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Housing Affordability in New Zealand: Evidence from Household Surveys

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Housing Affordability in New Zealand: Evidence from Household Surveys

David Law and Lisa Meehan

New Zealand Treasury Working Paper 13/14

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Te Kōmihana Whai Hua o Aotearoa

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Housing Affordability in New Zealand: Evidence from Household Surveys

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Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics New Zealand.

Abstract

Housing affordability has been a topic of much interest in New Zealand over recent years with the median house price increasing by over 50% between 2004 and 2008. The aim of this paper is to inform debate by drawing out evidence from two surveys: the Household Economic Survey (HES); and the Survey of Family, Income and Employment (SoFIE). In particular, the paper examines how patterns of house prices, expenditures, and home ownership have changed over time and across groups. A model which may be suggestive of whether or not an individual or couple is likely to find home-ownership affordable is also developed. This model incorporates information relating to four important influences of affordability: income; net wealth; house prices; and the structure of mortgage contracts (including the interest rate and mortgage term).

JEL CLASSIFICATION R21: Housing Demand
R31: Housing Supply and Markets
R32: Other Production and Pricing Analysis

KEYWORDS Housing Affordability; House Prices; Homeownership; Housing Expenditures; Rent; Mortgage Payments.

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Housing Affordability in New Zealand: Evidence from Household Surveys

1 Introduction

Housing affordability has been a topic of much interest in New Zealand over recent years with the median house price increasing by over 50% between 2004 and 2008. Indeed, the House Price Unit was formed in 2007 to analyse both demand and supply side factors likely responsible for this and any policy options that might reduce pressure on house prices (House Prices Unit, 2008). With the newly formed Productivity Commission's inaugural inquiry being housing affordability, these issues are again receiving significant attention.

Housing affordability is important for a number of reasons. Unlike many other goods, expenditures on housing (whether renting or owning) usually absorb a large proportion of household income. Housing makes up a significant share of household wealth and retirement accumulations for many New Zealanders. Further, home ownership has been linked to building social capital and a sense of community (DiPasquale & Glaeser, 1999). More generally, the performance of the housing sector has widespread implications for investment, banking, saving and employment (Scobie et al., 2007).

The aim of this paper is to inform debate by drawing out evidence from two surveys: the Household Economic Survey (HES); and the Survey of Family, Income and Employment (SoFIE). The main advantages of HES are that it contains detailed expenditure data and has been running for several decades. SoFIE on the other hand contains a wealth of asset and liability information, and though it spans a shorter period, it tracks the same individuals through time.

In particular, the paper:

1. examines the distribution of house prices and how this has changed across time and between regions
2. examines changes in housing expenditures (rent or mortgage payments) as a proportion of income over time and across groups
3. examines patterns of home ownership over time and across groups, and

4. develops a model which may be suggestive of whether or not an individual or couple is likely to find home-ownership affordable. This is based on whether a lower quartile priced home in their region can be purchased without mortgage payments exceeding 30% of gross-income after taking account of their income, assets, liabilities and prevailing interest rates. Comparisons are then made of housing 'affordability' across groups and over time.

These elements, or outcomes, of housing affordability are explored primarily by way of various descriptive techniques. However, panel logistic regressions are employed to examine how the likelihood of home-ownership and housing affordability depend on a wide range of demographic and economic variables. These include: income, age, education, gender, ethnicity, New Zealand born, region, partnership status, regional house prices and mortgage interest rates.

Results show considerable increases in prices throughout the house price distribution between 2004 and 2008. Interestingly, lower quartile house prices increased by more than upper quartile house prices in all major regions. Further, although Auckland remains the most expensive region, growth in house prices across all other major regions was higher than Auckland during this period.

Home ownership rates, however, have declined only slightly between 2004 and 2008. Factors associated with a higher likelihood of owning a home include being partnered, female or older, and living in any region other than Auckland. Higher house prices are negatively associated with home ownership as is belonging to an ethnicity other than NZ European. A statistically significant relationship between income and home-ownership was not found. However, higher levels of education were positively associated with home-ownership, perhaps indicating that lifetime rather than point in time income is more important for home ownership.

For non-homeowners housing affordability improves significantly with income and is much higher for couples than singles. Between 2004 and 2008 income quintiles 2 and 3 (for couples) and 5 (for singles) experienced the greatest falls in affordability. Other income quintiles either had persistently high or low levels of affordability. Across regions, Auckland had the lowest levels of housing affordability throughout the period, however, by 2008 affordability levels in other regions had deteriorated such that they were much closer to those of Auckland. Housing affordability for homeowners was much higher throughout the period than for non-homeowners. Interestingly, when the affordability test for homeowners was changed so that rather than being able to afford a lower quartile priced house in their region we asked whether or not they could afford their current house, affordability actually increased.

The remainder of this paper is organised as follows. Section 2 briefly outlines the data. Sections 3 and 4 examine house prices and expenditures respectively. Descriptive and regression analyses of patterns of home ownership between 2004 and 2008 are presented in Section 5. Section 6 outlines a model of housing affordability and presents results separately for both non-homeowners and homeowners. The final section concludes and offers possible directions for future work.

2 Data

This paper uses unit record data from two household surveys conducted by Statistics New Zealand. The first is the Survey of Family, Income and Employment (SoFIE) and the second is the Household Economic Survey (HES).

SoFIE, the primary data source for this study, is a longitudinal survey where the original sample members are tracked and surveyed each year. It began in October 2002 with an original sample size of about 11,500 households, amounting to over 22,000 individuals 15 years of age and over. It concluded in September 2010 after running annually for a total of eight years (waves). The core survey collects information on individual and family characteristics, as well as labour market and income spells. In alternate years health, and assets and liabilities modules are included respectively.

At the time of this analysis only the first seven waves of SoFIE were available for analysis. The assets and liabilities module was included for three of these waves (waves 2, 4 and 6) and is required for our examination of house prices, ownership and affordability. Interviews for each wave were evenly spread over a 12 month period so that some households were interviewed in October and others the following September. However, we index all asset values to the mid-point of the relevant wave. Asset values for wave two are therefore indexed to approximately 31 March 2004, wave 4 asset values to 31 March 2006 and wave 6 asset values to 31 March 2008.

Indexation was particularly important during this period, with strong house price growth potentially leading to non-trivial increases in individuals' net wealth even within the interview period of a particular wave. Fortunately respondents in SoFIE were asked not only for the value of any residential property they owned but also to provide a valuation date. We used this date, together with detailed regional house price indices from Quotable Value (QV) (aggregated to the six major SoFIE regions) to index housing assets as described in the previous paragraph.¹ For all other assets the Consumer Price Index (CPI was used).

Another issue is that only the total value of all mortgages is recorded in SoFIE. There is no information about the number of mortgages or to which property the mortgages are assigned. For tax benefits, investment properties usually have high loan-to-value ratios, and consistent with Le *et al.* (2012), we therefore allocate mortgages to investment properties up to their asset value, with any remaining mortgage value then allocated to the owner-occupied property.

SoFIE required a great deal of careful cleaning in order to minimise loss of observations due to question non-response or apparent errors in recording of individual information.² Wherever possible we made use of the longitudinal nature of the data to attempt to correct for this. For example, if we observed an individual owning a house worth just \$1 in wave four we would examine their housing assets in other waves. If it turned out that that same person in wave two owned a house worth say \$900,000 and in wave 6 worth \$1,100,000 we changed the value recorded in wave four to \$1,000,000. Similar anomalies or non-response were observed across most of the variables we used in this analysis and so are too numerous to mention here. For more information about SoFIE and some of the

¹ In a number of cases respondents failed to provide valuation dates. In these cases we assumed that the distance between the respondents' interview date and valuation date was the same as the average of that distance for those respondents that were able to provide valuation dates. This distance was between two and three years depending on the survey wave.

² To construct a usable panel data set for analysis SoFIE also required a great deal of manipulation / formatting, with the data originally being stored in around 20 separate files with different (often incompatible) formats.

problems researchers can expect to encounter, see for example Scobie and Henderson (2009) or Carter et al. (2009).

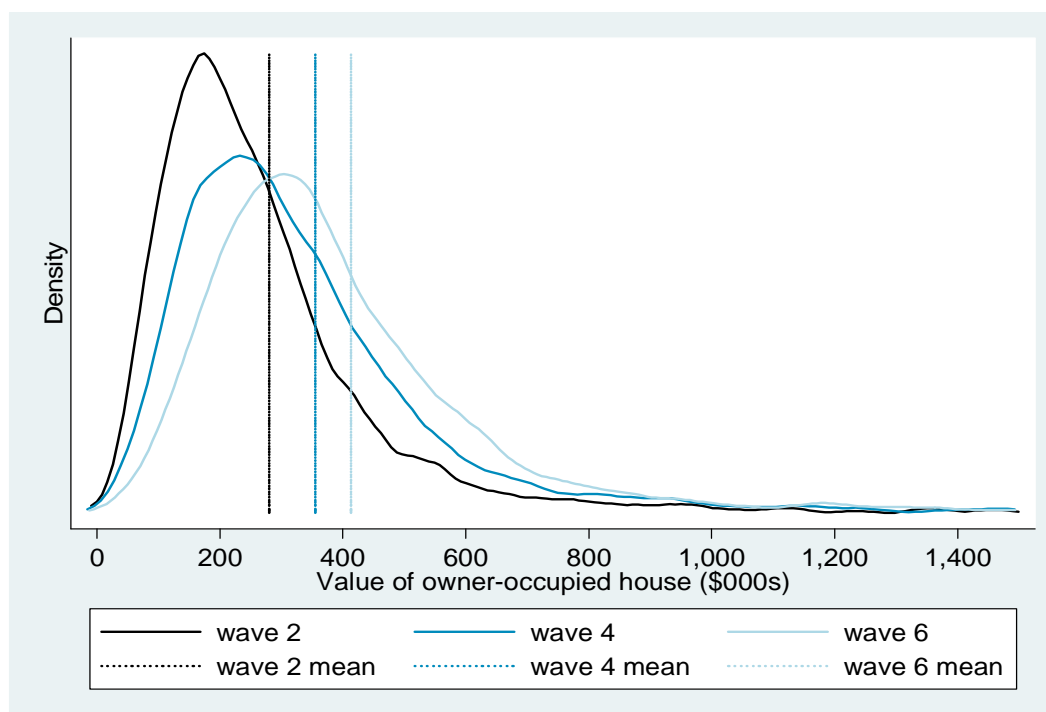
For most of our analysis using SoFIE the sample was restricted to those individuals aged 25 years and older. For descriptive analysis weighting of survey responses was necessary, however, Statistics New Zealand only provide longitudinal survey weights for those respondents who were original in scope sample members.³ Therefore a further restriction to the sample was required. For regression analysis we elected not to apply survey weights, allowing the use of significantly more observations, as many of the control variables included in regressions are those upon which the construction of weights would be based.

Finally, as SoFIE was not designed to collect detailed expenditure data we also make use of HES. This allows us to examine for example the pattern of rental or mortgage expenditures over time as well as patterns of detailed housing tenure.⁴ We employ HES going back to 1983. For more information about HES see, for example, Perry (2011).

3 Prices

In this section we examine changes in house prices between 2004 and 2008. Figure 1 gives kernel density plots of the distribution of owner-occupied house values for each of waves two, four and six of SoFIE. As described in the previous section asset values provided in these waves are indexed approximately to the first quarters of 2004, 2006 and 2008 respectively.

Figure 1 – Distribution of owner-occupied house values, 2004, 2006 and 2008



Source: Statistics New Zealand (SoFIE) data

³ Though preferred for the current analysis, cross-sectional weights were not provided. Longitudinal weights are for the 2002 New Zealand population, regardless of survey wave.

⁴ SoFIE and HES are not linked in any way. In other words, different individuals are surveyed in each case. Therefore we are not able to link the respective respondents' expenditures and assets, for example.

Owner-occupied house values increased substantially between 2004 and 2008 right throughout the distribution, with the largest change occurring between 2004 and 2006. Indeed the mean house price rose from approximately \$280,000 in 2004 to \$355,000 in 2006 and \$415,000 in 2008.

Growth in owner occupied house values is explored further in Table 1. In particular, for each of the six major regions within SoFIE the change in house values are shown at three different points on the distribution (the lower quartile, median and upper quartile). Two points of interest are immediately apparent. First, house values at all three points on the distribution in Auckland were higher than those of any other region in both 2004 and 2008, however, all other regions experienced greater increases in house values than Auckland did over the period. Second, in all regions the lower quartile experienced stronger growth in house values than the upper quartile.⁵

There are a number of possible reasons for this observation. With various tax incentives on rental property more pronounced in the 2000s than they are now, and rental property typically being toward the lower end of the quality spectrum, this may have stimulated demand more at the bottom end of the distribution. Further, with fixed land prices for example, when building new properties the returns to doing so are likely to be better for larger, better quality houses. If this is the case then the supply of lower quality houses may have increased less than high quality houses, relatively speaking, putting further pressure on lower quartile priced houses. This is consistent with data presented in the Productivity Commission's housing affordability inquiry report, which showed that land prices as a share of house values have increased over time and investment in new houses has tended to come in the form of large and relatively expensive houses (Productivity Commission, 2012).

Table 1 – Distribution of growth in regional house values, 2004 to 2008

Region	Lower Quartile			Median			Upper Quartile		
	2004 (\$)	2008 (\$)	%age change	2004 (\$)	2008 (\$)	%age change	2004 (\$)	2008 (\$)	%age change
Auckland	230,874	330,649	43	308,466	439,204	42	431,731	595,169	38
Waikato	135,642	234,245	73	192,706	337,742	75	282,588	452,333	60
Wellington	169,086	282,770	67	228,531	358,711	57	326,015	489,797	50
Rest of NI	114,125	190,347	67	176,804	289,031	63	260,232	403,088	55
Canterbury	159,795	248,109	55	213,060	323,665	52	308,376	449,251	46
Rest of SI	113,009	197,633	75	169,933	264,137	55	270,647	377,300	39
New Zealand	150,679	244,863	63	224,940	343,731	53	328,350	483,125	47

Source: Statistics New Zealand (SoFIE) data

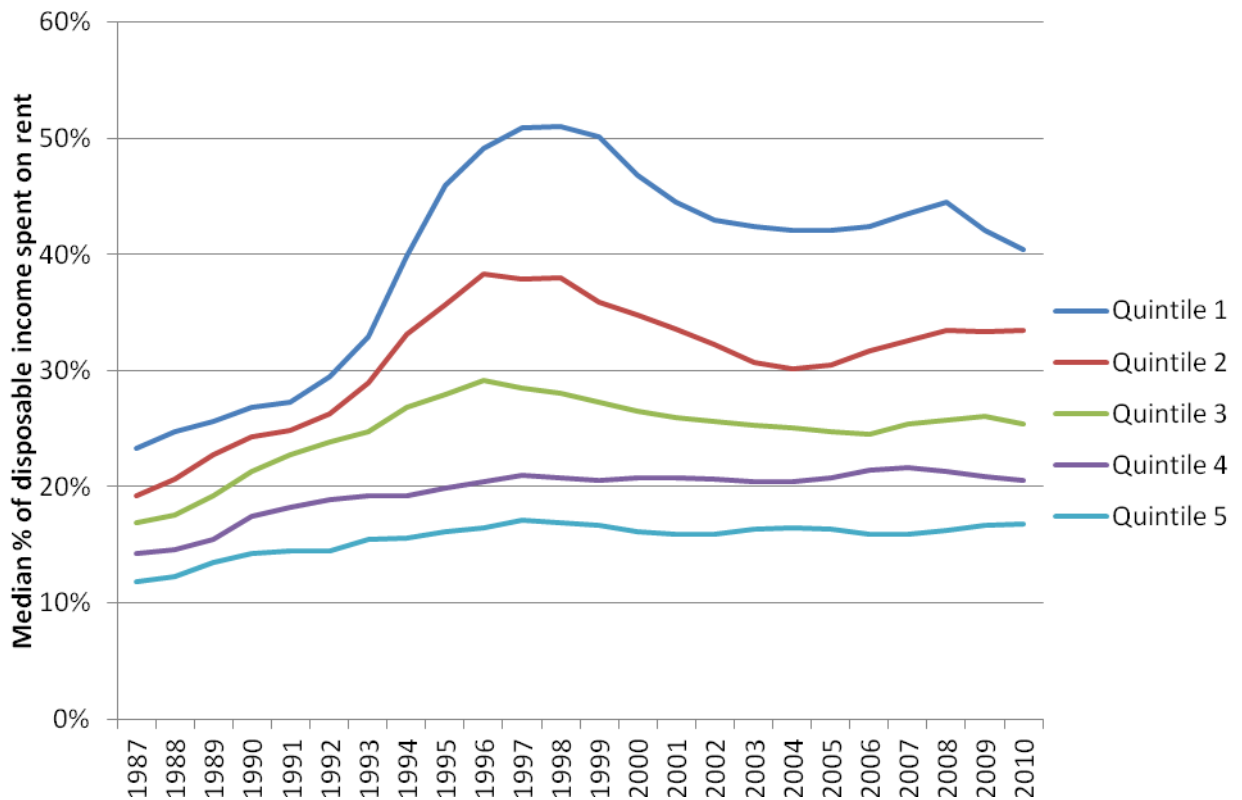
⁵ This is also true with respect to the median, with the only exception being that of Waikato – 73% versus 75% growth.

4 Expenditures

In this section we examine changes in housing expenditures between 1987 and 2010 using data from HES. Here, the unit of analysis is the household rather than the individual as expenditures in HES are only available at the household level.⁶

We consider both median rent (Figure 2) and mortgage payments (Figure 3) as a proportion of household disposable income by disposable income quintiles. In each case only expenditure on the primary residence is included. Related expenditures, such as those on utilities, rates, and depreciation are excluded.⁷

Figure 2 – Median rent-to-disposable income by disposable income quintile



Source: Statistics New Zealand (HES) data

The share of household disposable income spent on rent decreases significantly with income. For the top two income quintiles, after a gradual increase from the late 1980s to the late 1990s, rent to disposable income remained relatively constant at around 16% and 21% respectively. Rent to disposable income for the bottom income quintile however, peaked at over 50% in the late 1990s.

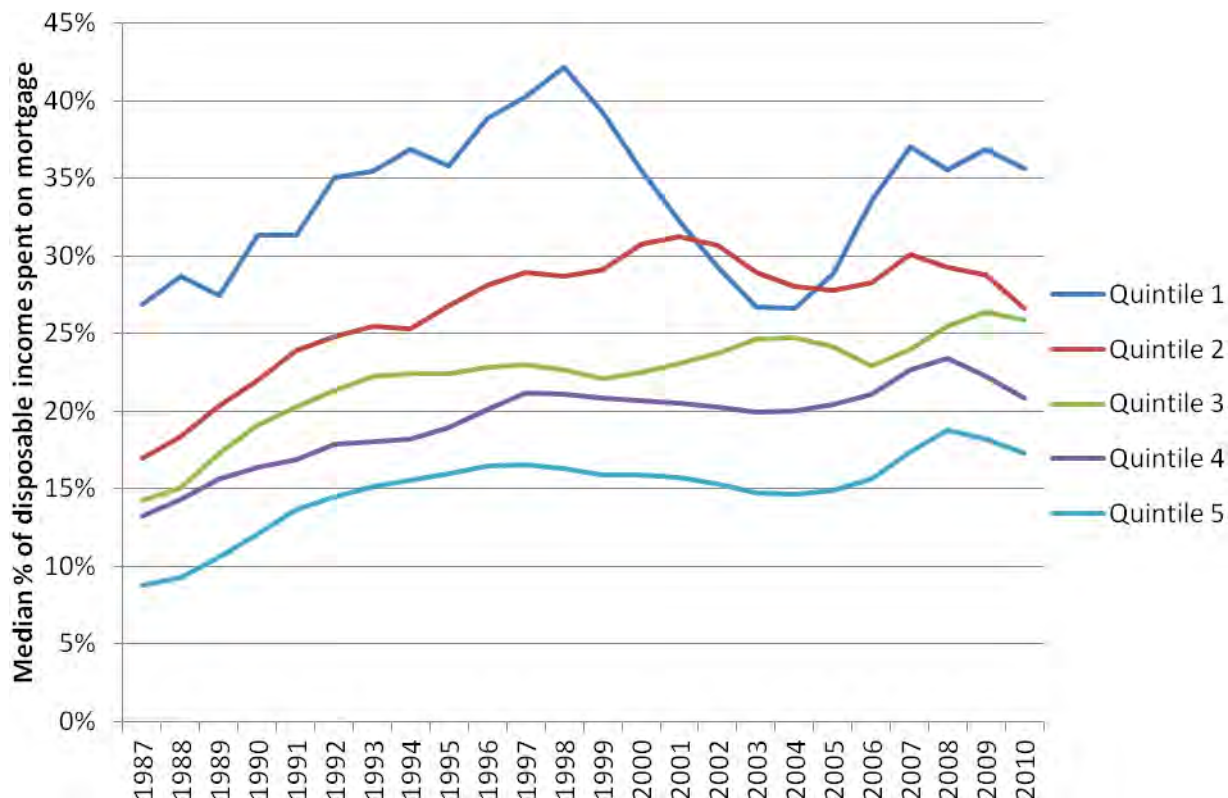
A number of policy changes occurred over the period that are likely to have affected households in lower income quintiles. In particular, Housing New Zealand (HNZ) introduced a system of market-related rents. The accommodation supplement was then introduced, and finally, HNZ began charging income-related rents. These changes roughly coincide with the strong growth, and then decline, in rent as a proportion of disposable income observed for those in the bottom two income quintiles.

⁶ While a number of methods have been developed to attribute spending to various members of the household, it is not necessary to do so for our purposes.

⁷ Imputed rental is also excluded from income.

Recall from Section 3 that between 2004 and 2008 house values in SoFIE increased significantly, for example, the median house value rose by over 50%. It is interesting then that over the same period rent to disposable income for all income quintiles remained relatively constant.

Figure 3 – Median mortgage-to-disposable income by disposable income quintile



Source: Statistics New Zealand (HES) data

The pattern for mortgage payments is similar to that for rent, minus the changes likely due to policy. If anything, the amount households spend on mortgage payments as a proportion of disposable income (compared to rent) appears slightly lower. Between 2004 and 2008 all but the bottom income quintile⁸ experienced only modest increases in the proportion of disposable income allocated to mortgage payments. This is not particularly surprising, however, given that many households represented here would have purchased their homes before the period of strong growth in house prices.⁹

⁸ The volatility of mortgage payments to disposable income for this income quintile is likely to be at least in part due to a lack of observations as relatively few households in this income quintile own a home with a mortgage.

⁹ In future work we plan to contrast housing affordability of those who have recently purchased a house and those who have owned their homes for longer.

5 Ownership

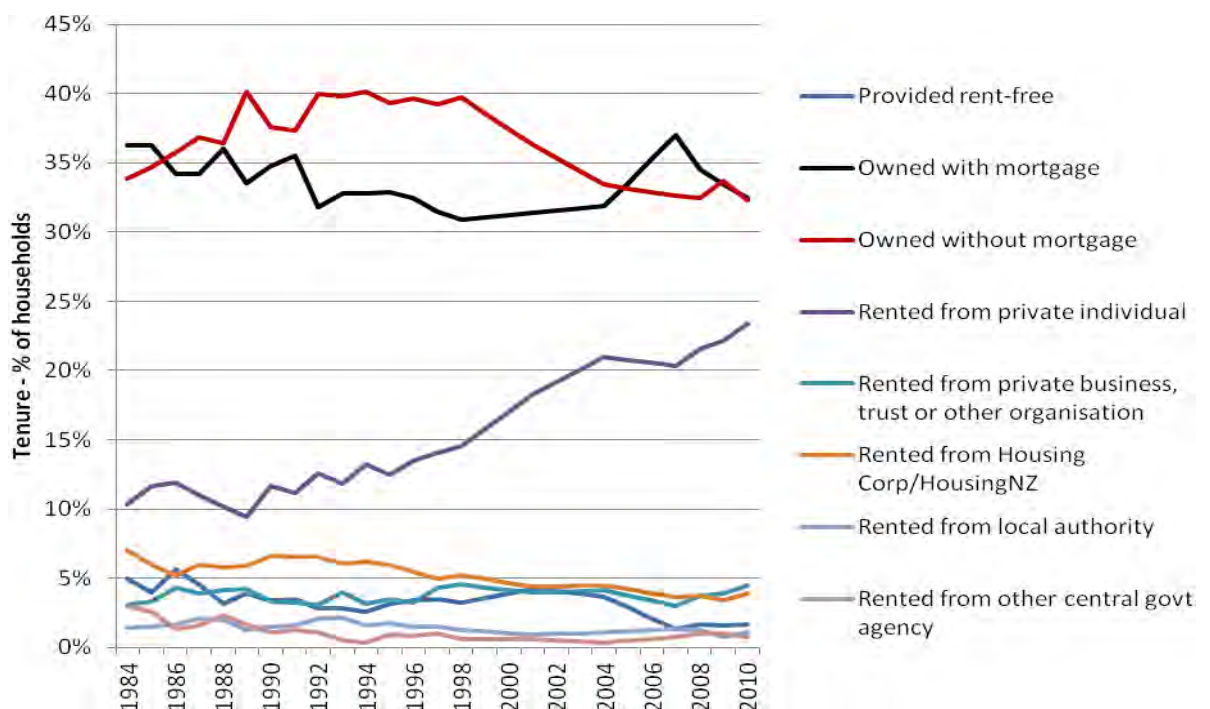
Patterns of home ownership are now examined. Section 5.1 presents bivariate descriptive analysis of home ownership across groups and over time. To guard against the possibility of drawing spurious relationships between variables multivariate analysis is required and presented in Section 5.2. In particular, the results of a logistic regression of home ownership status are discussed where the relationship between a range of factors on the likelihood of owning a home are considered. These include: income; age; education; gender; ethnicity; New Zealand born; region; partnership status; and regional house prices.

5.1 Descriptive analysis

Patterns of housing tenure between 1984 and 2010 are described in Figure 4. Home ownership peaked in the late 1980s / early 1990s with nearly 75% of households owning the home they lived in. By 2010 this had fallen to around 65%, split evenly between those living in homes with and without mortgages respectively. With rapidly rising house prices during the 2000s and relatively stable rent, the proportion of household living in private rental accommodation increased substantially from the late 1990s to 2010.

Briggs (2006) suggests that at least part of the decline in home ownership over this period is attributable to the increasing number of homes held in Family Trusts. Statistics New Zealand changed questions in HES late in the period to account for this, possibly creating a discontinuity in measurement of home ownership. In the case of SoFIE, questions about family trusts were asked from the outset so no such discontinuity should exist. However, complications remain that mean home ownership may to some extent also be underreported in SoFIE (see for example Scobie and Henderson, 2009).

Figure 4 – Housing tenure



Source: Statistics New Zealand (HES) data

Figures 5 through 9 examine the proportions of individuals and couples who own their homes in each of waves 2, 4 and 6 of SoFIE, by income, age, ethnicity and region respectively. Generally, couples are far more likely to own their homes than singles, with the proportion of couples owning their homes being 63% over all three waves compared to 42% for singles.¹⁰ Overall, the proportion of individuals owning their home declined slightly between 2004 and 2008, from around 58% to 55%.

For couples there appears to be little relationship between income and home ownership. For singles home ownership increases with income for the most part (the second income quintile has relatively high home ownership but this is likely due to high numbers of retirees in this group).

Figure 5 – Home ownership by income



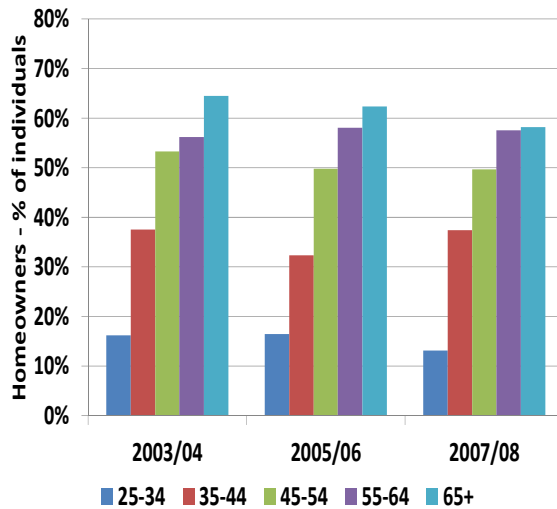
Source: Statistics New Zealand (SoFIE) data

Home ownership increases with age regardless of partnership status and across all three waves of SoFIE, however, the relationship is particularly strong for singles. Mortgage-free home ownership also increases with age, such that, nearly 100% of singles and over 90% of couples over the age of 65 who own their homes do so without mortgages. Given that home ownership is more prevalent amongst couples, it is interesting that conditional on owning a home, mortgage free home ownership is much more likely for singles than couples.

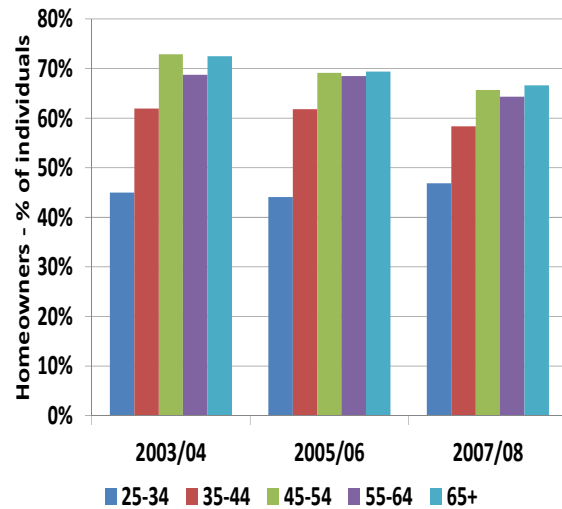
¹⁰ Owner-occupied rates from HES are higher than those from SoFIE because HES rates are based on a household measure of ownership while SoFIE uses an individual-level measure. That is, HES measures whether at least one person living in the house owns it, while in SoFIE, an individual is not considered to be a home owner unless he or she actually owns the house. To check consistency, we also applied the household-level measure to SoFIE and found similar owner-occupied rates as in HES.

Figure 6 – Home ownership by age

Singles



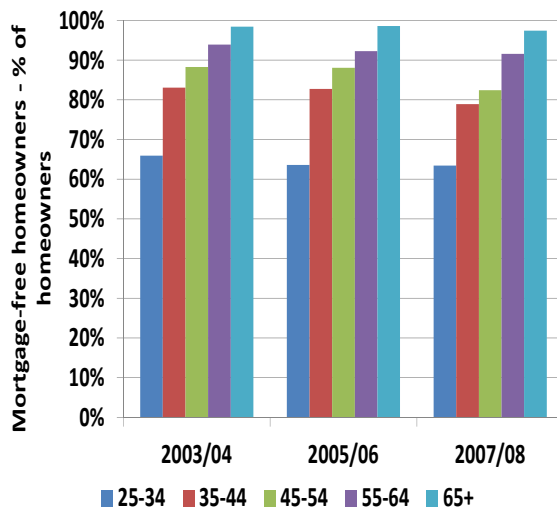
Couples



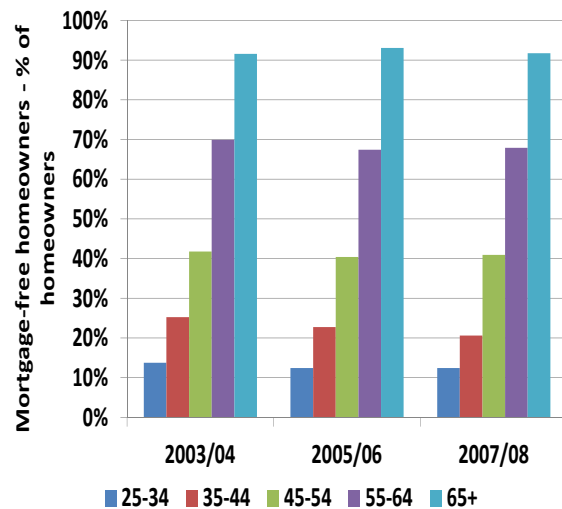
Source: Statistics New Zealand (SoFIE) data

Figure 7 – Mortgage-free home ownership by age

Singles



Couples

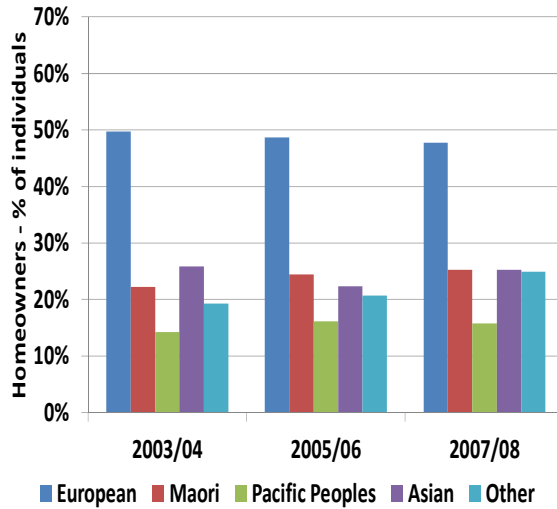


Source: Statistics New Zealand (SoFIE) data

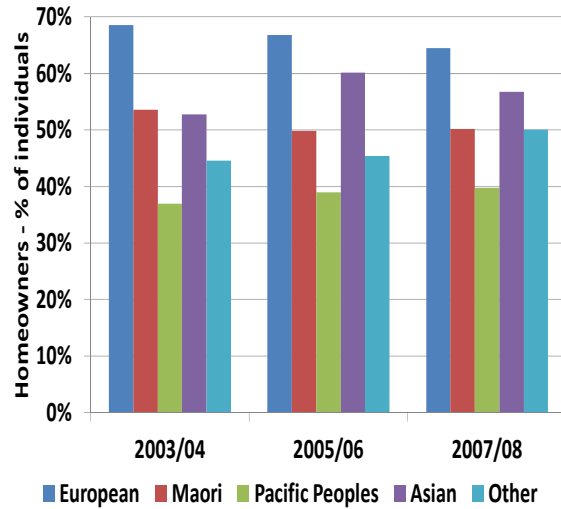
Single Europeans are around twice as likely to own their home as singles belonging to any other ethnicity. Coupled Europeans are also relatively more likely to own their home than those from other ethnicities, though the difference is less pronounced and diminished between 2004 and 2008. Regardless of partnership status and survey wave, Pacific peoples have the lowest levels of home ownership.

Figure 8 – Home ownership by ethnicity

Singles



Couples



Source: Statistics New Zealand (SoFIE) data

Finally, given our discussion of house prices in Section 3, it is not surprising that home ownership is lower in Auckland than in any other region for both singles and couples over the entire period of analysis. The rest of the South Island (for singles) and Wellington (for couples) had the highest rates of home ownership, though particularly in the case of Wellington, these declined significantly over the period.

Figure 9 – Home ownership by region

Singles



Couples



Source: Statistics New Zealand (SoFIE) data

5.2 Regression analysis

While relatively simple to produce and interpret, descriptive bivariate analysis of the type presented in the previous subsection can often be misleading. This is because any apparent relationship (or lack thereof) could actually be the result of an omitted factor. For example, we saw that Europeans are a lot more likely to own houses than all other ethnicities. It may be the case that this is due to different preferences for homeownership amongst different ethnic groups. However, it could also be that Europeans are older and therefore have had longer to accumulate wealth, or on average are more likely to live outside of Auckland (the region with the highest house prices in New Zealand). To guard against the possibility of drawing spurious relationship between variables in this way, multivariate analysis is required.

The results of logistic random effects panel regressions of home ownership status are presented in Table 2, where the effects of a range of factors likely to affect the probability of owning a home are examined simultaneously.¹¹ The dependant variable is equal to one if an individual owns the home they live in and zero otherwise. Explanatory variables include those discussed in Section 5.1 as well as gender, years of schooling, whether or not the respondent was born in New Zealand and regional house prices.

Positive coefficient values associated with variables indicate that an increase in the value of that variable is associated with an increased likelihood of home ownership and vice versa. For readers interested in these results in more detail, coefficients can also be interpreted as log odds ratios. If one exponentiates the coefficient estimates then this provides odds ratios. For example, looking at the regression combining singles and couples, the ratio of the odds of owning a home (compared to not owning a home) for partnered versus non-partnered individuals is 9.4:1¹² (i.e. $e^{2.2407}$).

Results are largely what one would expect, and confirm the associations illustrated by the descriptive analysis of the previous subsection. For example, focussing again on the regression combining singles and couples, the likelihood of owning a home improves with age (but at a decreasing rate), if one is partnered or lives outside of Auckland. The likelihood is reduced if an individual is any ethnicity other than European.

¹¹ Pooled logistic regressions yield similar results.

¹² In this example if p is the probability of a partnered individual owning a home and q is the probability of a non-partnered individual owning a home, then the odds ratio is equal to $(p/(1-p))/(q/(1-q))$.

Table 2 – Logistic panel regressions of home ownership status, 2004 to 2008

Variables	Singles	Couples	Combined
Income	0.0000** (0.0000)	-0.0000* (0.0000)	0.0000 (0.0000)
Years of Schooling	0.4538** (0.0476)	0.0338** (0.0095)	0.1223** (0.0194)
Age	0.8764** (0.0441)	0.1860** (0.0101)	0.5228** (0.0177)
Age squared	-0.0060** (0.0004)	-0.0012** (0.0001)	-0.0038** (0.0002)
Partnered			2.2407** (0.0810)
Female	1.0866** (0.2262)	0.1140** (0.0425)	0.3481** (0.0890)
New Zealand Born	1.1820** (0.3492)	0.2294** (0.0631)	0.1323 (0.1291)
Regional House Price	-2.9378** (0.3611)	-1.0983** (0.1273)	-2.1505** (0.1530)
Maori	-5.3391** (0.4049)	0.3765** (0.0695)	-2.4108** (0.1596)
Pacific Islander	-5.9337** (0.6326)	0.9700** (0.1474)	-3.9320** (0.2485)
Asian	-2.5910** (0.8262)	1.3886** (0.1023)	-1.1794** (0.2350)
Other Ethnicity	-3.3665** (0.9938)	0.0431 (0.1504)	-2.5249** (0.3663)
Waikato	1.5238** (0.3698)	0.1600 (0.0826)	0.6372** (0.1572)
Wellington	0.5427 (0.3522)	0.7771** (0.0727)	0.9306** (0.1417)
Rest of North Island	1.5073** (0.3120)	0.4388** (0.0628)	0.8507** (0.1238)
Canterbury	1.4723** (0.3405)	1.0748** (0.0675)	1.0565** (0.1365)
Rest of South Island	1.8052** (0.3594)	0.7854** (0.0729)	1.2099** (0.1440)
Constant	-33.9965** (1.4248)	-6.2264** (0.3266)	-16.4308** (0.5530)
Log Likelihood	-6023.3162	-14716.7110	-21261.7300
Observations	13910	31740	45650
Groups	7535	13985	19805

Source: Statistics New Zealand (SoFIE) data

Notes – The dependant variable is one if the person owns their own home, and zero otherwise. The effects of ethnicity and region are relative to being New Zealand European and living in Auckland respectively. Person specific effects are included in all regressions. Standard errors are in parenthesis. Two stars (**) indicates that the coefficient is significantly different from zero at the 1% significance level and one star (*) indicates that it is significant at the 5% level.

It is interesting that income is not found to have a statistically significant effect on the likelihood of homeownership. However, additional years of schooling are positively associated with the likelihood of homeownership. This suggests that people's lifetime earnings, rather than income at a point in time, may be a more important determinant of whether one owns a home.

Three further factors not discussed in the previous subsection, but likely to influence homeownership, have been included in our regressions: gender, whether or not the respondent was born in New Zealand and regional house prices. Being female and New Zealand born are both associated with increases in the likelihood of owning a home, though New Zealand-born is not statistically significant at conventional levels. It is probable, however, that if we were to split those individuals not born in New Zealand into recent arrivals (say in the last five to ten years) and those who have been living here longer, we would observe a stronger relationship. Finally, higher house prices have a significant negative effect on the likelihood of home ownership.

6 Affordability

Patterns of housing affordability are now examined. In Section 6.1 a model of housing affordability is developed. This model is then applied to non-homeowners and homeowners in Sections 6.2 and 6.3 respectively, allowing comparison of housing affordability across groups and over time. Regression analysis of housing affordability, similar to that of the previous section, is also undertaken for the sample of non-homeowners.

6.1 The model

There are many factors that will determine whether an individual or couple will find home ownership affordable. The model we use here incorporates information relating to four important influences of affordability: income; net wealth; house prices; and the structure of mortgage contracts (including the interest rate and mortgage term). This information is then used to ask whether or not a particular individual or couple could afford to service a mortgage on a lower quartile priced house in their region, with payments not exceeding a certain proportion of their income.

The first step is to determine the amount that an individual or couple needs to borrow (if anything) in order to purchase a home. This is calculated as the difference between the cost of a lower quartile priced house in the region which they live (obtained from QV) and any positive net wealth they have, which we assume is used as a deposit.

Required mortgage payments are then determined by the terms of the mortgage contract. We assume a standard table mortgage for a term of 30 years, and nominal interest rates equal to the average of 1-year fixed mortgage rates prevailing at the time (sourced from Reserve Bank of New Zealand series).

Of course nominal interest rates are comprised of real interest rates and inflation. It is well understood that inflation can have a substantial negative effect on the affordability of housing (see for example Modigliani and Lessard, 1975, Fischer and Modigliani, 1978 and Coleman 2008, 2010). Inflation results in 'front-loading' of mortgage repayments since it leads to larger real principal repayments during the early stages of homeownership (an

issue known as mortgage-tilt). Further illustration and discussion of the effects of inflation on housing affordability are available in the appendix.

As real mortgage contracts are not available in New Zealand our focus here is on nominal housing affordability. This reflects 'actual' affordability by highlighting the difficulties of meeting the terms and conditions of mortgage contracts currently available for those who need to borrow to purchase a house.¹³

Required mortgage payments are then offset against a proportion of the individual or couples income. Many variants are used in the literature, broadly falling into two categories (outgoings-to-income ratios and residual income measures), each with their own strengths and weaknesses (Robinson et al. 2006). In this case we adopt the so called '30 percent rule' where we say that an individual or couple would find it unaffordable to purchase a home if servicing the mortgage required more than 30% of their gross income.¹⁴ In cases where an individual or couple have negative net wealth we use gross income after debt servicing costs have been deducted in our calculations of affordability.

This model is then applied to those aged 25 and older. Non-homeowners and homeowners are examined in turn. In the case of homeowners we relax the model to consider the affordability of the houses they currently own, as well as lower quartile priced houses in their respective regions.

6.2 Non-homeowners

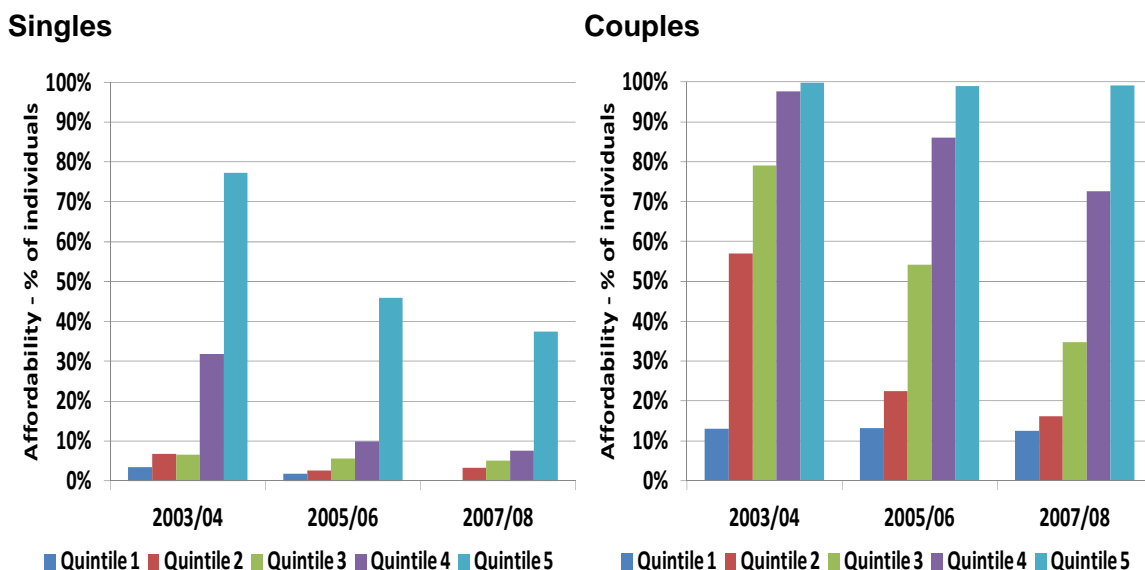
6.2.1 Descriptive analysis

Figures 10 through 13 illustrate patterns of housing affordability for non-homeowners. In particular we examine the proportions of individuals and couples who, according to our model, could afford to buy a home in each of waves 2, 4 and 6 of SoFIE, by income, age, ethnicity and region. Generally, couples are far more likely to find homeownership affordable than singles, with the proportion of couples being able to afford being 57% over all three waves compared to around 16% for singles. Overall, the proportion of individuals able to afford home ownership declined significantly between 2004 and 2008, from around 51% to 31%. Subsequently, house price and interest rates have both softened which, together with modest income growth, will have at least partially reversed this decline in housing affordability.

¹³ In future work we intend to investigate how housing affordability, according to the model used in this paper, might have been improved if real mortgage contracts had been available to potential homeowners.

¹⁴ An important advantage of this rule is that it is very easy to calculate. Residual income measures, particularly those where income is equalised, require much more information (including the tax paid by individuals on all forms of their income) and manipulation. In future work, however, we intend to investigate the predictive power of different affordability rules in explaining transitions into home ownership.

Figure 10 – Affordability by income (non-homeowners)



Source: Statistics New Zealand (SoFIE) data

Note: The figure for quintile 1 in 2007/08 is not presented for confidentiality reasons since the number of those who could afford was very small.

Housing affordability improves significantly with income, particularly for couples. Between 2004 and 2008 income quintiles 2 and 3 (for couples) and 5 (for singles) experienced the greatest falls in affordability. Indeed, in each case affordability levels fell to below half their 2004 levels. Other income quintiles either had persistently high or low levels of affordability over the period.

Between waves 2 and 6 all age groups experienced a decline in housing affordability, though this decline was more pronounced amongst the youngest age groups. Within each wave, for both singles and couples affordability initially increases with age, likely reflecting the higher incomes associated with greater work experience. However, beyond a certain point affordability actually decreases with age. This likely reflects that while most older people already own their home, some, such as the lifetime poor, cannot afford to buy a house. It also reflects that incomes tend to be lower in this age group due to retirement. Some older people may also have experienced adverse shocks such as marriage dissolution or other financial issues late in life, leaving them little time to recover financially.

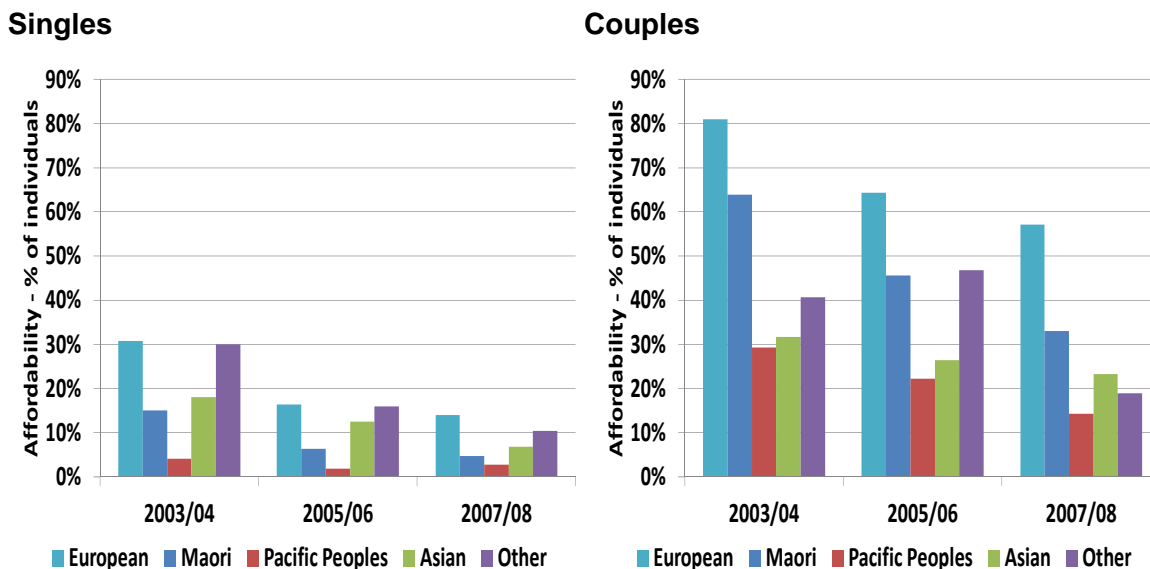
Figure 11 – Affordability by age (non-homeowners)



Source: Statistics New Zealand (SoFIE) data

Affordability declined for all ethnic groups between 2004 and 2008. However, the capacity to buy a house varies across ethnic groups, and was highest for European New Zealanders and lowest for Pacific peoples over the entire period of analysis. This may partly reflect location choices, with some ethnic groups more likely to be concentrated in Auckland. Rather than disparities in income or net wealth per se, differences between ethnicities may also be due in part to age, with Maori for example tending to be much younger on average than Europeans.

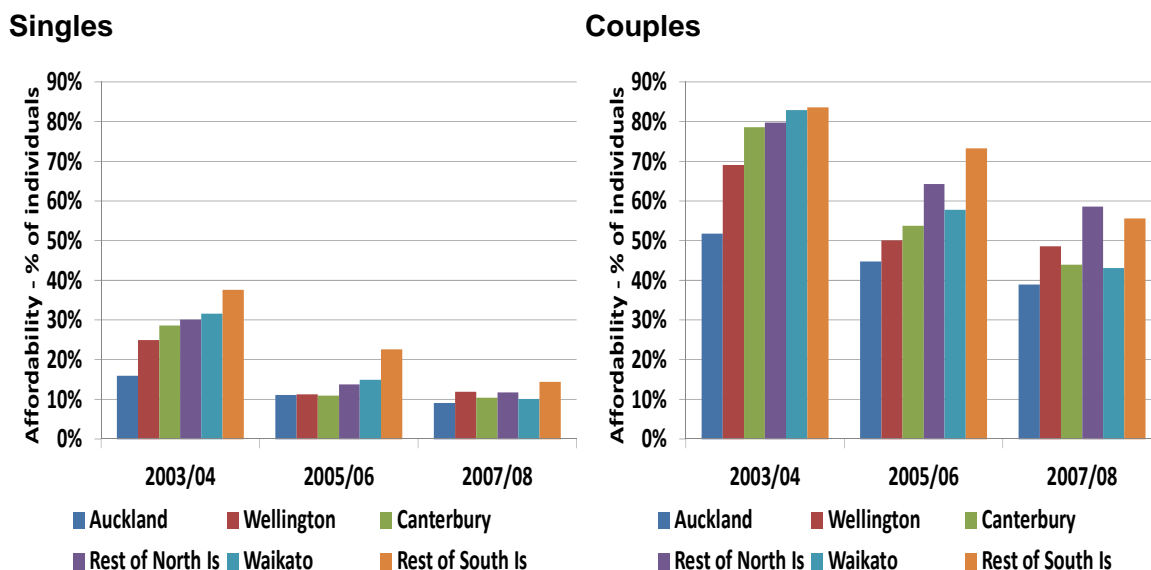
Figure 12 – Affordability by ethnicity (non-homeowners)



Source: Statistics New Zealand (SoFIE) data

Across regions, Auckland had the lowest levels of housing affordability throughout the period of analysis. However, by 2008 affordability levels in other regions deteriorated such that they were much closer to those of Auckland.

Figure 13 – Affordability by region (non-homeowners)



Source: Statistics New Zealand (SoFIE) data

6.2.2 Regression analysis

Just as was the case when we examined patterns of home ownership in Section 5, the possibility exists that bivariate analysis can yield spurious relationships. Multivariate analysis is again employed to guard against this possibility.

The results of logistic random effects panel regressions of housing affordability status (determined by our model) are presented in Table 3, where the affect of a range of factors likely to affect the probability of being able to afford to purchase a house are examined simultaneously.¹⁵ The dependant variable is equal to one if an individual can afford to buy a house, and zero otherwise. Explanatory variables are similar to those used in the regression analysis of Section 5. However, as income and house prices are key drivers of our housing affordability model these are excluded from the regression,¹⁶ interest rates remain to capture changes in the macro-environment. Interpretation of coefficient estimates is also similar to that of the previous section.

Results are largely what one would expect, and again confirm the picture painted by the descriptive analysis of the previous subsection. Focussing on the regression combining singles and couples, the likelihood of being able to afford a home initially improves with age (and then declines), if one is partnered or lives outside of Auckland. The likelihood is reduced as interest rates rise, if an individual is any ethnicity other than European or is female.

¹⁵ Pooled logistic regressions yield similar results.

¹⁶ If all variables used to derive the dependant variable were included in the regression as explanatory variables, affordability would be perfectly predicted, and gaining an understanding of how other factors are associated with affordability would not be possible.

Table 3 – Logistic panel regressions of Affordability status, 2004 to 2008

Variable	Singles	Couples	Combined
Age	0.2420** (0.0286)	0.3527** (0.0267)	0.2577** 0.0184
Age Squared	-0.0022** (0.0003)	-0.0037** (0.0003)	-0.0026** 0.0002
Partnered			4.1058** 0.1315
Female	-0.8858** (0.1586)	0.0450 (0.1233)	-0.2300* 0.0933
New Zealand Born	-0.1824 (0.2368)	0.4240* (0.1912)	0.1784 0.1448
Interest Rate	-69.8548** (5.0735)	-80.9188** (3.9807)	-73.8592** 3.0237
Maori	-2.3600** (0.2600)	-2.2065** (0.2033)	-2.1709** 0.1531
Pacific Islander	-3.3380** (0.5250)	-3.8012** (0.2872)	-3.5440** 0.2384
Asian	-0.7490 (0.4046)	-3.6633** (0.3251)	-2.6869** 0.2507
Other Ethnicity	-0.5475 (0.5547)	-2.7837** (0.4103)	-2.0982** 0.3280
Waikato	1.3880** (0.3021)	1.3903** (0.2327)	1.3318** 0.1787
Wellington	0.9319** (0.2570)	0.6912** (0.2068)	0.7581** 0.1560
Rest of North Island	1.3519** (0.2377)	1.4606** (0.1790)	1.3636** 0.1380
Canterbury	0.8423** (0.2486)	0.5092** (0.1977)	0.6269** 0.1502
Rest of South Island	1.3911** (0.2687)	1.8566** (0.2279)	1.5951** 0.1664
Constant	-3.5126** (0.7751)	-0.4523 (0.6438)	-3.2221** 0.4732
Log Likelihood	-2941.1765	-4838.8974	-7863.7909
Observations	7735	9200	16935
Groups	4800	5360	9655

Source: Statistics New Zealand (SoFIE) data

Notes – The dependant variable is one if the person is deemed to be able to afford a lower quartile priced house in their region (according to the housing affordability model described in Section 6.1), and zero otherwise. The effects of ethnicity and region are relative to being New Zealand European and living in Auckland respectively. Person specific effects are included in all regressions. Standard errors are in parenthesis. Two stars (**) indicates that the coefficient is significantly different from zero at the 1% significance level and one star (*) indicates that it is significant at the 5% level.

6.3 Homeowners

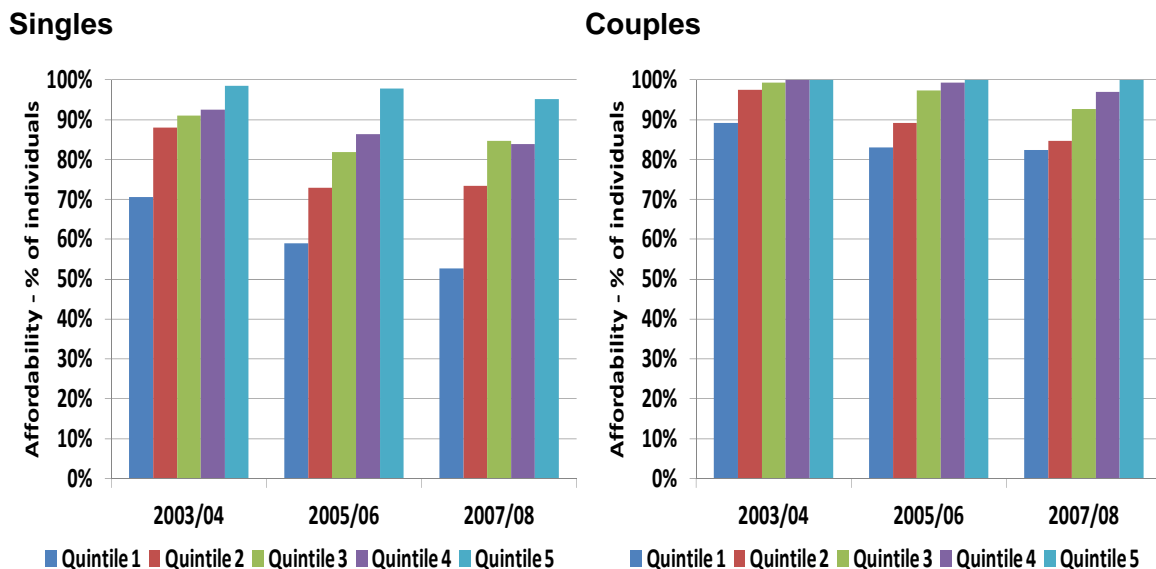
The financial consequences of home ownership will of course linger well beyond that point at which one chooses to buy a house. For this reason we also apply our affordability model to those who currently own the house they live in.

As was the case for non-homeowners, couples are more likely to find homeownership affordable than singles, however, the difference between these two groups is much less pronounced. The proportion of home owning couples able to afford a lower quartile priced house in their region according to our model was 91% on average over all three waves compared to around 82% for singles. Overall, the proportion of home owning individuals declined slightly between 2004 and 2008, from around 95% to 88%.

Even so, the levels of affordability for home owners compared to non-homeowners were much higher throughout the entire period of analysis, for example, 88% versus 31% in 2008. This is not necessarily surprising as in this analysis we examine all homeowners regardless of how long they have owned their home. It is likely that the levels of affordability for recent homeowners would be lower than for those who purchased their homes some time ago.¹⁷ However, the large difference between affordability of non-homeowners and homeowners does highlight the potential importance of transition into home ownership.

The observed relationships between affordability and each of income, age, ethnicity and region for homeowners are similar to that of non-homeowners. For example, Figure 14 shows the proportions of individuals and couples who, according to our model, could afford to buy a lower quartile priced home in each of waves 2, 4 and 6 of SoFIE, by income. Housing affordability improves with income, particularly for singles. The most substantial falls in affordability between 2004 and 2008 were experienced by singles belonging to the bottom two income quintiles.

Figure 14 – Affordability by income (homeowners)



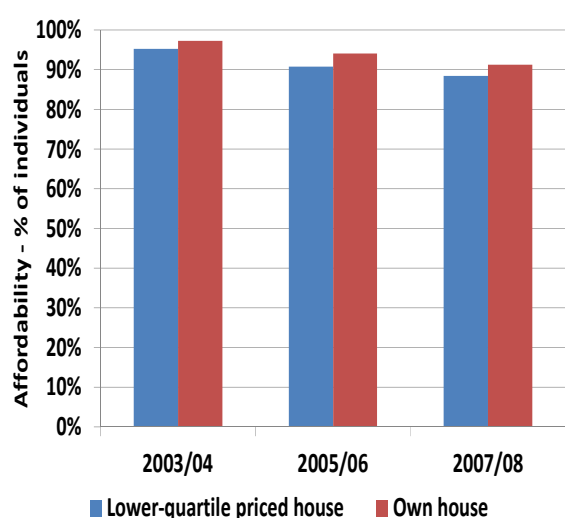
Source: Statistics New Zealand (SoFIE) data

¹⁷ In future work we intend to examine this point in more detail.

Finally we examine the effects of relaxing our housing affordability model for homeowners in Figure 15. Specifically, we change the affordability test so that rather than being able to afford a lower quartile priced house in their region we asked whether or not they could afford their current house.

Interestingly, the result is that affordability actually increases. Given that for most homeowners (around three quarters of them) their current house would be more expensive than a lower quartile priced house in their region this is suggestive that individuals, on the whole, make rational decisions about house purchases. In other words, those who purchase relatively expensive houses can afford them, and those that may struggle to afford even a lower quartile price house tend to purchase still cheaper houses.

Figure 15 – Affordability of lower quartile versus own home (homeowners), singles and couples combined



Source: Statistics New Zealand (SoFIE) data

7 Discussion

Housing affordability is important for a number of reasons. Unlike many other goods, expenditures on housing (whether renting or owning) usually absorb a large proportion of household income. Housing makes up a significant share of household wealth and retirement accumulations for many New Zealanders.. Further, home ownership has been linked to building social capital and a sense of community (DiPasquale & Glaeser, 1999). More generally, the performance of the housing sector has widespread implications for investment, banking, saving and employment.

The aim of this paper has been to inform debate by drawing out evidence from two surveys: the Household Economic Survey; and the Survey of Family, Income and Employment. In particular, the paper examined how patterns of house prices, expenditures, and home ownership have changed over time and across groups. A model which may be suggestive of whether or not an individual or couple is likely to find home-ownership affordable was also developed. This model incorporated information relating to four important influences of affordability: income; net wealth; house prices; and the structure of mortgage contracts (including the interest rate and mortgage term).

These elements, or outcomes, of housing affordability were explored primarily by way of various descriptive techniques. However, panel logistic regressions were employed to examine how the likelihood of home-ownership and housing affordability in turn depend on a wide range of demographic and economic variables simultaneously. These included: income, age, education, gender, ethnicity, New Zealand born, region, partnership status, regional house prices and mortgage rates.

Results show considerable increases in prices throughout the house price distribution between 2004 and 2008. Interestingly, lower quartile house prices increased by more than upper quartile house prices in all major regions. Further, although Auckland remains the most expensive region, growth in house prices across all other major regions was higher during this period.

Home ownership rates, however, have declined only slightly between 2004 and 2008. Factors associated with a higher likelihood of owning a home include being partnered, female or older, and living in any region other than Auckland. Higher house prices are negatively associated with home ownership as is belonging to an ethnicity other than NZ European. A statistically significant relationship between income and home-ownership was not found. However, higher levels of education were positively associated with home-ownership, perhaps indicating that lifetime rather than point in time income is more important for home ownership.

For non-homeowners housing affordability improves significantly with income and is much higher for couples than singles. Between 2004 and 2008 income quintiles 2 and 3 (for couples) and 5 (for singles) experienced the greatest falls in affordability. Other income quintiles either had persistently high or low levels of affordability. Across regions, Auckland had the lowest levels of housing affordability throughout the period, however, by 2008 affordability levels in other regions had deteriorated such that they were much closer to those of Auckland.

For both singles and couples affordability initially increases with age, likely reflecting the higher incomes associated with greater work experience. However, beyond a certain point affordability actually decreases with age. This likely reflects that while most older people already own their home, some, such as the lifetime poor, struggle regardless of age. It also reflects that incomes tend to be lower in the highest age groups due to retirement.

Affordability declined for all ethnic groups between 2004 and 2008. However, the capacity to buy a house varies across ethnic groups, and was highest for European New Zealanders and lowest for Pacific peoples over the entire period of analysis. This may partly reflect location choices, with some ethnic groups more likely to be concentrated in Auckland. Rather than disparities in income or net wealth per se, differences between ethnicities may also be due in part to age, with Maori for example tending to be much younger on average than Europeans.

Housing affordability for homeowners was much higher throughout the period than for non-homeowners. Interestingly, when the affordability test for homeowners was changed so that rather than being able to afford a lower quartile priced house in their region we asked whether or not they could afford their current house, affordability actually increased. Given that for most homeowners (around three quarters of them) their current house would be more expensive than a lower quartile priced house in their region this is suggestive that individuals, on the whole, make rational decisions about house purchases. In other words, those who purchase relatively expensive houses can afford them, and

those that may struggle to afford even a lower quartile price house tend to purchase still cheaper houses.

Differences in affordability between homeowners and non-homeowners serve to highlight the potential importance of transitioning into home ownership. In future work we intend to measure transitions into and out of home ownership between waves 2, 4, 6 and 8 of SoFIE, and to attempt to explain them using information on a range demographic and economic factors. Further, this will provide an opportunity to test the predictive power of a number of 'rules of thumb' relating to housing affordability in predicting transitions into home ownership. It will also be possible, and interesting, to examine the extent to which the deterioration in housing affordability observed between 2004 and 2008 could have been ameliorated with the introduction of real mortgage contracts.

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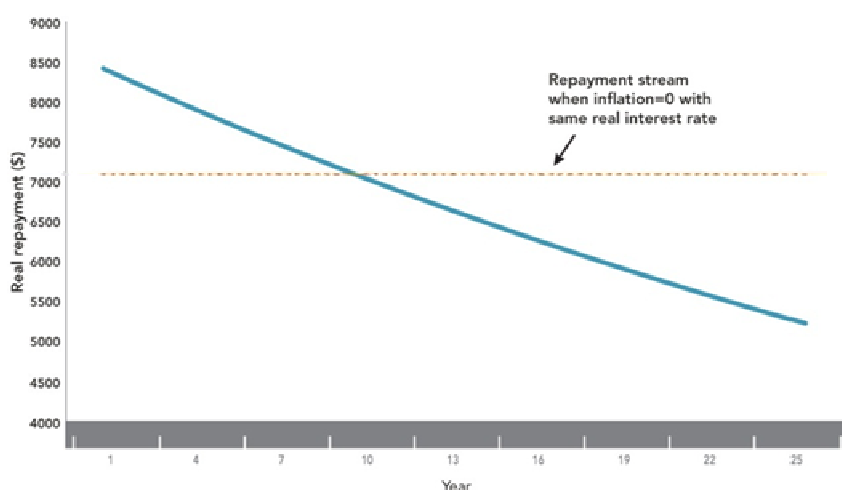
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Appendix: Inflation and Housing Affordability

Nominal measures of housing affordability like those used in this paper reflect ‘actual’ affordability by highlighting the difficulties of meeting the terms and conditions of a mortgage contract for those who need to borrow to purchase a house. However, some of these difficulties are not caused by the purchase price of the house nor the real interest rate, but by inflation. As such, it is also useful to examine housing affordability in real terms by removing the effect of inflation and measuring ‘underlying’ affordability.¹⁸

Inflation results in ‘front-loading’ of mortgage repayments since it leads to larger real principal repayments during the early stages of home ownership. Home loans in New Zealand are typically table mortgages, which require a series of monthly payments determined by the loan’s maturity term and the nominal interest rate. For instance, if inflation is 2% per year, the real value of repayments on a 25 year loan of \$100,000 with a 7% interest rate declines from about \$8,400 at the end of the first year to \$5,200 at the end of the 25th year. In contrast, if the inflation rate was zero, there would be a constant repayment of about \$7,100 a year over the life of the mortgage (Figure 16).

Figure 16 – Real repayment stream of a 7% 25 year \$100,000 mortgage (inflation = 2%)



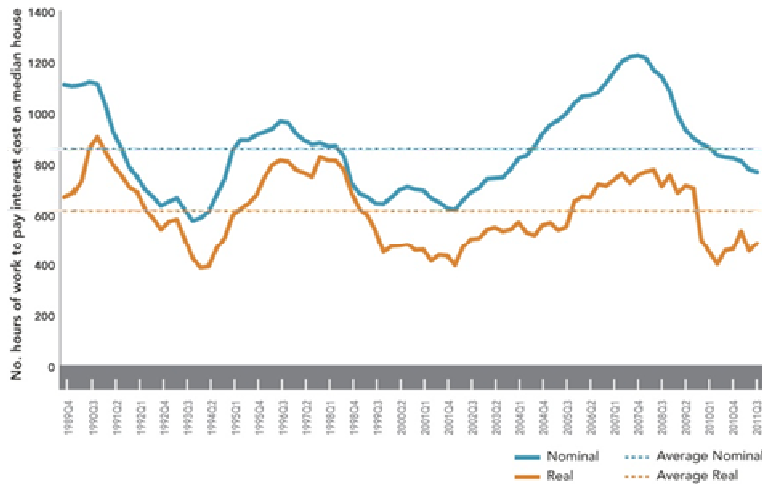
Source: Coleman (2008) modified

Another way to view this is when nominal interest rates rise due to inflation, monthly mortgage payments also rise, but the increase reflects more rapid real principal repayment rather than a higher real cost of housing. For example, if someone takes out a \$100,000 loan at an interest rate of 7% per year when inflation is 2%, the \$7,000 interest payment comprises \$5,000 real interest payments and \$2,000 to compensate the lender for the erosion of the initial value of the capital due to inflation. This \$2,000 is effectively saving by the borrower because it reduces the *real* value of the remaining debt to \$98,000. So while nominal affordability indices provide useful information about the financing difficulties facing credit-constrained households, they overstate the *average* lifetime cost of the mortgage as they do not take into account the expected decline in the real value of the payment stream over the life of the mortgage. An index based on the real mortgage rate makes this adjustment.

¹⁸ See Coleman (2008) for a detailed discussion of inflation and the measurement of housing affordability.

Housing affordability measured in nominal terms is considerably worse than real affordability, and the gap increases with the inflation rate. The number of hours of work, paid at the average hourly rate, required to service the nominal interest payments on a median priced house is much higher than the number of hours work required to service the real interest cost (Figure 17). The nominal and real indices follow a similar trend, with both deteriorating during the recent house price boom, but improving more recently.¹⁹ However, part of the deterioration in nominal housing affordability during the house price boom was due to high inflation rates. In fact, while nominal affordability was at its worst during this period, real affordability was better than in the mid-1990s.

Figure 17 – Real and nominal affordability indices



Source: Coleman (2008) modified

While real affordability indices remove inflation and therefore better reflect the lifetime cost of a mortgage, this is no consolation for a would-be homeowner who faces high debt repayments, particularly during the early stages of homeownership. Higher inflation rates make it more difficult for households to meet the terms and conditions of a mortgage. This highlights that with standard mortgage contracts, even moderate levels of inflation can negatively impact on the ability of credit-constrained households to meet home loan borrowing costs.

¹⁹ Nominal affordability has continued to improve recently while real affordability has worsened since late-2010. This is likely to be due to the 2010Q3 increase in GST and the resulting rise in the inflation rate. This higher inflation meant real affordability improved faster than nominal affordability, before worsening somewhat.