# An assessment of New Zealand's unofficial SPAR and stratified house price measures

Room document for the Ottawa Group,
Wellington, New Zealand,
5 May 2011

Frances Krsinich

Senior Research Statistician, Prices Unit, Statistics New Zealand
P O Box 2922
Wellington, New Zealand
frances.krsinich@stats.govt.nz

www.stats.govt.nz

# Abstract

Statistics New Zealand recently undertook a review of housing statistics. One of the recommendations of this review is that "Statistics NZ, with input from Quotable Value/PropertyIQ, the Treasury, the Reserve Bank, the Department of Building and Housing, and Housing New Zealand Corporation, should lead an investigation into different methodologies and data sources for quality adjusted house and land price indexes with a view to confirming or upgrading existing measures, or developing new measures."

The two existing New Zealand measures are a 'sales price appraisal ratio' (SPAR) method based on valuation data, and a stratified measure based on sales data collected by real-estate agents.

## Introduction

Statistics New Zealand recently gained access to valuation and sales data from Quotable Value (QV)/PropertyIQ, and has begun an investigation into the current SPAR methodology and alternative methods of using the data to produce a house price index. The investigation is in its early stages. Actual house price measures constructed from the data are unable to be shown at this stage due to confidentiality agreements. Instead, this paper raises for discussion a proposed approach to constructing hedonic indexes from the data, using valuation as an instrumental variable to reflect unmeasured characteristics of the houses.

The paper also briefly outlines the existing house price measures available in New Zealand.

### New Zealand's existing house price measures

New Zealand does not have an official house price index, although the price of newly constructed houses (not including land) is measured for the New Zealand CPI.

Two organisations produce house price measures in New Zealand. The Quotable Value house price index (QVHPI) produced by PropertyIQ uses a SPAR method. The Real Estate Institute of New Zealand (REINZ) produces a monthly measure that was, until recently, based on a national median price. Recently, REINZ implemented a stratified median price index, which more closely tracks the QV measure. Both the QVHPI and the REINZ housing price index include land.

More detailed information about these measures is in Krsinich and Dubner (2010).

### Quotable Value's SPAR measure

QV is a state-owned enterprise and is New Zealand's largest property valuation and information company. QV's property database contains historic and current valuation data on all property classes in New Zealand. QV also acquires sales records for all property sales including private sales and sales by developers, in addition to sales via real estate agents.

The QVHPI uses a SPAR method to produce a quarterly index. Sales data from each quarterly period for each of 74 territorial authorities are used to adjust the full property valuation database. The total net sale price (after editing) of all property sales of the listed residential categories is divided by the total appraisal value of the same properties sold in a quarter, producing a ratio for current sale value against appraisal value at the time of regular assessment. The ratio arrived at is applied to the entire stock of appraisal values for each territorial authority, which are aggregated to give the national index.

## REINZ stratified measure

In August 2009 REINZ began publishing a monthly stratified housing price index. It is based on the sales made by members of REINZ and represents slightly more than 80 percent of all settled sales.

The REINZ stratified index uses mix-adjustment to adjust for compositional change. It is very similar to the method outlined in McDonald & Smith (2009) except it uses individual sale prices rather than median prices for each suburb.

- Dwelling sales from approximately 1,800 New Zealand suburbs are ranked according to the median sales price of their suburbs over the relevant comparison period (currently January 2005 – June 2009).
- The suburbs are allocated to 10 different groups (or strata). Suburbs accounting for 10 percent of the lowest sales by price are grouped into stratum 1; suburbs with 10 percent of the most expensive sales price are in stratum 10. The allocation of suburbs to each stratum is fixed over the comparison period.
- Using sales data for the individual transactions within the stratum, a median sales price is derived.
- The median sales price for each stratum is averaged to produce a housing price measure from which the housing price index is derived.

## The Quotable Value data

Statistics New Zealand has access to QV valuation and sales data, to assess the current QVHPI methodology.

### Valuation data

The valuation data consists of three years of quarterly snapshots of the entire New Zealand property stock – from the third quarter of 2007 to the second quarter of 2010.  There were approximately 1.9 million properties in New Zealand in 2010.

The data Statistics New Zealand has access to includes information on:

- capital value
- land value
- category of property (for example, residential dwelling, residential – vacant, lifestyle)
- territorial authority (74).

A unique identification number enables the valuation data to be linked to the sales data.

### Sales data

All sales from 1982 onwards that are classified as freehold, arms-length open-market sales. On average there are approximately 25,000 sales per quarter, or around 1.3 percent of the stock.

The data includes information on:

- sale price (net, gross, chattels)
- sale date
- capital value
- land value
- a range of regional variables (territorial authority, area unit, suburb, meshblock)
- decade dwelling was built
- number of bedrooms
- building condition
- construction material (for example, weatherboard, brick, fibre cement)
- land area

- · floor area of dwelling
- · site cover of dwelling
- · number of garages
- · roof condition
- · roof construction material.

## Proposed approach to a hedonic index

In addition to independently producing indexes based on the SPAR method for comparison with that produced by QVHPI, an initial approach to the assessment is to produce a hedonic index incorporating as much price-determining information from the data as possible.

As noted above, it is not possible to show preliminary indexes at this stage, for confidentiality reasons.

There are a number of price-determining characteristics in the data that can be included in a hedonic model, as shown above. Fitting meshblock-specific intercepts will further control for fine level locational characteristics.

To start with, we produced hedonic indexes separately for each 10 years of data and linked them together, to give some freedom for the shadow prices to change over time.

For the sale data from 2000 to 2010 we modelled the log of price against the following characteristics (with number of categories shown in brackets for the categorical variables):

- · quarter (42)
- · number of bedrooms
- · land use (74 categories, with 99.9 percent of the data belonging to the largest 16)
- · land area
- · land area squared
- · decade dwelling was built (15, from 1870 to 2010)
- · construction material (13)
- · building condition (5)
- · number of garages.

Number of bedrooms and garages were initially modelled as categorical variables.

We fitted meshblock specific intercepts, which is equivalent to including meshblock as a characteristic in the model, but more efficient. There are approximately 32,700 meshblocks.

The R-squared for this model is 0.80.

We have valuation data for every dwelling sold, so we have the potential to treat valuation as an instrumental variable reflecting, along with the characteristics above, unobserved characteristics.

We can do this by first fitting log of valuation to the characteristics above, and then modelling log of price against the characteristics above along with the residual from the valuation model.

So we first run

$$(1) \ \ln V_{dt} = \sum_k b_k C_{kdt} + \sum_t d_t D_{dt} + e_{dt}$$

Where $V$ is the appraisal value for dwelling $d$ at time $t$, $C_{kdt}$ are the $k$ observed characteristics for the dwelling $d$ at time $t$ and $D_{dt}$ are the time dummy variables.

With the residuals $R_{dt}$ from model (1) we can then fit

(2) $\ln P_{dt} = \sum_k b_k C_{kdt} + \sum_t d_t D_{dt} + gR_{dt} + e_{dt}$

Where $P_{dt}$ is the sale price of dwelling $d$ at time $t$.

At the time of writing the models incorporating all the observed variables in models (1) and (2) weren't estimating, so we have started by fitting just territorial authority (ie, a broad regional variable) and quarter. This results in an R-squared of 0.86 when the residual of valuation is included, compared with an R-squared of 0.44 for the model of logged price against quarter and TA without residual of valuation, ie:

(3) $\ln P_{dt} = \sum_k b_k C_{kdt} + \sum_t d_t D_{dt} + e_{dt}$

Clearly there is some price-determining information in valuation that is not being captured by the observed characteristics, since incorporating them all gives us an R-squared of 0.80 compared with 0.86.

We are interested in the Ottawa Group's feedback on this approach.

# References

Krsinich, F and Dubner, M (2010, May). House price measurement in New Zealand and Australia. Paper presented at the joint UNECE/ILO meeting on Consumer Price Indices, Geneva, Switzerland. Retrieved 28 March 2011 from www.stats.govt.nz.

McDonald, C, & Smith, M (2009). Developing stratified housing price measures for New Zealand. (Discussion paper series, DP 2009/07). Wellington: Reserve Bank of New Zealand. Retrieved 28 March 2011 from www.rbnz.govt.nz.

Statistics New Zealand (2009). *Review of housing statistics report 2009*. Wellington: Statistics New Zealand. Available from www.stats.govt.nz.