



To Buy or Not to Buy? A Spatial Analysis of House Prices and Rents in Auckland, 2001-2013

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To Buy or Not to Buy? A Spatial Analysis of House Prices and Rents in Auckland, 2001-2013

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Executive summary

Housing policy is an increasingly important topic in Auckland. Policymakers and the general public are particularly concerned about the substantial increase in median house prices relative to household incomes. Increases in house prices have coincided with a general increase in the number of households that live in rental properties. There is evidence that renting, like home ownership has also become more costly, particularly for those on low incomes, and that rentals are often low quality and potentially unhealthy.

In response, both Auckland Council and central government have developed and begun to implement policies to address issues in the housing market. These policies include increasing the pace of housing development in Auckland and finding practical ways to identify and improve poor quality rental housing.

To assist with policy development, this report investigates the relationships between house prices and rents in Auckland. It examines how house prices and rents have changed over time and how they vary at a detailed spatial level. It attempts to control for the size of dwellings but finds that there is not sufficient data to control for other variations in housing quality. Understanding these trends provides more context to the housing and rental markets in Auckland, and can assist policymakers to make more informed decisions about how to implement housing policy in Auckland.

The analysis was focused on four key questions:

- First, at a regional level, has the relationship between house prices and rents held constant over time, or have the two data series followed different trends?
- Second, at a point in time, is there a correlation between house prices and rents at a detailed geographic level? In other words, if sale prices are high in a neighbourhood, are rents also likely to be high?
- Third, are indicative rental yields (a measure of the relationship between prices and rents) constant throughout the Auckland region or do they vary between areas?
- Fourth, are there any geographic patterns in changes to indicative rental yields between Census years?

To answer these questions data was drawn from a range of sources that enabled a consistent regional and subregional analysis of the relationship between housing and rents in Auckland in recent decades.

Analysis at a regional level found that there have been substantial changes in the relationship between prices and rents over time. While prices and rents increased at broadly similar rates in the 1990s, prices began to grow much more rapidly than rents

starting in 2003. More recently, in 2010-2014, Auckland has experienced accelerating house prices while prices are flat in the rest of New Zealand. One potential reason for this divergence was a significant change in expectations for future prices in the housing market in Auckland.

A detailed geographic analysis also found that the changes in the price to rent relationship appear to be an Auckland-wide phenomenon rather than being concentrated in certain areas. However, we observe significant geographical variations in the relationship between rents and prices. Indicative rental yields are significantly lower in some areas than others, indicating that prices are high relative to rents.

Broadly speaking, the city centre fringe areas, along with beach-side suburbs in east Auckland and the North Shore, tend to have lower rental yields. These geographic variations remained relatively constant over time – i.e. the areas with the lowest indicative rental yields in 2001 tended to also have the lowest yields in 2013.

These persistently low yields present a conundrum for interpretation. They highlight an important feature of the housing market: that dwellings are both simultaneously investment and consumption goods (Henderson & Ioannides, 1987). Low yields could be interpreted as an indication that buyers in some areas are investing in the expectation that prices will rise rapidly in the future. On the other hand, buyers may not be seeking investment, but rather placing a premium on the high amenity values in these areas. This is supported by the fact that owner-occupation in area units with less than 3 per cent rental yield is higher (68%) than those areas with a higher yield (58%).

Even if a premium exists for high amenity, the literature suggests that investment intentions and future expectations about house price growth remain a significant driver of people's behaviour in housing markets (Glaeser & Gyourko, 2007; Henderson & Ioannides, 1987). Landlords and homeowners in these areas may be seeking a return from capital gains rather than rents. This finding suggests that future expectations play a potentially important role in determining rental yields and thus house prices. Therefore, understanding how they change and develop over time needs to be taken into account when developing and implementing housing policy in Auckland.

This research could be extended by analysing in more detail some of the drivers of house prices and rents at the regional level and by investigating the correlation between historical and expected rental yields over time. There are also opportunities to link the findings in this report to issues of future land use, infrastructure and transportation policy.

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1.0 Introduction

Housing policy has become an important policy topic in Auckland, as many issues have been identified around the affordability and quality of housing in Auckland. Of particular concern to policymakers has been the substantial increase in nominal median house prices, which have increased from \$262,000 in June 2002 to \$600,000 in June 2014 (REINZ, 2014), an increase from approximately 5 to 8 times the median Auckland household income (Statistics New Zealand, 2013a). This has affected the ability for people to transition into the owner-occupier market from renting and, potentially the rate of household formation (Auckland Council, 2012).

The causes of the increase in the cost of housing are complex and multifaceted, and include both supply and demand-side issues. Some potential explanations include a lack of land supply for new houses, difficulty assembling land for infill development, potentially restrictive development policies, issues around taxing capital gains on housing, high costs of construction and difficulty in securing financing for new housing development, particularly at the medium density.

There is also evidence that renting has also become more costly, particularly for those on low incomes, and that rentals in some instances, can be of low quality and potentially unhealthy (Auckland Council, 2012). In response, both Auckland Council and central government have developed and begun to implement policies to address some of these issues, including increasing housing development in Auckland and finding practical ways to identify and improve poor quality rental housing.

To assist with policy development, this report investigates the relationships between house prices and rents in Auckland. It examines how house prices and rents have changed over time and how they vary at a detailed spatial level. Understanding these trends provides more context to the housing and rental markets in Auckland, and can assist policymakers to make more informed decisions about how to implement housing policy in Auckland.

1.1 Report structure

The rest of this chapter provides a brief overview of some of these current policies to improve the affordability and quality of housing stock for both the owner-occupied and rental markets in New Zealand (sections 1.2 and 1.2.3). Section 1.3 highlights the current and historical trends within the housing market in Auckland and New Zealand, to provide further context for this research.

Chapter 2 begins with an introduction of the theoretical relationship between prices and rents (section 2.1), which also incorporates a section about alternative theories of future expectations. The following sections then review the previous empirical evidence on housing and rental prices in New Zealand. It then concludes with section 2.3, which

highlights previous studies that have examined the differences between owner-occupied and rental dwellings in terms of housing quality, particularly with regard to housing satisfaction and health outcomes.

Chapter 3 presents the data sources and the methodology used to analyse the changes within the Auckland housing and rental market. Section 3.2 introduces the key questions for analysis, while section 3.3 describes some of the caveats and cautions that need to be taken into account when interpreting the analysis presented in chapter 4.

Chapter 4 presents the findings from region-wide and spatial analyses of changes to house prices and rents over time in Auckland.

Finally, chapter 5 summarises and discusses the main findings on the geographical distribution of house prices and rents in Auckland in section 5.1 and 5.2. It concludes by outlining some potential areas for future research in section 5.3.

1.2 Policy context for the housing market

Central and local government policies have have important impacts on housing markets. It is necessary to take these policies into consideration when analysing outcomes for home buyers and renters.

1.2.1 Policies targeted towards housing supply

Planning regulations can either enable or hinder housing development. On the one hand, they can manage positive and negative externalities, support the provision of public goods, and manage coordination failures in the provision of infrastructure for new housing (New Zealand Productivity Commission, 2014). This can make it more attractive to develop housing or live in cities. On the other hand, regulatory policies and practices can impose added costs, uncertainty, and delay on developers (Grimes & Mitchell, 2015). If they do so to a significant extent, it will tend to drive up housing prices across the board by constraining the supply of both owner-occupied and rental dwellings.

The main policy directive currently being implemented in Auckland is a rapid increase in the rate at which new housing developments are zoned, consented and developed. This policy is being facilitated by the Housing Project Office (HPO), which in conjunction with central government facilitates the development of fast-tracked Special Housing Areas (SHAs) across Auckland. The SHA policy has also been applied to the Tāmaki area, which is an existing targeted place-based development initiative, facilitated through the Tāmaki Redevelopment Company (TDC). The TDC was formally established in 2012, to regenerate and develop the Tāmaki area of Auckland, an area with relatively high levels of existing state housing.

The Proposed Auckland Unitary Plan (PAUP) also has provisions to support increasing housing supply, including the development of affordable housing. These provisions include supporting more compact development by reducing barriers to infill development and medium density housing, as well as implementing a flexible rural-urban boundary (RUB) that will facilitate new land supply on greenfield sites (Auckland Council, 2013). These policies are aimed at not only increasing the stock of housing, but also the number of choices (in terms of size and type of dwelling) available to different groups of home-buyers (Auckland Council, 2013).

1.2.2 Policies aimed at supporting home buyers or renters

Central government also maintains a number of policies to support first home buyers to purchase their first home, which are administered by the Ministry of Building, Innovation and Employment. The *Welcome Home Loan* which provides low deposit (10 per cent) home loans for housing under a certain price cap (\$485,000 in Auckland), while the *First Home Grant*, provides a direct grant for homebuyers on relatively low incomes (\$80,600 before tax for a two-income household). First home buyers can also use their KiwiSaver funds to purchase their first home and home buyers can receive a capped subsidy of up to \$5,000 based on the length of time they have contributed to the scheme.

Renters on low incomes can also receive income supplements through the Ministry of Social Development to assist with rental payments. This scheme is also geographically targeted, so that people living in higher cost rental areas (such as Auckland and Christchurch) can receive relatively higher levels of assistance.

1.2.3 Policies targeted towards improving housing quality

Local and central governments have also implemented policies to improve housing quality for both owner-occupied and rental dwellings. These include the *Warm Up New Zealand: Heat Smart* programme, which was set up in 2009 to provide co-funding for the retrofitting of insulation and clean heating (Grimes, Denne, Howden-Chapman et al, 2012). While this programme has been wound down and replaced with an insulation programme targeting low-income households, it supported the insulation of 235,000 homes¹.

Starting in 2011, Auckland Council also implemented the *Retrofit Your Home* programme to provide low-income loans for householders seeking to insulate or install clean heating. This programme was intended to provide householders with access to finance needed to take advantage of the Warm Up NZ subsidies (Rohani, et al., 2014).

¹ According to data from the Energy Efficiency and Conservation Authority, available online at <http://www.eeca.govt.nz/eeca-programmes-and-funding/programmes/homes/insulation-programme>.

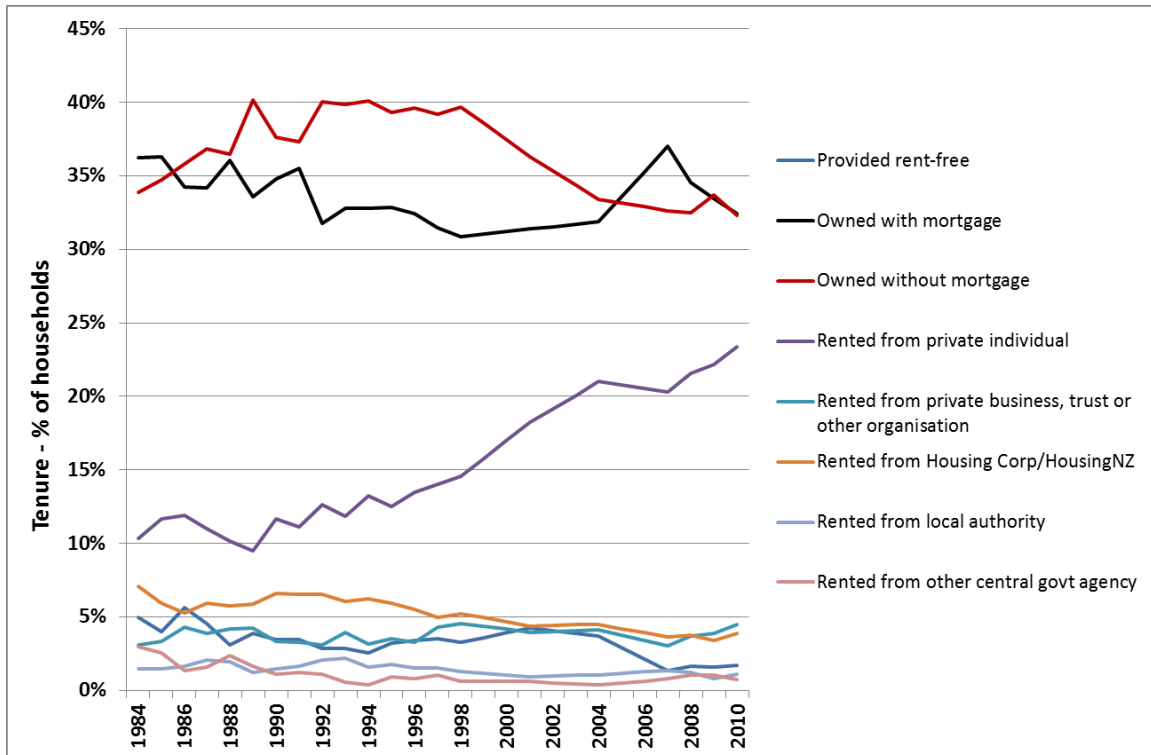
In addition, local and central government are also considering policies to improve housing quality in rental dwellings. As discussed in Section 2.3 below, there are actual and perceived quality differences between rental and owner-occupied dwellings. As a result, the Ministry of Building, Innovation and Employment is currently trialling small scale a rental Warrant of Fitness (WOF) scheme for state housing across 500 houses, with some arguing it should be extended to all rental housing (Collins, 2013). According to the Minister of Housing, the rental WOF scheme “was likely to combine elements of a healthy housing index developed by Otago University, the Green Building Council's Homestar rating, and quality standards being applied by Housing NZ”.

A recent nationwide preliminary WOF survey conducted by the Housing and Health Research Programme (He Kainga Oranga) at Otago University in partnership with a number of councils including Auckland Council, showed 8 of the 144 homes surveyed passed all the WOF criteria, a further 44 would have passed the housing WOF assessment, if low-cost issues such as smoke alarms, and hot water temperature were addressed. Overall, the findings of this research suggested that there is scope for this WOF policy to be further explored as a potential method to improve the quality of rental housing in New Zealand.

1.3 Housing market context

New Zealand has historically had a high rate of home ownership relative to other OECD countries (Andrews & Sánchez, 2011; Andrews, et al., 2011). However, the structure of the housing market has shifted significantly over the last three decades. According to Law and Meehan (2013), which analysed Household Economic Survey (HES) data from 1984 to 2010, home ownership peaked in the late 1980s and early 1990s, when nearly 75% of households owned their own home. However, Figure 1 shows the share of households renting grew substantially in the 1990s and 2000s. By 2010 the proportion of households owning their own home had fallen to around 65%. The vast majority of renters now live in private rental dwellings, although Housing Corporation New Zealand (HCNZ) and other social housing providers also have a significant role in housing in Auckland.

Figure 1 - Housing Tenure in New Zealand, 1984-2010



(Source: Law and Meehan, 2013)

Data from the last three New Zealand Censuses (2001-2013) suggests that Auckland has mirrored national trends. Since 2001, private renting has risen in importance, while home ownership rates have slipped slightly. In 2013, a greater share of Auckland households lived in rental accommodation – 38.5% compared with a national average of 35.2%. In addition, HNZA housing accounts for a greater share of the Auckland market, reflecting both higher levels of housing need and the presence of significant areas of state housing.

From 2001 to 2013, the number of Auckland households living in private rental dwellings rose from 83,400 to 116,600 (a 40% increase). The number of Auckland households living in HNZA rentals rose from 20,600 to 23,600 (a 15% increase). By contrast, the number living in owner-occupied dwellings (whether owned directly or in held in a family trust rose from 236,800 to 268,900 (a 14% increase).

Overall, this data suggests that New Zealand’s housing market has changed significantly in recent decades. Rental accommodation now plays a much larger role than it did in the past. As a result, it is much more important to understand both the rental and owner-occupied ends of the Auckland housing market. In particular, it is important to understand the financial trade-offs between renting and owning.

2.0 Theory and literature review

This chapter begins with an introduction of the expected relationship between prices and rents (section 2.1), which also considers alternative theories of how people's expectations for future housing prices are shaped. The following sections then review the previous empirical evidence that has been produced examining housing and rental prices in New Zealand. This chapter concludes by highlighting previous studies that have examined the differences between owner-occupied and rental dwellings in terms of housing quality, particularly with regard to housing satisfaction and health outcomes (section 2.3).

2.1 Theory: The relationship between prices and rents

We consider a model of the relationship between house prices and rents presented in Coleman and Landon-Lane (2007). They describe the relationship outlined in Equation 1.

Equation 1 - Factors that determine the real price of housing

$$P_t(\theta) = \frac{R_t(\theta) + P_{t+1}^e(\theta)}{1 + r_t + k_t}$$

where θ is a vector of housing quality features, such as dwelling size and location; $P_t(\theta)$ is the real price of housing at time t ; $R_t(\theta)$ is the real rent of housing at time t ; $P_{t+1}^e(\theta)$ is the expected real price of housing at a future date; r_t is the real interest rate at time t ; and k_t is the risk premium at time t .

In other words, we would expect the relationship between rents and prices for dwellings of equivalent quality to depend upon real interest rates and expected future house price appreciation (Coleman & Landon-Lane, 2007). Renters do not own their homes or have the ability to borrow to pay their mortgage costs. As a result, reductions in interest rates or increases in expected future house price appreciation are expected to raise house prices but not rents. Table 1 outlines how changes in different variables would affect the real price of housing, if everything else remained constant.

Table 1 - Effect of variables on the expected price of housing

Variable	Change in Price (P_t) from an increase/decrease in variables	
	Increase	Decrease
Rents R_t	↑	↓
Future expectations P_{t+1}^e	↑	↓
Interest rates r_t	↓	↑
Risk premium k_t	↓	↑

(Source: Adapted from Coleman and Landon-Lane, 2007)

The impacts of these variables have all been well studied, with interest rates and the risk premiums known to have fairly consistent impacts on house prices (Gallin, 2004; Bayer, et al., 2010). The impacts of real rents have been shown to follow in line with Table 1.

Within the literature there has been some discussion of the extent to which housing and rental markets can be seen as substitutable, which this equation suggests. This is a common assumption within the literature and is often used within empirical analysis of the housing market (Glaeser & Gyourko, 2007; Bracke, 2013). However, this assumption may not hold in all circumstances. Glaeser and Gyourko (2007) note that in some markets owner-occupiers and renters are often quite different demographically, particularly in terms of age, as younger people are generally more likely to rent. However, the Auckland-level results from the 2013 census showed that the age of renters and owners tended to be relatively similar (Statistics New Zealand, 2013a).

As noted in the equation above, the role of future expectations is also particularly important in determining house prices. However, within the literature there are alternative approaches to explaining how these future expectations are determined and influenced (Coleman & Landon-Lane, 2007). The following section describes two of the most common theories, rational expectations and adaptive expectations.

2.1.1 Alternative theories about future expectations

Rational and adaptive expectations are two alternative methods of describing the behaviour of people when they buy and sell goods and services within different markets.

In a housing market context, rational expectations assumes that people make decisions about purchasing or renting a house by weighing up all the information they have available about future trends, such future migration rates, economic growth rates, and urban investment levels, to make a best-guess about the future of the housing market. It also assumes that people are aware that past performance is not a good predictor of future outcomes – i.e. that they discount past trends when predicting the future (Coleman & Landon-Lane, 2007; Malpezzi & Wachter, 2005).

In contrast, adaptive expectations, assumes that people based their decisions about the future based on what has occurred in the past. In a housing market with rapidly rising house prices, this means that people might guess that an upward trend in house price will continue and adjust their decisions accordingly. In short, this means people change the way they participate in the market, based on the decisions other people in the market have already made (Coleman & Landon-Lane, 2007). The literature suggests that agents are more likely to use adaptive expectations when markets are complex. In particular, this approach is more relevant when it is difficult for agents to effectively determine the relative factors that contribute to the price, or when the “search costs” to find a seller and negotiate a sale are high (Coleman & Landon-Lane, 2007). As all of these factors are common within housing markets, it seems reasonable that adaptive expectations may have some influence in determining house prices.

Understanding these alternative theories about how future expectations are determined is useful, as although both rational and adaptive expectations both produce the same effect described in Table 1, they provide different explanations of how people make decisions within housing markets, and ultimately contrasting interpretations of the trends discussed in this report. This is discussed in more detail in chapter 5.

2.2 Previous empirical evidence on house prices and rents in New Zealand

A range of previous research has identified housing costs as a significant challenge for Aucklanders. The majority of this research has focused on the relationship between house prices and incomes. The annual Demographia housing affordability report (Demographia, 2014) and the New Zealand-specific Massey Home Affordability Report compare housing affordability between different cities (Massey University, 2014). Hitchins et al (2014) conducted a similar comparison at a detailed geographic level within Auckland. The Productivity Commission’s 2012 Housing Affordability Inquiry took a similar view, focusing

more narrowly on the cost to purchase a house (New Zealand Productivity Commission, 2012) .

Some previous research has also considered affordability for renters. Statistics New Zealand (2013b) examined rental affordability at a regional level, while Mattingly and Morrissey (2014) and Nunns et al (2014) use Census data on rents to estimate combined housing and transport affordability at a detailed level within major New Zealand cities. Their results tend to point in the same direction as analyses of house prices. However, different measures of housing costs do appear to produce different estimates of affordability levels and trends.

A number of data sources suggest that house prices and rents have followed different trends in New Zealand over the last decade. International indices suggest that New Zealand's house prices are high relative to rents, either when compared with other countries or with the historical average relationship within New Zealand.

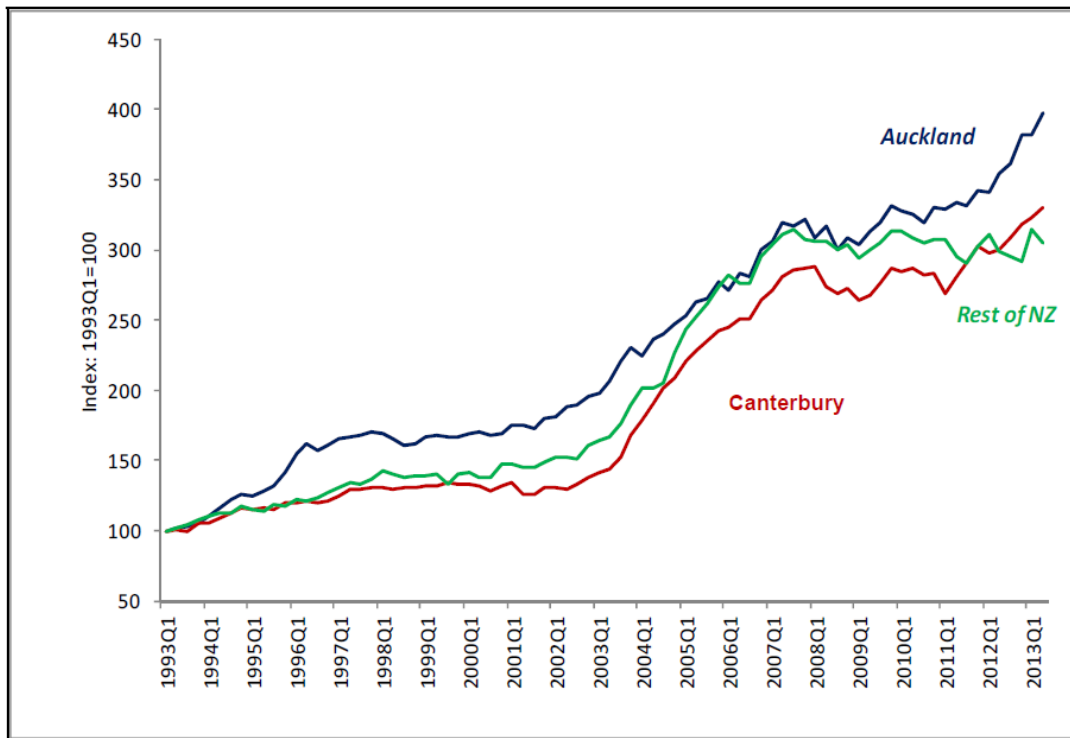
For example, the IMF's Global Housing Watch identifies New Zealand as having one of the highest ratios of prices to rents in the OECD; in 2013, New Zealand's house price to rent ratio was 80% above its historical average (IMF, 2014). *The Economist's* Global House Prices data, which presents the same variables over time, suggests that this deviation from the historical average emerged relatively rapidly in the 2000s (*The Economist*, 2014). It coincided with similar trends in other English-speaking countries. While price to rent ratios returned to their historical average in the United States and Ireland after property market collapses, they have remained elevated in New Zealand, Australia, Canada, and Britain (*The Economist*, 2014).

Skidmore (2014) analyses these trends on a regional level, focusing on changes to house prices and rents in Auckland, Canterbury and the rest of NZ from 1993 to 2013 (see Figure 2). This data suggests that Auckland house prices have increased more rapidly than rents by a considerable margin over the last two decades. In Canterbury, house prices have followed a similar trend but not risen quite as rapidly, while rents have increased more rapidly over the last decade.

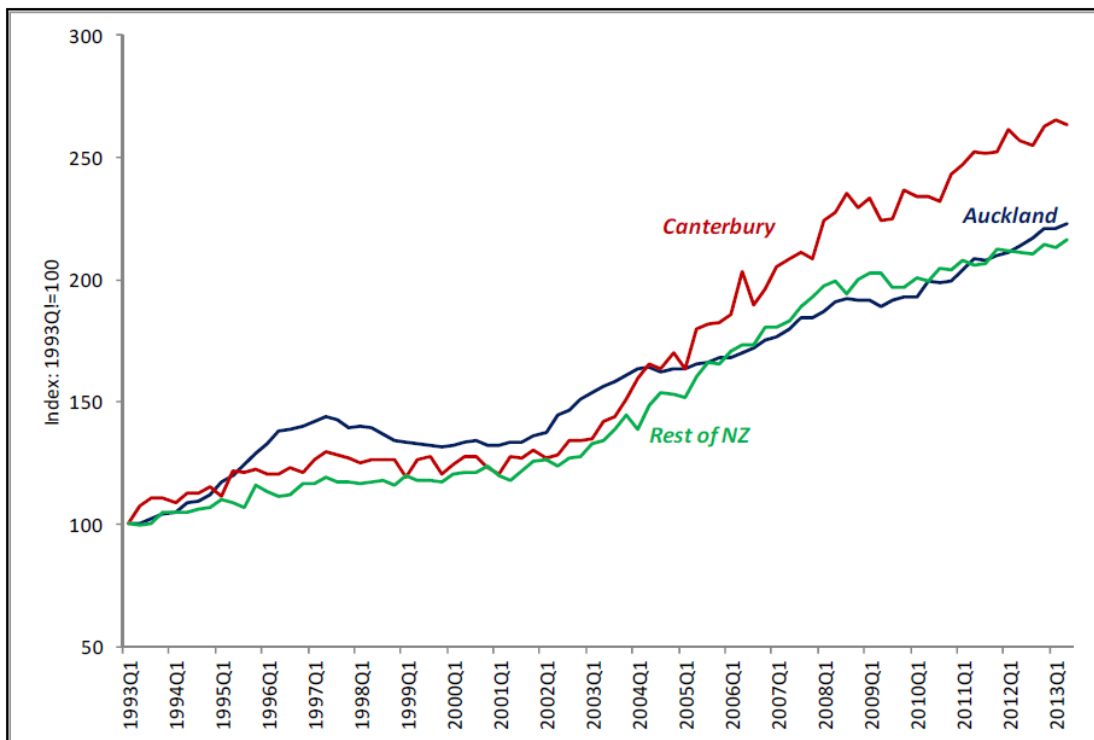
Many of these issues have also been highlighted in a report by Equb (2014), who noted that a wide range of policy responses would be required to address the imbalances described above.

Figure 2 - New Zealand Housing and Rental Prices

Panel A – Housing price Index



Panel B – Rental price index



(Source: Skidmore, 2014)

2.3 Quality differences in owner-occupied and rental properties

It is difficult to directly measure and compare the quality of rented and owner-occupied dwellings. However, a range of sources suggest that rental dwellings tend to offer a lower level of amenity for residents. Differences in (for example) insulation and heating, the quality of fittings, or repairs and upgrades to a dwelling that are unobserved by researchers may drive price differences for otherwise similar dwellings.

Controlling for unobserved quality differences is difficult due to the lack of comprehensive, detailed information on dwelling quality. In principle, it may be possible to match together micro-data on rental tenancies and dwelling sales to control for unobserved variations – an approach adopted by Bracke (2014) who analysed Central London housing markets, but is less feasible in the New Zealand context, due to the different ownership of databases on dwelling sales and rental tenancies².

At this stage, it is not possible to measure geographical variations in the quality of rental and owner-occupied housing, let alone relate them to differences in house prices and rents. Rather than ignoring quality differences entirely, we discuss several relevant measures of housing quality:

- Direct measures of housing quality, such as the Healthy Housing Index and the BRANZ house condition survey.
- Self-reported satisfaction with housing for renters and owners
- Differences in health outcomes for renters and owners.

At a national level, rental accommodation is less likely to meet quality standards, with the result that renters are less likely to be satisfied with their accommodation and more likely to face health issues. As a result, we would expect households to be willing to pay a slight premium to own their own house.

2.3.1 Housing quality measures

Several organisations have developed and tested measures of housing quality. These measures reveal significant quality differences between rental and owner-occupied housing. In short, rented dwellings are less likely to meet quality standards than owner-occupied dwellings, and more likely to impose health risks on to tenants.

The Healthy Housing Index, described in a pilot study by Keall et al (2007) measures houses' performance on five key measures: structural soundness, adequate services, warmth and dryness, safety, and protection from external hazards. A pilot study measured

² Data on new rental tenancies is held by the Ministry of Business, Innovation and Employment, which publishes aggregated data, while Auckland Council collects data on dwelling sales as an input to its ratings database. Confidentiality restrictions have made it difficult to access and match both datasets.

the quality of 102 houses in the Lower Hutt area which included a mix of different demographics. 24% of surveyed houses were Housing New Zealand Corporation rentals, while 8% were rentals owned by private landlords. While Keall et al (2007) does not report results separately for rented and owner-occupied accommodation, it is notable that Maori and Pacific households, that were disproportionately likely to live in rental accommodation, faced worse housing conditions.

A broader assessment of several thousand houses using the Healthy Housing Index found “a consistent pattern, with private rental housing being on average of poorer quality than state housing, which in turn is on average of poorer quality than houses that are owner occupied” (Howden-Chapman, et al., 2013).

More recently, this work was extended into a trial of a rental housing warrant of fitness (WOF) scheme (Bennett et al, 2014). This programme, which assessed 144 houses across five New Zealand cities, found only eight houses (6% of the total) passed the WOF. However, the pass rate would have risen to 36% with low-cost changes such as the installation of smoke alarms, security stays on windows, and adjusting the temperature range on hot water cylinders.

The Building Research Association of New Zealand (BRANZ) also conducts a House Condition Survey every five years³. The most recent publicly-available survey, conducted in 2010, found that rental houses tended to be in worse condition than owner-occupied houses (Buckett, et al., 2012). Rented houses were twice as likely to be in poor condition compared to owner-occupied houses. Interestingly, although both owner-occupiers and renters tended to overestimate the condition of their houses, renters were significantly more likely to do so.

The BRANZ survey highlighted particular quality differences, such as greater rates of deficiency in window and roof cladding and higher rates of dampness and mould. The study also examined the demographics of renters and owners and tenure security. Renting households tended to move more frequently and were more likely to be expecting to move within the next year (Buckett, et al., 2012).

2.3.2 Self-reported satisfaction with housing

Self-reported satisfaction with housing is another important measure of housing quality. The New Zealand General Social Survey (NZGSS), conducted in 2008, 2010, and 2012, gathers data on New Zealanders’ housing satisfaction. Statistics New Zealand (2013c) reviews the findings of the 2010 NZGSS in more depth.

³ The 2010 BRANZ survey covered 491 houses – defined as standalone houses, townhouses, and terraced houses but excluding flats and apartments. Both rental and owner-occupied accommodation was included.

The most recent NZGSS, conducted in 2012, shows that renters are less likely to be satisfied with their accommodation, and more likely to report problems with their dwellings. Table 2 summarises key results. Renters were three times more likely to report being dissatisfied or very dissatisfied with their housing when compared with owner-occupiers. Almost half of renters reported problems with their dwellings, compared with only one-quarter of owner-occupiers (Statistics New Zealand, 2013c).

Table 2 - Housing satisfaction in New Zealand, 2012

Tenure type	Owner-Occupied	Rented
Total population (15+ years)	2,311,000	1,149,000
Housing satisfaction (% of total)		
Very Satisfied or Satisfied	91.4%	76.3%
Neither satisfied nor dissatisfied	4.0%	9.7%
Dissatisfied or Very dissatisfied	4.6%	13.8%
Reported housing problems (% of total)		
No Problems	74.6%	50.2%
Problems	25.4%	49.7%

(Source: Statistics New Zealand, 2013c)

NZGSS data suggest that rental conditions may have improved in recent years. From 2008 to 2012, the percent of renters reporting problems with their dwelling declined from 56.8% to 49.7%. Due to the fact that rental households increased over this period, the total number of people reporting housing problems remained roughly constant.

Other research has also showed that conditions placed on tenants in New Zealand tend to be far more restrictive compared to other countries in the OECD (Eaqub, 2014), indicating that in New Zealand, renters are more likely to be less satisfied with their housing situation.

2.3.3 Health outcomes for renters and owners

Finally, a large body of research has identified health issues arising from poor quality housing in New Zealand (Howden-Chapman, et al., 2011). Although New Zealand's housing stock has some across-the-board issues due to poor insulation and heating, rental accommodation is particularly likely to be associated with poor health outcomes.

Public health studies have found that poor quality rental accommodation and poverty are associated with greater rates of hospitalisation. For example, a 2012 review of Auckland hospital admissions found that the majority of hospitalised children lived in rented accommodation, with 38% living in private rentals, 30% living in HNZC houses, and 3% living in other, irregular accommodation such as garages, caravans, and women's refuges (Howden-Chapman, et al., 2013).

Another study of HNZC applicants and tenants found that they were more likely to be hospitalised than the general population (Baker, et al., 2010). Even after adjusting for age and ethnicity, hospitalisation rates were 47.4% higher for tenants and 60.3% higher for

applicants than for other New Zealanders (Baker, et al., 2010). Infectious and respiratory diseases were also more common. This study also showed that HNZC may be providing tenants with a higher standard of housing than they would otherwise find on the private rental market (Baker, et al., 2010).

3.0 Overview of methodology and data sources

This chapter introduces the data sources and the methodological approach used to analyse the changes in within the Auckland housing and rental market. Section 3.2 also introduces the key questions for analysis, while section 3.3 describes some of the caveats and cautions that need to be taken into account when interpreting the analysis presented in chapter 4.

3.1 Compiling a detailed geographic dataset of house prices and rents

In this paper, we present a new dataset of house prices and rents at a detailed geographic level for Auckland. This dataset allows us to control for some, but not all, of the quality features that may influence house prices and rents.

Following a comprehensive review of the available data on the housing market (see Appendix A), we identified two key data sources for use in our analysis:

- New Zealand Census data, which allows us to identify median/mean rents broken down by geographic location and selected dwelling characteristics. Census data provides a comprehensive “snapshot” of the rental market in the three most recent Census years (2001, 2006, and 2013). However, the availability of Census data at a detailed level can be limited due to confidentiality restrictions imposed by Statistics New Zealand.
- Auckland Council’s dwelling sales audit file database, which contains information on all dwelling sales in the Auckland region over a similar period. It includes information on dwelling sale prices, dwelling locations, and selected dwelling characteristics. Data quality is robust from at least 2003 to the present; however we have incorporated some data from 1999 where possible to provide a more detailed time series. This dataset is aligned with, and feeds into, Auckland’s ratings database, which is re-assessed every three years.

We have obtained consistent, comparable data from these two sources that allows us to control for geographic location and dwelling size. Table 3 summarises the data that has been compiled.

Table 3 - Data sources and specifications

Data source	Auckland sales audit file	New Zealand Census
Description	Data on dwelling sale prices	Data on weekly rents
Time period	Annual (1999-2013)	Annual (2001, 2006, 2013)
Geographic classification	2013 Census area units	
Dwelling size	Number of bedrooms (1, 2, 3, 4, 5, 6+)	
Other exclusions	Includes only sales of single dwellings / no multi-dwelling sales	Includes only rentals owned by private person, trust or business / excludes state housing

In addition, we have also used data from the Ministry of Business, Innovation and Employment's (MBIE's) rental tenancies database (published in the New Zealand Housing and Construction Quarterly) and the Real Estate Institute of New Zealand's (REINZ's) regional house price monitor to examine region-wide trends for the period 1993-2014.

3.2 Analysing the relationship between house prices and rents

We use this new dataset to better understand how the relationship between house prices and rents varies in Auckland through space and over time. In the following section, we present the results of our analysis. We address four key questions:

- First, at a regional level, has the relationship between house prices and rents held constant over time, or have the two data series followed different trends?
- Second, at a point in time, is there a correlation between house prices and rents at a detailed geographic level? In other words, if sale prices are high in a neighbourhood, are rents also likely to be high?
- Third, are indicative rental yields (a measure of the relationship between prices and rents) constant throughout the Auckland region or do they vary between areas?
- Fourth, are there any geographic patterns in changes to indicative rental yields between Census years? Are changes in the relationship between prices and rents are they concentrated in certain areas or have most areas followed region-wide trends?

In the process, we provide a range of descriptive statistics and visualisations of this data.

3.3 Caveats and cautions

Although our new dataset allows us to control for dwelling location and dwelling size, it does not allow us to fully account for a range of other dwelling quality features. This inability to control for all sources of variation may affect our results. It is necessary to be aware of these issues when using the results presented in this report.

For example, when analysing the spatial relationship between sale prices and rents, we would expect to find a positive, statistically significant correlation, reflecting the fact that similar underlying factors (e.g. accessibility to employment and amenities) result in greater demand for both owner-occupied and rental dwellings. However, we would also expect to find a relatively poor model fit (coefficient of determination, or R^2), reflecting the influence of unobserved quality features and (potentially) differences in future price expectations between areas.

As discussed in section 2.3, there is significant evidence that rented dwellings are of lower quality than owner-occupied dwellings and that occupants are less satisfied with their dwellings. However, the available data is not sufficient to understand how dwelling quality varies between different areas of Auckland. While we may suspect that the relative quality of dwellings varies over space, we cannot quantify the degree to which it does.

Furthermore, we do not have sufficient data to identify how the quality of owner-occupied and rented dwellings has changed over time. We note that rapid changes in dwelling quality are relatively unlikely as the majority of Auckland's housing stock is relatively fixed over time – new builds only account for 1-2% of the overall housing supply in any given year. However, there is some evidence (from the NZGSS) that renters have become increasingly satisfied with their dwellings in recent years, perhaps as a result of policies such as the Warm Up New Zealand: Heat smart programme that have supported the upgrading of the housing stock (Grimes, et al., 2012).

In principle, it would be possible to control for all dwelling quality features using matched micro-data on rental tenancies and dwelling sales, as Bracke (2014) did for an analysis of London's housing market. However, we have not pursued this approach due to confidentiality concerns arising from accessing, merging, and publishing this data.

A future caveat is that the level of reporting within the dwelling sales audit file database is less robust pre-2003, particularly in terms of the completeness of the sales data. Therefore, some aggregation was required to develop dataset suitable for this type of analysis.

4.0 Analysis of house prices and rents in Auckland

In this chapter, we present the findings from the region-wide and spatial analyses of changes to house prices and rents over time in Auckland.

This section includes three main parts:

- First, in section 4.1, we present region-wide trends in house prices and rents in Auckland over the 1993-2014 period. We also compare trends in Auckland with national trends.
- Second, in section 4.2, we present spatial variations of house prices and rents at a detailed geographic level in Auckland over the 2001-2013 period. We analyse the relationship between prices and rents in each year.
- Third, in section 4.3, we estimate indicative rental yields at a detailed geographic level and analyse changes in rental yields over the 2001-2013 period.

4.1 Regional trends in house prices and rents

We begin by asking a simple question: at a regional level, has the relationship between house prices and rents held constant over time, or have the two data series followed different trends?

Answering this question will give us some initial insights into the evolution of the Auckland housing market over time. While we have not completed a full econometric analysis of changes in regional average rents and prices, the data strongly suggests that there have been one or more structural “breaks” in the relationship between the two variables.

We obtained a monthly series of average (mean) nominal house sale prices and rents for new tenancies in the Auckland region and for New Zealand as a whole from REINZ and MBIE, respectively. Table 4 provides some summary statistics for the year ended May 2014, the most recent month for which data is available. It shows that both prices and rents are substantially higher in Auckland than in the rest of New Zealand. Auckland also has a considerably higher price-to-rent ratio, indicating that sale prices are higher relative to rents in Auckland.

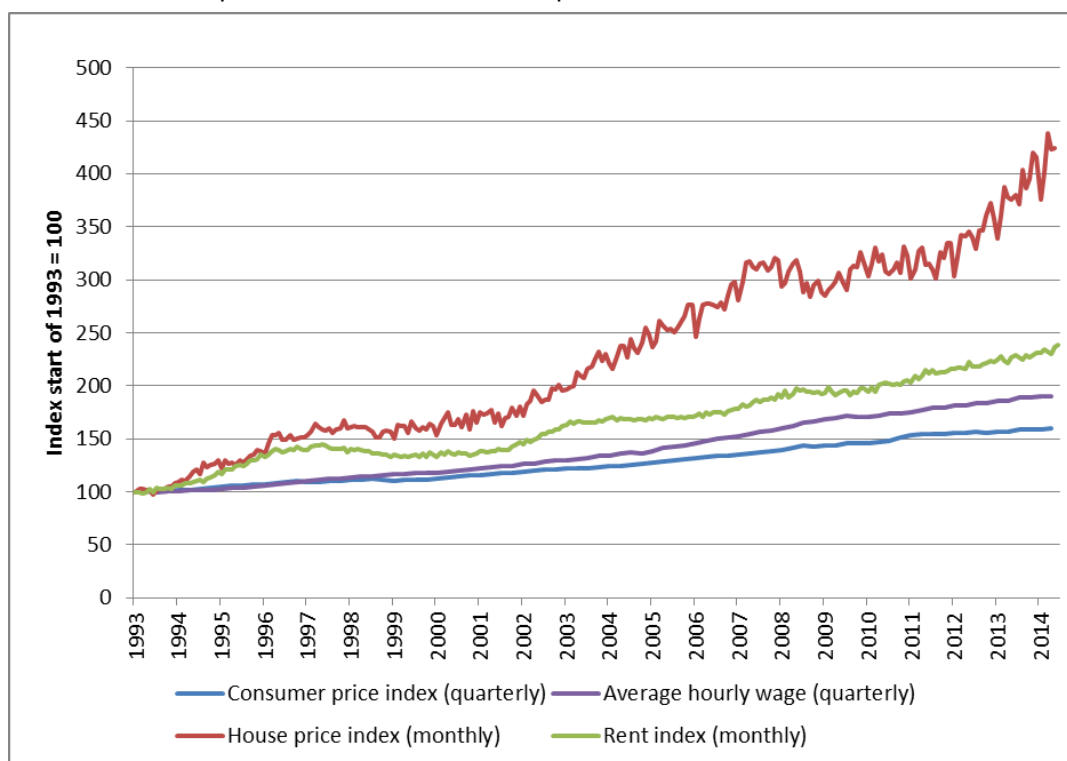
Table 4 - Summary statistics on house prices and rents for Auckland and the rest of New Zealand, Year ended May 2014

Variable	Auckland	Rest of New Zealand
Mean house sale price	\$693,500	\$373,870
Number of sales	30,055	45,953
Mean weekly rent for new tenancies	\$450	\$325
Number of new tenancies	58,923	170,610
Price to rent ratio	1,541	1,150

4.1.1 Two decades of changes in house price and rents

Figure 3 presents monthly changes on these variables over the last two decades. It compares nominal average house prices (red line) with nominal average rents (green line) and the consumer price index (blue line). All values are indexed to their value in January 1993.

Figure 3 - Auckland house prices, rents, and consumer price inflation, 1993-2014



(Source: Statistics New Zealand, REINZ, Housing New Zealand, 2014)

Figure 3 shows that both house prices and rents have increased faster than inflation in recent decades. Between 1993 and 2014:

- CPI rose by almost 60%
- Average nominal wages rose by 90%

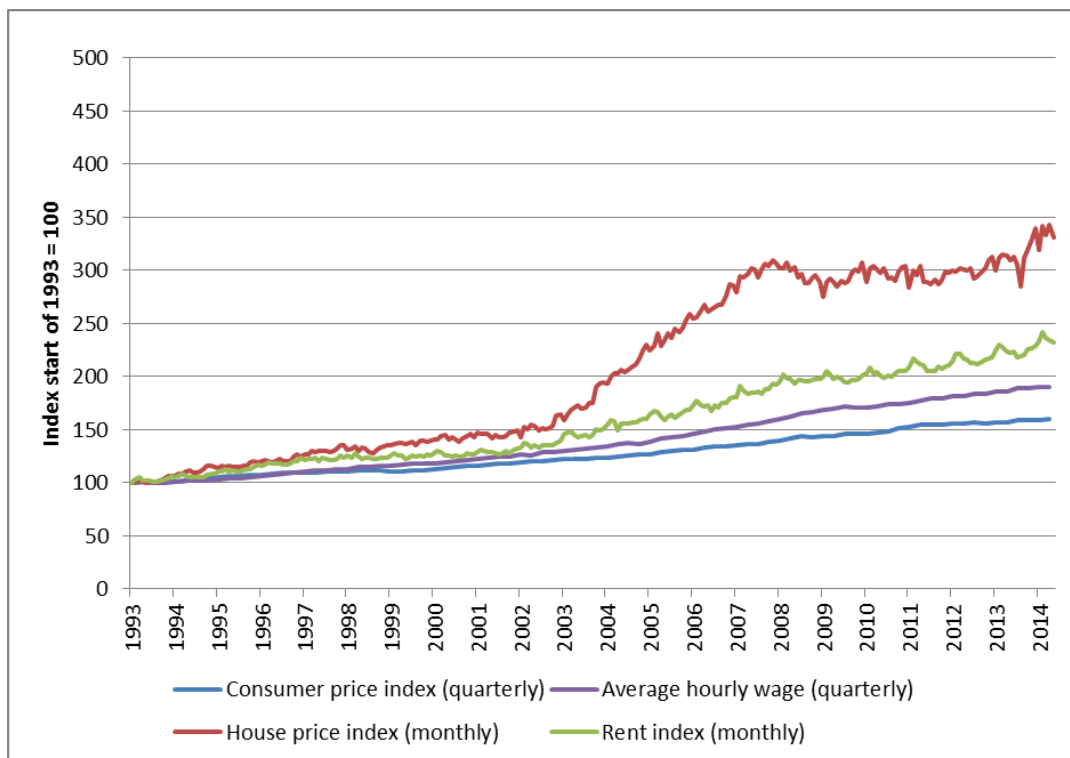
- Average nominal rents in Auckland rose by 130%
- Average Auckland nominal house prices rose by over 300%.

While this report does not explicitly consider the reasons for these trends, it is worth noting that the literature offers a range of potential explanations. Increases to both rents and house prices suggests that the market may be impacted by supply-side constraints, such as cost inflation or low productivity in construction, or limitations on land availability or development capacity imposed by regulations. In a 2012 inquiry on housing affordability, the Productivity Commission investigated a range of supply-side factors, including construction and land costs (New Zealand Productivity Commission, 2012). The increasing divergence between prices and rents, on the other hand, is likely to be a function of the demand-side factors outlined in Section 2.1.

However, these figures may overstate the real increase in housing costs, as they do not control for the size and quality of dwellings. We would expect real income growth to be associated with an increasing demand for housing, as wealthier households choose to purchase larger or higher quality houses. It is likely that some price increases reflect increases in the quantity or quality of housing.

Figure 4 displays similar data for the rest of New Zealand. This graph suggests that changes in Auckland have largely been matched by parallel changes elsewhere in the country.

Figure 4 - Rest of New Zealand house prices, rents, and consumer price inflation, 1993-2014



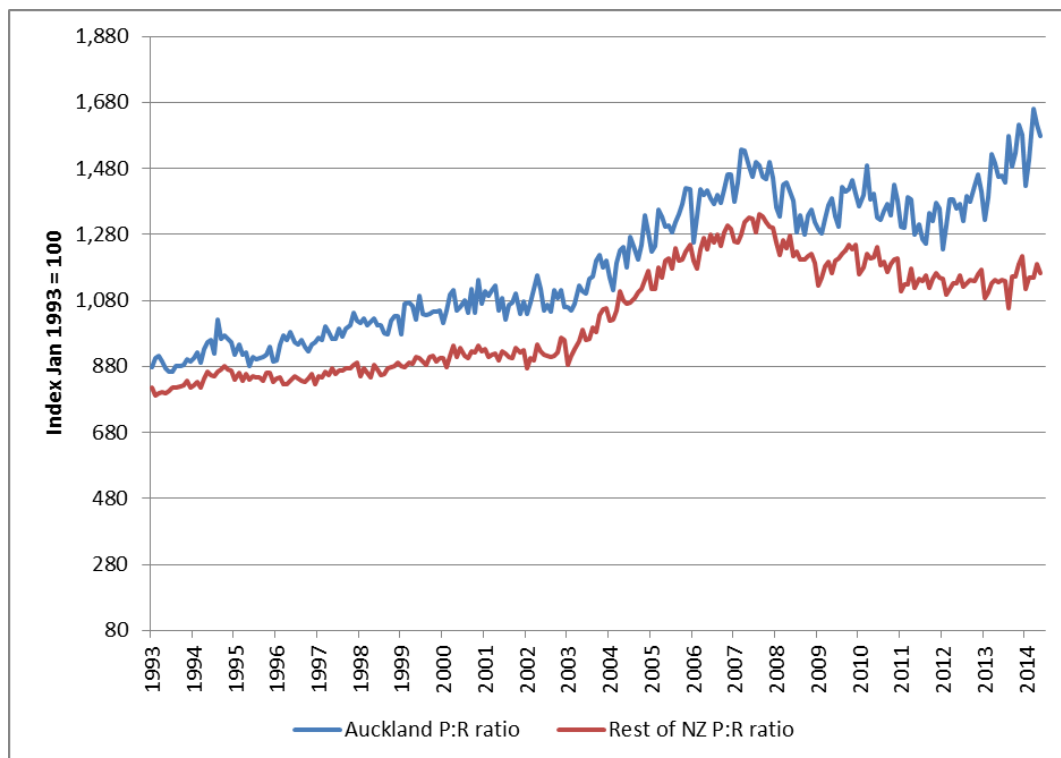
(Source: Statistics New Zealand; REINZ; Housing New Zealand, 2014)

4.1.2 A brief history of price to rent ratios

Figure 5 presents this data in a slightly different format. We have divided average house sale prices into average weekly rents to obtain an indicative measure of price-to-rent ratios. This allows us to easily observe relative changes in prices and rents in Auckland and the rest of New Zealand over the last 20 years.

We have used this measure to determine whether there are likely to have been any structural changes in the relationship between these two measures of housing prices.

Figure 5 - Price-to-rent ratios for Auckland and the rest of New Zealand, 1993-2014



(Source: Statistics New Zealand, REINZ, Housing New Zealand, 2014)

Figure 5 suggests that there are four distinct periods in the recent evolution of price to rent ratios:

- In the first period, from 1993 to 2002, price to rent ratios rose relatively slowly. Auckland's ratio appears to have grown at a more rapid rate, increasing from roughly 900 in 1993 to 1,100 at the end of 2002.
- In the second period, from 2003 to 2007, price to rent ratios rose rapidly in New Zealand and the rest of New Zealand. Auckland's ratio peaked at around 1,500 in 2007 while the rest of NZ ratio peaked at around 1,300.
- In the third period, from 2008 to 2011, price to rent ratios fell back from their pre-GFC highs and then stabilised at a lower level in Auckland and the rest of New Zealand. By 2011, Auckland's ratio had fallen to around 1,300 while the rest of NZ ratio fell to roughly 1,100.

- In the fourth period, from 2012 to the present day, price to rent ratios have risen rapidly in Auckland but stayed flat in the rest of New Zealand. Auckland's ratio has risen even more rapidly than during the 2003-2007 price run-up, reaching a new high of over 1,600 by mid-2014.

This analysis suggests that Auckland's housing market has moved in the same direction as the rest of New Zealand's housing market for most of the last two decades. However, it appears to have diverged from the rest of New Zealand in recent years – a significant but relatively recent phenomenon.

4.2 Spatial analysis of house prices and rents in Auckland

In this section we examine the cross-sectional relationship between house prices and rents at a detailed geographic level. In other words, we ask the question: if sale prices are relatively high in one area of Auckland, are rents also likely to be high in that area?

We answer this question using the detailed geographic dataset on house prices and rents that we introduced in the previous section. For ease of presentation, we have focused on three-bedroom dwellings only, as this represents the most common type of dwelling in Auckland (and hence the dwelling type for which the most robust data is available). The data also excludes area units with less than one dwelling per hectare, to partially control for variability in land prices across Auckland. We also aggregated the sales data from 1999-2002 as a proxy for the 2001 sales year, to provide a large enough sample to compare to the subsequent time periods. All the analysis in the subsequent sections of this report that incorporates 2001 housing sales data refers to this 1999-2002 aggregation.

4.2.1 Descriptive statistics

Table 5 summarises some descriptive statistics on median dwelling sale prices at an area unit level for the three Census years. This data is broadly consistent with Auckland-wide data that shows that there were large increases in house prices across the entire time period, particularly between 2006-2013. We note that even after aggregating housing price data from 1999-2002, we are missing robust price data for most Auckland area units. As a result, the robustness of our analysis of changes between 2001 and 2006 is more limited.

Table 5 - Descriptive statistics, area unit median house prices in Auckland, three bedroom dwellings

Measure	2001 (1999-2002)	2006	2013
N	133	362	375
Min	\$75,000	\$215,500	\$190,000
P10	\$156,000	\$262,750	\$344,000
Median	\$303,000	\$410,000	\$574,000
P90	\$561,800	\$654,750	\$970,800
Max	\$1,490,000	\$1,265,500	\$1,898,500

(Source: Auckland Council sale audit file; Statistics New Zealand, 2014)

Table 6 summarises some descriptive statistics on median rents at an area unit level for the three Census years. Once again, this data is broadly consistent with Auckland-wide data that suggests that rental prices grew consistently throughout the 1999-2013 period but that growth in rents did not suddenly accelerate like house prices.

Table 6 - Descriptive statistics on area unit median rents in Auckland, three bedroom dwellings

Measure	2001	2006	2013
N	384	391	397
Min	\$140	\$70	\$160
P10	\$220	\$270	\$350
Median	\$260	\$320	\$400
P90	\$340	\$430	\$550
Max	\$460	\$600	\$720

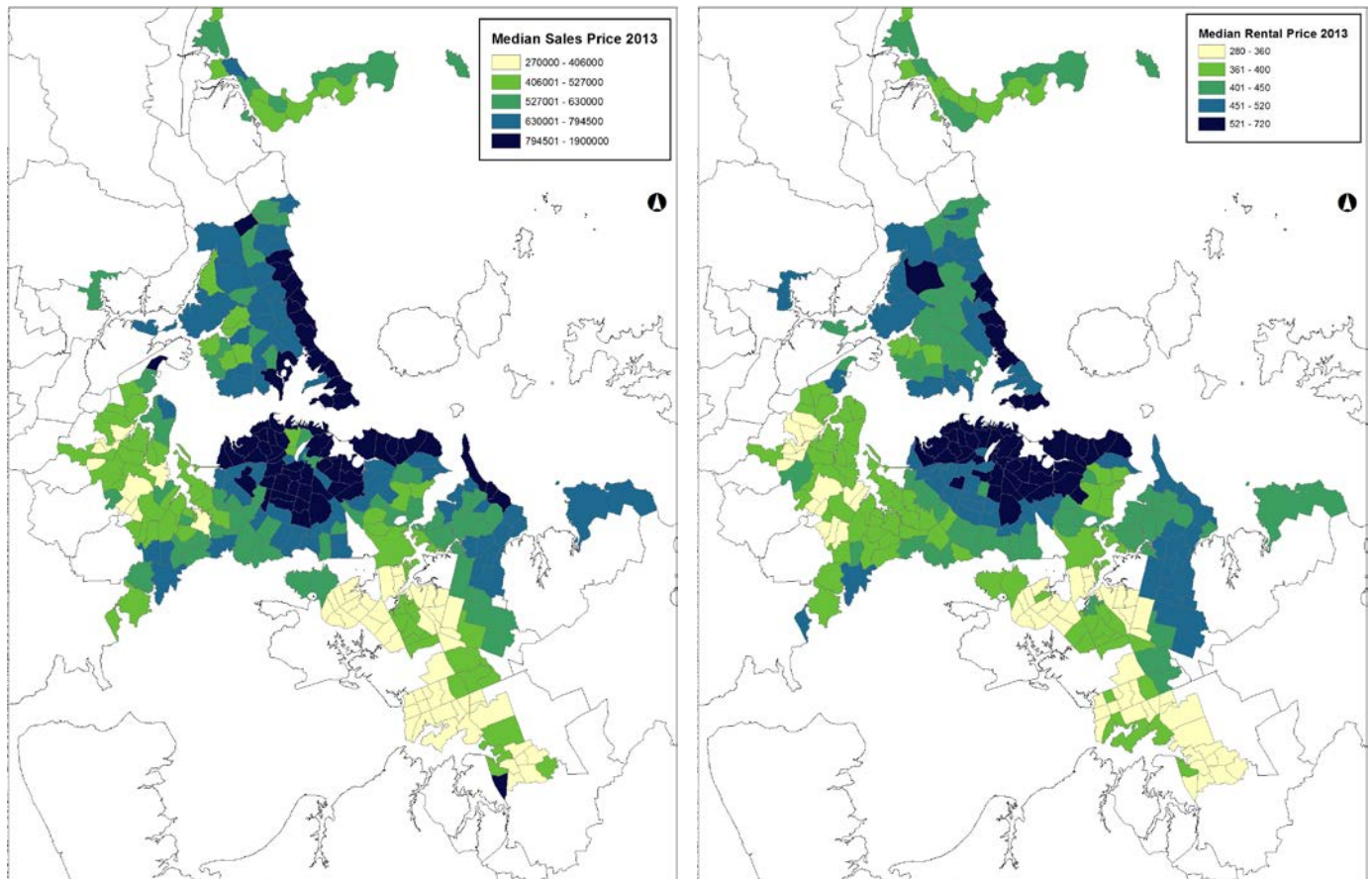
(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

4.2.2 Geographical variations in house prices and rents within Auckland

Here, we map data on house prices and rents to show geographical variations within Auckland. We also display data in scatterplot form to more clearly show the relationship between distance to the city centre and house prices and rents. Following previous work on the Auckland property market, we expect to find that dwellings that are further from the city centre tend to command lower prices (Hitchins, et al., 2014).

Figure 6 maps data on house sale prices and rents in 2013. These maps suggest that high prices were generally, although not always, associated with higher rents. The areas that tended to have higher rents included the inner isthmus, the North Shore, and the eastern bays – all areas with above-average house prices.

Figure 6 - Median sale prices and rents for three-bedroom dwellings by Auckland area unit, 2013



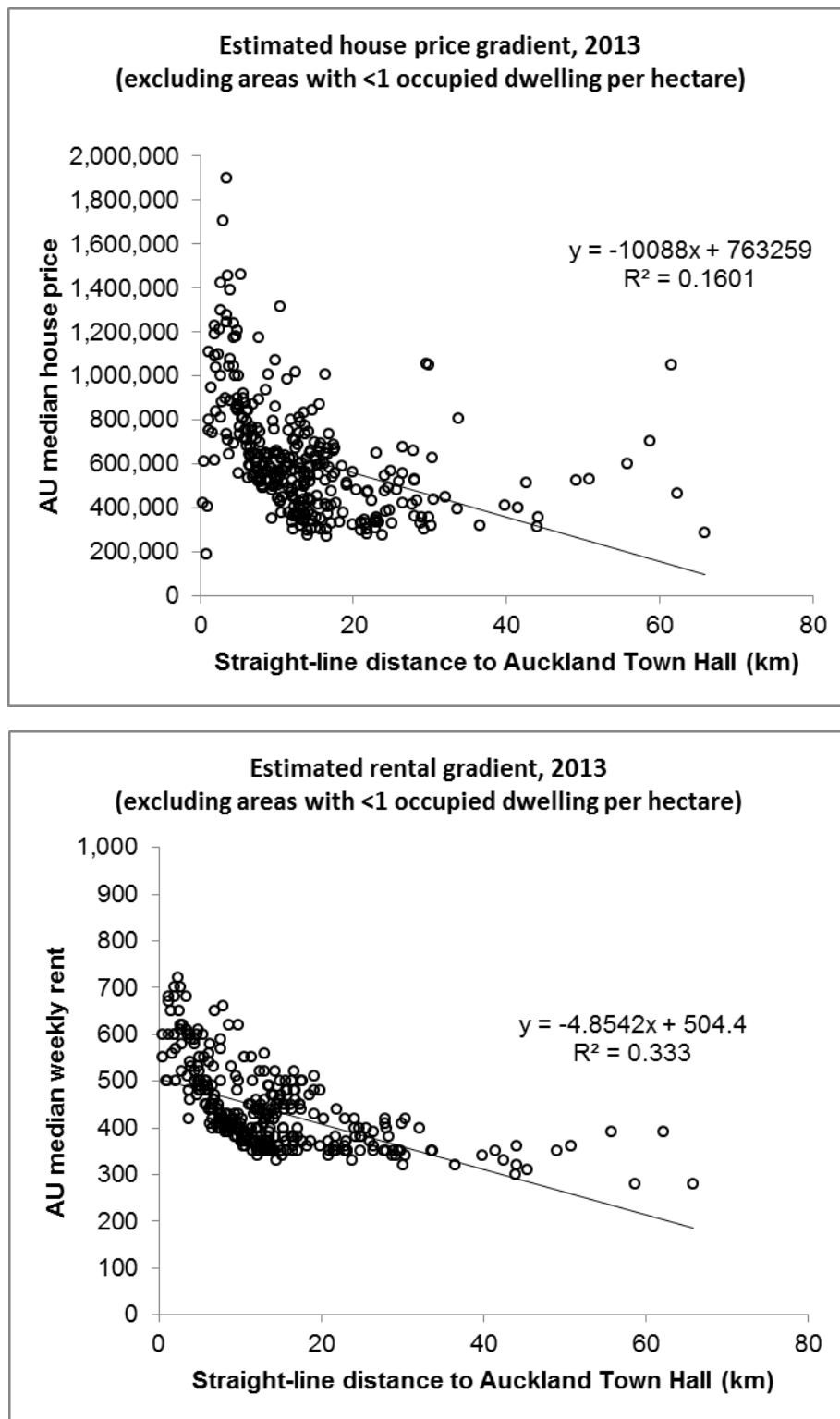
A – Sales Prices

B – Rental Prices

(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

Figure 7 presents the same data in two scatterplots, with straight-line distance from town hall (in kilometres) on the x-axis and median sale price or weekly rent on the y-axis. It confirms the intuition emerging from the above maps that there is value in proximity to the town hall (a proxy for the city centre), which is consistent with the predictions from the urban economics literature, such as the Alonso-Mills-Muth model (Fujita, et al., 2001). The relationships between distance to the centre and sale prices and rents are negative and statistically significant. Rents exhibit a relatively stronger relationship when compared to house prices. See Appendix B for regression results incorporating a log-linear model, which show an even stronger relationship between prices and distance from the town hall.

Figure 7 - Price gradients for house prices and rents, three-bedroom dwellings, by distance from city centre, 2013



(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

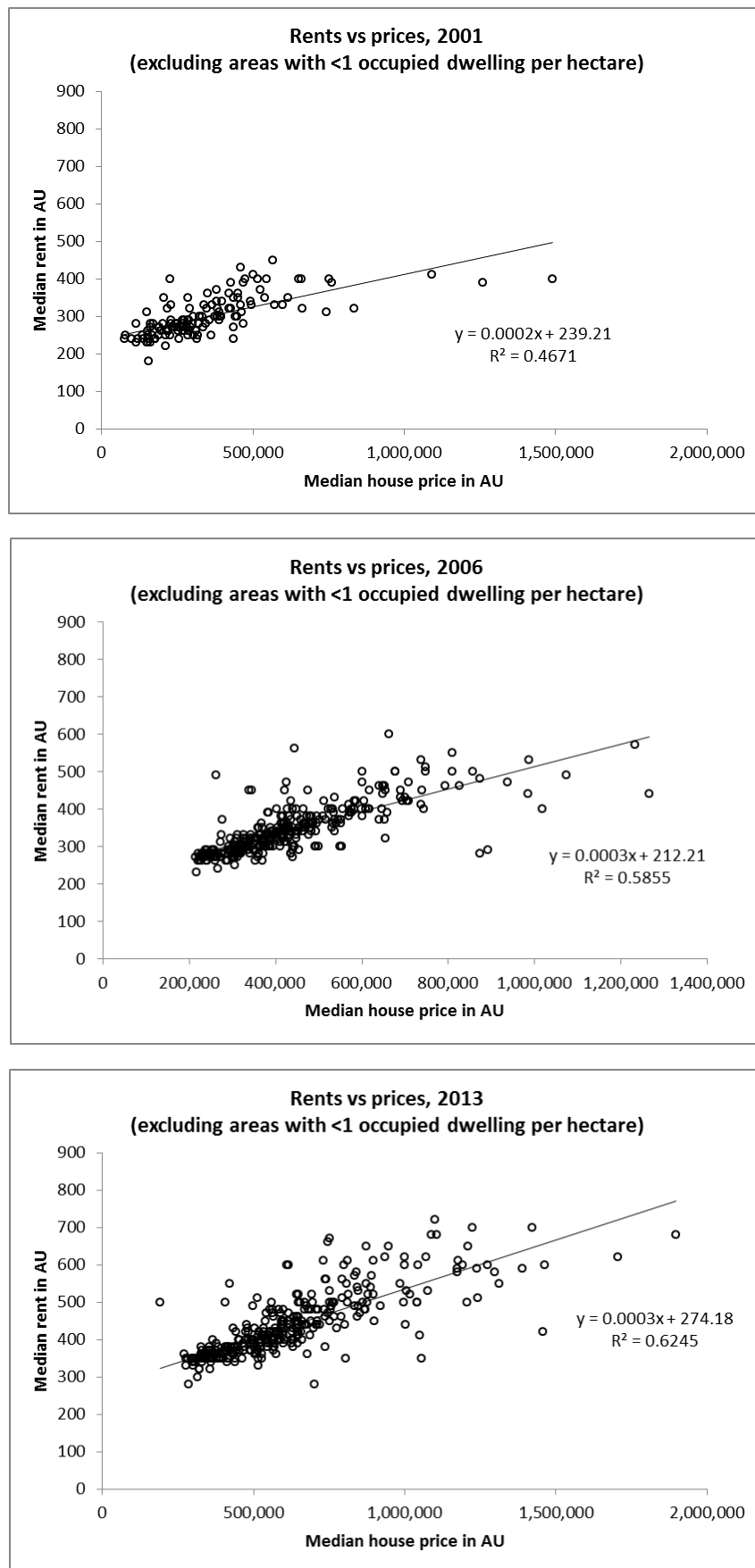
4.2.3 Is there a relationship between prices and rents?

Figure 8 shows the correlation between median house prices and median rents at an area unit level for the three Census years. We have presented this comparison in scatterplot form, with median rents on the x-axis and median house prices on the y-axis. The analysis suggests that there is a positive, statistically significant correlation between the two variables, with a relatively high model fit – See Appendix B for further regression results incorporating log-log models.

These findings suggest that there are other, unobserved factors which play a potentially significant role in explaining variations in house prices within Auckland. Recalling our theoretical framework, this suggests that the following factors may play an important role in shaping the Auckland housing market:

- Unobserved variations in the quality of rented and owner-occupied dwellings, other than location and dwelling size
- Different expectations about future house price appreciation in different areas
- Different interest rates or risk premia faced by buyers in different locations – an unlikely (but not impossible) outcome given the mobility of home buyers within the Auckland.

Figure 8 - Cross-sectional correlations between house prices and rents, three bedroom dwellings, 2001, 2006, 2013



(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

4.3 Spatial analysis of expected rental yields

Here, we examine the relationship between rents and sale prices at a detailed geographic level. This analysis follows on from the region-wide analysis presented in section 4.1. However, we now define a new measure of the relationship between prices and rents: indicative rental yields.

This measure, which is defined in Equation 2, is relatively intuitive. It reflects the annual rental return that a property owner could expect in a given area, before tax arrangements, rates, body corporate fees, and maintenance costs. It is a measure that is relevant for all categories of owners. For owners of investment properties, it represents the annual financial return on their investment. For owner-occupiers, it represents the annual value of the housing services that they get from owning a home.

Equation 2 - Indicative rental yield

$$Y(i, j) = \frac{R(i, j) * 52}{P(i, j)}$$

where $Y(i, j)$ is the indicative rental yield for dwellings in area unit i with j bedrooms; $R(i, j)$ is the median weekly rent for dwellings in area unit i with j bedrooms; and $P(i, j)$ is the median sale price for dwellings in area unit i with j bedrooms.

All else being equal, a lower indicative rental yield would be associated with higher house prices or lower rents, while a higher yield would be associated with lower prices or higher rents. However, all is not necessarily equal. As discussed in our theoretical section, (Section 2.1), some owners may be willing to tolerate a lower rental yield due to greater expectations about future house price appreciation, different interest rates, different risk premia, or unobserved quality differences.

We use this measure to address two key questions:

- Are indicative rental yields constant throughout the Auckland region or do they vary between areas?
- Are there any geographic patterns in changes to indicative rental yields between Census years? Are changes in the relationship between prices and rents are they concentrated in certain areas or have most areas followed region-wide trends?

4.3.1 Variations in indicative rental yields in Auckland

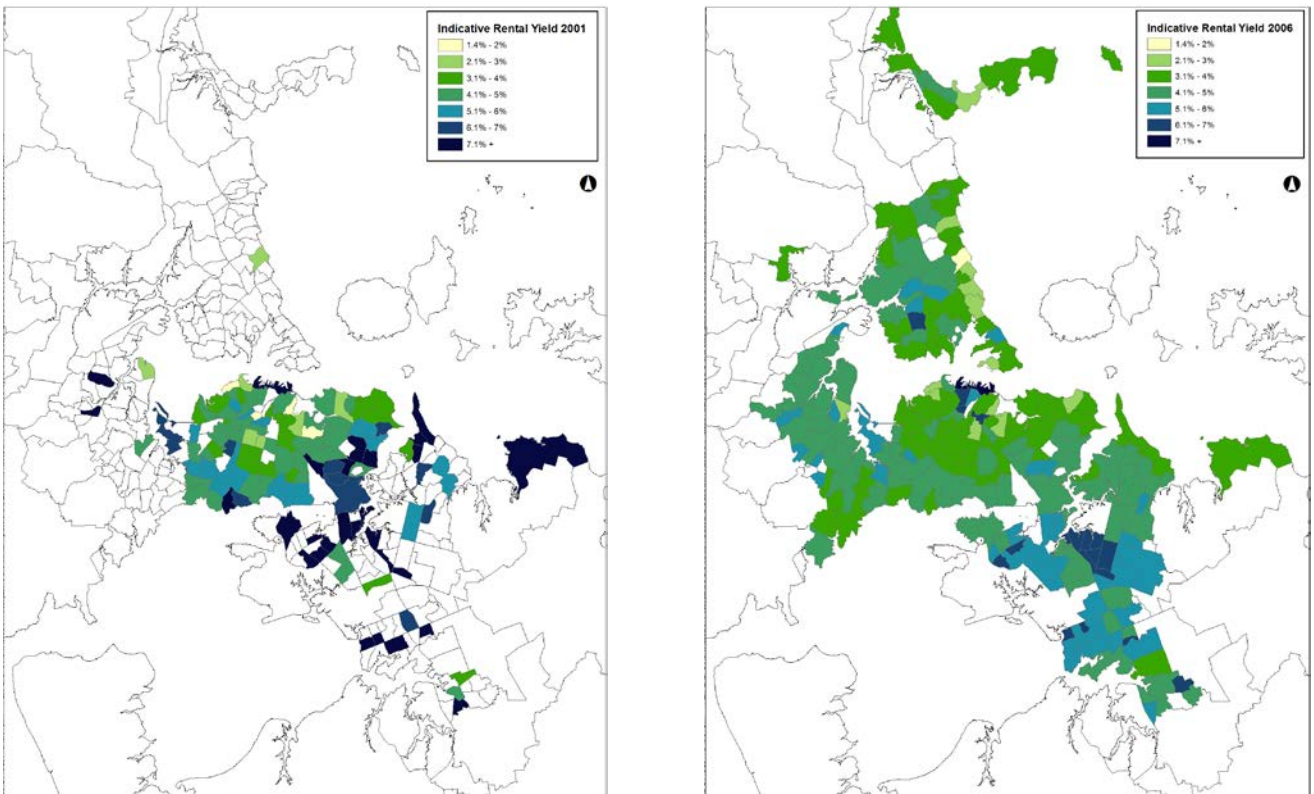
Figure 9 displays the geographical variation in estimated rental yields in Auckland during Census years 2001 (for which we have aggregated 1999-2002 sales data), 2006, and 2013. Area units are coloured according to estimated rental yields, with dark blue indicating higher yields and green to light yellow indicating lower yields.

These maps suggest that indicative rental yields do vary significantly within Auckland, with some areas having yields that are two to four times higher than others. However, we find that the broad spatial structure variations in rental yields have persisted over time. These findings are consistent with the analysis in Hitchins et al (2014), which showed changes to the spatial structure of Auckland house prices. We find that:

- Rental yields were consistently lowest in the city fringe suburbs in the Auckland isthmus, the eastern bays and the east coast of the North Shore.
- Rental yields were consistently highest in west, northwest, and southern Auckland.
- Rental yields were also relatively high in the city centre in 2006 and 2013, possibly as a result of the construction of and robust demand for relatively cheap apartments.

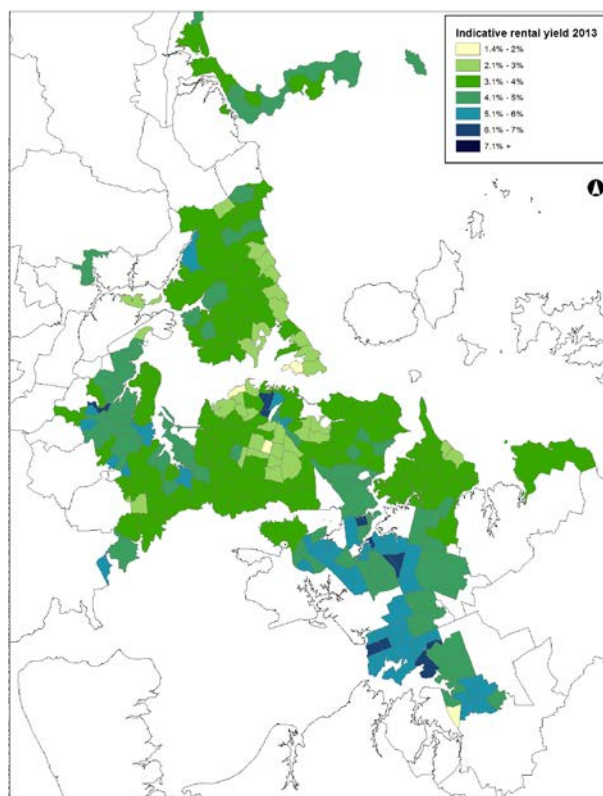
It is also apparent that indicative rental yields have fallen in most or all Auckland area units over this period, as shown by increase in the number of areas shaded a lighter shade of green between 2006 and 2013.

Figure 9 - Indicative rental yields for three-bedroom dwellings by Auckland area unit, 2001, 2006, and 2013



A – 2001

B – 2006



C – 2013

(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

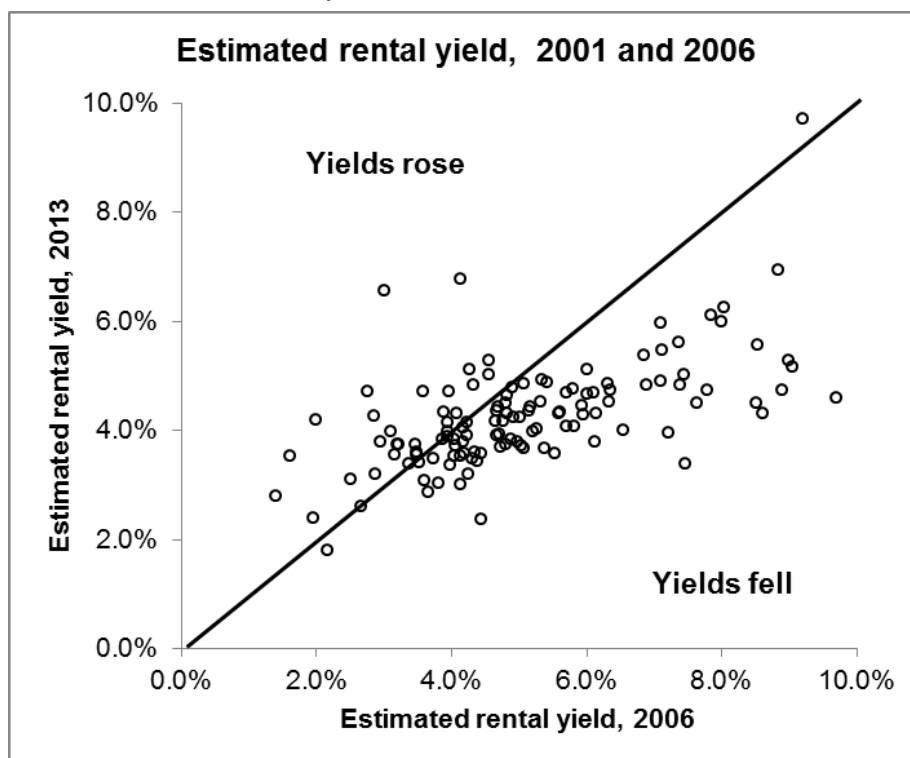
4.3.2 Changes to rental yields

In order to understand how indicative rental yields have changed at a detailed geographic level, we have summarised data into two scatterplots. These graphs compare indicative rental yields at an area unit in each Census year (x-axis) with rental yields in the following Census year (y-axis). Each point corresponds to a single area unit. Points that are below the black line are area units in which indicative rental yields decreased between years, while points that are above the black line experienced increased yields.

This analysis suggests that although indicative rental yields vary within Auckland, movements in rental yields are broadly synchronised across all area units. In other words, the changes in the relationship between rents and prices observed at an Auckland level have applied throughout the city.

Figure 10 displays movements in indicative rental yields between 2001 and 2006. Yields fell in almost all area units – as shown by the fact that most points are below the line. Area units which had higher rental yields in 2001 tended to experience larger falls in rental yields between 2001 and 2006. This tends to suggest that the relatively rapid appreciation of prices compared to rents affected yields throughout the majority of the Auckland isthmus area units for which we had data.

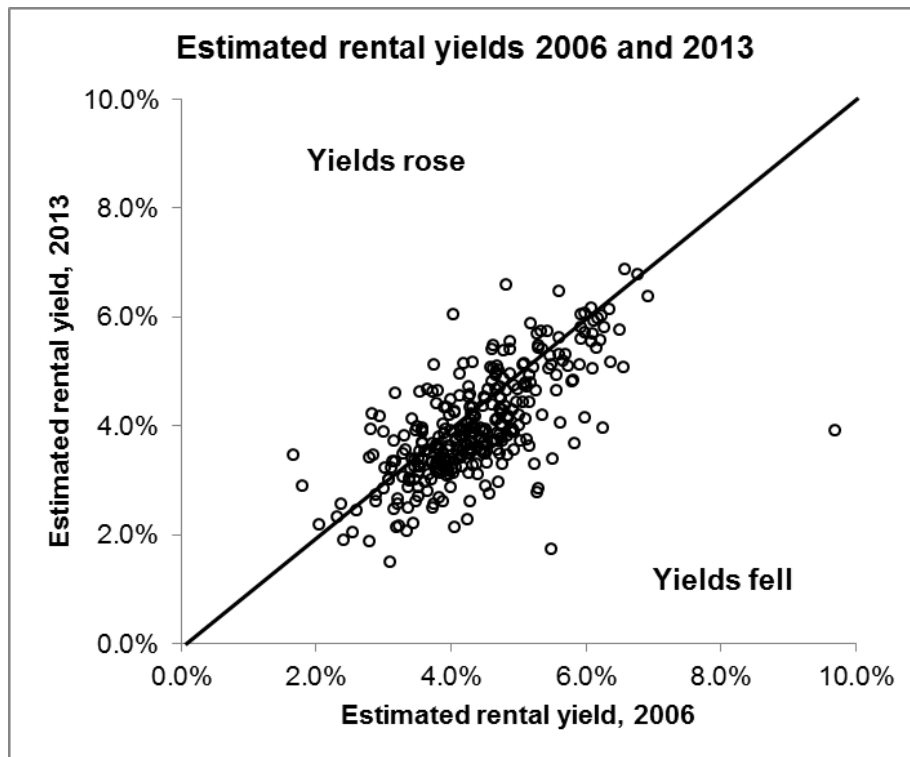
Figure 10 - Movements in indicative rental yields from 2001 to 2006



(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

Figure 11 presents changes in indicative rental yields from 2006 to 2013. It suggests that there were fewer changes in yields between these years, as shown by the clustering of points around the black line. Yields fell in a majority of area units while rising in some others. Once again, this data suggests that regional trends – in particular, the relatively slow appreciation in prices relative to rents seen since the GFC – have been replicated throughout Auckland.

Figure 11 - Movements in indicative rental yields from 2006 to 2013



(Source: Auckland Council sales audit file; Statistics New Zealand, 2014)

5.0 Discussion

This chapter summarises and discusses the main findings on the geographical distribution of house prices and rents in Auckland in section 5.1. It then discusses some implications that these findings may have on policy (section 5.2). The chapter concludes with an outline of some potential areas for future research in section 5.3.

5.1 Main findings

First, at a regional level we observe substantial changes in the relationship between prices and rents over time. The analysis in section 4.1 shows the majority of increases in prices relative to rents took place between 2003 and 2008, although a similar period of growth appears to have begun in the last two years. We note that the relationship between house prices and rents in Auckland tracked closely with the relationship observed in the rest of New Zealand from 1993 to 2012 but has diverged significantly over the last 2-3 years, largely due to increasing Auckland house prices. Drawing on the theoretical framework presented in section 2.1, this change suggests that this may be due to higher expectations of future house price appreciation in Auckland, or the presence of buyers with access to capital at lower interest rates.

Second, changes in the price to rent relationship appear to be an Auckland-wide phenomenon rather than being concentrated in certain areas. A detailed geographical analysis of changes in indicative rental yields in section 4.2 suggests that prices have risen relative to rents in almost every area of Auckland. Once again, we find that the largest changes took place between 2001 and 2006, with relatively modest changes between 2006 to 2013. Overall, this suggests that although location-specific factors can influence house prices, these often occur within the context of regional or national (macro-level) trends.

Third, we find that there are significant geographical variations in the relationship between rents and prices. Indicative rental yields are significantly lower in some areas than others, indicating that prices are high relative to rents. Broadly speaking, the city centre fringe areas, along with beach-side suburbs in east Auckland and the North Shore, tend to have lower rental yields. These geographic variations remained relatively constant over time – i.e. the areas with the lowest indicative rental yields in 2001 tended to also have the lowest yields in 2013.

These persistently low yields present a conundrum for interpretation. They highlight an important feature of the housing market: that dwellings are both simultaneously investment and consumption goods (Henderson & Ioannides, 1987). The low yields could suggest that people purchasing homes in these areas may not be seeking investment, but rather placing a premium on the high amenity values in these areas. This is supported by the fact

that owner-occupation in area units with less than 3 per cent rental yield is higher (68%) than those areas with a higher yield (58%).

However, even if it is the case that a premium exists for owner-occupation in areas of high amenity, the literature suggests that investment intentions and future expectations about house price growth remain a significant driver of people's behaviour in housing markets (Glaeser & Gyourko, 2007; Henderson & Ioannides, 1987). In other words landlords and homeowners in these areas may be seeking a return from capital gains rather than rents, following an adaptive expectations framework.

5.2 Interpretation and discussion

The theoretical section highlighted that we would expect the relationship between rents and prices for dwellings of equivalent quality to vary depending upon real interest rates and differences in expected future house price appreciation.

Our analysis allows us to control for two principal determinants of housing quality – location and dwelling size. However, it does not address dwelling condition or other more specific factors that may vary between locations, such as a significant premium in high value areas. However, taking these limitations into account, at a macro level, it could be reasonable to interpret geographic differences in the relationship in prices and rents at a point in time as resulting from different expectations about future house price appreciation.

We note that the areas with the lowest indicative rental yields also tend to be the areas where prices have risen fastest over the past several decades (Hitchins, et al., 2014). This suggests that past experiences may be anchoring expectations of future growth. Overall, this finding suggests that future expectations play an important role in determining variations in rental yields within Auckland. Therefore, understanding how they change and develop over time needs to be taken into account when developing and implementing housing policy in Auckland.

5.3 Implications for researchers and policymakers

Our findings on the variations in indicative rental yields within Auckland suggest some factors that researchers and policymakers may seek to investigate further.

First, this data suggests that changes in the relationship between rents and prices over time are likely to be the result of regional (or even national) factors rather than extremely localised factors. Indicative rental yields moved in a similar direction between Census years across most Auckland area units – suggesting that regional changes in rental yields were also experienced at the local level.

As a result, analysis of the drivers of house prices and rents at a regional (or national) level is likely to be sufficient to understand changes to the Auckland housing market over

time. In addition, this implies that it is necessary to consider the “spill-over” effects that may arise from housing market policies or planning regulations. Spatially targeted policies – e.g. a zoning regulation affecting a particular part of the city – may nonetheless affect outcomes throughout regional housing markets.

Second, this dataset provides further opportunities to understand the role of rational and adaptive expectations in the Auckland housing market, and investigate the correlation between previous price changes in an area and historical and expected rental yields. Policymakers and researchers would benefit from a greater understanding of the key drivers of the divergence between house prices and rents – and, in particular, whether this reflects long-term fundamentals or short-term financial factors that may or may not be maintained over time.

Finally, it would be useful to understand why indicative rental yields vary different parts of Auckland, and why these differences have persisted over time. As discussed above, this may be due to geographic differences in expectations for future house prices. In a qualitative sense, these differences could arise from different expectations around future supply and demand balance within areas, which will in turn be shaped by expectations for:

- The long-term demand for housing in individual areas, which may be affected by factors such as population growth, the future composition and spatial distribution of Auckland’s economy, future transport costs, and household preferences
- Provision of infrastructure and other public goods such as school zoning, which may make some areas more (or less) desirable over the longer term
- Land use regulations and other constraints on future housing supply, which may limit people’s ability to provide additional dwellings in some desirable areas or raise the cost and uncertainty of doing so (Grimes & Mitchell, 2015).

Understanding how these issues affect the Auckland housing market could potentially be examined through extensions of the dataset presented in this report. However, doing so will require more detailed datasets on house sales or rental tenancies, that allow us to control for a wider range of dwelling and neighbourhood characteristics. It may also require a range of different evaluation approaches and research strategies.

6.0 References

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7.0 Appendix A – Detailed methodology and data sources

In this section, we describe our approach to compiling a detailed dataset of prices and rents for Auckland. In the process, we cover the following topics:

- Overview of relevant sources of data
- Relevant geographical area classifications
- Dwelling characteristics variables

We have attempted to take a comprehensive perspective on available data sources that takes into account all of the possibilities offered by the data. However, our analysis is somewhat constrained by the form in which data is currently available. For example, while property sales data from Property IQ can be broken down according to dwelling characteristics, we have not currently purchased that detailed data. As a result, we cannot be certain that we have fully described this data.

Overview of relevant data sources

We have identified four main sources that provide information on house prices and rents at a detailed geographic level:

- New Zealand Census data, which allows us to identify median/mean rents by area unit (and potentially broken down further by dwelling characteristics) at a point in time [Census years 1996, 2001, 2006, 2013]
- New Zealand Housing and Construction Quarterly (NZHCQ) data published by MBIE, which provides median/mean rents for new tenancies, broken down by dwelling characteristics in 40-odd market rent areas in Auckland⁴ [1994-2014; quarterly data]
- Property IQ / Quotable Value data on observed sale prices, which can be broken down by dwelling characteristics and aggregated at an area unit level [1982-2014, annual data]
- Auckland Council's ratings database, which estimates property values for all buildings in Auckland on a three-yearly basis (most recently updated in 2014). The ratings database is aligned with the Auckland dwelling sales audit file database also maintained by Council, which provides good coverage of the time period between 2003 and 2014. Consequently, our discussion of the dwelling sales audit file below also applies to the rating database.

⁴ Market rent areas are defined using 2001 Census Area Units. As the boundaries of area units change slightly with each Census, this poses some challenges to interpretation and analysis.

Geographic classifications

Previous work on house prices and rents has been done at a national or regional level only. As a result, it does not provide a detailed account of geographic variations in the relationship between rents and prices. However, some challenges arise as a result of differences in the geographic classifications used for different datasets.

The New Zealand Geographic Hierarchy is commonly used to gather, analyse, and report geographical data. The lowest levels of the hierarchy – meshblocks and area units – are commonly used for detailed geographical analysis. Statistics New Zealand maintains this classification system and provides online summaries⁵ and concordance matrices between different levels in the hierarchy. Geographic boundaries are updated for each Census, which can result in difficulties in comparing data over time.

The table below summarises the geographic classifications used in each of the four datasets identified in this paper.

Dataset	Classification and level of aggregation
Census data	Area units as at 2013 Census [Note: data from the 1996-2006 Censuses is available for 2006 Census area units]
NZHCQ data	DBH market rent areas based on area units from 2001 Census
Property IQ data	Area units as at 2006 or 2013 Census [Note: Auckland Council currently has access to historical data coded to 2006 Census area units]
Dwelling sales audit file database	Sales coded to residential addresses Can be geocoded to area units (or any other geographical classification)

The use of different geographic classifications may pose a challenge for analysis, as boundaries have shifted between the 2001-2013 Census. However, many geographic boundaries have been retained with only minor changes.

Dwelling characteristics variables

Not all dwellings are created equal. House prices and rents are likely to vary as a result of a number of quality features, such as:

- Dwelling location (i.e. access to employment and amenities)
- Dwelling size and lot size
- Dwelling age and condition

⁵ <http://www.stats.govt.nz/methods/classifications-and-standards/geographic-hierarchy.aspx>

- Quality features like insulation, chattels, visual attractiveness, access to sun, etc.

If we are seeking to estimate spatial variations in the relationship between prices and rents, it is necessary to control for other dwelling characteristics that may influence prices. It is also necessary to be aware that unobserved dwelling characteristics may play a role. For example, it may be the case that rental units are systematically less well maintained than owner-occupied dwellings.

We have reviewed the dwelling characteristics variables in the four identified data sources. Dwelling size, measured by number of bedrooms, is the principal dwelling characteristic variable available to us. Other dwelling characteristics are measured by some data sources but not others.

The table below summarises key dwelling characteristics variables from each of the four data sources we have identified.

Dataset	Dwelling size measure	Other characteristics
Census data	Number of bedrooms (1, 2, 3, 4, 5, 6+) [Alternative: total number of rooms]	Type of dwelling (attached, detached, mobile) Number of floors in building Heating fuels used Telecommunications access
NZHCQ data	Number of bedrooms (1, 2, 3, 4, 5+)	Property type (apartment, flat, house, total)
Property IQ data	Number of bedrooms	Unknown
Dwelling sales audit file database	Total floor area Number of bedrooms	Type of dwelling (flat, apartment, detached dwelling, etc.) Land area (lot size) Building age Building condition Building construction (materials) Off-street parking Other indicators

This table suggests that we will probably be restricted to a single measure of dwelling characteristics – number of bedrooms. While the Census data contains richer information on dwelling characteristics, confidentiality restrictions are likely to prevent us accessing that data. In addition, we do not know whether Property IQ data contains other information on the type and qualities of dwellings.

Lastly, it is important to consider the influence that the sector of landlord may have on rental prices. Housing New Zealand Corporation offers below-market rents to many of its tenants, which may skew rental prices in areas with significant state housing. The Census collects data on the ownership of rental dwellings – i.e. whether a dwelling is owned by:

- private person, trust or business

- local authority or city council
- Housing New Zealand Corporation
- Other state-owned corporation or state-owned enterprise, or government department or ministry.

In our analysis we have restricted the analysis to rental dwellings owned by private persons, trusts or businesses as that is likely to provide the best indication of market rents.

8.0 Appendix B – Additional regression analysis

Relationship between median dwelling rental prices and house sales prices

The regression table below outlines the relationship between house prices, rental prices, and distance from the town hall. For both rental and house prices, in 2013 there was a negative relationship between prices and distance that is statistically significant at the 99 per cent confidence level. The higher adjusted R-squared for rents indicates a stronger relationship to distance compared to house prices.

Regression table: relationship between house prices, rents and distance from the town hall – three bedroom dwellings

Regression summary table				
Dependant Variable - Natural Logarithm	House Prices		Rental Prices	
OLS estimates	(1)		(2)	
	2013		2013	
Intercept	13.48	***	6.21	***
	(0.326)		(0.137)	
Distance from town hall (km)	-0.016	***	-0.011	***
	(0.002)		(0.014)	
N	334		336	
Adjusted R-squared	0.17		0.37	
<i>Standard errors in parentheses</i>				
*p<.1, **p<0.05, ***p<.01				

Relationship between median dwelling rental prices and house sales prices

The regression table below outlines the relationship between rents and sales prices. Overall it shows that across 2001, 2006 and 2013 there is a positive relationship between median rents and house sales prices that is generally statistically significant. The adjusted R-squared ranges from .53 to .64 indicating a reasonable level of model fit.

Regression table: relationship between house prices and rents – three bedroom dwellings

Regression summary table						
Dependant Variable - Natural Logarithm	Median Rent					
OLS estimates	(1)		(2)		(3)	
	2001		2006		2013	
Intercept	2.68	***	0.435	*	0.98	***
	(0.247)		(0.228)		(0.208)	
Median dwelling sales price - Natural Logarithm	0.238	***	0.417	***	0.383	***
	(0.196)		(0.176)		(0.158)	
N	131		325		332	
Adjusted R-squared	0.53		0.63		0.64	
<i>Standard errors in parentheses</i>						
*p<.1, **p<0.05, ***p<.01						