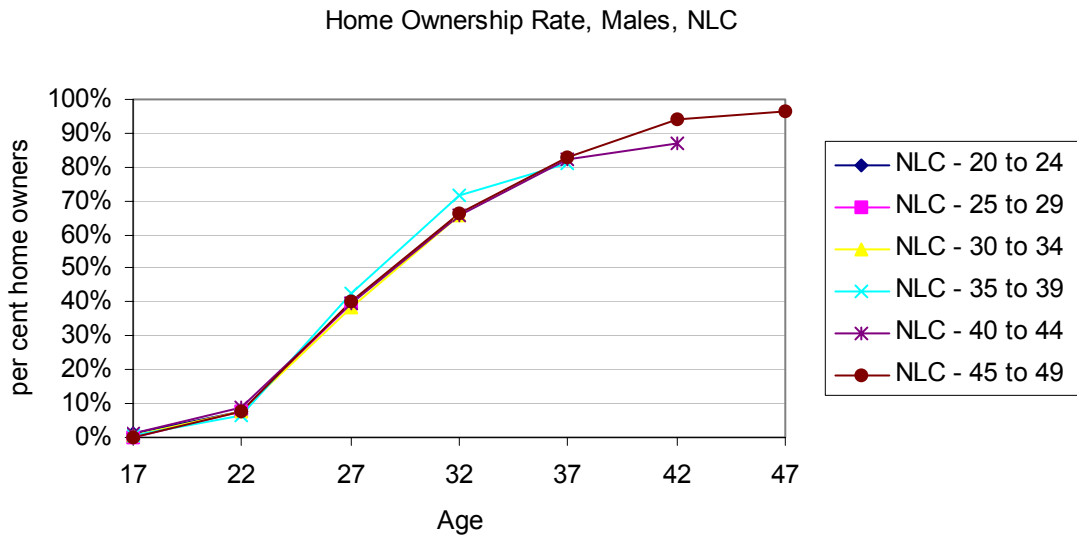


Figure 3-3: Comparison of Home Ownership, NLC and AHS, Males



4 A DISCRETE TIME EVENT HISTORY ANALYSIS OF HOME OWNERSHIP IN AUSTRALIA

4.1 The data

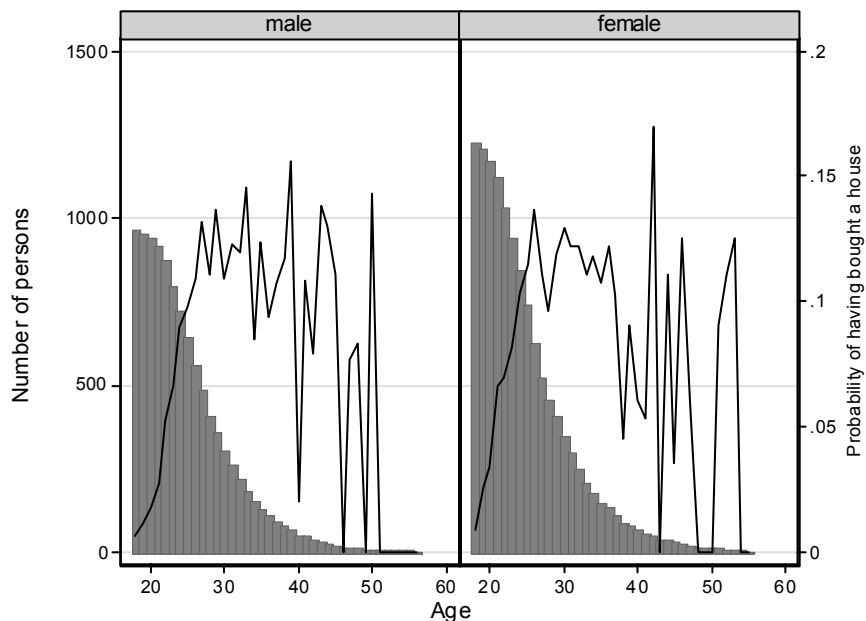
This analysis was based on data from the Negotiating the Life Course (NLCS) Survey Wave 1 (1996-97) and Wave 2 (2000). While it was initially intended to complement these data with data from the Australian Housing Survey and the Australian Families Life Course Survey, the housing questions in these surveys proved too different to those of NLC to enable comparable data items to be created.

The NLC survey data were used to compile a relationship and birth history for each respondent, month-by-month from when the respondent turned 18. These data were related to the year of first home purchase along with other information on highest level of education, work history, country of birth, birth cohort and sex. A detailed description of how these data were compiled is given in Attachment 3, along with information on the sample size.

To use discrete-time event history analysis with these data, the observations were converted to person-period format, that is, one record for each person and period under observation. For each person, there was one record for each year between when they turned 18 to the age they bought their first house, or if they have not yet bought one, to their age at the survey (using 2000 data if they responded to the second wave, otherwise using 1996-97 data). The home purchase variable indicated whether the respondent had bought a house, so remained at zero – one indicating they had bought this year – over the time periods preceding the year they bought a house. If they had not bought a house by the survey date, all values of home ownership were set at zero.

The following figure shows how the transition event of having bought a house (on the right-hand axis) varies over age in this dataset, with the bars on the left-hand axis showing how many person-year observations there were for each exact age. As this figure shows, the number of observations becomes smaller as age increases. This is expected as, over time, the sample becomes more selective as it becomes restricted to those who have not yet bought a house. It is not surprising, then, that the probability of buying a first home becomes more erratic in the older ages. Analysis of those at older ages is likely to be problematic, given the small sample size and the more unstable dependent variable. This analysis is therefore limited to persons aged 35 years and under.

Figure 4-1: Transition Probabilities and Sample Counts



Persons in the youngest birth cohort, those born between 1975 and 1979, were aged no more than 25 in the final data and to avoid the risk they would bias the estimates in some way, given there were no data points for ages 26 through to 35, they were excluded from the analysis. The next birth cohort, those born 1970 to 1974 were retained, given they were able to contribute points for the majority of the age distribution.

Observations which contained missing information were excluded from the analysis.

4.2 Methodology

The home ownership data were first examined overall and against the different covariates to identify possible relationships. In order to see more clearly how home ownership varied over age and across different variables, the transition probabilities were converted using life table techniques to a cumulative proportion having purchased a home.

The data were then examined using multivariate techniques. Event history analysis is the appropriate methodology, as it enables analysis of the effect of covariates on both the likelihood of the event (home ownership) occurring and the timing of that event. Because the data were available in fairly broad time periods (years, rather than months or weeks) it was preferable to use discrete-time event history analysis (Allison 1984). This involved using the data, as described above, in person-year form, and then applying logistic regression to analyse the effects of the covariates and time (in this case, age) on the likelihood of the transition occurring. To take into account the repeated events per person, robust estimates of variance were calculated by incorporating the person level identifier as a clustering variable. Models for males and females were fitted separately in order to investigate how the covariates differed by sex in their relationship with home ownership.

The final models were used to calculate the predicted transition probability under different scenarios, and these were converted to cumulative home ownership functions, which are used to demonstrate relationships in the results section.

4.3 Results

Figure 4-2 shows how home purchase patterns have changed over time for males and females. These are based on the raw data, without standardising across any of the covariates – this is done in the next section after an initial examination of the overall trends. The charts actually show only very slight changes over time, in fact, amongst males, there is little discernable change across all the periods analysed. For females, there is some evidence that home purchase is lower in more recent years, especially at the younger ages. This, as would be expected, is consistent with the findings in the previous chapter.

Figure 4-2: Cumulative Proportion of Males and Females Having Bought a House, Time Effects

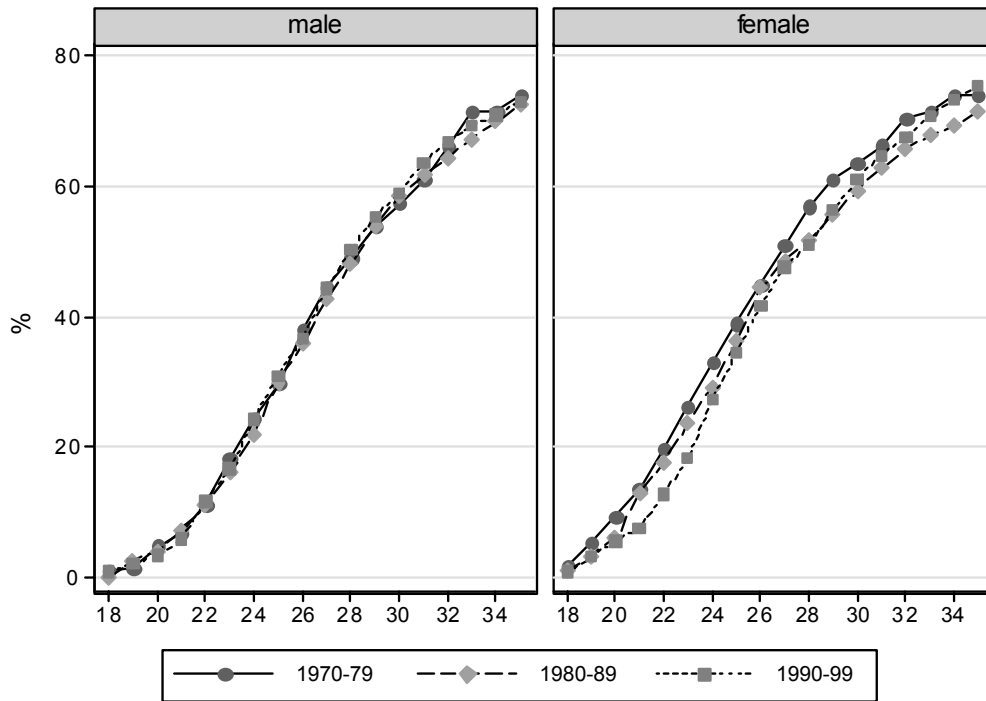
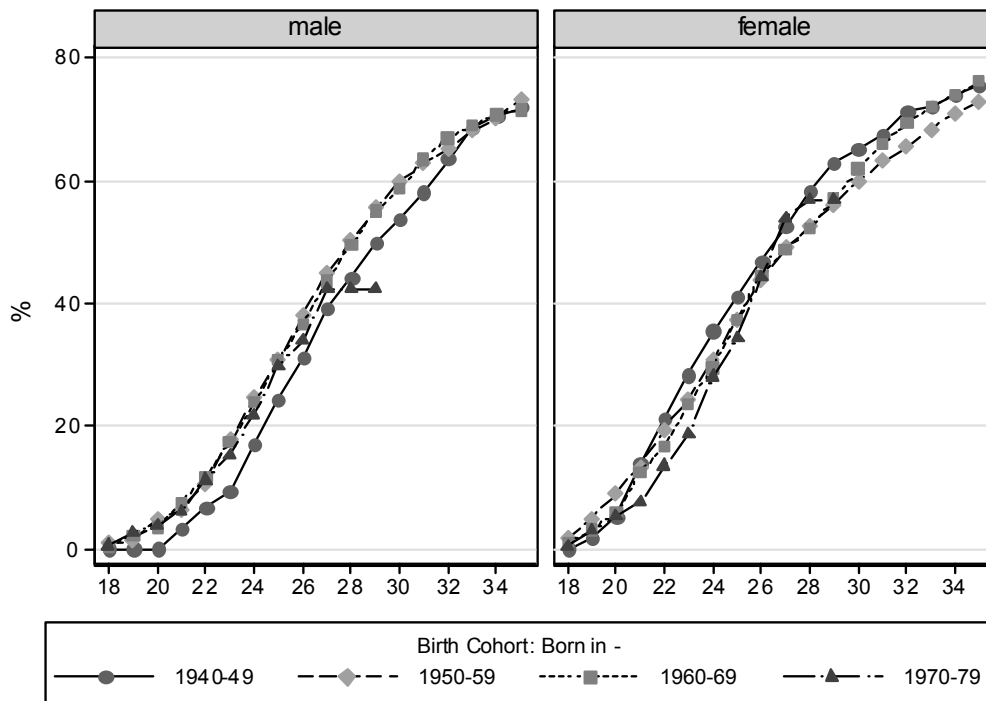


Figure 4-3: Cumulative Proportion of Males and Females Having Bought a House, Birth Cohort Effects



Because these data examine the period changes over time, they do not represent the actual lifetime experiences of people – for example, those aged 20 in 1970-79 are not the same people as those aged 30 in 1970-79. To look at lifetime experiences, it is best to look at birth cohort effects instead of period effects, as is done in Figure 4-3. This chart also shows only slight differences across the birth cohorts and no consistent trend across time.

Changes across time in home purchase rates, however, are perhaps being confounded with other changes across time. The composition of the population has changed such that, at younger ages, males and females are more likely to be single, less likely to have children and more likely to have a higher education compared to earlier cohorts. A multivariate analysis of these data allows an examination of changes across time, holding various composition effects constant. To do this, the home ownership transition was modelled using logistic regression.

The results of the logistic regressions are summarised in Figure 4-1. Age has been entered in these models as a categorical variable, to capture any changes in the likelihood of home purchase over the age range. It could also have been entered as a continuous variable, with a squared-age term included to capture the non-linearities in the data. A continuous-age model was fitted, and was very similar to the categorical-age model in all respects. However, given that this method of event history analysis was chosen because of the discrete nature of the time variable, the categorical-age model was used. The results of the continuous-age model are compared to the categorical-age models in Attachment 4.

All the variables have been entered into the model as main effects only. Various interaction terms were investigated but none were considered necessary. Importantly, this means that there were no significant interactions between the birth cohorts (the indicator of affordability across time) and the population composition characteristics. The summary statistics at the bottom of Figure 4-1 show that the models fit reasonably well. Further analyses using the Hosmer-Lemeshow test and the ROC Curve show no reason to reject this model.

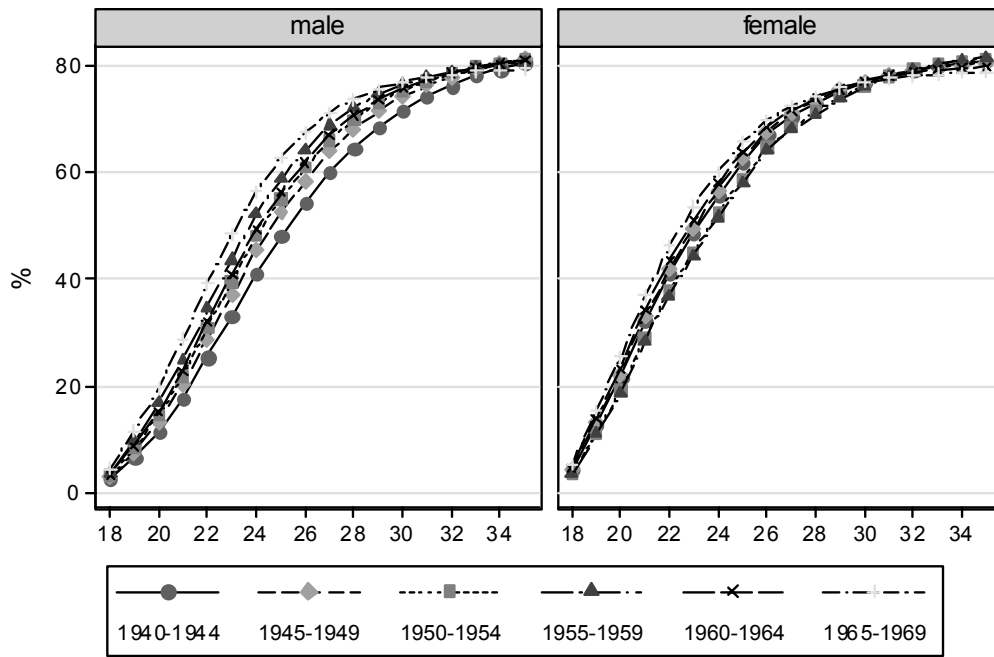
Table 4-1: Parameter Estimates and Odds Ratios, Male and Females, Home Purchase

Variable	Male		Female	
	coefficient	odds ratio	coefficient	odds ratio
Birth cohort (born in -)				
1940-44	Reference			
1945-49	0.173	1.2	0.047	1.0
1950-54	0.278	1.3	-0.148	0.9
1955-59	0.452	* 1.6	-0.179	0.8
1960-64	0.336	1.4	0.114	1.1
1965-69	0.656	*** 1.9	0.239	1.3
1970-74	0.804	** 2.2	0.488	* 1.6
Marital status				
<i>single, not living with parents</i>	reference			
single, living with parent/s	-0.588	*** 0.6	-0.726	*** 0.5
married	1.565	*** 4.8	1.436	*** 4.2
cohabiting	0.344	* 1.4	0.134	1.1
Number of children				
<i>none</i>	reference			
1	-0.276	0.8	-0.396	*** 0.7
2	-0.434	** 0.6	-0.655	*** 0.5
3 or more	-0.677	** 0.5	-1.210	*** 0.3
Country of birth				
Australia	0.272	* 1.3	0.306	** 1.4
Other	reference			
Work History				
Has worked full-time	reference			
Has not worked full-time	-0.711	*** 0.5	-0.397	** 0.7
Highest qualification				
<i>no post-secondary</i>	reference			
vocational	0.257	* 1.3	0.269	* 1.3
undergraduate or higher	0.334	** 1.4	0.103	1.1
Age dummies: refer to Appendix 2 for details				
Constant	-5.492	*** 0.0	-4.793	*** 0.0
McFadden's R-square	0.144		0.113	
Wald chi-square	426		580	
Log-Likelihood Full Model	-1906		-2599	
N	8896		10741	
BIC	-339		-359	

legend: * p<0.05; ** p<0.01; *** p<0.001

Looking at the birth cohort variable, it is clear from the model coefficients that there has been some tendency to greater odds of home purchase among more recent birth cohorts, especially for males. While this largely reflects the much lower home purchase rate for males in the oldest birth cohort, the rates of home purchase have continued to increase amongst males in all birth cohorts except for the 1960-64 birth cohort (Figure 4-4).

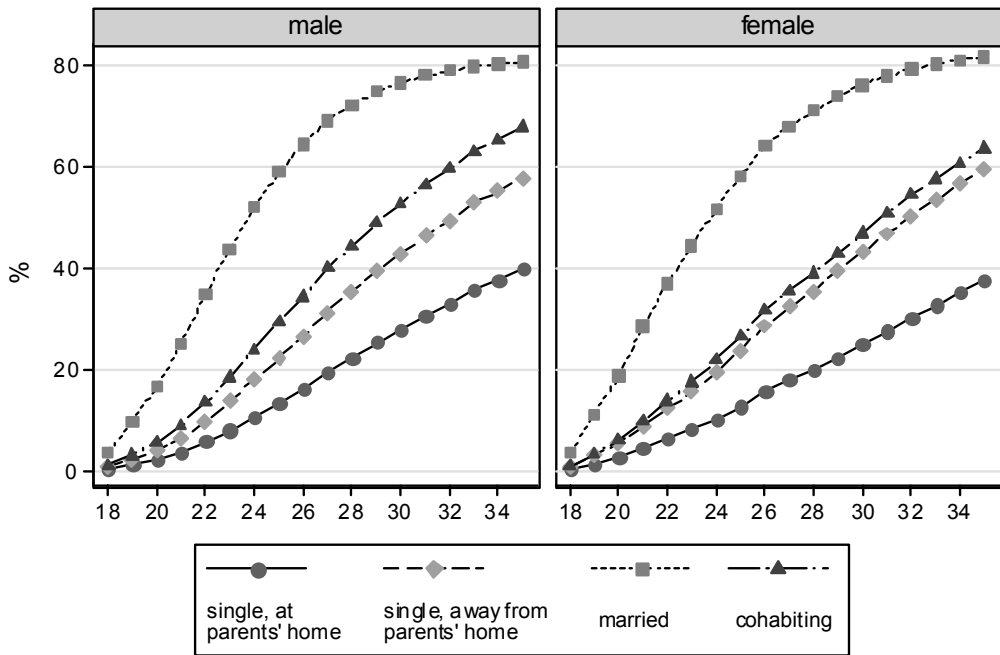
Figure 4-4: Predicted Cumulative Home Purchase, Varying Birth Cohort



note: other variables set to married, no children, no post-secondary education, Australian-born, has worked full-time

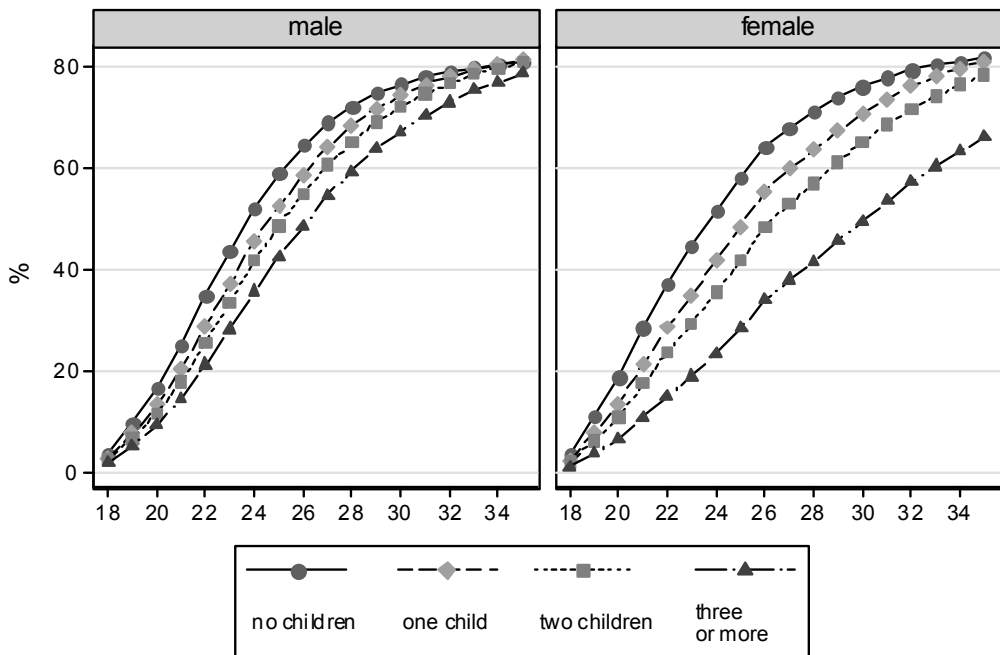
Other than age, relationship status is the most important determinant of home purchase, with married persons being almost five times more likely to purchase their first home than persons who are single and still living with their parents. As the following chart shows, this results in a far higher cumulative (predicted) proportion of married persons having bought a house at all ages. The difference between cohabiting persons and single persons living away from home is only slight for females, but for males, the cohabiting persons are more likely to have purchased (See Figure 4-5).

Figure 4-5: Predicted Cumulative Home Purchase, Varying Relationship Status



note: other variables set to born in Australia in 1955-59, no children, no post-secondary education, has worked full-time

Figure 4-6: Predicted Cumulative Home Purchase, Varying Number of Children



note: other variables set to born in Australia in 1955-59, married, no post-secondary education, has worked full-time

The number of children ever born is also a strong predictor of home purchase, particularly for females. Controlling for other characteristics, men and women with no children are the most likely to have purchased a house. As seen Figure 4-6, the likelihood of home purchase falls as the number of children born increases, with a much steeper fall experienced by women. In most cases, however, children appear to delay home purchase rather than putting off home purchase for a lifetime. For men, while family size makes a difference at younger ages, by age 35 there is very little difference by family size. The same is true for women except for women with three or more children. For women with larger families (3 or more children), the cumulative proportion having bought a house is lower at age 35 than it is for other women. This may reflect the difficult financial circumstances of women with three or more children who are sole parents.

Other variables entered as control variables were also significant determinants of home purchase. Again controlling for other characteristics, Australian-born men and women had a higher odds of purchasing a house than those born outside Australia. As expected, persons who had worked in a full-time job also had higher odds of purchasing a house. Education made some difference, with vocational qualifications being associated with higher odds of home purchase relative to those with no post-secondary qualifications. For males, having other post-secondary qualifications also increased the odds of home purchase.

Overall, however, the most significant determinant of first home ownership is marriage, meaning formal marriage, and, as there is no significant interaction with birth cohort, this conclusion applies across the full time period of the study.

5 CONCLUSION AND FUTURE RESEARCH

The strong conclusion to be drawn from the analysis is that, when viewed from the perspective of age at first entry to home ownership of individual Australians, there has been remarkably little change across time. There appears to have been a fall off in home ownership levels at young ages in the past decade, but the evidence in the report suggests that this is due more to delay than to lifetime non-achievement of home ownership. Thus, this analysis suggests that it is premature to see relatively small falls in home ownership among people in their twenties as a 'crisis' in home ownership among young people. Of course, the data take us forward only to about July 2000, the timing of Wave 2 of NLC. They do not take into account the recent sharp shift in housing affordability. At the same time, the years that are not covered, 2000-2003, were years in which the government's first home owners scheme was utilised to a very high level, thus it is possible that first home ownership rates could have risen in this period rather than fallen. Some indication will be obtained when the Wave 3 data from NLC become available. Unfortunately, the new large, national longitudinal survey, HILDA, in its first three rounds has not asked a question on the date of first entry to home ownership. However, at the authors' suggestion, the question is to be included in the fourth HILDA survey to be run in 2004. Inclusion of this question in HILDA will enable this analysis to be repeated on a larger sample and in association with variables not collected in NLC, such as the wealth variables obtained in HILDA Wave 2.

Since the mid 1970s, young Australians have been deferring other life cycle events that have long been associated with home purchase. The conventional framework is that first home purchase is associated with the achievement of a secure income stream and with the markers of family formation, marriage and first birth. While Winter and Stone (1999) have demonstrated that a classic sequencing of life cycle events (marriage to first child to home ownership) has been replaced by variation in the sequencing of these events, Mudd et al. (2001) conclude that 'the housing ladder or cycle – where a person would typically leave the parental home and move to a form of rental, alone or with others, then to purchase and finally outright ownership later in life as the mortgage was paid off-remains the dominant pattern'. Likewise, in examining the fulfilment or otherwise of expressed home ownership aspirations between 1997 and 2000, Merlo and McDonald (2002) found that achievement of home ownership was highly associated with a shift to a dual-earner household (mainly by partnering), income, and with the birth of a child during the three-year period.

Using discrete time event history analysis, in this report we have been able to examine the simultaneous effects of both time (birth cohort) and population composition characteristics on first home purchase. Birth cohort (equivalent to current age in a comparative statics analysis) was found to have little impact on the odds of acquiring a first home. If anything, younger cohorts were more likely to own than older cohorts, especially among men. To the extent that birth cohort can be taken as a measure of changing affordability across time (as has been done in previous comparative statics studies), these results suggest that, at least to the year 2000, changing affordability was not an issue in home purchase among young Australians.

Instead, the analysis shows that there have been falls in home ownership rates at young ages but the implication of the study is that these falls have been associated with delays of relationship formation, especially the delay of marriage. To the extent that delay of marriage leads in the future to people never marrying during their lifetime, home ownership rates may fall, but there is little indication that this is a significant factor to the year 2000. Of more concern, perhaps, is the finding of the study that having children delays home purchase, and the more children you have, the longer is the delay.

ATTACHMENT 1. DERIVATION OF AGE OF FIRST HOME OWNERSHIP, AUSTRALIAN HOUSING SURVEY 1999

Respondents were categorised according to their home ownership status as follows:

Home Ownership summary (OWNED)

- 0 Has never owned a house
- 1 Owns their current home and has a valid year bought value
- 2 Owned and lived in a house previously
- 3 Owned in another house not lived in
- 4 Owned previous or current house, but does not have a valid value for year the house was bought.

The distribution of values in these categories is given below:

	never owned	owns current and has valid time	owned and lived in another home	owned but did not live in another home	owned previous and/or current home, not applic value	Total
Sex	Estimated Number ('000)					
Male	2 530.8	3 999.1	422.9	105.7	237.7	7 296.1
Female	2 479.7	4 260.0	436.0	73.7	231.2	7 480.6
	Per cent					
Male	34.7	54.8	5.8	1.4	3.3	100
Female	33.1	56.9	5.8	1.0	3.1	100

Derivation of home ownership timing

Where owned = 0

The 'never owned' are those censored cases in each cohort. They will make up the proportion that have not bought a house in the last age group covered by that cohort in the survival chart. No derivation is necessary.

Where owned = 1

No derivations is necessary for this group. The data are used as recorded.

Where owned = 2, 3,4

These respondents need to have year of first home ownership derived. This is done by first estimating a *minimum* number of years ago that first home ownership may have taken place (see below). The distribution of year of first home ownership by age and sex from those whose home ownership details are known is created, and separate distributions are created for every possible combination of age group/sex and *minimum years*. This enables us to say, for example, what is the probability of a respondent having bought their house 10 years ago if we know they bought it at least 8 years ago. To attach an estimate of first home ownership at the individual level, these cumulative probabilities are imported into an SPSS program. A random number is generated for

each respondent, and then a derived year of home ownership is assigned based on where in the probability distribution this random number falls, given a particular combination of sex, age group and minimum years before purchase.⁴

Deriving minimum years since purchase where owned = 2

The minimum number of years is assumed to be equal to YRMOVED, which is the number of years since they moved out of the home they previously owned.

Deriving minimum years since purchase where owned = 3

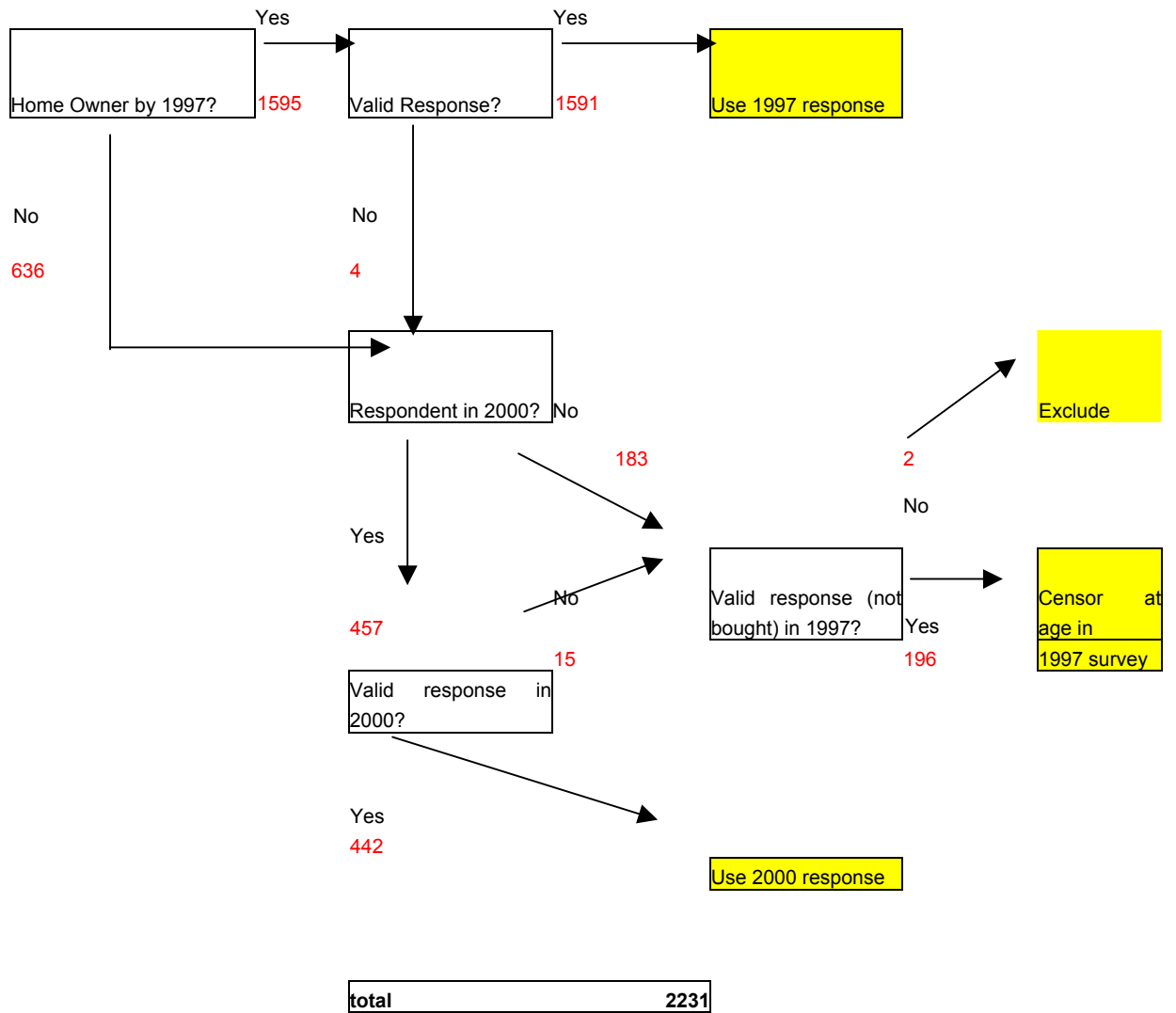
No minimum number of years can be used. The probabilities are based on overall probabilities.

Deriving minimum years since purchase where owned = 4

For these respondents we have the number of years lived in the previous or current house, so this is assumed to be the minimum number of years since the person first became a homeowner. That is, we assume that (for those that bought their current home x years ago) they bought their first home at least x years ago.

⁴ The drawback of this method, basing derivation on a random number, is that when the derivation is run a second time, it will not necessarily result in the same estimates of derived home ownership.

ATTACHMENT 2. 1997-2000 NEGOTIATING THE LIFECOURSE SURVEYS: FLOWCHART TO DEFINE AGE AT FIRST HOME OWNERSHIP



ATTACHMENT 3. CREATION OF DATA USED IN DISCRETE TIME EVENT HISTORY ANALYSIS

The following table shows the breakdown of the Negotiating the Life Course Survey (NLCS) wave 1 (1996-97) and wave 2 (2000) samples. Three respondents were excluded from the analysis because they did not provide sufficient information to process their home ownership status or age at first home ownership. Also, persons were excluded if they had purchased their first home before the age of 18, or if they were censored at age 18. This resulted in the exclusion of 38 cases.

Table A3. 1: Sample Numbers by Home Ownership status, Persons who did not own their own home before age 18.

	<i>Had purchased first home</i>	<i>Had not purchased by survey date</i>	<i>Total</i>
Respondents in waves 1 and 2	1404	343	1747
Respondents in wave 1 only	271	172	443
Total	1675	515	2190

To relate the birth history and relationship history to the first home ownership was a little problematic, given that the birth and relationship history is available in months while home ownership is known only in calendar year. It is not possible to determine at exactly which point in the year the home was purchased. Unfortunately this problem could not be solved with the data available and remains a flaw in this analysis. The approach used was to take the relationship and birth status at the end of the year, as at December, and to relate this to the home ownership indicator for that same calendar year. In effect this assumes that home ownership occurred in December for everyone.

Following is a description of how home ownership, relationship and birth history were derived.

First home ownership

To ensure home ownership details were compatible with the relationship and birth history data, first home purchases made in any year up to but not including the final survey year were used. If first home ownership occurred in the final survey year (that is, 1996 or 1997 for wave 1 only respondents and 2000 for wave 2 respondents), we are unable to relate this to relationship or birth information as at December of that year, given that in each wave the surveys were in the field before December. All persons were censored at the year before the final survey, and for 15 respondents, this meant their home purchases made in the final survey year were not included.

Relationship history

The NLCS asks a complete set of questions relating to marriages, time living de facto before marriage and other de facto relationships. The month and year of commencement of each marriage and de facto relationship is collected, along with the number of months or years living de facto before marriage. This dates collected can be used to populate an array for each month and year since the respondent turned 18, indicating whether at that time the person was not in a live-in relationship (referred to as single), living de facto or married. This data was compiled initially using the 1996-97 data, and then for those that also responded to the 2000 survey, this data was updated to fill in any relationship changes between the date of the first wave and the date of the

second. For those that were non-respondents in the second wave, all entries following the 1996-97 survey date were set to missing.

Persons were initially coded as being single, de facto or married. Single included those not living in a de facto or married relationship. De facto is used for those living de facto prior to marriage, as well as those who never married but lived de facto with a partner. Married is used for all months between when the marriage began and when it ended (if applicable).

There were other cases in which the relationship history had to be set to missing. Where a respondent was unable or unwilling to provide the year a relationship started or ended, this caused problems in filling in the details of that relationship, and the values had to be set to missing⁵. For example, if we know they were married in 1970, which ended in 1975, but then they stated they married again but provided no details on the timing of that marriage, all months and years from then end of the first marriage were set to missing.

Where information was known about other relationships, before or after the one for which some details were unknown, it was sometimes possible to fill in some of the relationship history, but to set to missing all the months and years between the known relationships. In the example above, if we know they were in a de facto relationship which started in 1990 and continued until the end of the survey, the missing values need only go until that de facto relationship started, as the second marriage must have been some time between 1975 and 1990.

Missing values also had to be used for those respondents who indicated that they had had more than 3 marriages or more than 3 de facto relationships. In each case, the respondent was asked to provide details of the first, second and most recent one, meaning that details of any relationships that occurred in the period between the second and most recent relationships were unknown. This period was set to missing unless other details were known (for example, between the second and most recent de facto they may have been married). This coding meant that some respondents, had periods of missing relationship history in the middle of a known relationship history. Some had completely missing relationship histories where insufficient details were provided on any relationship.

Table A3. 2: Numbers by Relationship History completion

	<i>Complete relationship History</i>	<i>Partially Complete relationship history</i>	<i>No relationship history</i>	<i>Total</i>
Respondents in waves 1 and 2	1692	54	1	1747
Respondents in wave 1 only	432	10	1	443
Total	2124	64	2	2190

Data on the age at which the respondent left home were also used to further classify single persons into those living with their parents and those not living with their parents. This was done using the questions in the two waves of the NLC on the age at which the respondent left home. The questions do not actually capture the complete history of moves into and out of the parental home, so there will be some cases in which

⁵ Where a year was known but the month was not, a dummy value was substituted for the month – equal to one if the beginning of the relationship and equal to 12 if the end of the relationship.

respondents have mistakenly been coded to living at home when they do not, and vice versa.⁶ This is expected to have a small effect on the analyses.

Birth history

Each respondent was asked to provide details of all their children, including birth year and date. This data was used to fill out an array for each month and year since the respondent turned 18, on how many children they had had at that time⁷. The child count was determined using only details relating to their own children. Partners children were not included and neither were adopted or foster children. In both these cases, it was possible the child did not reside with the respondent for their whole life, and it would be therefore incorrect to count them from their birth date.

Data was initially used from the 1996-97 survey, and then updated using the 2000 data for those that responded. There were a number of respondents who provided different information regarding their birth history in the two surveys (complete birth histories were collected in each survey). Often these differences were minor, say reporting a birth year one year different in the two surveys. Sometimes an additional child was reported in the second survey, as having been born twenty or thirty years ago. As it was impossible to know which data was correct, the first survey results were used, and only updated with new births that had occurred since the first survey. The data was set to missing from the year and month after the first survey when the respondent did not respond in the second.

Other cases of missing values were for those people that did not provide sufficient information to complete the array. Some did not provide birth year information⁸ for one or more birth, that is, we were told a birth occurred, but the year was unknown. For these persons, the complete birth history was set to missing. In a very few cases, birth year and month was provided, but the parentage was not provided. Again, the birth histories for these respondents were set to missing.

Table A3. 3: Sample Numbers by Birth History completion.

	<i>Complete birth History</i>	<i>No birth history</i>	<i>Total</i>
Respondents in waves 1 and 2	1732	15	1747
Respondents in wave 1 only	439	4	443
Total	2171	19	2190

Education

To simplify the analysis, highest level of education was coded as at the time of the survey, and therefore is not allowed to vary across time periods, even though it is likely that the highest level of education did change over time, for example, as respondents undertook education as mature age students.

⁶ For example, 111 respondents were living at home at the time of the survey, but had spent some time living away from home. For these respondents we know at what age they returned home but not the age they first left home.

⁷ For those who commenced childbearing before age 18, the first entry in the array is how many children they had had up to age 18.

⁸ Those provided a birth year but no birth month, 6 was imputed for all cases as the birth month.

Table A3. 4: Sample Numbers by Education and Sex.

<i>Education</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
Bachelor or higher	200	239	439
Undergraduate or associate diploma	72	142	214
Vocational	242	212	454
Complete secondary	204	277	481
Less than secondary	219	316	535
Not stated	29	38	67
Total	966	1224	2190

Country of Birth

Respondents were also classified according to their country of birth, grouping the countries according to the following classification. In the multivariate analyses, these data were further collapsed into Australian-born and non-Australian born.

Table A3. 5: Sample Numbers by Birth Cohort and Sex.

<i>Country of Birth</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
Australia	759	986	1745
New Zealand	15	35	50
Other English-Speaking	92	110	202
Non-English Speaking	100	93	193
Total	966	1224	2190

Birth Cohort and Sex

Respondents were also classified according to birth cohort and sex as the following table shows.

Table A3. 6: Sample Numbers by Birth Cohort and Sex.

<i>Birth cohort</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
1940-44	39	67	106
1945-49	113	127	240
1950-54	146	182	328
1955-59	182	214	396
1960-64	150	230	380
1965-69	144	165	309
1970-74	107	156	263
1975-79	85	83	168
Total	966	1224	2190

Whether had worked full-time

Respondents were also classified according to whether or not they had worked full-time in each year since they turned 18. This was derived from questions asking about the year in which the respondent worked in their first full-time job (part-time jobs while studying were to be excluded).

Creation of person-period data

To use discrete-time event history analysis on these data, the structure of the data was changed to be in person-period format, that is one record for each person and period under observation. For each person, there was one record for each year between when they turned 18 to the age they bought their first house, or if they have not yet bought one, to their age at the most recent survey. The home ownership variable indicated whether the respondent had bought a house, so remained at zero (one indicating they had bought this year) over the time periods preceding the year they bought a house. If they had not bought a house by the survey date all values of home ownership were set at zero.

The resulting file included a person indicator, a year variable along with the person's age at that time (age measured in how many years old they were at December that year), their relationship in that year (whether single living with parents, single living away from parents, cohabiting or married), the number of children ever born (0 or more), whether they had worked full-time and other information that was fixed at all time periods – sex, birth cohort, country of birth and level of education.

The conversion of person-data to person-year data resulted in a much larger dataset, as would be expected. The following table shows the distribution of variables within this dataset.

Table A3. 7: Variables in the Person-Year Dataset and Probability of Buying a House

	Bought a House	Did not Buy a House	Total	Probability of Home Purchase
Male	712	9773	10485	7%
Female	948	11548	12496	8%
Birth cohort				
1940-44	101	1296	1397	7%
1945-49	230	2674	2904	8%
1950-54	308	3698	4006	8%
1955-59	356	4292	4648	8%
1960-64	320	3942	4262	8%
1965-69	219	2819	3038	7%
1970-74	109	1865	1974	6%
1975-79	17	735	752	2%
Relationship Status				
Single, living with parents	93	5865	5958	2%
Single, not living with parents	354	6994	7348	5%
Cohabiting	161	2402	2563	6%

	Bought a House	Did not Buy a House	Total	Probability of Home Purchase
Married	1043	5662	6705	16%
Missing	9	398	407	2%
Children Ever Born				
0	1038	15933	16971	6%
1	275	2186	2461	11%
2	223	1692	1915	12%
3	65	793	858	8%
4	36	330	366	10%
5 or more	8	126	134	6%
missing	15	261	276	5%
Country of Birth				
Australia	1306	16468	1306	7%
New Zealand	40	449	40	8%
Other English-Speaking	174	2206	174	7%
Non-English Speaking	140	2198	140	6%
Highest qualification				
Bachelor or higher	363	4663	5026	7%
Undergraduate or assoc. diploma	181	2075	2256	8%
Vocational	371	4230	4601	8%
Complete secondary	303	4378	4681	6%
Less than secondary	389	5389	5778	7%
Not Stated	53	.586	639	8%
Work History				
Has not worked full-time	113	4693	4806	2%
Has worked full-time	1547	16628	18175	9%
Total	1660	21321	22981	7%

ATTACHMENT 4. COMPARISON OF MODELS WITH CATEGORICAL AND CONTINUOUS AGE

Table A4. 1: Parameter Estimates and Standard Errors for Home Ownership Models, Comparison of Categorical Age and Continuous Age

	Male				Female			
	Model 1		Model 2		Model 1		Model 2	
	Categorical Age		Continuous Age		Categorical Age		Continuous Age	
	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>
Age (reference = 18 in model 1)								
18	reference							
19	0.561	(0.609)			0.835	(0.388)		
20	0.837	(0.574)			0.995	(0.380)		
21	1.150	(0.555)			1.449	(0.364)		
22	1.532	(0.538)			1.465	(0.365)		
23	1.678	(0.535)			1.490	(0.369)		
24	1.904	(0.532)			1.694	(0.366)		
25	1.931	(0.534)			1.846	(0.369)		
26	1.980	(0.536)			2.082	(0.371)		
27	2.201	(0.537)			1.842	(0.380)		
28	2.049	(0.545)			1.726	(0.389)		
29	2.224	(0.545)			1.995	(0.388)		
30	2.023	(0.556)			2.062	(0.394)		
31	2.200	(0.564)			2.130	(0.401)		
32	2.053	(0.568)			2.192	(0.416)		
33	2.348	(0.575)			2.138	(0.429)		
34	1.870	(0.609)			2.167	(0.433)		
35	2.188	(0.598)			2.227	(0.460)		
Age (continuous)			0.777	(0.130)			0.517	(0.105)
Age-squared			-0.013	(0.002)			-0.008	(0.002)
Birth cohort (born in -)								
1940-44	reference							
1945-49	0.173	(0.190)	0.179	(0.191)	0.047	(0.196)	0.041	(0.197)
1950-54	0.278	(0.186)	0.283	(0.187)	-0.148	(0.200)	-0.157	(0.200)
1955-59	0.452	(0.186)	0.457	(0.187)	-0.179	(0.192)	-0.189	(0.192)
1960-64	0.336	(0.192)	0.335	(0.192)	0.114	(0.185)	0.101	(0.186)
1965-69	0.656	(0.199)	0.657	(0.200)	0.239	(0.201)	0.223	(0.202)
1970-74	0.804	(0.253)	0.826	(0.253)	0.488	(0.208)	0.501	(0.209)
(Continued on next page)								

Table A4. 2: Parameter Estimates and Standard Errors for Home Ownership Models, Comparison of Categorical Age and Continuous Age (continued from previous page)

	Male				Female			
	Model 1		Model 2		Model 1		Model 2	
	Categorical Age		Continuous Age		Categorical Age		Continuous Age	
	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>
Marital status								
<i>single, living away from home</i>	reference							
single, living at home	-0.588	(0.162)	-0.603	(0.162)	-0.726	(0.143)	-0.745	(0.143)
married	1.565	(0.125)	1.576	(0.125)	1.436	(0.105)	-1.449	(0.105)
cohabiting	0.344	(0.155)	0.345	(0.155)	0.134	(0.145)	-0.142	(0.145)
Number of children								
<i>none</i>	reference							
1	-0.276	(0.142)	-0.280	(0.142)	-0.396	(0.111)	-0.394	(0.111)
2	-0.434	(0.161)	-0.446	(0.161)	-0.655	(0.132)	-0.664	(0.132)
3 or more	-0.677	(0.255)	-0.684	(0.254)	-1.210	(0.187)	-1.216	(0.186)
Country of birth								
Australia	0.272	(0.121)	0.274	(0.121)	0.306	(0.098)	0.307	(0.098)
Other	reference							
Work History								
Has worked full-time	reference							
Has not worked full-time	-0.711	(0.211)	-0.728	(0.211)	-0.397	(0.146)	-0.421	(0.145)
Highest qualification								
<i>no post-secondary</i>	reference							
vocational	0.257	(0.111)	0.260	(0.111)	0.269	(0.108)	0.273	(0.109)
undergraduate or higher	0.334	(0.112)	0.334	(0.112)	0.103	(0.094)	0.106	(0.095)
Constant	-5.492	(0.563)	-14.890	(1.711)	-4.793	(0.398)	-10.796	(1.364)
McFadden's R-square	0.144		0.142		0.113		0.111	
Wald chi-square	426		448		580		600	
Log-Likelihood Full Model	-1906		-1910		-2599		-2607	
N	8896		8896		10741		10741	
BI								
C	-339		-468		-359		-482	

REFERENCES

- Allison, P. D. 1984. *Event history analysis : regression for longitudinal event data*. Beverly Hills, California: Sage Publications.
- Hughes, J. 1996, Economic shifts and the changing home ownership trajectory, *Housing Policy Debate*, vol. 7, no. 2, pp. 293-325.
- King, A. and Baekgaard, H. 1996, 'The dynamics of housing wealth', Paper presented to the 8th National Conference of the Australian Population Association, Adelaide, December.
- Landt, J. 1998, Housing affordability of low-income households in Australia, 1981-1982 to 1994-1995, 27th Conference of Economists, Sydney, 28 September-1 October.
- McDonald, P. 2003, 'Changing home ownership rates in Australia: issues of measurement and interpretation', AHURI Positioning Paper, AHURI, Melbourne.
- Merlo, R. and McDonald, P. 2002, *Outcomes of Home Ownership Aspirations and Their Determinants*, Australian Housing and Urban research Institute.
- Mudd, W., Tesfaghiorghis, H. and Bray, J. 2001. *Some Issues in Home Ownership*. Policy Research Paper No. 17, Department of Family and Community Services.
- Percival, R. 1998, Changing housing expenditure, tenure trends and household incomes in Australia, 1975-1976 to 1997, Discussion Paper No. 28, NATSEM, University of Canberra, Canberra.
- Winter, I. & Stone, W. 1998, *Social polarisation and housing careers: Exploring the interrelationship of labour and housing markets in Australia*, Working Paper No. 13, Australian Institute of Family Studies, Melbourne.
- Winter, I. & Stone, W. 1999, Home ownership: Off course? in J. Yates and M. Wulff, (eds), *Australia's Housing Choices*, University of Queensland Press, Brisbane, pp. 43-52.
- Yates, J. 1998, *Trends in Home Ownership*, New South Wales Department of Urban Affairs and Planning, Sydney.
- Yates, J. 1999, Decomposing Australia's home ownership trends, 1975-1994, in J. Yates and M. Wulff (eds), *Australia's Housing Choices*, University of Queensland Press, Brisbane, pp. 27-42.
- Yates, J. 2002. *Housing Implications of Social, Spatial and Structural Change*, Australian Housing and Urban Research Institute, Sydney Research Centre.

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