



# Bulletin

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# New Zealand house prices: a historical perspective<sup>1</sup>

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Over the past three years, house prices have increased 52 percent in Auckland, but only 11 percent in the rest of New Zealand. Regional variation in house price inflation is not unusual, but the extent of the current divergence between house prices in Auckland and the rest of the country is unprecedented.

Historically, Auckland house prices have trended upwards relative to those in the rest of New Zealand. But in instances when they have deviated significantly from house prices elsewhere, this divergence has subsequently reversed to some extent. Correction has occurred both via prices in the rest of New Zealand catching up to those in Auckland, and by Auckland prices falling to levels more consistent with those elsewhere.

## 1. Introduction

Since the beginning of the current house price upswing in mid-2012, nationwide house prices have risen 33 percent – underpinned by rapid house price inflation in Auckland and post-earthquake accommodation shortages in Christchurch, but more modest house price inflation elsewhere (figure 1).<sup>2</sup>

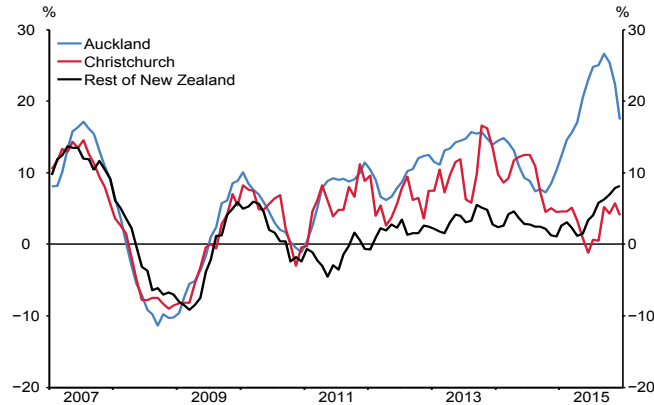
It will come as little surprise to readers that Auckland houses cost more – and prices have been growing more rapidly – than those in the rest of the country. But the extent of the current divergence is remarkable. The ratio of Auckland house prices to those elsewhere in New Zealand has trended up over time, but the extent of the increase in this ratio since 2009 is unprecedented (figure 2).

This *Bulletin* article does not attempt to pass judgement on whether Auckland house prices will fall, nor whether house prices in the rest of New Zealand will significantly lift. Rather, it provides historical context for the current house price upswing, using nationwide house price data

<sup>1</sup> The author would like to thank Arthur Grimes, John McDermott, Dean Ford, Yuong Ha, David Hargreaves, Anella Munro, Jed Armstrong, Chris Bloor, Willy Chetwin, Özer Karagedikli, Adam Richardson, and Matt Galt for their comments and assistance.

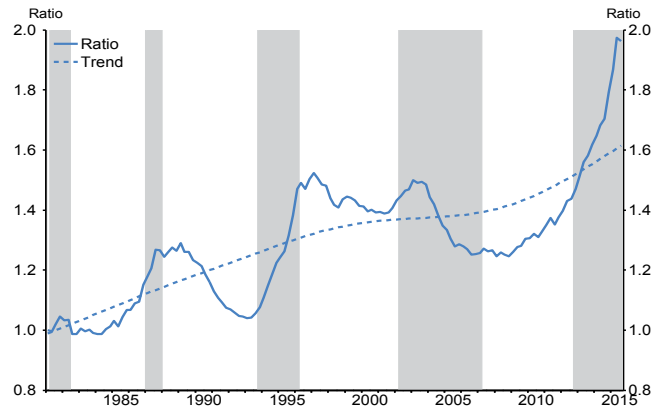
<sup>2</sup> See Appendix A for information about the data used in this Bulletin article. Excluding figure 1, data in all charts and figures are up to and including the September quarter of 2015.

**Figure 1**  
**House price inflation by region**  
*(annual percent change, 3-month m.a.)*



Source: REINZ

**Figure 2**  
**Auckland house prices and rest of New Zealand**  
*(ratio of indices, nationwide upswings in shaded grey)*



Source: CoreLogic, RBNZ calculations.

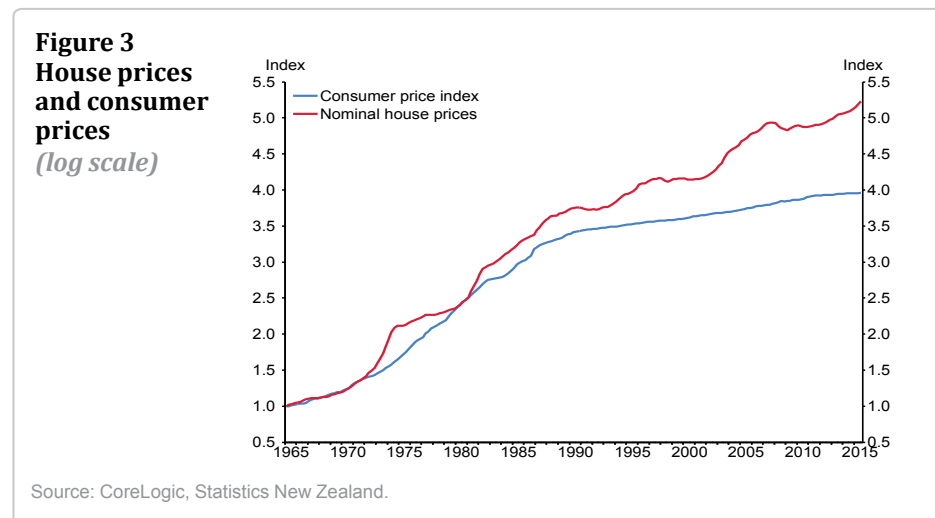
from 1965 and regional house price data from 1981. In particular, it looks at the role of Auckland house prices in nationwide house price upswings over history. It does not attempt to explain why house prices have evolved as they have, but simply describes what has happened in a systematic, accessible way.<sup>3</sup>

Section 2 documents the trends in nationwide house prices since 1965 and identifies periods of high house price inflation over that time. Section 3 presents regional house price data since 1981, and compares Auckland house prices to those in the rest of New Zealand. Section 4 investigates the relationship between house prices in Auckland and the rest of the country, while section 5 discusses key differences between Auckland and elsewhere. Section 6 discusses their recent unprecedented divergence.

<sup>3</sup> For more on the demand and supply factors influencing residential property markets see Watson (2013). For a more granular, comprehensive survey of the data see Hall, McDermott & Tremewan (2006).

## 2 New Zealand house prices over the past 50 years

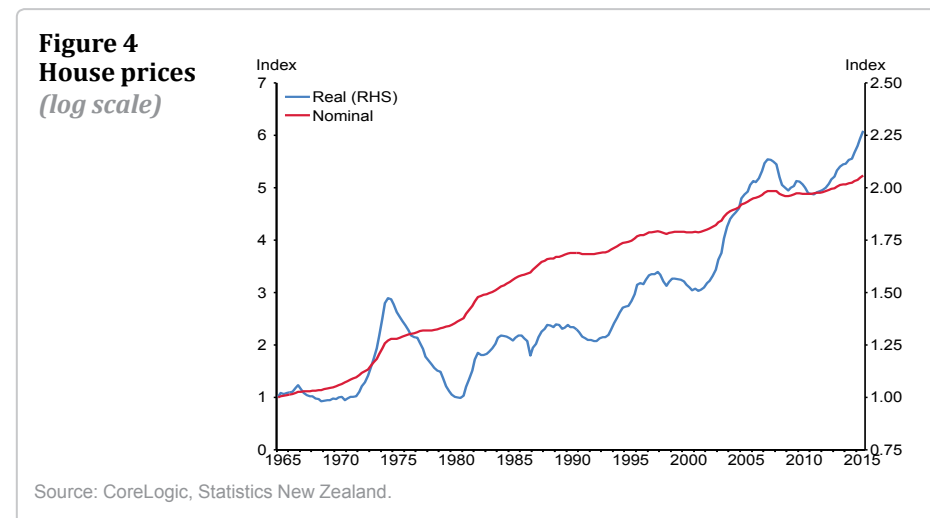
Since 1965, house prices have risen significantly. Figure 3 shows nominal house prices and the consumer price index using a logarithmic scale. A logarithmic scale is useful for expressing order of magnitude – it shows how much a series has increased relative to its previous value, rather than its starting value. An increase of one index point represents a doubling in the index. This shows that nominal house prices have doubled every 12 years on average.



Nominal house prices have increased faster than consumer prices. Before the Reserve Bank adopted inflation targeting in 1989, high nominal house price inflation partly reflected generalised inflation in the economy. There is a statistically significant structural break in

nominal house price inflation in 1991, when low and stable inflation was established.<sup>4</sup> After this structural break, nominal house price inflation halved. Before 1991, house price inflation averaged 12 percent per year; afterwards it was about 7 percent.

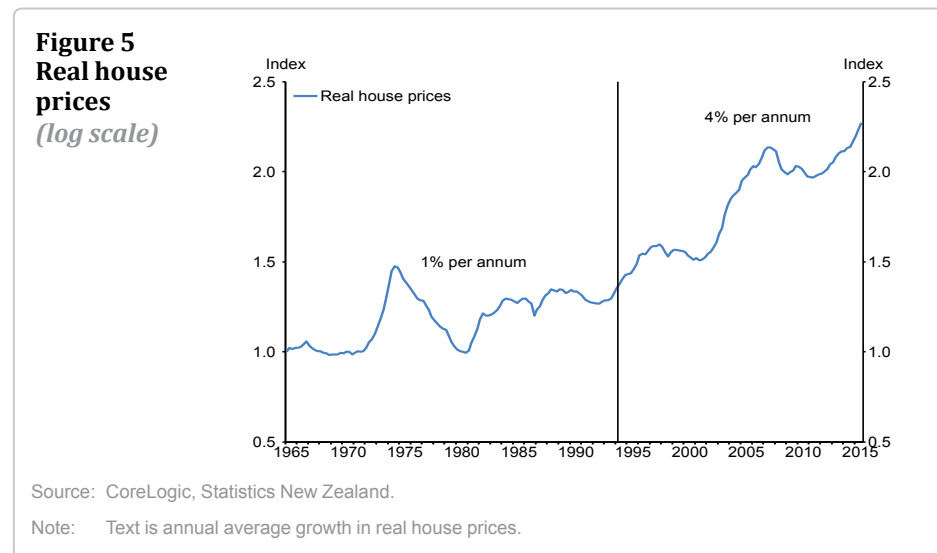
In real terms (i.e. adjusting for consumer price inflation), house prices have increased at a more modest pace, growing 3 percent per annum on average since 1965. Real house prices are now more than three times what they were in 1965, but there have been several instances where real house prices have fallen (figure 4). For the remainder of the *Bulletin* article, house prices will be expressed in real terms.



The increase in real house prices since 1965 can be decomposed into an underlying trend and more cyclical variations. However, the trend has not been stationary over time. There was a large, statistically significant

<sup>4</sup> According to a least-squares regression with sequential Bai-Perron structural break tests at a 99 percent significance level.

upward shift in real house prices in 1994.<sup>5</sup> Between 1965 and 1994, real house prices grew 1 percent per annum, but after this they grew 4 percent per annum on average (figure 5).



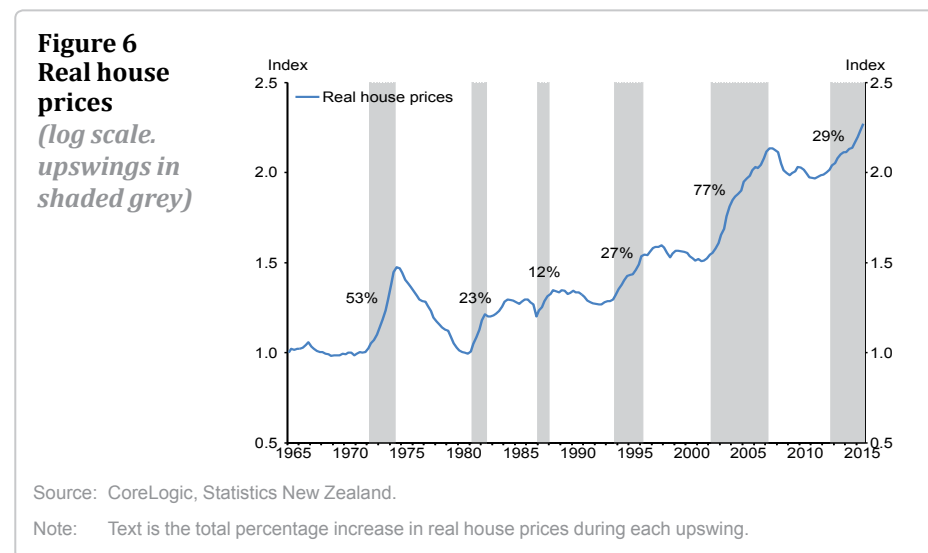
Since 1965, there have been six distinct periods of high real house price inflation, as identified using a simple Markov-switching model.<sup>6</sup> These occurred in: 1972q2-1974q2, 1981q2-1982q2, 1987q1-1987q4, 1993q4-1996q1, 2002q2-2007q1, and 2012q4 to date.

As shown in figure 6, these upswings have varied in magnitude. The largest upswing was seen in the mid-2000s, when real house prices

5 According to a least-squares regression with sequential Bai-Perron structural break tests at a 99 percent significance level. There is also evidence of a structural break in 2003, but the average growth rate in real house prices was little changed at this time (the variance of the series increased).

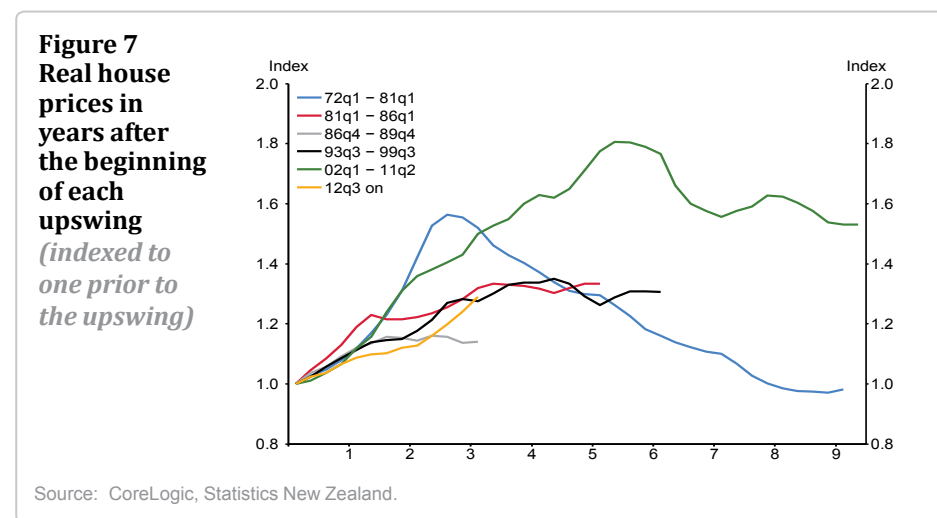
6 This statistical method is commonly used to date business cycle turning points. A stochastic 'regime' variable is estimated taking into account the variance of the series, where there are two possible regimes – high house price inflation or not. 'Upswing' phases are the quarters where the smoothed probability of being in a high-inflation regime is greater than 90 percent. See Hamilton (1996) for more details.

increased 77 percent. The second-largest upswing occurred in the high-inflation era of the early-1970s, with house prices increasing 53 percent. By comparison, the housing market upswings of the 1980s and 1990s were more modest. To date, the same can be said of the current cycle. But how long the upswing will endure, and therefore the magnitude of the increase, is yet to be seen.



The highest house price inflation was seen during the early 1970s, when real house prices grew 22 percent on average per year and annual house price inflation peaked at 31 percent. The upswing of the mid-2000s was the largest in magnitude, partly reflecting its long duration, but house price inflation was lower than in the early-1970s and early-1980s cycles on average, increasing 13 percent per annum. Relative to other upswings, real house price inflation has grown at a slower pace in the most recent upswing to date, increasing only 8 percent on average per year (peaking at 14 percent in the latest outturn).

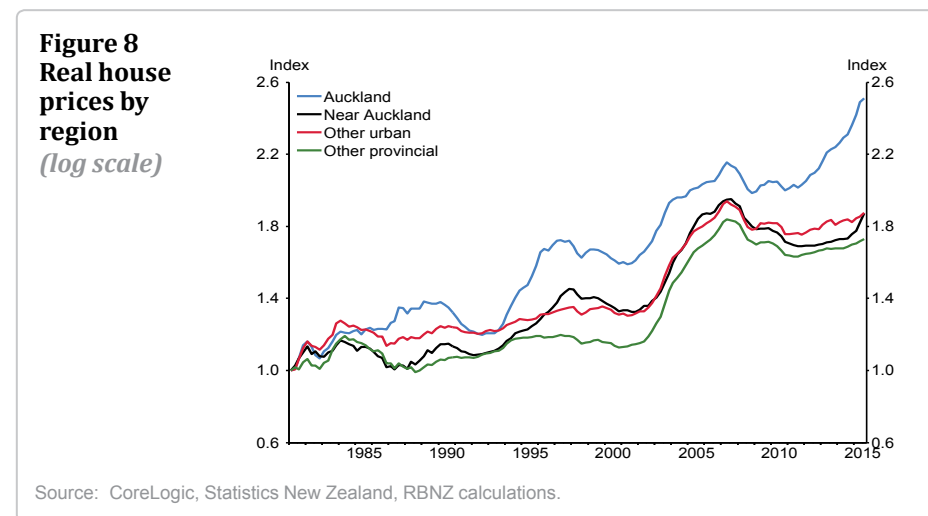
After both the early-1970s and mid-2000s upswings – the two largest upswings – real house prices fell (figure 7). Between 1975 and 1980, all of the previous increase in real house prices was completely unwound. Following the cycle of the 2000s, real house prices fell 15 percent by mid-2011. However, this unwound only a third of its previous increase. Consequently, the most recent housing market upswing started from a high level of real house prices relative to history.



### 3 House prices in Auckland and the rest of New Zealand

Figure 8 shows real house prices across broad regions. Since 1981, house prices in Auckland have increased more than in other areas of New Zealand. Real house prices in Auckland have risen 4.5 percent per

year on average. By comparison, regions outside Auckland have seen annual real house price inflation of 2.5 percent per annum on average.



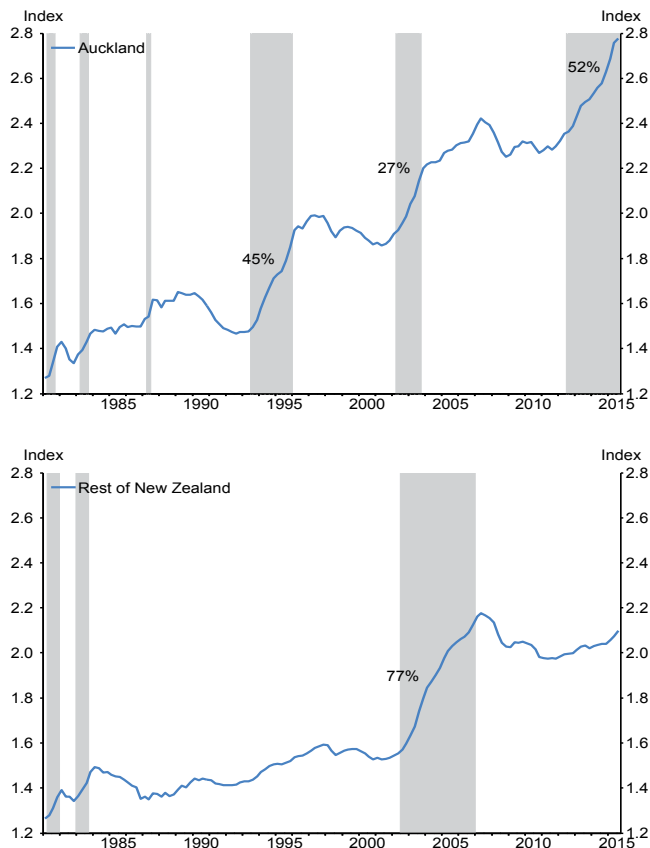
While house prices have risen across the country (albeit at different rates in different regions), high house price inflation has not been synchronised regionally. The five upswings in nationwide house price inflation since 1981 have varied regionally.

Some upswings in house prices have been driven by high house price inflation in Auckland, while others have been widespread across the country. To illustrate, figure 9 identifies periods of high house price inflation in Auckland and the rest of New Zealand (again using a simple Markov-switching model).<sup>7</sup>

<sup>7</sup> These composite indices are created using a different methodology to the CoreLogic nationwide index, so the timing of the upswings identified will not map exactly to those in the nationwide index shown in the previous section.

Strong house price inflation was seen across the country in the early 1980s, whereas the upswings of the late 1980s and mid-1990s were both concentrated in Auckland. High house price inflation was seen across the country in the 2000s, but the upswing outside of Auckland was much longer and larger in magnitude. The more recent nationwide upswing has been driven by Auckland, with no upswing in the rest of the country (in aggregate) statistically identified to date.

**Figure 9**  
House price upswings in Auckland and the rest of New Zealand (log scale)



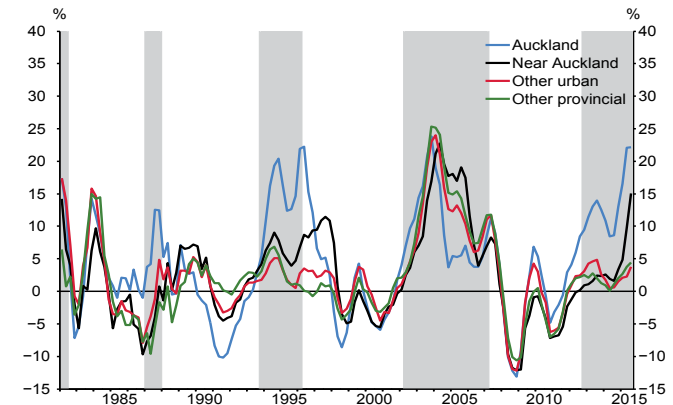
Source: CoreLogic, Statistics New Zealand, RBNZ calculations.

Note: Text is the total percentage increase in real house prices during selected upswings.

## 4 Relationship between house prices in Auckland and other regions

Auckland house prices have experienced different upswings to those in the rest of New Zealand, but house price movements in these regions are linked (figure 10). First, they are reasonably well correlated.<sup>8</sup> House prices in Auckland are strongly correlated with those in other urban centres and moderately correlated with nearby regions and other provincial areas.

**Figure 10**  
Real house prices (annual percent change, nationwide upswings in shaded grey)



Source: CoreLogic, Statistics New Zealand, RBNZ calculations.

<sup>8</sup> With a contemporaneous correlation co-efficient of 0.65 for house prices in Auckland and those in the rest of New Zealand.



Second, house price increases in Auckland tend to lead increases in other regions at times, over and above any contemporaneous relationship. To illustrate this phenomenon, table 1 shows the results for a statistical test that assesses whether house prices in each region can help predict those in other regions. Importantly, these tests cannot identify whether one series causes the other – or, if so, why – but simply test whether the lags of one series contain statistically significant information about the future path of the other, over and above the information contained in the variable’s own lags.

**Table 1**  
Summary of results from pairwise tests<sup>9</sup>

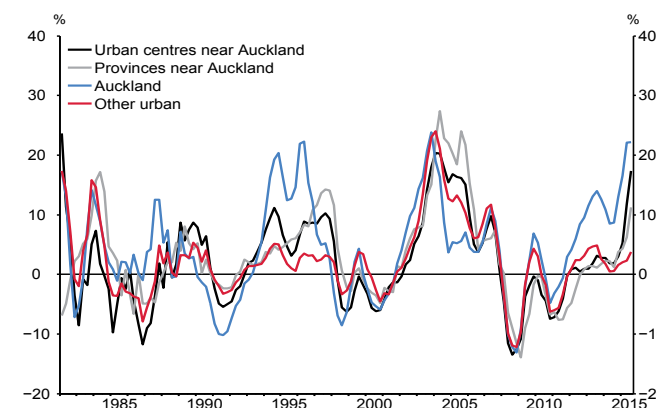
↓ Contains predictive information for →	Auckland	Near Auckland	Other urban	Other provincial
Auckland				
Near Auckland				
Other urban				
Other provincial				

Note: Dark grey indicates strong, robust evidence that house prices in one region contain predictive information about another. Light grey indicates some evidence, but that the result is not robust to different specifications. White indicates no evidence.

The results from these tests show that Auckland house prices contain predictive information for house prices in regions nearby – both urban and provincial – and other urban centres. However, house prices in other areas are also statistically important predictors for house prices in districts near Auckland.

The link between house prices in Auckland and those in other regions was particularly evident in the Auckland-driven upswing of the mid-1990s. The upswing in Auckland was followed by subsequent increases in house prices in regions nearby, although the increases in these regions were smaller than the increase seen in Auckland. House prices in nearby urban areas – Hamilton, Tauranga, and Whangarei – increased soon after they did in Auckland (figure 11). House prices in nearby provincial areas also increased, but with a longer lag.

**Figure 11**  
Real house prices by region  
(annual percent change)



Source: CoreLogic, Statistics New Zealand, RBNZ calculations.

Likewise, in the latest upswing, house price inflation has picked up recently in these regions. Since mid-2012, house prices in urban areas near Auckland have increased 22 percent, while house prices in nearby provincial areas have increased 14 percent.

<sup>9</sup> Granger-causality tests were conducted using log differences of each series and information from the past ten quarters (chosen based on a range of lag order selection criteria). Statistical significance is at the 95 percent significance level. These results have been checked for robustness using log levels and a number of different lag choices.

## 5 Differences between house prices in Auckland and other regions

While Auckland house prices contain predictive information for other regions, house prices in the rest of New Zealand tend to move differently to those in Auckland. First, outside Auckland and its surrounding regions, house prices in urban and provincial areas are influenced by factors other than Auckland house prices.<sup>10</sup>

Consistent with this, Auckland house prices do not explain house prices in these regions well. A simple least-squares regression using statistically significant lags of Auckland house prices can explain only 44 percent of the variation in house prices in the rest of New Zealand.<sup>11</sup> The impact of Auckland-specific factors will be only a portion of this, with common factors – those influencing house prices in both regions – likely to be important.

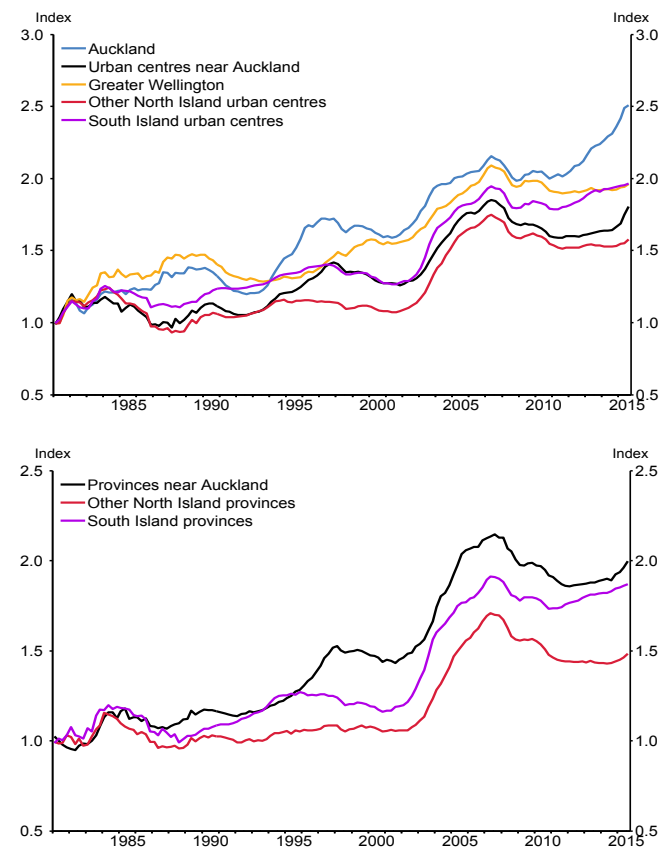
Second, house prices outside Auckland have increased at a much slower pace than those in Auckland, and have fallen more frequently – particularly in provincial areas.

House prices in urban centres outside Auckland have experienced weaker house price inflation than in Auckland, but stronger house price

<sup>10</sup> Outside Auckland, house prices in urban and provincial areas are closely linked. House prices in South Island provincial areas move closely with those in South Island urban areas, while house prices in North Island provincial areas move in sync with those in North Island urban centres and provincial areas near Auckland.

<sup>11</sup> Auckland house prices in the current quarter, the last quarter, and nine quarters ago are all statistically significant at the 90 percent significance level. The following equation was estimated using log differences and has an adjusted R2 of 0.44:  $HP_t^{Rest} = 0.4 HP_t^{Auck} + 0.1 HP_{t-1}^{Auck} + 0.1 HP_{t-9}^{Auck}$

**Figure 12**  
Real house prices by region  
(log scale)



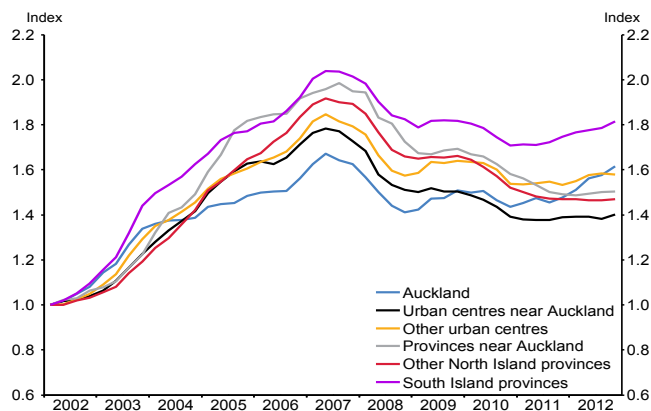
Source: CoreLogic, Statistics New Zealand, RBNZ calculations.

inflation than in provincial regions. Outside of Auckland, house prices have generally grown fastest in the greater Wellington region (figure 12). However, during the most recent upswing, house prices in greater Wellington have been flat. Meanwhile, house price inflation has been strong in South Island urban centres, with strong house price inflation in Christchurch following the Canterbury earthquakes.

During the generalised upswing of the 2000s, the largest increase in house prices was in provincial areas. But, aside from this, house price inflation in provincial regions has generally been lower than in other areas. Between 1981 and 2001, house prices were broadly flat, with house price inflation of only 0.7 percent per year on average in the provinces (excluding those near Auckland).

During the upswing of the 2000s, house prices increased 104 percent in South Island provinces and 92 percent in North Island provinces (figure 13). But after the upswing, house prices in provincial areas fell the furthest too – 25 percent in provinces near Auckland, 24 in other North Island provinces, and 16 percent in South Island provinces. House prices in the provinces have also shown little growth since 2012.

**Figure 13**  
Real house prices by region between 2002 and 2012 (indexed to one in 2001q1)



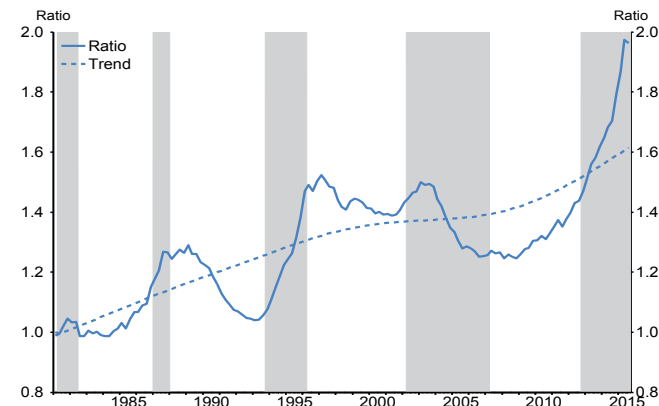
Source: CoreLogic, Statistics New Zealand, RBNZ calculations.

## 6 An unprecedented divergence

Since 1981, house prices in Auckland have increased much more than those in the rest of New Zealand. House prices in North Island provinces – where house prices have grown the least – are only 63 percent higher than they were in 1981. By contrast, Auckland house prices are 352 percent higher.

Figure 14 shows Auckland house prices as a ratio to those in the rest of New Zealand. High average rates of house price inflation in Auckland relative to the rest of the country have seen this ratio trend upwards since 1981. The extent of the increase in this ratio since 2009 is unprecedented.

**Figure 14**  
Auckland house prices and rest of New Zealand (ratio of indices, nationwide upswings in shaded grey)



Source: CoreLogic, RBNZ calculations.

An upward trend in this ratio might be expected over time, but it is not clear how steep that trend should be, whether it is time-varying, or whether it will persist.<sup>12</sup> Notwithstanding that uncertainty, the ratio is currently 22 percent above a simple filtered trend.<sup>13</sup> A divergence of this magnitude is also evident when Auckland is compared with urban centres only. This means that the upward trend has not been driven by a more general divergence between house prices in urban and provincial centres, but is an Auckland-specific phenomenon.

In previous instances when the ratio has increased relatively quickly – namely, during the late 1980s and mid-1990s – this has subsequently been followed by a period of lower growth.<sup>14</sup> In 1987, house prices in Auckland increased while they were flat in the rest of the country. Then in subsequent years, Auckland house prices fell while those in the rest of New Zealand continued increasing. In the upswing of the 1990s, Auckland house prices increased relative to the rest of the country, and stayed elevated until the latter part of the 2000s cycle, at which time house prices in the rest of the country increased at a faster pace than those in Auckland.

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12 It might be expected as a result of stronger population growth in Auckland than in the rest of the country, in conjunction with housing supply constraints.

13 Based on a stiff Hodrick-Prescott filter with a lambda of 100,000.

14 Statistical testing confirms that the ratio tends to mean revert to a trend when there is a deviation. Based on augmented Dickey-Fuller and Phillips-Perron unit root tests with linear time trend and intercept, the null hypothesis of a unit root cannot be rejected at the 99 percent significance level.

## 7 Concluding observations

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New Zealand house prices have risen significantly over the past five decades. In real terms, house prices have more than tripled, with a strong upward trend since 1994. Nonetheless, there have been several instances where real house prices have fallen.

There have been six distinct house price upswings since 1965. The most recent house price upswing has been more modest than previous ones, but real house prices were already at a relatively high level. House price upswings have been varied in their regional composition. Some have been concentrated in Auckland, while others have been generalised across the country.

House prices movements in Auckland contain some predictive information for house prices in other regions. In the Auckland-driven upswing of the 1990s, house prices increased in regions nearby. Likewise, in the current upswing, house prices in surrounding regions have increased recently.

But Auckland-specific factors explain only a small portion of house price movements in other regions. Indeed, while Auckland house prices have experienced a strong upward trend since 1981, provincial regions have generally experienced very low house price inflation. As such, Auckland house prices have trended upwards relative to those in the rest of the country.

Since mid-2012, Auckland house prices have increased 52 percent, but house prices in the rest of New Zealand have increased only 11 percent. The extent of this divergence is unprecedented. In previous periods

when Auckland house prices have deviated significantly from those in the rest of the country, this divergence has subsequently reversed to some degree.

## References

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Grimes, A, Kerr, S and Aitken (2003), 'Housing and economic adjustment', *Motu Working Paper 03/09*, July 2003 for more details about the historical regional data

Hall V, McDermott, C J and J Tremewan (2006), 'The Ups and Downs of New Zealand House Prices', *Motu Working Paper 06/03*, July 2006

Hamilton, J (1996), 'Specification Testing in Markov-Switching Time Series Models', *Journal of Econometrics* 70(1), January 1996

Watson E (2013), A closer look at the supply and demand factors influencing residential property markets', Reserve Bank of New Zealand *Analytical Note*, 2013/11, December 2013

## Appendix A

### Data sources

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To analyse nationwide house prices, this *Bulletin* article uses data from CoreLogic from 1965 onwards. To consider regional trends, a dataset of house prices across broad regions has been constructed from 1981.

Quarterly regional data by territorial authority has been compiled using data from CoreLogic and the Bank's own calculations.<sup>15</sup> In instances where there were insufficient sales in a territorial authority in a given quarter (meaning that data could not be released), an estimate has been constructed using data from nearby regions.<sup>16</sup> Interpolating missing data in this manner provides continuity to the dataset, allowing the data to be analysed over history.

These data for New Zealand's 73 territorial authorities have then been aggregated to create the regional data presented in the tables and figures throughout this *Bulletin*. Data for each territorial authority have been weighted by their share of national house sales. Sales weights were constructed using CoreLogic house sales data, with each territorial authority weighted by its average share of total sales between 1995 and June quarter 2015. Each territorial authority was then grouped into the regional buckets shown in table A1. Data are seasonally adjusted.

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15 Based on Grimes, Kerr & Aitken (2003).

16 Because these interpolated figures are for territorial authorities that represent only a small share of national house sales, they will have only a small impact on the broad regional series.

**Table A1**  
**Composite house price indices<sup>17</sup>**

Composite	Sub-indices	Territorial authorities
Auckland region		Council area (North Auckland, Auckland city, and South Auckland below).
	<b>North / West Auckland</b>	Rodney, North Shore City, Waitakere.
	<b>Auckland city</b>	
	<b>South Auckland</b>	Manukau City, Papakura, Franklin.
Rest of New Zealand		
Near Auckland	<b>Provincial</b>	Kaipara, Waikato, Hauraki, Thames-Coromandel, Western Bay of Plenty, Matamata-Piako.
	<b>Urban</b>	Tauranga, Hamilton, Whangarei.
Other Urban	<b>Central North Island</b>	Gisborne, Rotorua, New Plymouth, Napier, Hastings, Wanganui, Palmerston North.
	<b>Lower North Island (Greater Wellington)</b>	Kapiti Coast, Upper Hutt, Porirua, Wellington, Lower Hutt.
	<b>South Island</b>	Nelson, Christchurch, Dunedin, Invercargill.
Other Provincial	<b>North Island</b>	Far North, Whakatane, Kawerau, Waipa, Otorohanga, South Waikato, Waitomo, Opotiki, Wairoa, Taupo, Central Hawke's Bay, Stratford, South Taranaki, Ruapehu, Rangitikei, Manawatu, Taranua, Horowhenua, Masterton, Carterton, South Wairarapa.
	<b>South Island</b>	Tasman, Marlborough, Kaikoura, Buller, Grey, Westland, Hurunui, Waimakariri, Banks Peninsula, Selwyn, Timaru, Mackenzie, Ashburton, Waimate, Waitaki, Central Otago, Queenstown Lakes, Southland, Clutha, Gore.

<sup>17</sup> 'Urban' based on Statistics New Zealand classification of New Zealand's main urban areas for 2013. See <http://www.stats.govt.nz/methods/classifications-and-standards/classification-related-stats-standards/urban-area.aspx> for details.