Mortgagor Vulnerability and Deposit Affordability in New Zealand before and after the Loan-to-Value Restrictions

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NON TECHNICAL SUMMARY

Mortgagors constitute a third of households in New Zealand, and the vulnerability of mortgagors to different risks impacts the financial system as a whole. This study uses Household Economic Survey (HES) microdata provided by Statistics New Zealand to assess changes in the vulnerability of new non-investor mortgagors from 2006 to 2016. The data also enable us to estimate 'deposit affordability' – the affordability of the equity required from households to purchase houses. Our measure of affordability computes the number of years required to save a deposit given the LVR rules that apply in the country as a whole or in a given locality.

The time period of the analysis covers the first two rounds of the Loan-to-Value Ratio (LVR) policies implemented by the Reserve Bank of New Zealand (RBNZ). However, a number of other policy changes occurred over this period, and New Zealand house prices continued to increase substantially. As a result, the data do not currently allow us to precisely identify the relative contribution of LVR policies to changes in mortgagor vulnerability and deposit affordability. Nevertheless, based on our analysis, we draw the following conclusions:

New home-occupier mortgagors are less vulnerable to a housing market bust, to declines in incomes, and to increases in interest rates now, relative to the pre-LVR period. The share of households with high debt-to-income (DTI) ratios, high debt-service-ratios (DSR), as well as high LVRs has declined considerably after the introduction of LVR restrictions. New borrowers in Auckland appear less resilient to interest rate or income shocks.

DTIs calculated from the HES microdata are lower than those calculated from the commercial bank data supplied to the Reserve Bank. Additionally, whereas the banks' data show that DTIs have an upward trend, the HES data show that DTIs have declined after the LVR restrictions. Finally, the HES data show a higher share of mortgagors with LVRs above 80 percent. This note provides reasons for the different results obtained from each data source.

Deposit affordability has declined, especially in Auckland. Although the LVR restrictions are likely to have required some households to save longer for a deposit than otherwise, it is difficult to disentangle this impact from other factors, such as rising house prices. Commercial banks can fund some high LVR borrowing under the current regulations. In the period since the LVR policy has been in place, commercial banks have disproportionately allocated high LVR lending to first-home buyers. There is also evidence that first-home buyers have substituted to lower value housing and relied on parental guarantees.

1   INTRODUCTION[1,2]

Like many other countries, New Zealand suffered a decline in house prices during the Global Financial Crisis. Later, from 2011 to 2013, house prices were increasing at an elevated rate, household credit growth was easing, and mortgage lending standards were easing. The increase in house prices was more pronounced in Auckland, where house prices were already higher than in the rest of the country. The rapid growth in house prices relative to home-buyers' savings, along with heightened competition for new mortgage lending, led to an increase in the proportion of new mortgagors with high LVRs.

In this environment, the Reserve Bank raised concerns about the resilience of the financial system in the face of a sharp correction in house prices, a decline in incomes, or an increase in interest rates. Thornley (2016) argues that the size of a boom, and its subsequent bust, can be amplified by highly leveraged mortgage lending. An increase in interest rates for highly leveraged households, or a decline in their incomes, makes it harder for them to service their mortgages, and leaves less income available for consumption. Highly stressed mortgagors might choose to sell their houses to repay their debts, which pushes house prices down and further lowers the perceived wealth of other homeowners. Such scenarios can have a large impact on the economy as a whole, as the US experience during the 'great recession' highlights.

The Reserve Bank's LVR policy was introduced in late 2013 in response to heightened risks to the financial system arising from the housing market. By reducing the share of high-LVR loans on bank balance sheets over time, the policy aims to reduce the share of housing loans that would default during a severe housing downturn. The LVR policy reduces the share of high-LVR lending undertaken by commercial banks. The policy is also intended to reduce the extent of over-valued house prices, which should reduce the likelihood of a substantial fall in house prices, and thus reduce the likelihood and magnitude of loan defaults. The LVR policy has evolved since 2013, in particular with the introduction of an investor-specific restriction in 2015. Table 1 summarises the evolution of the LVR policy.

Table 1: A summary of the LVR policy over time

Date	Policy
October 2013 (LVR1)	Lending to borrowers with LVR above 80% should not exceed 10% of the total new mortgage lending of each bank (the 'speed limit').
November 2015 (LVR2)	Restricted the LVR for investors in Auckland to 70% (speed limit of 5%), while increasing the speed limit for non-Auckland borrowers from 10% to 15%.
October 2016 (LVR3)	60% LVR for investors nationwide (speed limit of 5%) and 80% LVR for home occupiers nationwide (10% speed limit).
January 2018 (LVR4)	65% LVR for investors nationwide (speed limit of 5%) and 80% LVR for home occupiers nationwide (15% speed limit)

Note: this study cannot observe the outcomes of LVR3 and LVR4 as the HES data used here finish in July 2016.

The remainder of this study is structured as follows. Section 2 describes the microdata provided by Statistics New Zealand and introduces the measures used in assessing the vulnerability of mortgagors and the affordability of housing for potential first-home buyers. Section 3 reports the findings on mortgagor vulnerability. Section 4 reports the findings on affordability. Section 5 concludes.

2   WORKING WITH THE HOUSEHOLD ECONOMIC SURVEY[3]

The Household Economic Survey (HES) of Statistics New Zealand collects comprehensive data on households living in New Zealand for more than 12 months. The HES covers multiple aspects of household economics including income, debt, expenditures, housing tenure, and house value. The data are repeated cross-sectional (different households are surveyed in every time period) rather than longitudinal (the survey does not repeatedly survey the same households over their lifetime), although households are weighted to ensure representativeness of the population and a high degree of comparability over time. The data are collected in one-year waves extending from July to June. Each wave surveys around 3000 households. Our sample extends from mid-2006 to mid-2016.

Households in the HES fall into one of three tenures: renters; owners with a mortgage; and owners without a mortgage. This study focuses on home occupiers that own a single property, partly reflecting that the house value reported in the HES is for the primary dwelling in most survey years.[4] In our analysis, home occupiers include first-home buyers and movers who occupy the mortgaged property and have no other properties. The value

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[3] The code used to clean the data and calculate all the measures are available upon request.

[4] The data are selected in several stages. First, I exclude any household that owns a house and receives rental income on another property. Second, I exclude any household that has a mortgage on a secondary property. However, a household with multiple properties might not receive rent and might own the other property without a mortgage. Therefore, I exclude any household with an LVR above 1.5 as banks are not likely to offer higher LVRs unless the household has another property that serves as a collateral. 7.7 percent of new borrowers are excluded in this procedure over the whole sample period. Finally, I drop households with DTI ratios above 10. Elevated DTIs may indicate one of two things. Either the household has multiple properties, which they can count on to service this debt, or their DTI could be high as the household misreports its income or debt. 4.5 percent of the borrowers had a DTI above 10.

of owner-occupied property is estimated using the latest rateable value, updated using QV quarterly data on house price inflation within the relevant territorial authority.

The RBNZ also monitors changes in LVRs and DTIs using data provided by commercial banks, and reports on these trends regularly in RBNZ *Financial Stability Reports*.[5] The HES data are at the household-level, which allows for more granular breakdowns by different characteristics, such as income and demographics, than in the RBNZ data. On the other hand, the RBNZ data collect information on all new bank lending and, therefore, are not subject to the sample size limitations of the HES. The data provided by the HES and the banks tend to result in different estimates of average LVRs and DTIs. These differences are discussed in the results section. The LVR data provided by banks are available from the Reserve Bank website,[6] while the DTI data were discussed extensively in a recent consultation paper.[7]

This study focuses on the risk profile of approximately 550 new home occupiers surveyed throughout the sample period. New home occupiers are defined as households that purchased a property to occupy within the same year as their survey wave. Appendix A discusses other secondary data issues relating to sample representativeness, sample selection, and variable definitions. The sampling method is stricter than that used by Dunstan and Skilling (2015), who included households that were surveyed in later waves as long as they purchased their property in the period of interest. The method used in this paper provides more certainty that survey data on income, debt, and other demographics match the (unobserved) values at the date of house purchase. The downside is that the sample of new buyers is smaller. The recent decline in different vulnerability measures (see section 3) is confirmed using both sampling methods, serving as a robustness check for the findings.

The vulnerability of new home occupiers is assessed using three measures:

- The loan-to-value ratio (LVR), which is the ratio of mortgage debt to the house value;
- The debt-to-income ratio (DTI), which is the ratio of mortgage debt to annual disposable income; and
- The debt service ratio (DSR), which is the ratio of annual debt repayments by the household to annual disposable income.

Both the DTI and DSR measure the ability of a household to service its debt. In addition to debt and income, the DSR takes into account the level of interest rates and, if principal payments are included, the term of the mortgage.

To measure deposit affordability for first-home buyers, I construct the following index:

Deposit affordability = (median regional house price) × (minimum required deposit rate) ÷ (annual household disposable income for renters).

The index measures the number of years it takes a household outside of the housing market to save for the median house deposit in their region.

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[5] https://www.rbnz.govt.nz/financial-stability/financial-stability-report.

[6] https://www.rbnz.govt.nz/statistics/c30.

[7] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Policy-development/Banks/DTI/Consultation-paper-DTIs-June-2017.pdf?la=en.

3   MORTGAGOR VULNERABILITY

3.1 Loan to value ratios

The average LVR for new home occupiers declined sharply in the period since the LVR restrictions were implemented, from approximately 67 percent to 55 percent (figure 1). This suggests a substantial increase in average equity buffers driven by a widening gap between median mortgage debt and median house prices. The increase in average equity buffers is not necessarily due to the LVR policy as rising property values would likely have increased the average equity of movers even if the policy was not in place.

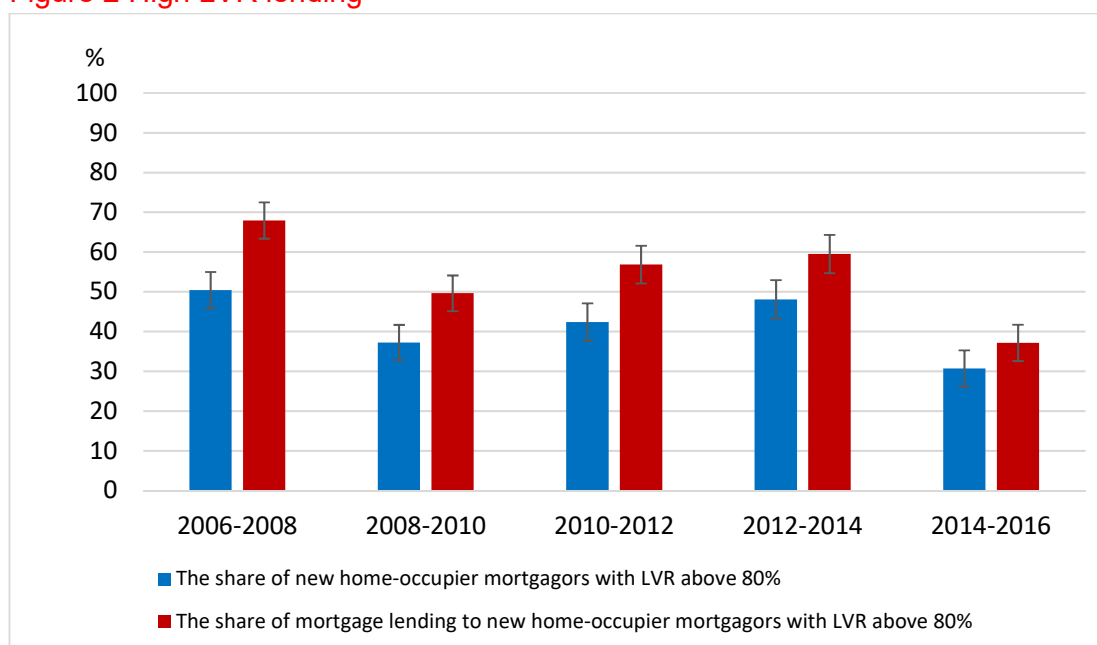Figure 1 Average LVR for new home-occupier mortgagors
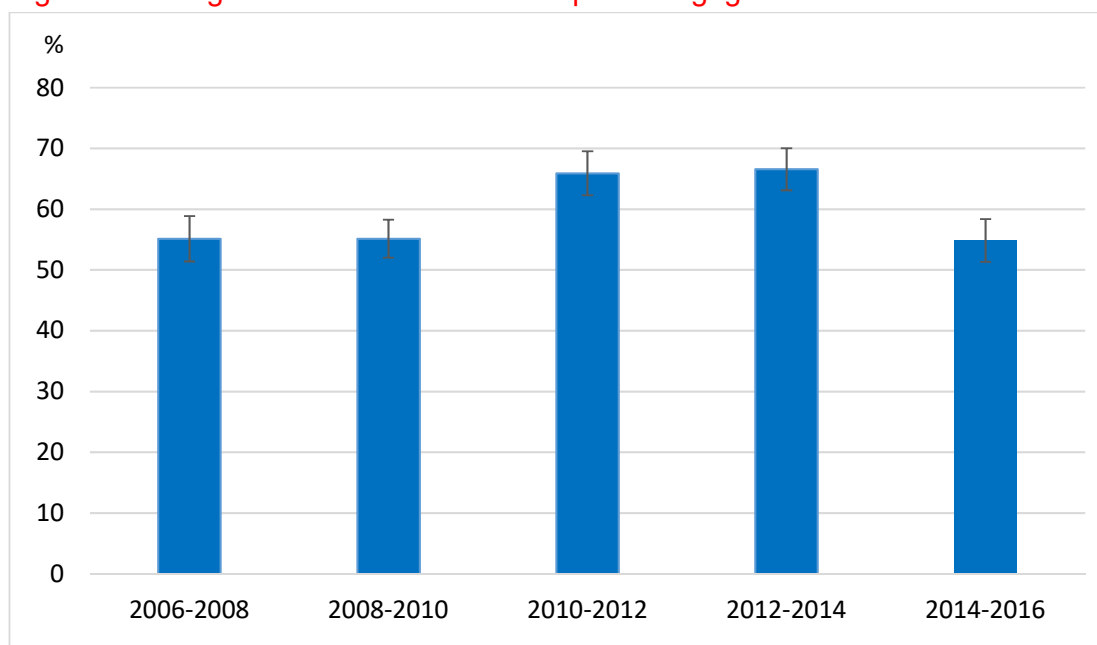
The share of mortgage lending extended to mortgagors with LVRs above 80 percent declined from 60 percent to 35 percent (figure 2). This provides evidence for the resilience benefits of the LVR policy, as households with lower equity buffers have a more limited safety net against a variety of risks. In the event of a decline in income or an increase in interest rates, households with lower LVRs have higher flexibility to restructure or refinance their mortgages. Households with lower LVRs are also more likely to maintain positive equity in the event of a decline in house prices. However, the full recourse nature of mortgage lending in New Zealand means that the ability to continue servicing the loan is a more critical determinant of default for home occupiers. Serviceability is the focus of the next section.[8]

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[8] In some countries, mortgages are backed by the house itself only. These are called non-recourse mortgages, as banks cannot pursue a borrower directly for the debt. If a house is purchased for $100 with 90 percent LVR and the house price declines by more than 10 percent, the household might choose to strategically default on their mortgage and turn over the key to the bank. This is known as strategic default since the household chooses to default not because they cannot service the mortgage anymore but to minimise their wealth losses. The risk of strategic default declines over time as the household pays back the debt gradually, ie expands its equity buffer. That is why new home occupiers are particularly risky. Most mortgages in New Zealand are full recourse contracts

The HES data shows a higher share of owner-occupier mortgagors with LVRs above 80 percent than in the RBNZ statistics, which averaged around 11 percent between 2014 and 2016. There are several possible explanations for the discrepancy. First, measurement error in the value of houses in the HES, which uses the rateable value rather than the actual sale value. Second, the HES data may include some mortgage top-ups in the period between the house purchase and the survey taking place (at most one year). Third, the treatment of guarantees (eg where a parent pledges their own house as additional security) differs across the datasets. The HES does not account for guarantees, whereas LVRs in the RBNZ dataset can be lowered by guarantees. Although there are level differences when calculating the LVRs using each dataset, both data sources agree that LVRs have declined after the restrictions in late 2013.

Figure 2 High LVR lending

■ The share of new home-occupier mortgagors with LVR above 80%
■ The share of mortgage lending to new home-occupier mortgagors with LVR above 80%

Although the sample size of the cohorts is smaller within regions, it appears that there was a larger decline in the average LVR in Auckland than in the rest of New Zealand since 2014 (figure 3). This could be because the more rapid increase in Auckland house prices over this period increased the equity buffer of buyers moving properties within Auckland. Alternatively, the lower average LVR could reflect that the share of first-home buyers, who tend to have lower deposits, declined more in Auckland as compared to the rest of the country. As shown in table 2, houses in Auckland became increasingly unaffordable for the last household cohort in our HES data, in 2016.

where the creditor has the right to pursue the borrower for the debt, regardless of what happens to the asset tendered as a security (Harris and Meir 2015). The risk of strategic default is, therefore, less likely in New Zealand.

Figure 3: Average LVR for new home-occupier mortgagors by region
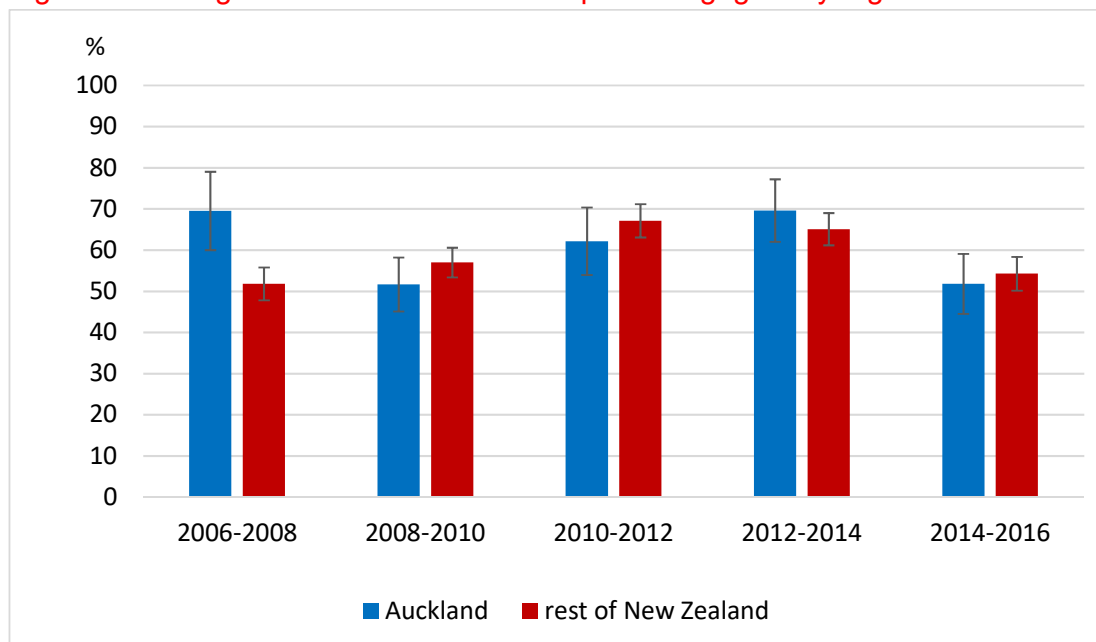
3.2 Debt-to-income and debt service ratios

The average DTI for new borrowers also declined from 3.6 to 2.9 in the last time cohort and the share of borrowers with a DTI above four declined from 37 percent to 24 percent (figure 4). These trends suggest that new borrowers now have more flexibility to restructure their debt and are likely more resilient to a hike in interest rates or a decline in income. The decline in the share of high-DTI borrowers may be related to the LVR policy as borrowers with high-LVRs also tend to have weak serviceability. For example, low income borrowers may have difficulty assembling a deposit through savings and are also more likely to have high DTIs (see below).

Figure 4: DTIs for new home-occupier mortgagors
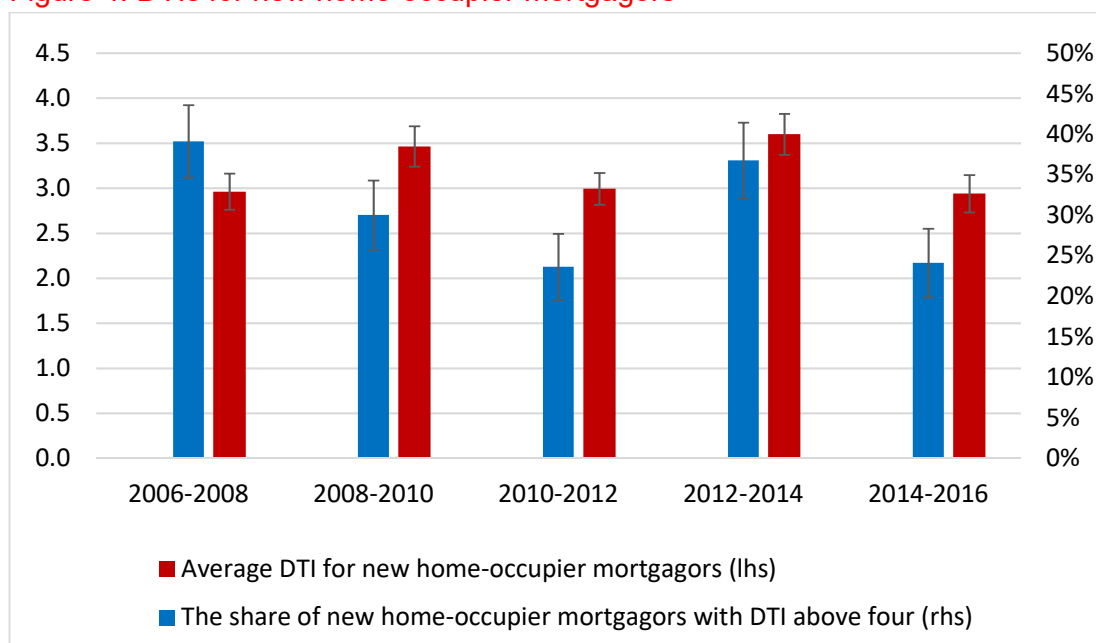
The share of lending with an elevated DTI is significantly lower in the HES than in RBNZ data, even if investors are excluded from the latter dataset. Additionally, whereas the commercial bank data show that DTIs have an upward trend since 2014 for owner-occupiers (RBNZ 2017), the HES data show that DTIs have declined after LVR restrictions. These contrasting results may reflect that income is known to be mis-measured for some borrowers in the RBNZ data over the relevant period (2014-2016), leading to some upward bias in the measured DTIs in the bank dataset. For example, a bank may not collect the full income of a household if the borrower is clearly able to service the loan, whereas the HES is more likely to capture the full income of the household. Alternatively, it may be that the very high DTI borrowers were not properly captured in the relatively small sample of new borrowers within the HES.

The average DTI is consistently higher in Auckland than in the rest of New Zealand, reflecting that Auckland house prices are higher relative to incomes (figure 5). With the servicing burden of debt being higher, new buyers in Auckland appear to be more vulnerable to an increase in interest rates or a decline in income. The decline in average DTIs for new home occupiers in Auckland also appears to have been stronger since mid-2014. Although this may partly reflect the small sample size of this cohort, it is broadly consistent with the sharper decline in LVRs in Auckland. The result is surprising given other data sources suggest a rapid increase in Auckland house price-to-income ratios in recent years, and RBNZ estimates suggest that the debt servicing ratio for a typical new Auckland buyer is likely to have increased substantially (see figure 6B of the Reserve Bank's macro-prudential indicator chartpack).[9]

Figure 5: Average DTI for new home-occupier mortgagors by region
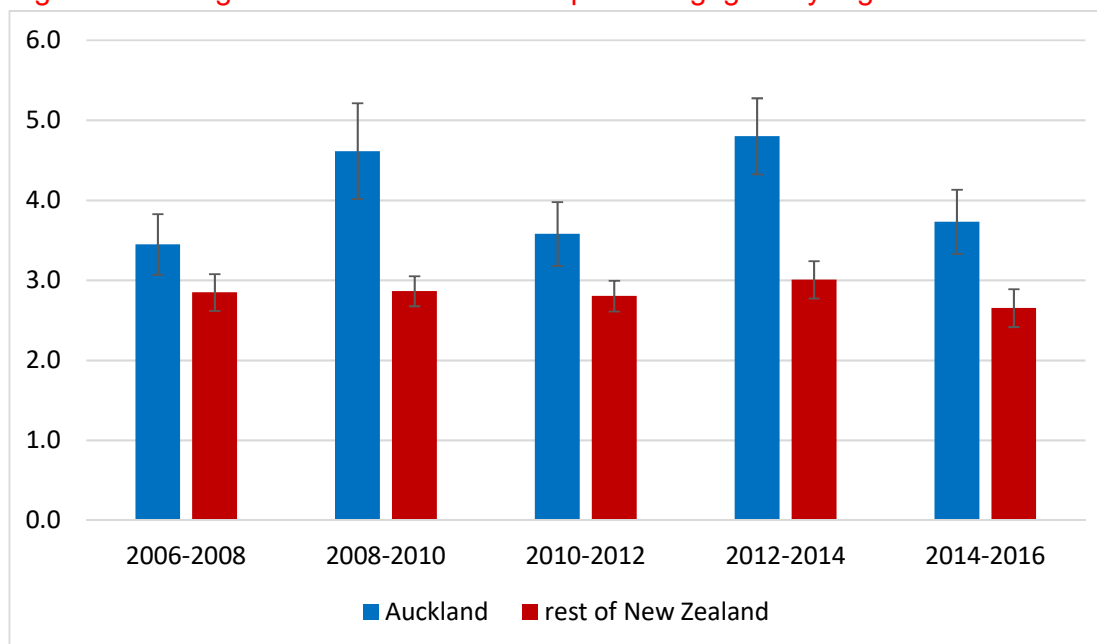
Households with high DTIs and high LVRs represent the most significant risk for the financial system. Defaults of households with high DTIs and low LVRs are less concerning as they do not pose much risk to banks due to the high equity buffer. On the other hand, households with high LVRs and low DTIs are more able to continue servicing their debt

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[9]   https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Financial%20stability/Macro-prudential%20indicators/2018/MPI-chartpack-mar-2018.pdf?la=en.

when under stress. Looking at both measures of new home-occupier vulnerability, we observe a general decline in risk. The share of high-risk borrowers who have a DTI above four and an LVR above 80 percent declined significantly after the policy, from 17 percent to 7 percent.

Figure 6: The share of high-risk new home-occupier mortgagors
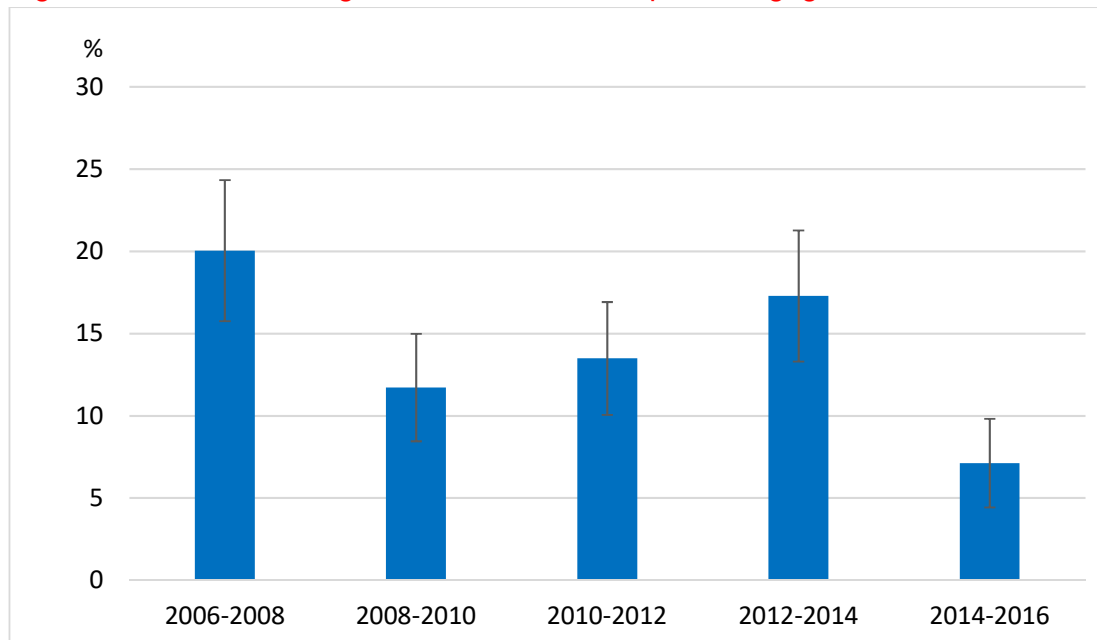
In contrast to new buyers, the average DTI for all mortgagors in New Zealand increased over the period of the study from 2.65 to 3. Although average DTIs for all mortgagors has not changed much in the period following the implementation of the LVR policy, I observe that its composition has in fact changed. Among home occupiers, the lower half of earners have experienced a decline in DTIs since mid-2014. In contrast, the highest earners experienced increasing DTIs (figure 7). Mortgagors with lower incomes continue to have higher-than-average DTIs and are also likely to have less capacity to service their debt from a cash flow perspective (assuming that living expenses do not rise one-for-one with income levels).

Figure 7: Average DTI for home-occupier mortgagors who purchased the house before LVR introduction by income group
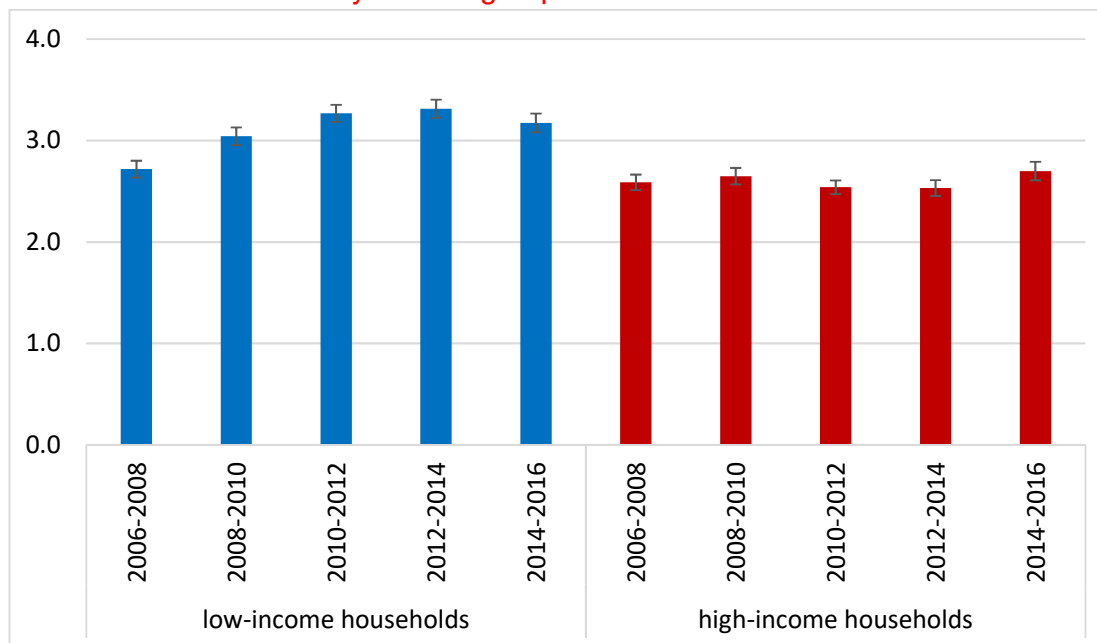
Consistent with lower DTIs, the average DSR has also declined since mid-2014 (figure 8). The decline in average DSR is due to factors other than the movements in interest rates as the average interest rates for the last two time cohorts are roughly the same. The share of borrowers where debt servicing required more than 40 percent of their disposable income has also declined (figure 9). These trends provide further evidence that new borrowers now have a greater ability to cope with a decline in their incomes or an increase in interest rates. This is especially true if borrowers are able to negotiate a temporary shift to interest-only payments in the event they come under stress, as highlighted by the red bars in figures 8 and 9.

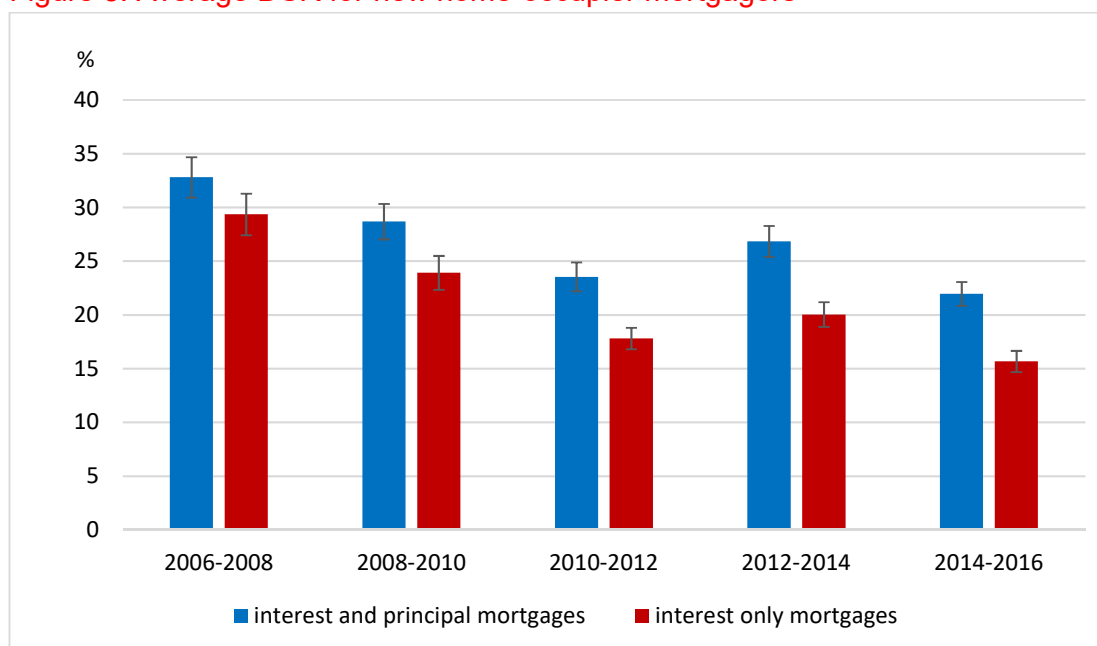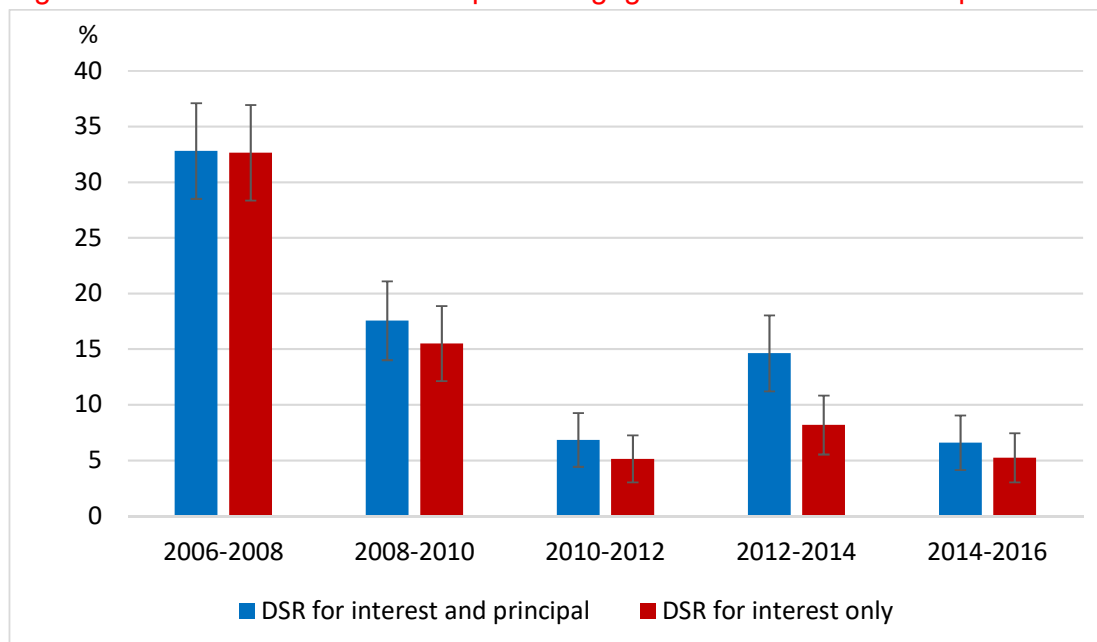Figure 8: Average DSR for new home-occupier mortgagors

Figure 9: Share of new home-occupier mortgagors with DSR above 40 percent

4   DEPOSIT AFFORDABILITY AND THE LVR RESTRICTIONS

Housing affordability has been declining in New Zealand for a long time. For example, the share of renting households increased from 23 percent in 1991 to 32 percent in 2013 according to census data.[10] Housing affordability can be driven by a range of factors, including house prices, LVR requirements for mortgage approval, the level of interest rates, changes in household saving patterns, income equality among households with different housing tenures, and market expectations. As these factors are interrelated, it is hard to quantify the causal impact of the change in one of them on affordability.

The financial stability benefits of the LVR restrictions outlined in section 3 require borrowers to contribute a larger equity share of their house purchases, and potentially spend longer accumulating deposits. As this impact is likely concentrated among first-home buyers, LVR restrictions can have distributional consequences through their effect on the ease of accessing finance for different sectors of society. Figure 10 shows that younger households are also much more likely to have high-LVRs, while figure A1 in the Appendix suggests that younger households are more likely to be first-home buyers. The share of market sales to first-home buyers fell in the period immediately after the implementation of the LVR policy, but it has recovered in recent years to around its historical average.[11]

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[10]   http://archive.stats.govt.nz/browse_for_stats/population/estimates_and_projections/dwellings-household-trends-1991-2015.aspx#renting.
[11] See data provided by CoreLogic:
 https://issuu.com/corelogicaustralia/docs/digital_cl18_nz_monthly_market_repo_dd84928f1689f8.

Figure 10: Average LVR by age cohort
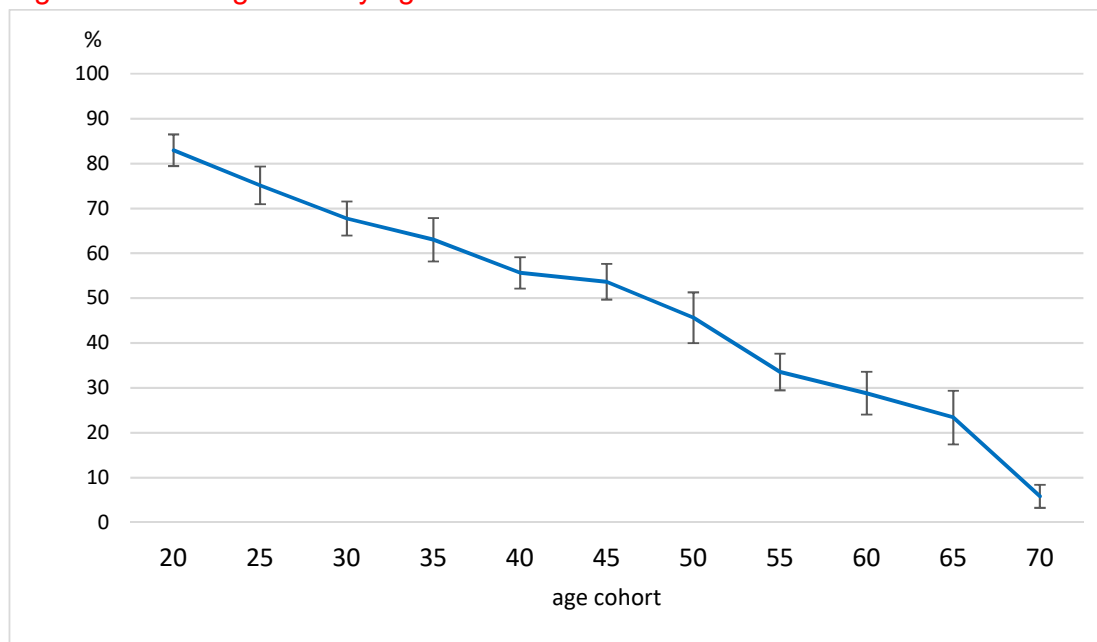
The HES allows us to measure how deposit affordability changes over time, and we can explore the implications of different LVR assumptions. Where the Ministry of Business, Innovation, and Employment provides an index for mortgage repayment affordability,[12] I introduce a complementary measure for deposit affordability for every renter household. As explained in section 2, the index measures the number of years it takes a household out of the housing market to afford the mortgage deposit assuming the household saves all it earns conditional on a given LVR level. The higher the index, the less affordable the mortgage is.

The index is similar to the widely used measure of the median house value to the median income. The affordability index is influenced by the observed house price, household income, and the LVR. Given that most renter households transition into outright owners through mortgaging, the index used in this paper focuses on (i) the affordability of the deposit rather than the total value of the house, and (ii) computes affordability using the incomes of renters rather than the whole population. Figure A2 shows that renter households tend to have lower incomes compared with homeowners; the incomes of renters have also been growing at a slower rate.

Table 2 shows how affordability changes under different LVR assumptions for the actual level of income and house prices in a certain region and time period. The comparison implicitly assumes that LVR restrictions had no impact on house prices, which might not be plausible. The index suggests that mortgages in Auckland are less affordable for first-home buyers and have become even less affordable recently.

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[12] http://www.mbie.govt.nz/info-services/housing-property/sector-information-and-statistics/housing-affordability-measure/latest-results.

Table 2: Average mortgage affordability for renters by region under different LVR assumptions

Region	Auckland			Rest of NZ		
LVR year	90%	85%	80%	90%	85%	80%
2007	1.2	1.7	2.3	0.9	1.4	1.8
2008	1.2	1.8	2.4	1.0	1.4	1.9
2009	1.1	1.6	2.2	0.8	1.2	1.6
2010	1.2	1.8	2.4	0.7	1.1	1.5
2011	1.2	1.8	2.4	0.8	1.2	1.7
2012	1.1	1.7	2.2	0.8	1.1	1.5
2013	1.2	1.8	2.3	0.9	1.3	1.7
2014	1.3	1.9	2.5	0.9	1.3	1.8
2015	1.3	2.0	2.6	0.9	1.3	1.8
2016	1.7	2.5	3.3	0.9	1.4	1.8

The index measures the number of years it takes a household out of the housing market to afford the mortgage deposit assuming the household saves all it earns and given a certain LVR level. The higher the index, the less affordable the mortgage is.

The literature provides a large variety of affordability measures, none of which is perfect. The measure of affordability presented in table 2 has at least two shortcomings. First, it does not capture the fact that the saving rate of first-home buyers depends on many time-variant variables such as the interest rate, house price expectations, and the overall economic outlook. Instead, the framework makes the simplifying assumption of a fixed saving rate of 100 percent.

Second, the assumption that the typical first-home purchase would be at the median house price for the region in which the household was purchasing is not necessarily true. Since 2013, first-home buyers have tended to buy houses that are around 85 percent of the median house price for movers and investors (figure 11). This implies a downward level shift of 15 percent for the index in table 2. The ratio has also been declining in recent years, which indicates that first-home buyers are moving into relatively cheaper houses compared to other buyers (perhaps to houses that are smaller or farther from city centres). This reduces the size of the required deposit. Similarly, there is anecdotal evidence of first-home buyers increasingly relying on parental guarantees in order to reduce the required deposit amount.

Figure 11: Ratio of the median house price for first-home buyers to the median house price for movers and investors (six monthly average)
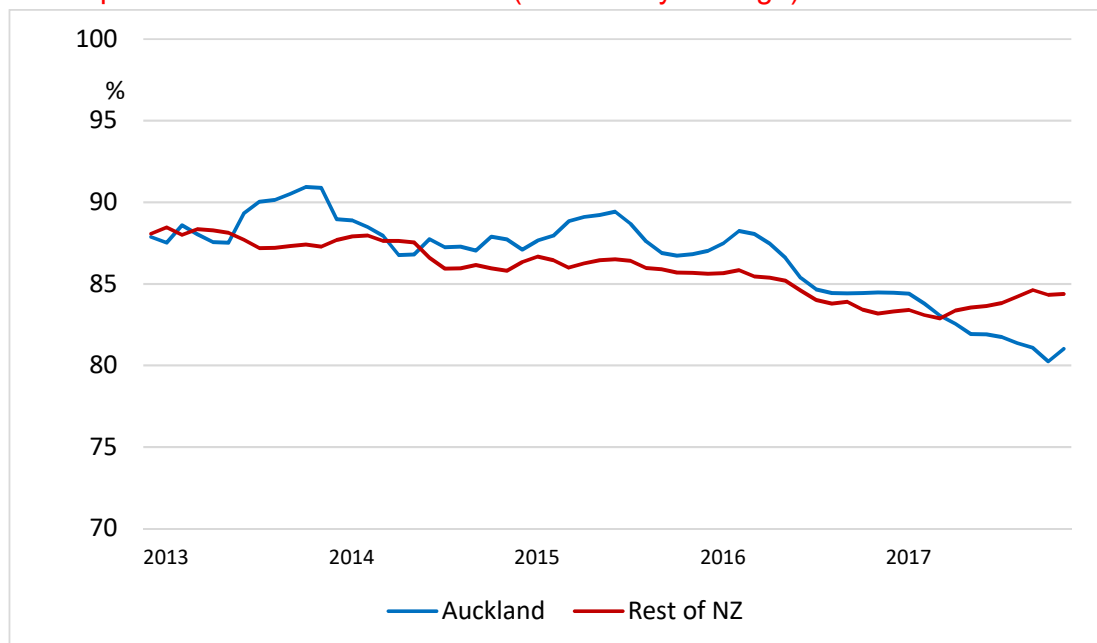
Another uncertainty is how much the LVR requirement has tightened for first-home buyers due to the LVR policy. Although there is a limit on lending at LVRs of 80 percent or more, banks can still provide *some* high-LVR loans. Furthermore, banks may have targeted this high-LVR lending to first-time buyers. There are also exemptions from the policy for households that qualify for a Welcome Home Loan.[13] Figure 12 shows that first-home buyers' share of total lending to households with LVR above 80 percent is currently around 60 percent. The share of first-home buyer lending that is high-LVR is currently 30 percent. These data are not available for the period before the LVR restrictions were introduced, although it is worth noting that banks did have differential credit availability and pricing depending on the LVR of the applicant.

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[13] The Welcome Home Loan is offered by lenders, supported by Housing New Zealand, and, designed for first-home buyers who can afford to make regular repayments on a home loan, but have trouble saving for a large deposit. With a Welcome Home Loan first-home buyers only need a 10 percent deposit. To qualify, the income of the first-home buyer household needs to be below a certain threshold. The house price also needs to be below a certain value depending on the region.

Figure 12: first-home buyer borrowing

First-home buyers' share of total lending to households with LVR>80%

Share of first-home buyers with LVR>80%
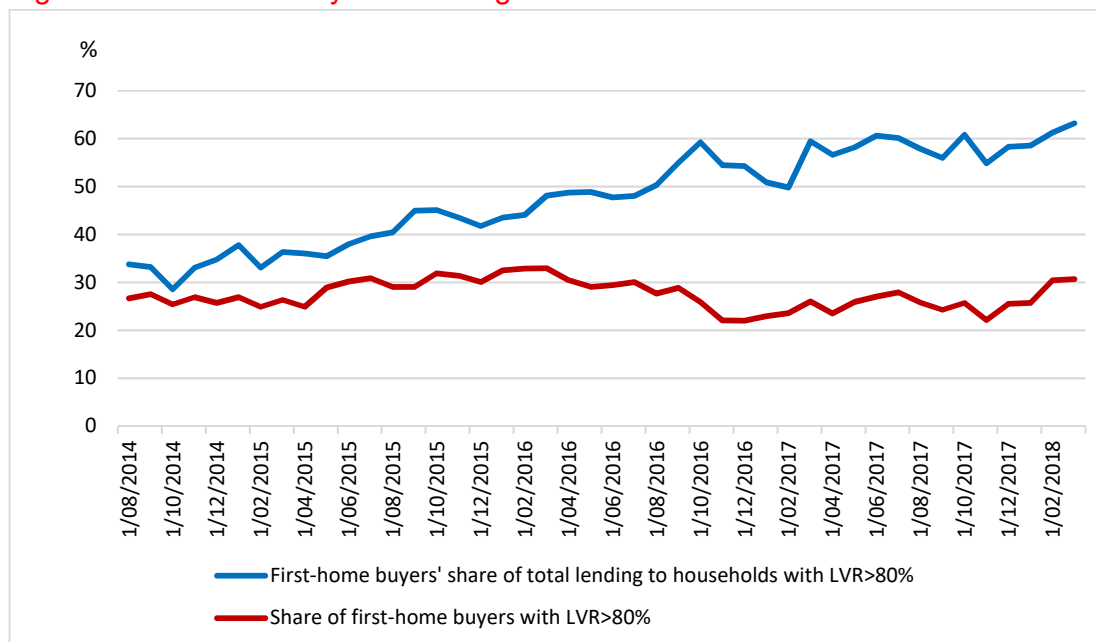
5   CONCLUSION

This study uses the Household Economic Survey data to examine the vulnerability of mortgagors and deposit affordability in New Zealand before and after the LVR policy. The findings generally point to an improvement in the resilience of mortgagors and the overall financial sector to different risks. The findings also point to a decline in deposit affordability, although banks have tended to prioritise their LVR speed limits for first-home buyers.

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APPENDIX A: DATA ISSUES

This study excludes households with more than one family from the analysis. These households might be living with their parents or have other arrangements. Since the HES is household-based,[14] I drop the households with more than one family to avoid distorting the measurement of debt and income. The dropped households constitute 11 percent of the sample.

To capture the actual income of each household, I use the disposable (after-tax) annual income data calculated by the New Zealand Treasury, which is based on the HES raw data and is therefore able to be matched at the household level. For more information about the calculation of disposable income, refer to Aziz et al (2012).

Overall, I observe only minor differences between our data and the data available in the census. The differences are largely due to the exclusions explained above and the sample design of the HES. For example, the number of people per household is around 2.7 in the 2013 census. In our data, the number is 2.5 because I include one-family households only.[15] In the 2013 census, the share of non-renter households was 64.8 percent while the share is 68.9 percent in our data. This is because of two reasons. First, I include one family households only. Second, the HES covers households that have been living in the country for over 12 months while the census covers everyone. For the same reason, I observe that the share of households living in the North Island is 74.8 percent in our data while it is 77 percent using the census as non-permanent residents in New Zealand are more likely to live in the North Island rather than the South Island.

It should be noted that the debt in the HES does not include consumer debt, such as that obtained from credit card facilities. The HES data suggest significantly lower aggregate household debt compared to data from other sources. Dunstan and Skilling (2015) show that the difference can be largely explained through imposing plausible assumptions about investors' debt. Investors are excluded from this study.

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[14] According to Statistics New Zealand, a household is a person or group of people living in a single home or dwelling.
[15] number of people per household is 2.7 if I include households with more than one family.

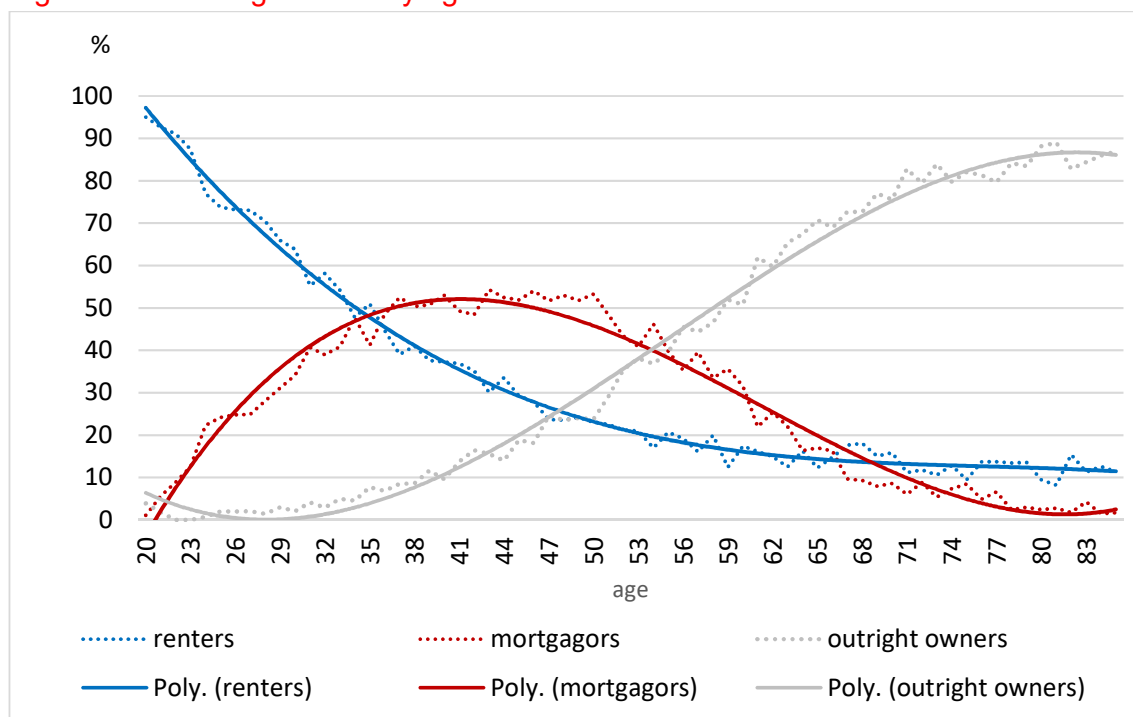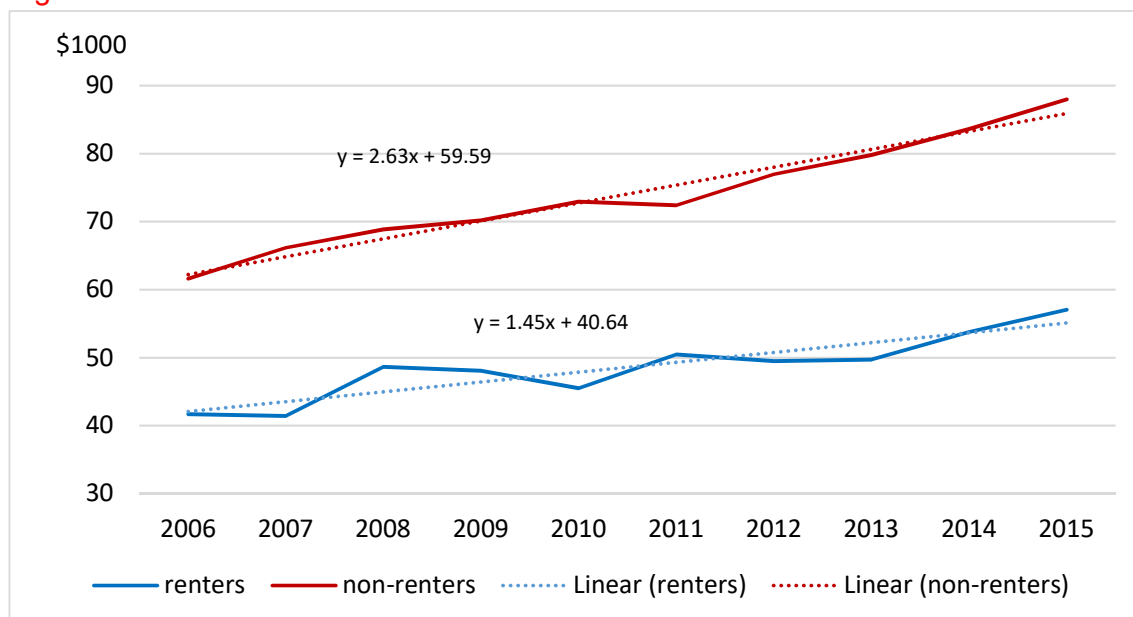## Appendix B: Other relevant statistics

Figure A1: Housing tenures by age cohorts[10]

Figure A2: The median household income for renters and home owners

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[16] I use the average age of the parents if the household has both parents. The depicted data start from the age of 20 to 85. The data are fitted with third order polynomials for presentational purposes only.