MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Ministry for the Environment
Manatū Mō Te Taiao

National Policy Statement on Urban Development Capacity

Price efficiency indicators technical report: Price-cost ratios

New Zealand Government

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Introduction

This technical report describes the methodology and data used to construct price-cost ratios for housing in urban areas and territorial authority areas, for the National Policy Statement on Urban Development Capacity (NPS-UDC). Price-cost ratios show the extent to which house prices are driven by construction costs versus the cost of land (infrastructure-serviced sections).

The report relates to the price-cost ratio time series for extended urban areas[1] and territorial authority areas, available on the dashboard on the Ministry of Business, Innovation and Employment's website.

The report should be read alongside part six of the *Guide on evidence and monitoring* on the Ministry for the Environment's website, which explains how to interpret the ratios.

These tools are designed to help local authorities give effect to NPS-UDC requirements to monitor market indicators and use indicators of price efficiency. The tools were developed with the assistance of technical experts in economic consultancies, central government, local authorities and Property Council New Zealand.

Methodology

The methodology used to develop price-cost ratios for housing in New Zealand urban areas and territorial authority areas adapts the method to produce such indicators for American cities in Glaeser, EL, and J. Gyourko (2003) "*The impact of zoning on housing affordability*." Economic Policy Review 9 (2), pages 21-39.

The key steps were to:

a) Obtain the sale price of each stand-alone house[2] for each year going back to 1993

b) For each house sale, proxy construction costs with regional cost data (building consent values) at each period by housing type to construct a per square metre cost for each sale

c) Add a standard "construction cost buffer" to include construction costs that are undercounted in the data at b) (as advised by industry experts)

d) Add a standard percentage for agent fees and related costs

e) Compare the sum of b), c), d) to the sale price in a): the residual is the imputed value of land (that is, for infrastructure serviced sections) at each point in time

f) Aggregate the ratio up to extended urban areas and territorial authority areas, and chart the time series.

The components of the price-cost ratio are illustrated in figures 1 and 2.

[1] Extended urban areas are the combined areas of territorial authorities that share jurisdiction over urban areas as defined by Statistics New Zealand in 2017. For example, the Christchurch extended urban area comprises the areas of Christchurch city and Selwyn and Waimakariri districts.

[2] Only data for stand-alone houses are included in these price-cost ratios.

Figure 1: The components of the price-cost ratio

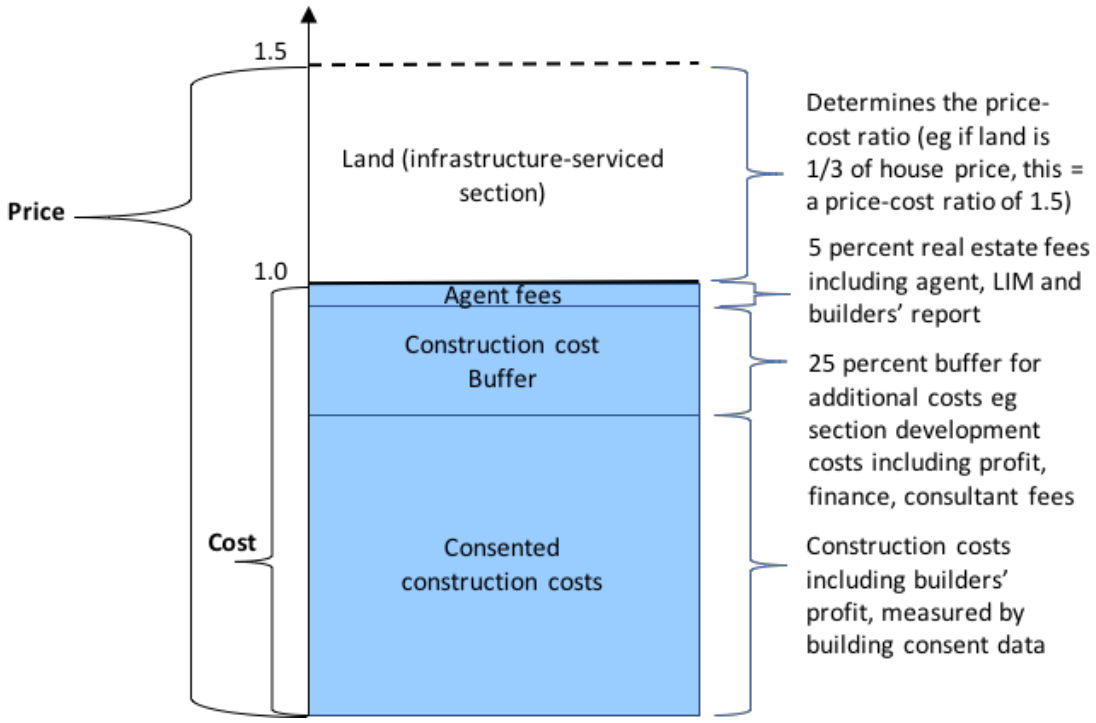


Figure 2: A worked example of the price-cost ratio – Great South Road

A house on Great South Road, Auckland, sold for $689,000 in the last quarter of 2014. Its price-cost ratio can be calculated as follows:

- During that quarter, Auckland building consents were $1,728.85 per square metre
- Multiplying this measure by the 25 per cent construction cost buffer plus 5 per cent agent fees suggests total build costs of up to $2,247 per square metre
- Applying this build cost to the size of the house (230 square metres) provides total costs of $516,810
- Comparing build costs to the price produces a price-cost ratio of 1.33 in this case.

Data

House prices

CoreLogic data were used to obtain information about house sales, size etc. at a unit record level. This data is comprehensive and has been purchased by the Ministry of Business, Innovation and Employment for the purposes of constructing market indicators and price efficiency indicators for the NPS-UDC.

Data on stand-alone dwellings were used as the key headline measure since this ratio comprises the majority of the housing stock and is likely to be highly correlated with price-cost ratios constructed for apartments (see Lees 2017 for example).

To isolate observations of interest, several filters were applied to the CoreLogic database. These removed:

- Any properties that are not "dwelling houses of a fully detached or semi-detached style situated on their own clearly defined piece of land".
- Leasehold properties
- Maori land
- Potentially leaky homes
- Buildings that are either very small (less than 50 square metres) or very large (more than 500 square metres)
- Very low sale prices (less than $50,000) that may be associated with non-market sales
- Very high sale prices (more than $5,000,000) – it is likely that construction cost measures may not accurately reflect the replacement cost of these properties.

The sales prices are nominal and make no adjustment for changes in quality over time.

Construction costs

Building consents

The price-cost ratios calculated for the NPS-UDC use Statistics New Zealand building consents' (values) data to track the movement of construction costs. The approach was to divide total floor area by value to obtain a per square metre value that evolves over time.

This is not the only source of data on construction costs for housing. Others include:

- new dwelling construction costs in Statistics New Zealand's Consumer Price Index
- the *QV CostBuilder*[3]
- using a quantity surveyor.

[3] The *New Zealand Building Economist* provides similar data but is not evaluated here.

These other data sources are outlined in the Appendix, along with the results of an evaluation of construction cost data sources. This evaluation selected building consents as the best source for constructing price-cost ratios for urban areas and territorial authorities.

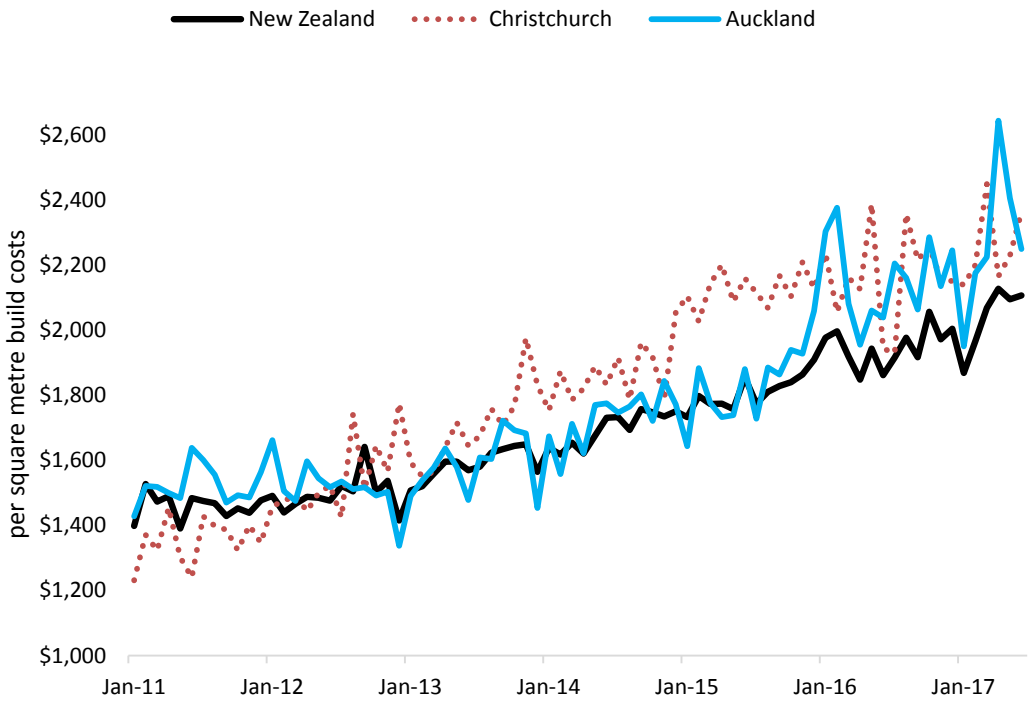
The advantages of the building consents' data are that it is:

- a tier one statistic – Statistics New Zealand takes considerable effort to maintain and update the measure.
- available by region and selected territorial authorities (which is useful for constructing accurate price-cost ratios for different urban places)
- available from 1993, on a monthly basis, and is very up-to-date
- widely used in the analyst community.

The building consents measures are nominal (but so are the house price measures used for the price-cost ratios).

Figure 3 shows that the nominal construction cost estimates from the consents data increase particularly rapidly at times.

Figure 3: Building consents value/square metres, June 2011 - June 2017 (monthly)



Source: Statistics New Zealand

Construction cost buffer

The costs included in the building consents numbers do not capture the full range of cost of constructing a home.

The building consents' data provide an imperfect measure of construction costs for several reasons:

- actual building costs that eventuate after the consent is issued often exceed planned costs
- section development costs and some demolition costs are not included in building consents' data
- consultant costs, finance costs, marketing costs, sales costs, holding costs and legal costs over and above conveyancing may also be excluded or undercounted in building consents' data
- building costs vary by location within territorial authorities, with steeply sloped sections being more expensive
- building consents include GST on the value of construction costs. New builds carry GST at the point of sale. New builds are a small fraction of sales so GST is only implicitly included in new house sales.

In order to address these issues a "construction cost buffer" of 25 percent was added to the building consent's values. Consultation with industry experts suggests that this would certainly cover costs (and may actually overstate total construction costs in some places and times)[4].

In addition, the real estate fees and other associated costs of buying a home (including conveyancing, purchasing a builder's report and LIM) need to be incorporated in the non-land costs of buying a home. These costs can be up to 5 percent of the cost of purchasing a new home.

Results

Charts presenting price-cost ratio time series for high and medium growth extended urban areas and territorial authority areas follow.

Over time, except during periods of rapid growth most areas show price cost ratios below 1.5 (where the cost of sections comprises less than one third of the price of a house). These results suggest a threshold of 1.5, below which land markets are operating well, and above which it appears there are constraints on the supply of infrastructure-serviced sections relative to demand. See part six of the *Guide on evidence and monitoring* (on the Ministry for the Environment's website) for more information about how to interpret price-cost ratios.

[4] This would tend to under-estimate price-cost ratios and produce a conservative estimate of residual land costs.

High growth urban areas and territorial authority areas

Figure 4: Price-cost ratio for Whangarei District

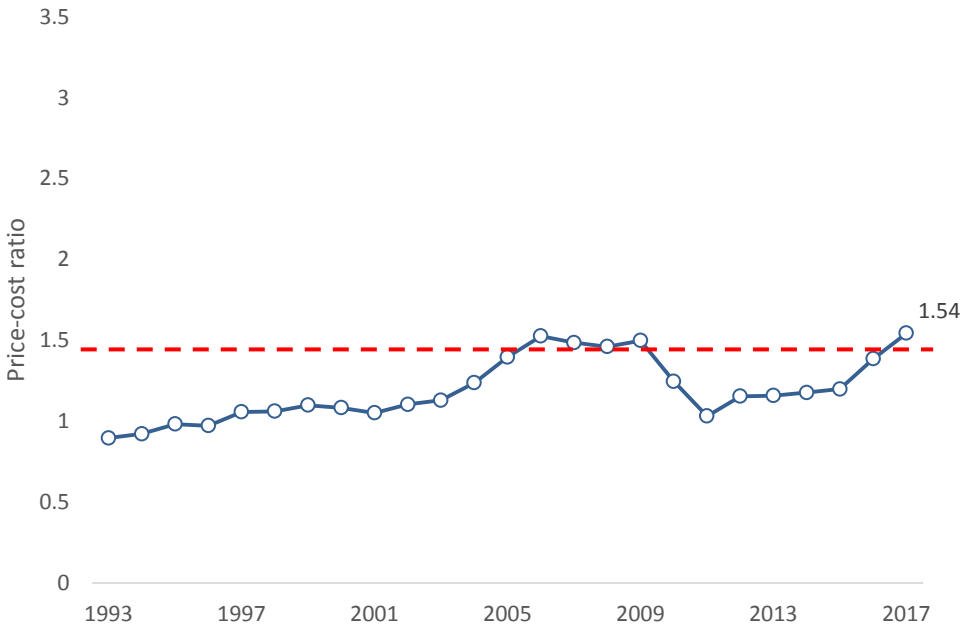


Figure 5: Price-cost ratio for Auckland

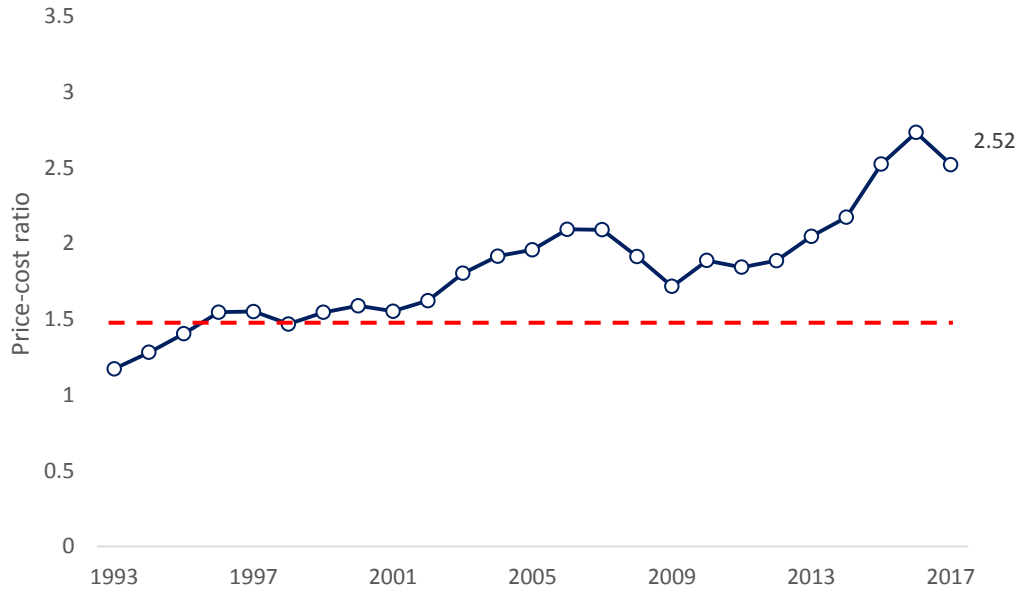


Figure 6: Price-cost ratio for Hamilton extended urban area (Hamilton City, Waipa and Waikato District)

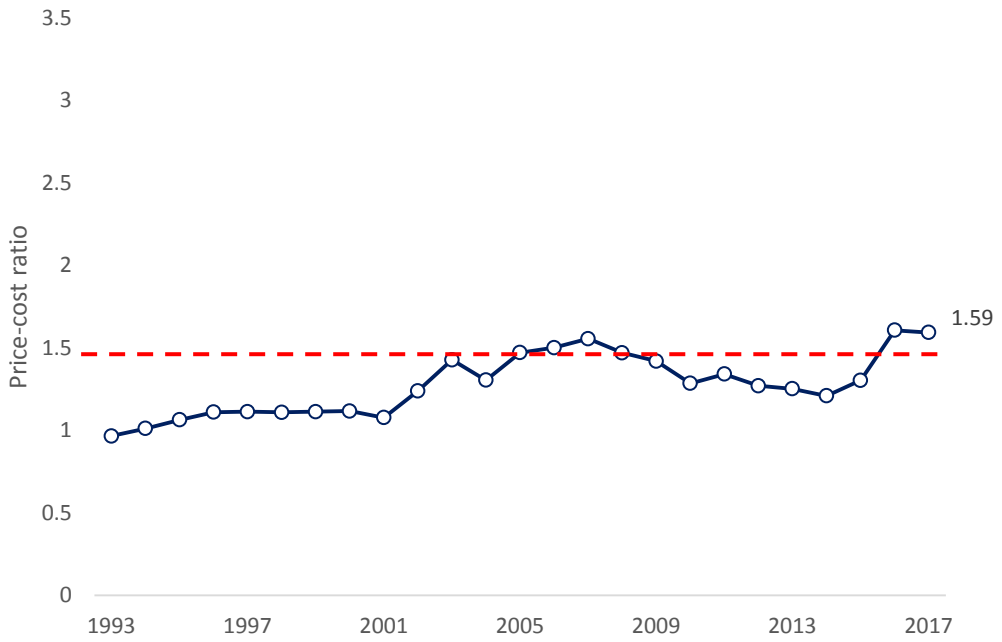


Figure 7: Price-cost ratio for Tauranga extended urban area (Tauranga City and Western Bay of Plenty District)

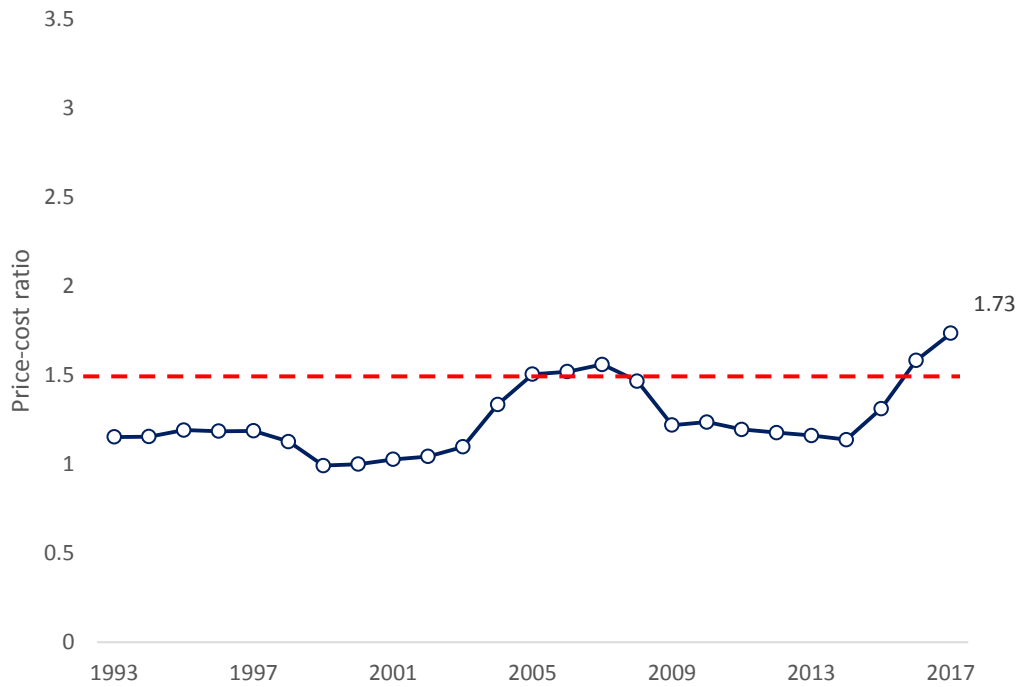


Figure 8: Price-cost ratio for New Plymouth District

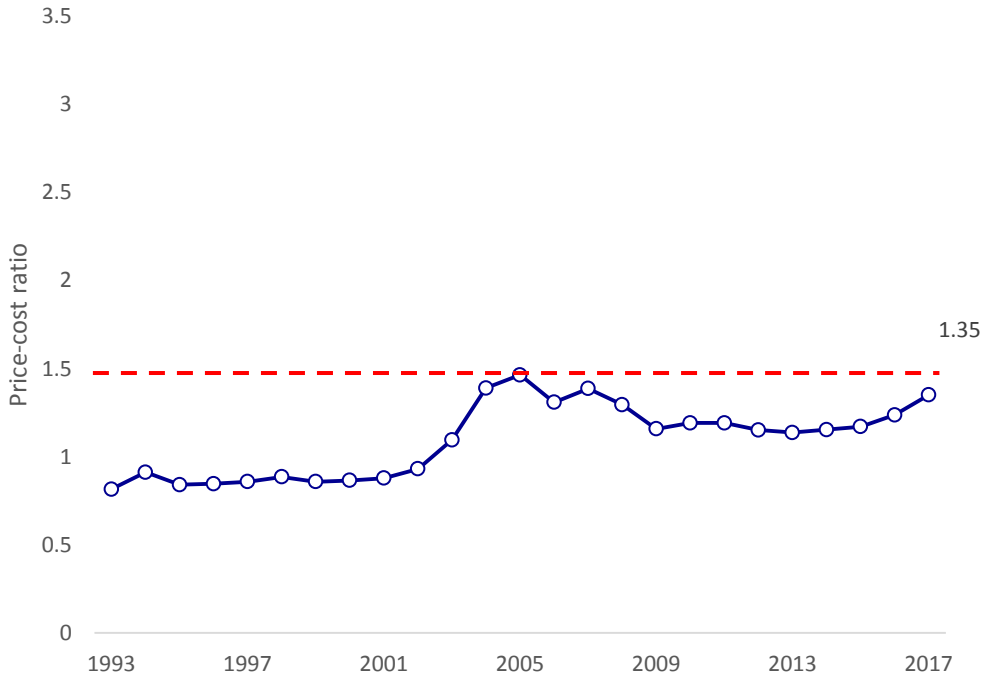


Figure 9: Price-cost ratio for Christchurch extended urban area (Christchurch City, Selwyn and Waimakariri Districts)

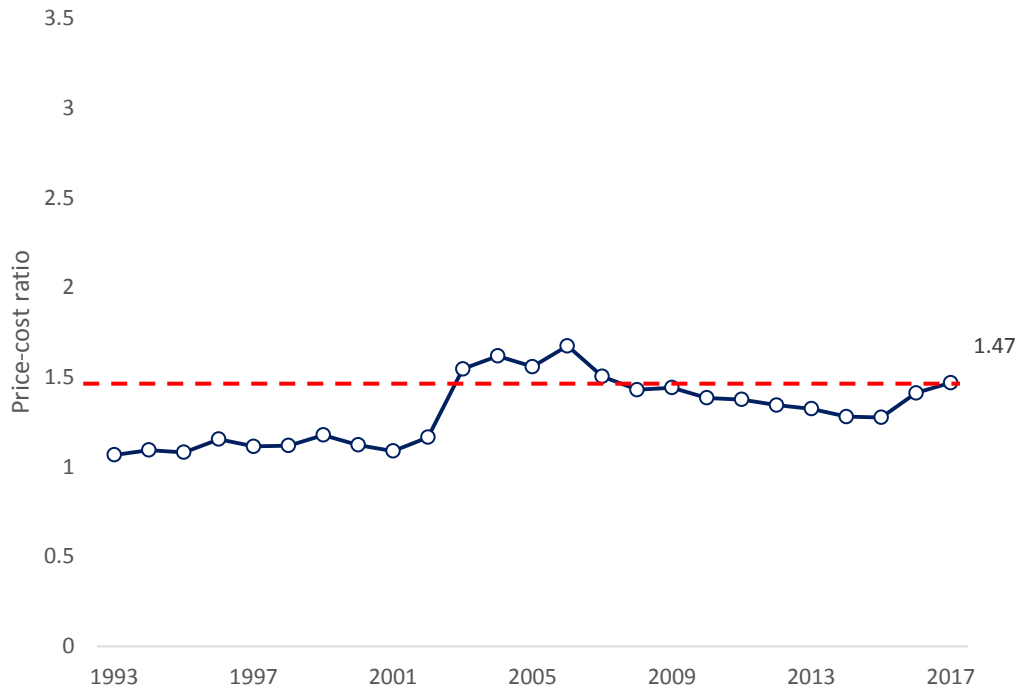
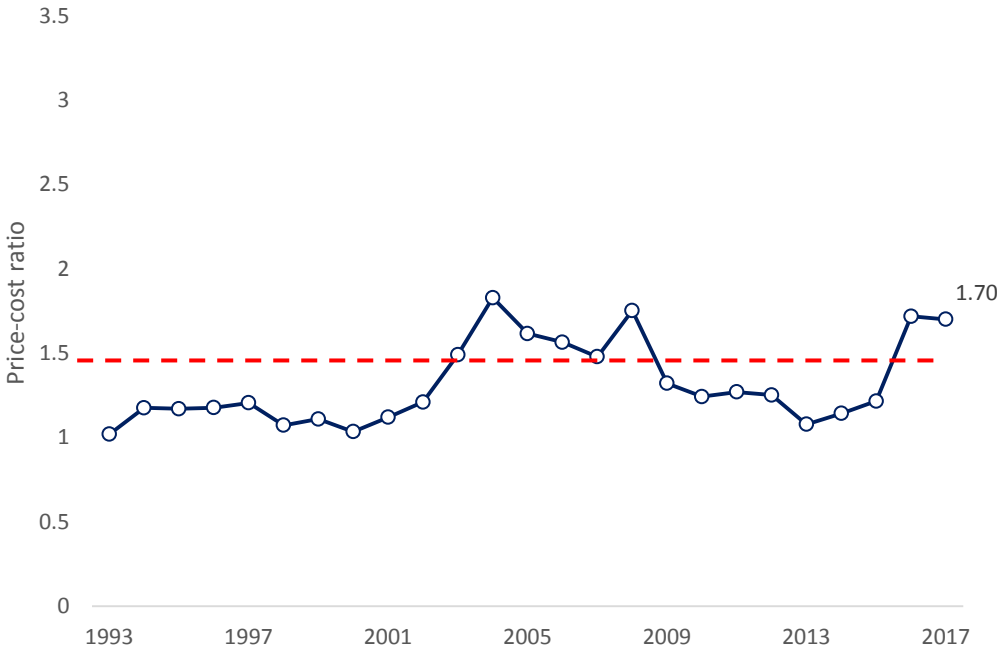


Figure 10: Price-cost ratio for Queenstown-Lakes District



Medium growth urban areas and territorial authority areas

Figure 11: Price-cost ratio for Palmerston North City

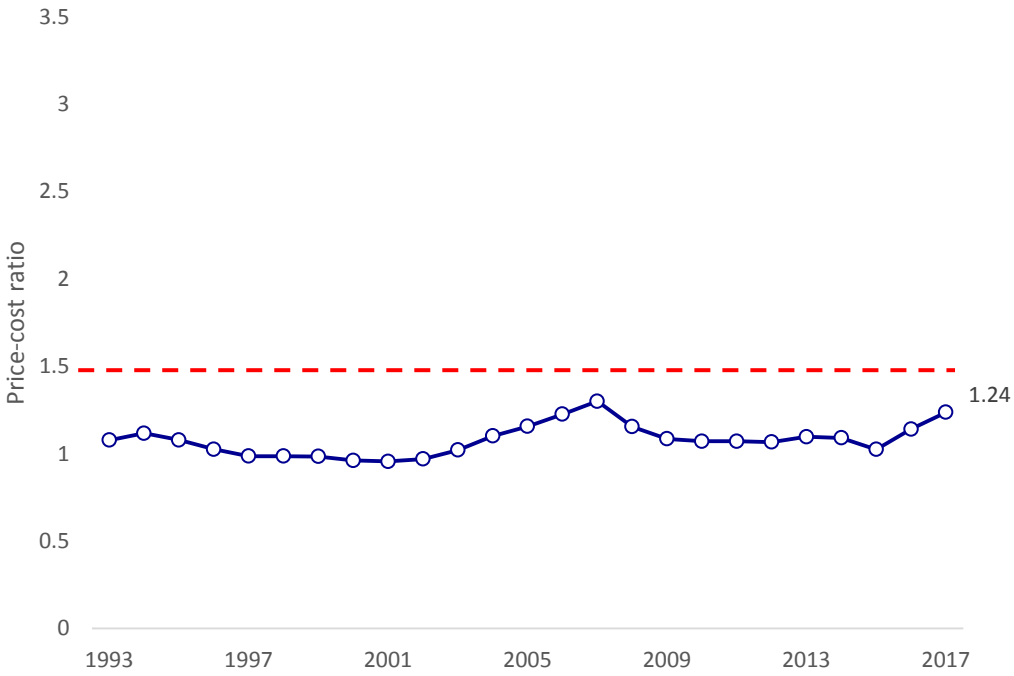


Figure 12: Price-cost ratio for Kapiti District

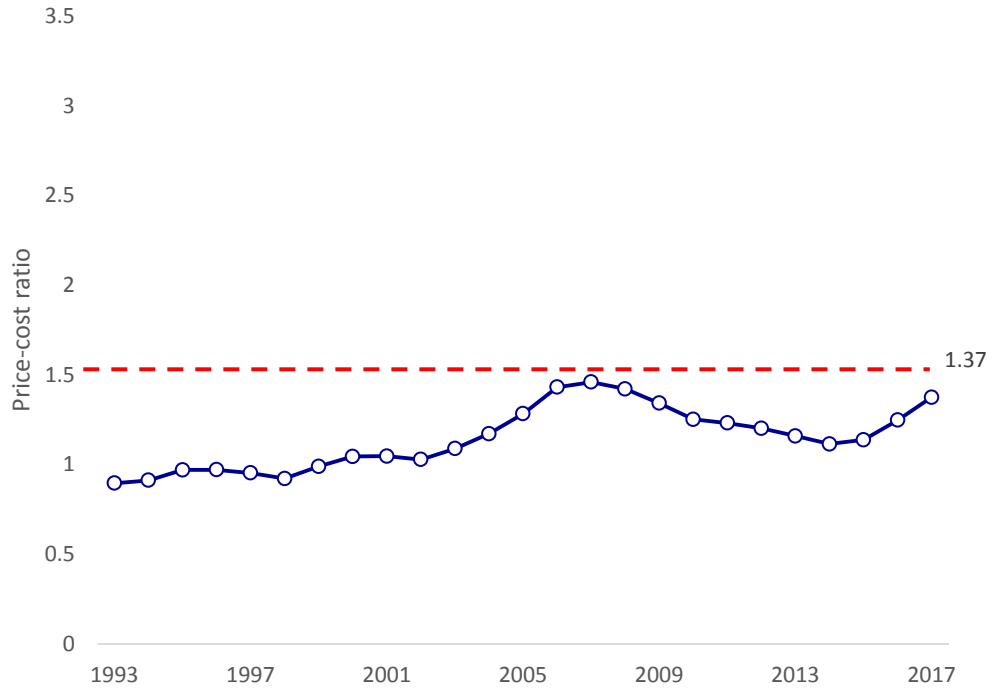


Figure 13: Price-cost ratio for Wellington extended urban area (Wellington, Lower Hutt, Hutt and Porirua Cities)

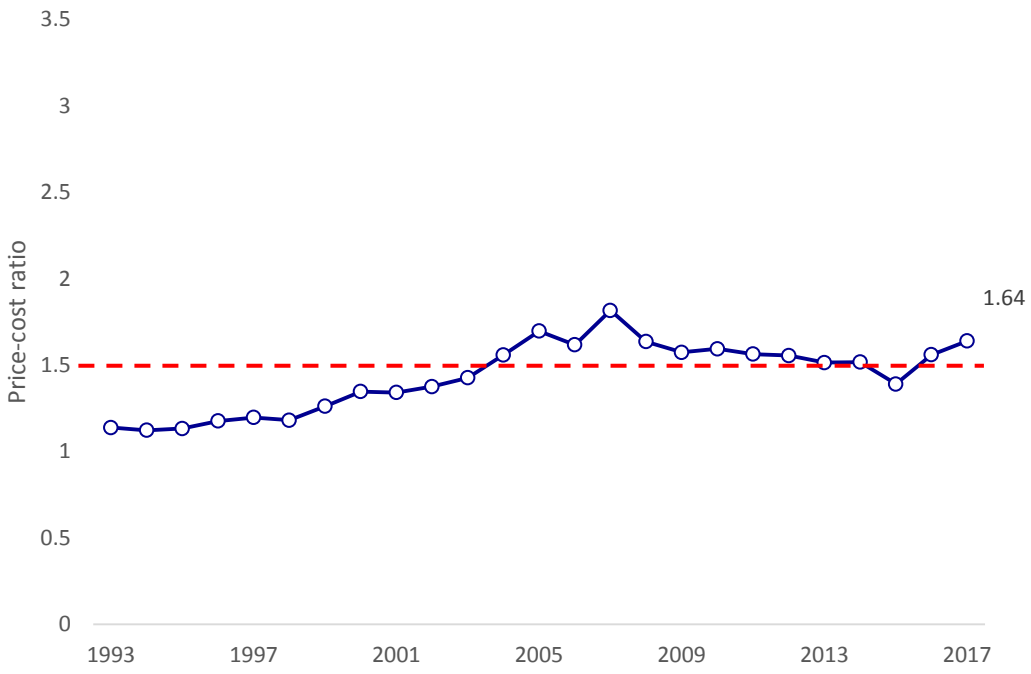


Figure 14: Price-cost ratio for Nelson extended urban area (Nelson City and Tasman District)

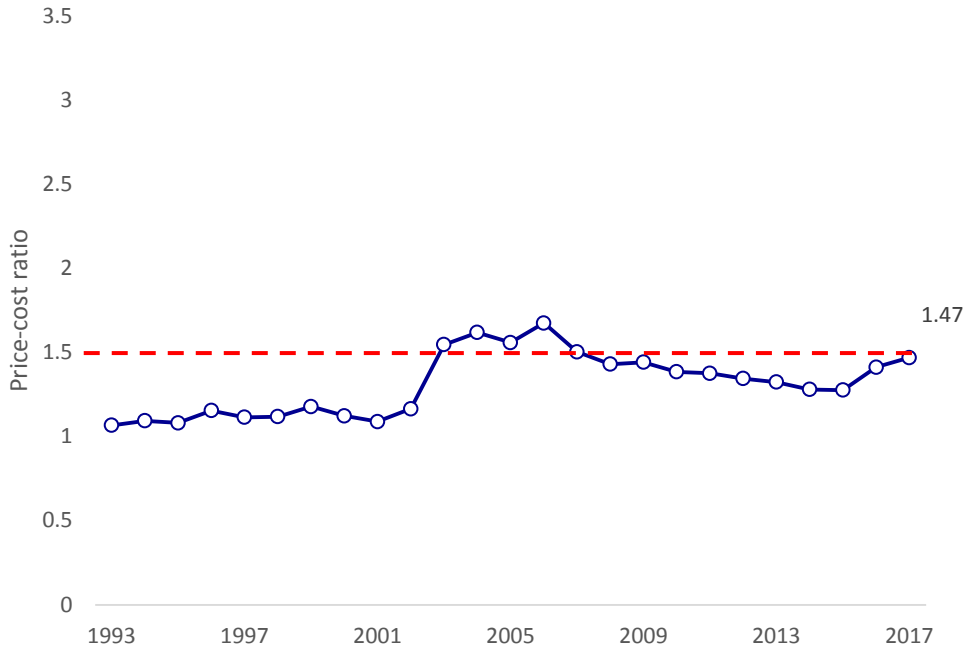


Figure 15: Price-cost ratio for Rotorua District

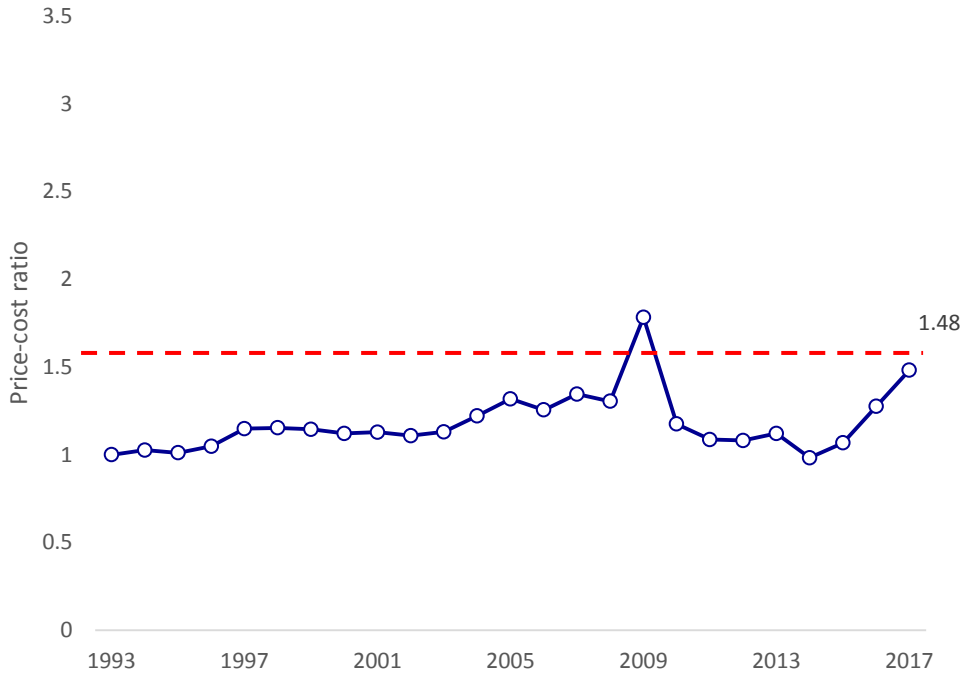


Figure 16: Price-cost ratio for Gisborne District

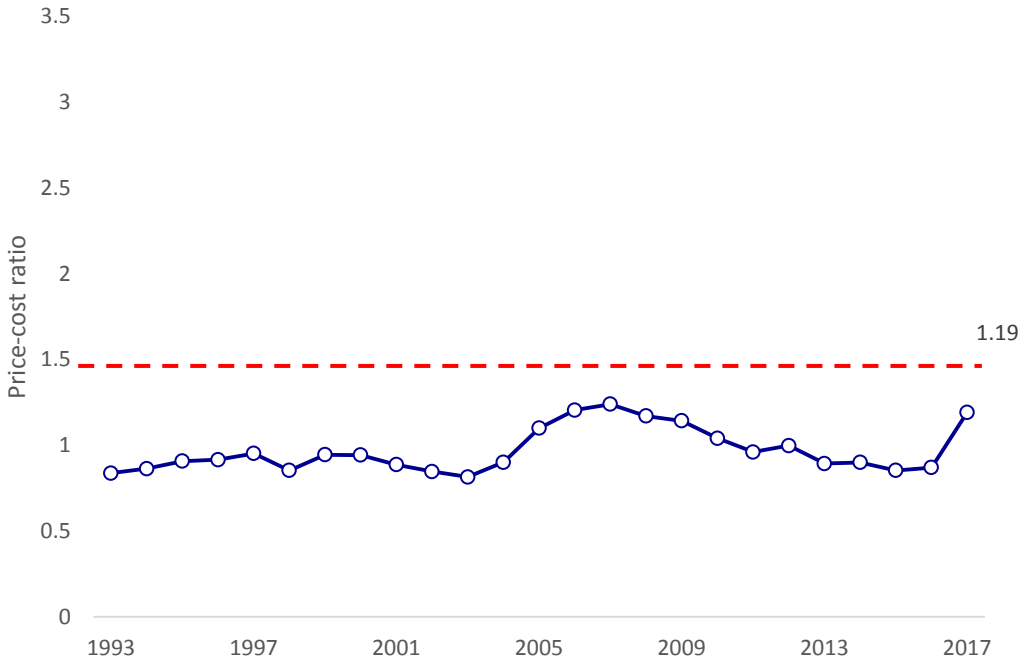


Figure 17: Price-cost ratio for Napier-Hastings extended urban area (Napier City and Hastings District)

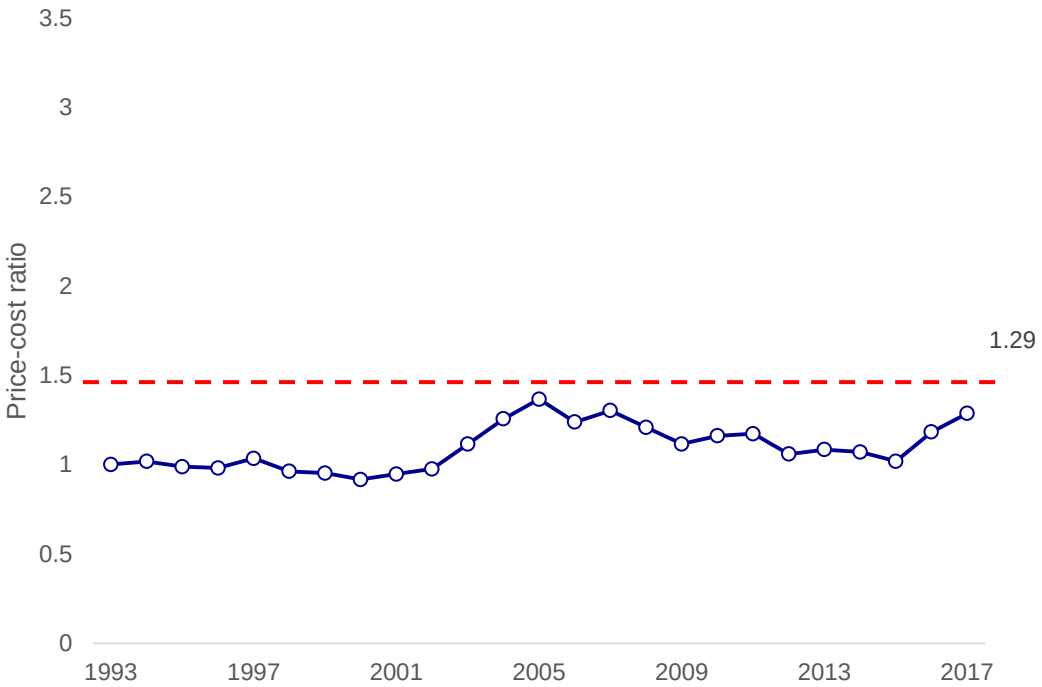


Figure 18: Price-cost ratio for Marlborough District

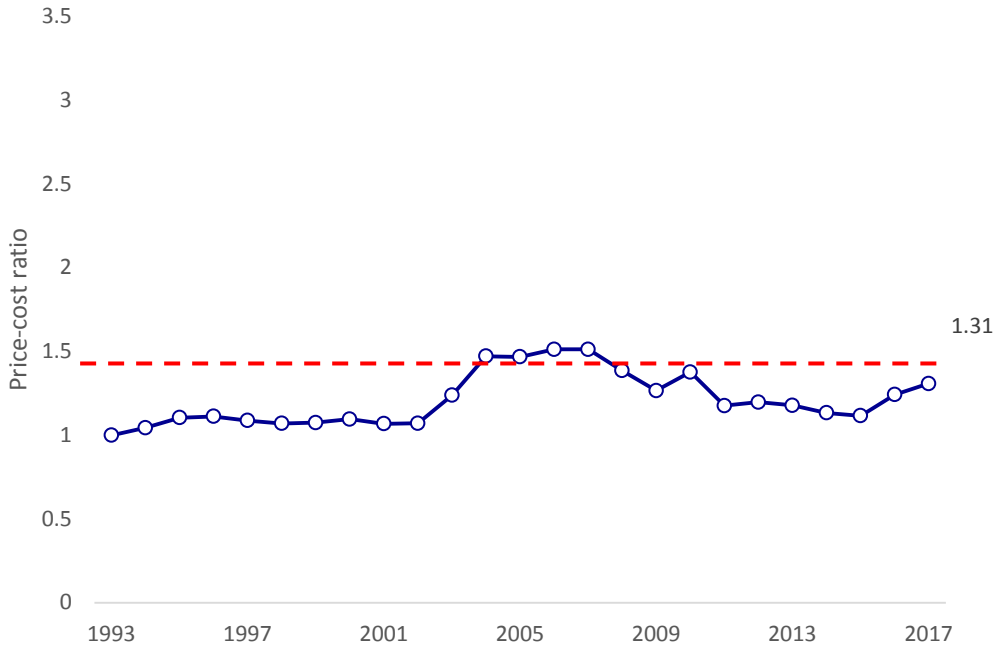
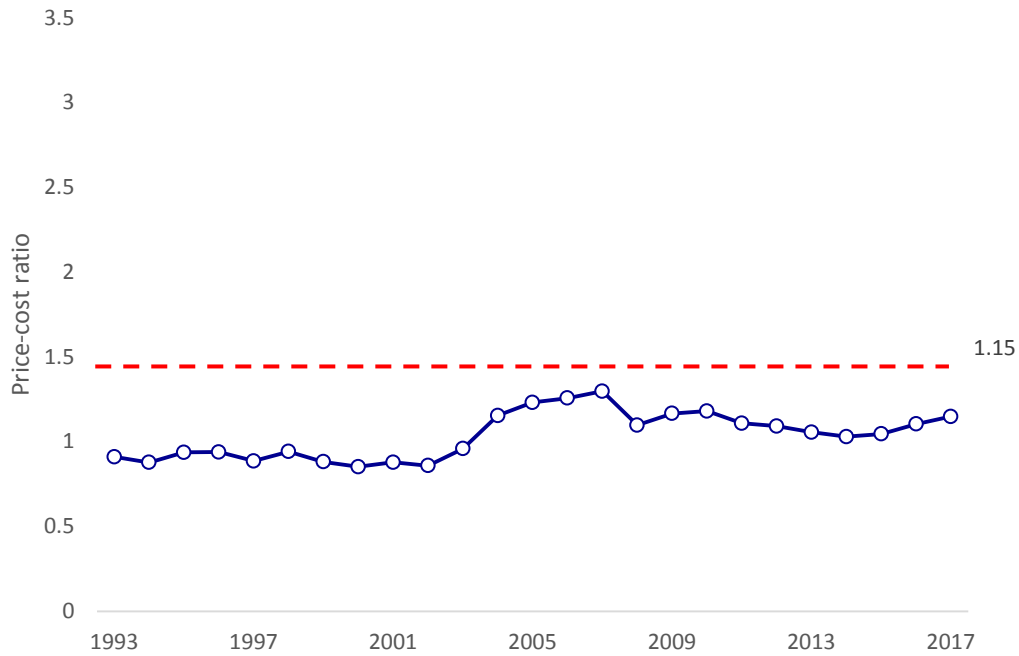


Figure 19: Price-cost ratio for Dunedin City



Appendix

Evaluation of alternative data sources for construction costs

Data sources

Statistics New Zealand building consents' data

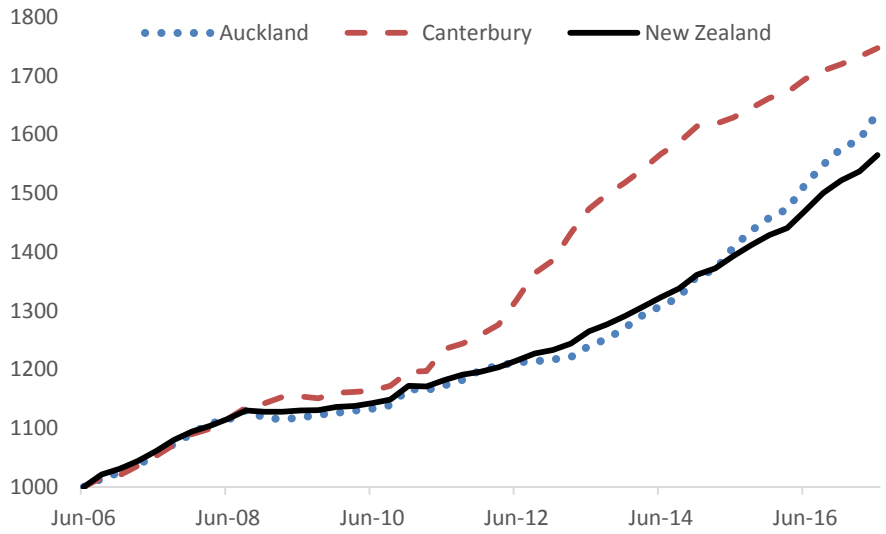
Statistics New Zealand's building consents' data are summarised in the body of this report.

New dwelling construction costs in Statistics New Zealand's Consumer Price Index

Since 2006, New Zealand's Consumer Price Index (CPI) has contained a measure of changes in the cost of constructing new dwellings over time. Usefully for the purpose of constructing price-cost ratios, this measure of house prices excludes the cost of land, and includes the construction cost of new dwellings only and not the existing housing stock.[5]

Statistics New Zealand produces separate components for Auckland, Canterbury, and the rest of the South Island and the rest of the North Island. Figure 20 shows this.

Figure 20: New house construction costs, Consumer Price Index, June 2006 to June 2017.



Source: Statistics New Zealand

Statistics New Zealand is looking at further splits for Hamilton and Tauranga but this is unlikely to be sufficiently timely for local authorities to begin meeting NPS-UDC requirements by 31 December 2017.

While Statistics New Zealand can provide dollar values for the indices, one of the drawbacks for price-cost ratios is the absence of cost measures for the type of house or apartment. Smaller and more elaborate builds have a different per square metre cost than simpler,

[5] Like most statistical agencies, New Zealand follows the *acquisition approach* to constructing the CPI. This means that the CPI is constructed based on the time of purchase, rather than distributing a purchase over the time of use of the asset, for example, over the life of a durable item such as a refrigerator.

standard homes. That information would provide a more nuanced estimate of both the level and change over time in construction costs that influences the price-cost ratio.

QV cost builder

Quotable Value produces detailed construction cost data in its *QV Cost builder* product.[6] That data provides estimates of nominal build costs across a range of house types (one-storey houses, two-storey houses, large houses, multiple low-rise units, multiple high rise units and retirement village units) and house size (90-130m^2, 100-250m^2, low- and high-stud variants).

Data is also available at a regional level for Auckland, Wellington, Christchurch, Dunedin, Waikato and Palmerston North. However, these regional differences are not as fine-grained as using building consents information.

Individual local authorities can access the *QV Cost builder* for an annual subscription. However, the charge for using the *QV Cost builder* series to construct price-cost ratios for public use was high relative to other data sources.

Quantity surveyor estimates

There are a range of private quantity surveyors who could be used to provide construction cost estimates. However, using Statistics New Zealand data is more likely to provide a transparent and consistent approach that allows the mapping of movements in construction costs over time.

Criteria for evaluation

The following criteria were used to assess data sources:

- **Relevant**: providing meaningful information on the phenomenon of interest
- **Timely:** available within a timeframe helpful to planning and decision-making
- **Robust**: sound measurement methodologically that is fit-for-purpose
- **Clear:** easy to understand, interpret, use and communicate
- **Comparable**: indicator trends can be compared over time and/or across regions/areas
- **Cost-effective**: cost of data does not make long term publication of price-cost ratios prohibitive.

Table 1 summarises the results of evaluating the alternative sources against these criteria. On balance, the per square metre construction cost estimates from Statistics New Zealand's building consents' data was the best for the price-cost ratios. This provides a timely construction cost estimate with sufficient breadth (across territorial authority areas) and depth (over time).

[6] This product is like the earlier Rawlinson's manual and the *New Zealand Building Economist*.

Table 1: Evaluation of construction cost data sources for price-cost ratios

Attribute	CPI data	Building Consents' data	QV cost builder	Quantity Surveyor estimates
Relevant	• Directly relevant data on new house construction costs • No detail by type of dwelling	• Value of building consents a good proxy for construction costs (although some costs undercounted/excluded) • Provides detail by house type and size	• Directly relevant estimates of construction costs (although some costs are excluded) • Provides detailed house type and size breakdowns	Could be tailored to requirements on request
Timely	Quarterly, available on a timely basis	Monthly on a timely basis	Unclear	Can be undertaken at specified time periods
Robust	• A Tier One Statistics New Zealand statistic subject to quality protocols • Uses a survey methodology to capture data	• A Tier One Statistics New Zealand statistic subject to quality protocols • Uses administrative data – quality somewhat dependant on inputs	Method unclear, potentially robust	Potentially robust, would need to contract surveyor on a long-term basis
Clear	A Tier One Statistics New Zealand statistic subject to interpretability protocols	A Tier One Statistics New Zealand statistic subject to interpretability protocols	Method unclear	May or may not be clear
Comparable	• Comparable over time from 2006 Appears to have a step-change when survey method changes • Limited geographical breakdown	• A long history that extends to the start of the price data (1993). Tracks the earlier state of the land and housing market • Comparable across regions and select territorial authority areas	• Limited number of years available • Comparable for select regions	• Unclear how to obtain historical data for a time series • Could specify regions to compare
Cost-effective	No charge	No charge	High cost (when used to produce price-cost ratios for public use).	Unknown

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