

Student 1: Low Excellence

NZQA Intended for teacher use only

Context

House prices vary between New Zealand's cities and towns¹. If a teacher is moving to New Zealand from overseas and having to choose where to take a position out of the four main centres of Wellington, Auckland, Dunedin and Christchurch from overseas house prices may influence their final choice of destination, especially if they have limited funds available to purchase a house. Having the right information available will help them to choose a centre where they can afford a house, and this will make it more possible for them to feel at home in New Zealand and not feel financial pressure. This report investigates whether there is a difference in North Island house prices compared to South Island house prices for median house sales price (NZD) in Auckland, Wellington, Christchurch and Dunedin in 2016 to help teachers choose where in New Zealand they may want to look at purchasing a house. Thus, the variables for this investigation are location by island (categorical) and 2016 house sale price (NZD). This data has come from the Real Estate Institute of New Zealand.

Question

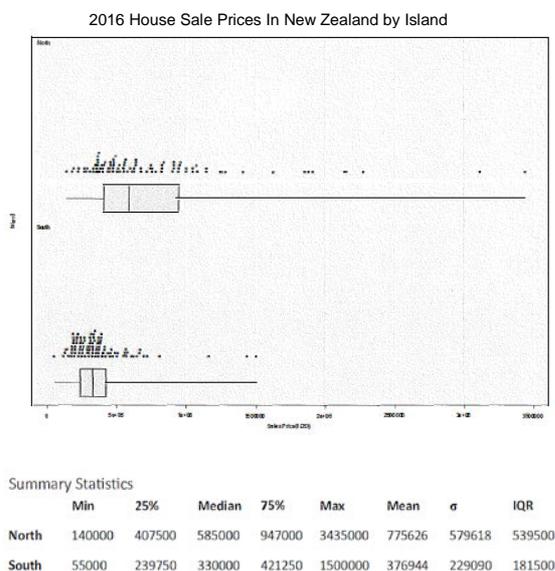
What is the difference between the median house sales price (NZD) in Auckland, Wellington, Christchurch and Dunedin in 2016 for North Island median sales price compared to South Island median sales price? ①

Hypothesis

Given that, North Island prices are higher than South Island prices, and Auckland prices are higher than prices in other cities² and the Auckland housing market is so 'hot'³, it is expected this report will show the median house sales price (NZD) in Auckland, Wellington, Christchurch and Dunedin in 2016 will have a higher median sale price for North Island properties than South Island properties.

Analysis

For this data set it is appropriate to compare median rather than mean house sale price for houses sold in Auckland, Wellington, Christchurch, and Dunedin in 2016. This is because a sample could have a small number of houses that sell for a very high price. This causes the mean to increase but would usually cause the median to change to a lesser degree thus the median is a better representation of the 'mid-point' that most of the houses are sold for. REINZ also uses median figures for their reports on property sales explaining, "There are technical reasons why the median provides a more accurate picture of what is happening to the prices of houses rather than the 'average.' As an example, assume there are 11 houses sold in a month with a price range of \$200,000 to \$300,000 and an average price of \$250,000. Now replace one of those houses with a house that sold for \$1 million. The average is now \$318,182, even though 10 of the 11 houses for the month sold for less than this value. The median would be the price of the middle house sold in the range (in this case the sixth house), which more accurately reflects what the majority of the houses sold for."⁴ Later in this report, Bootstrapping is used to determine the difference in median house sale prices. Median is compared here again, instead of mean, to similarly represent the sale prices of most houses in the market. ③



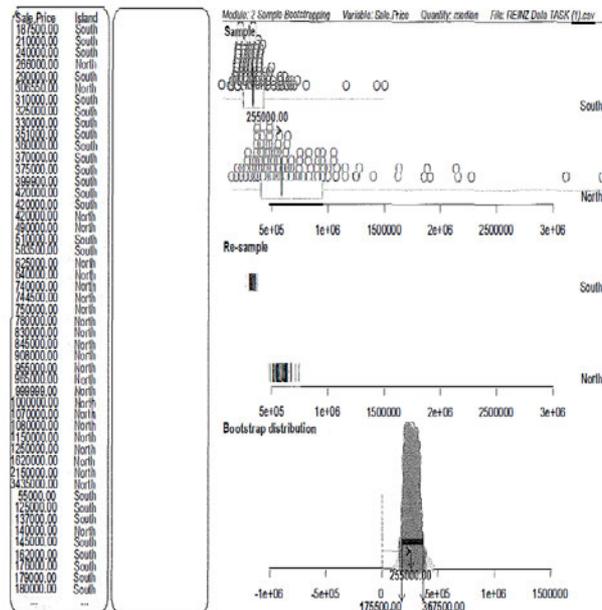
Centres

This sample shows that the median house sales price (NZD) in Auckland, Wellington, Christchurch and Dunedin in 2016 for the North Island is \$585,000 NZD which is \$255,000 NZD than the median sale price for the South Island at \$330,000 NZD. This difference in median house sales prices is significant because a difference of \$255,000 is more than 5 times the 2016 median annual income in New Zealand (the 2016 median income in New Zealand is \$924⁵ per week; equating to an annual median income of \$48048 NZD). This demonstrates that it is likely to be much harder for someone to purchase a property in the North Island. A higher median for North Island house sales prices than South Island house sales prices makes sense because of the particularly high prices in the Auckland property market. The Real Estate Institute of New Zealand (REINZ) reports that the median house sale price in Auckland is \$854,500 and \$537,000 in Wellington compared to \$447,000 in Canterbury and \$381,000 in Otago⁶. ②

Because the median house sale price for the two North Island cities are higher than the South Island cities it makes sense that the North Island median house sale price is higher than the South Island median house sale price.

Inference and Conclusion

From this sample, we can conclude that the median house sales prices (NZD) in Auckland, Wellington, Christchurch and Dunedin in 2016 is greater for houses sold in the North Island than houses sold in the South Island. From the bootstrapping confidence interval we can be pretty sure that the difference in medians between houses sold in the North Island compared to the South Island will be between \$175,500 and \$367,500. Thus, we can be pretty sure that the median sale price of North Island houses will be between \$175,500 and \$367,500 higher than the median sale price of South Island houses. Since this confidence interval is all positive, we can make a fairly certain call that the median price of houses in the North Island is higher than the median price of houses in the South Island for house sales prices (N) in Auckland, Wellington, Christchurch and Dunedin in 2016; at no point in the 1000 re-samples is the median house sale price higher in the South Island than the North Island.



When using a bootstrap confidence interval our statistics modelling programme resamples the data set, with replacement, 1000 times. This means that even a small sample of data can be used to create a relatively good representation of the population as long as this sample is representative of the population. For someone coming to NZ this is an efficient, low cost, effective way for her to understand the difference in property prices in selected North and South Island cities without having to gather multiple samples.

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Due to sampling variation, if this study was repeated with a similar sized sample we would expect to have similar (but not the same) values and a confidence interval of a similar width. We would expect to still be able to make a call about the difference in medians between the two groups because our confidence interval is significantly enough above zero that we wouldn't expect the new confidence interval to shift into such a region (ie. Have both positive and negative values) where a call could not be made. Should the analysis be repeated with a larger sample we would expect to see a narrower confidence interval thus a more precise call about the difference in medians can be made.

These results are consistent with research quoted from a variety of sources throughout this report and provide compelling evidence that a teacher should look to choose a job and move to and purchase a home in Christchurch or Dunedin (South Island) rather than Auckland or Wellington (North Island); especially if they have limited resources and no other ties to any city. In reality, choosing a job and a city to live in requires many more considerations beyond the expense of houses in that city and their decision-making process will include factors such as family, climate, recreation etc.

While Sale Method may change the price that a house sells for, so too will other factors like the number of bedrooms and bathrooms, suburb, time of year, proximity to power lines etc⁷. It might be useful to investigate these other further before deciding which island to buy a house. Also, other research might be useful such as finding out how the number of migrants may influence house prices in the North Island compared to the South Island cities. This may be worthwhile looking into further as it could influence where teachers could afford to live. If there are too many migrants the house prices might be too high because of increased demand.

¹ <http://www.enz.org/new-zealand-real-estate-guide.html>
² <http://www.enz.org/new-zealand-real-estate-guide.html>
³ https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11675211
⁴ <https://www.reinz.eo.nz/statistics>
⁵ http://www.stats.govt.nz/browse_for_stats/income-and-work/Income/LabourMarketStatistics
⁶ <https://www.reinz.eo.nz/residential-property-data-gallery>
⁷ <http://www.rochesterrealestateblog.com/what-factors-influence-the-sale-price-of-a-home/>