



MCERT House Price Index (MCERT HPI):

Concepts, sources and methods

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Purpose

This paper describes the concepts, data sources and methods used to construct the Ministry for Cities, Environment, Regions and Transport (MCERT) House Price Index (MCERT HPI).

The purpose of the paper is to:

- document the methodology used to produce the index
- support transparency and reproducibility
- provide guidance on interpretation and limitations
- document key assumptions and methodological decisions
- describe the application of the Sales Price to Appraisal Ratio (SPAR) methodology within the New Zealand property valuation environment.

The MCERT HPI is intended for economists, researchers, analysts and policy practitioners who require a transparent and reproducible measure of residential property price change over time.



About the index

The MCERT House Price Index measures changes in the value of residential property sales over time. The index is constructed using residential property sales and capital values from the District Valuation Roll (DVR). It applies a Sales Price to Appraisal Ratio (SPAR) methodology using capital values as the appraisal measure.

House price indices are designed to measure changes in property values while accounting for changes in the mix of properties sold over time. This differs from simple statistics such as median sale prices, which can be influenced by changes in the types of properties sold in a particular period.

The MCERT HPI is designed to provide:

- a consistent measure of house price change through time
- comparable indices across geographic areas
- a flexible methodology that can be applied to different property segments and geographies
- a reproducible measure based on administrative data held by government.

The MCERT HPI is not intended to replace existing commercial measures such as those produced by REINZ or Cotality. Rather, it provides a transparent and flexible alternative that can be applied to geographical areas and population groups that are not available in existing products. It will also be freely available to users and not constrained by commercial charges or restrictions on use.

Methodological background

Sales Price to Appraisal Ratio methodology

The MCERT HPI applies a Sales Price to Appraisal Ratio (SPAR) methodology.

SPAR is a recognised house price index methodology used internationally and described in the Eurostat Handbook on Residential Property Price Indices (Eurostat, 2013) and by de Vries (2009).

For an individual property, the SPAR is calculated as:

$$SPAR = \frac{\text{Sales Price}}{\text{Capital Value}}$$

In the New Zealand context, the appraisal value is the property's most recent capital value (CV) from the District Valuation Roll (DVR).

Armstrong, Dunstan and Irrcher (RBNZ, 2017) evaluated several different approaches for constructing New Zealand house price indices, including:

- stratified median price indices
- repeat-sales indices



- hedonic indices
- SPAR indices.

They found that the SPAR methodology performed strongly across a range of evaluation criteria, including stability, robustness to changes in the composition of sales, and predictive accuracy.

The MCERT HPI applies this established methodology to residential property sales recorded within the DVR system.

Summary of data used

The MCERT HPI is calculated using:

- property sales records from the DVR
- residential property attributes from the DVR
- capital values associated with residential rateable assessments
- geographical classifications including territorial authorities, regions and New Zealand totals.

No survey data or modelled property values are used in the calculation process.

Data sources

District Valuation Roll

The primary data source for the MCERT HPI is the District Valuation Roll (DVR).

The DVR contains rating valuation records for properties maintained by territorial authorities. MCERT receives the data from councils through Land Information New Zealand (LINZ).

Each rateable assessment includes:

- property characteristics
- location attributes
- property classification information
- valuation information including CV.

CVs form the appraisal component of the SPAR calculation.

Capital values

Territorial authorities typically revalue properties every three years.



Within a territorial authority, all active assessments share a common valuation date, allowing comparisons between properties within that authority.

Because revaluation dates vary across territorial authorities, CVs are not directly comparable between territorial authorities until they have been converted into indexed series.

Sales data

The MCERT HPI uses sales recorded within the DVR system. These sales are reported via Councils after settlement. Sales are allocated to the month that the sales agreement was reached, not settlement month. Due to this delay, the MCERT HPI is produced with a three month lag.

The methodology uses only market sales that meet defined quality requirements.

Sales records are linked to the corresponding rateable assessment and capital value.

Data preparation

Residential property population

The base residential population includes properties classified as:

- houses
- flats
- apartments.

Property classifications are based on DVR definitions.

Sale selection

Only sales as classified are included in the index:

- single-property sales
- freehold sales
- arm's-length market transactions.

Sales involving multiple properties, partial interests or non-market transactions are excluded.

The sales data is the “date of agreement” from the sales record, which is considered to be the date the parties agreed on the contract.

Property matching requirements

A key assumption of SPAR methodology is that the sale price and CV represent broadly equivalent states



of the property.

To support this assumption:

- the property type recorded at the time of sale must match the property type recorded for the relevant assessment
- the assessment must contain a valid CV for the current valuation cycle
- the assessment must be active within the valuation system.

Sales that do not meet these criteria are excluded. Only around 1% of available sales are excluded on these grounds.

SPAR calculation

Individual-property SPARs

A SPAR is calculated for every valid sale.

$$SPAR = \frac{\text{Sales Price}}{\text{Capital Value}}$$

For example:

Item	Value
Sale price	\$900,000
Capital value	\$750,000
SPAR	1.20

In this example, the property sold for 20% above its CV.

A SPAR greater than 1 indicates the property sold above its CV.

A SPAR below 1 indicates the property sold below its CV.

Outlier treatment

Property markets naturally contain unusual sales.

To reduce the influence of extreme observations, outlier detection is applied before population SPARs are calculated.



For each analysis population:

1. The mean SPAR is calculated.
2. The standard deviation of SPARs is calculated.
3. Observations outside two standard deviations of the mean are identified.
4. Identified observations are excluded.
5. Population SPARs are calculated using the remaining observations.

This process is designed to remove observations that may reflect unusual sales circumstances, data quality issues, or atypical transactions while retaining the majority of market activity.

Population SPAR calculation

Territorial authority SPARs

The territorial authority (TA) is the fundamental building block of the MCERT HPI as all assessments within a TA will have the same CV revision date.

For each territorial authority and period, an arithmetic mean $SPAR(TA)$ is calculated:

$$SPAR(TA) = \frac{sum(SPAR1, SPAR2, SPAR3 \dots)}{n}$$

where $SPAR1,2,3$ represents the SPAR for each individual sale within the population after removing outliers and n represents the number of SPARs (sales) within the period.

The arithmetic mean is used because testing has shown similar results to alternative estimators while retaining simplicity and transparency.

Index construction

Why indexing is required

SPAR values from different TAs cannot be directly compared because CVs are based on different revaluation dates.

To create comparable series, TA SPARs are converted into indexed series.

Base period

The MCERT HPI uses 2018 as the base period.



This aligns with other commonly used house price indicators and facilitates comparison with other housing datasets.

Rather than selecting a single month, the index base is constructed from the average of monthly SPAR values across the 12 months of 2018.

Using an annual average reduces the influence of seasonal variation within the base period.

Index calculation

For each TA:

$$Index_t = \frac{SPAR(TA)_t}{SPAR(TA)_b} \times 1000$$

where the $SPAR(TA)_t$ is the SPAR for each TA in each period and the $SPAR(TA)_b$ is the average monthly SPAR during 2018.

Aggregation to regional and national levels

Combining territorial authorities

Regional and national indices are calculated from indexed TA results.

The MCERT HPI uses capital-value-weighted aggregation.

The weighting factor for each TA is the total CV of residential property stock within that authority.

The weighted average of indexed TA series is then used to calculate regional and national indices.

This approach reflects established New Zealand practice and provides a stable representation of housing stock distribution.

Limitations of weighting

CVs originate from different revaluation dates across TAs.

Consequently, weighting based on CVs may place relatively greater importance on areas with more recent valuation bases if values are increasing (and conversely otherwise).

This limitation is considered when interpreting regional and national series.



Time-series revisions

Revision approach

Due to the time taken for settled sales data to be provided through Councils, the MCERT HPI is calculated with a three-month lag in order to provide as complete a result as possible. Each month, the series is recalculated so that any newly received sales for earlier periods are also included.

Therefore, historical values are subject to revision.

This differs from snapshot approaches used by some house price index providers, where historical values are fixed after publication and recent results are 'stitched' on.

Reasons for revisions

Revisions can occur because of:

- additional sales becoming available
- corrections to source data
- updates to property records
- changes in active assessment populations
- methodological improvements.

Implications for users

Historical values may change between releases.

Most sales are available within several months of the transaction date, but some sales can be reported considerably later. As these sales become available, they are incorporated into future versions of the time series.

The revision approach ensures that each release reflects the best available information at the time of publication. Generally, each revision is relatively small, but this removes the issue of compounding variances over time.

Outputs

Geographic availability

The methodology can be applied at multiple geographic levels including:

- New Zealand
- regional councils
- territorial authorities



- Auckland local boards
- other geographical aggregations where sufficient sales exist.

Time periods

The MCERT HPI is produced for:

- monthly periods
- three-month rolling periods.

Monthly periods provide the timeliest indication of market change.

Three-month rolling periods reduce short-term volatility and may provide more robust estimates for smaller areas.

Minimum sales threshold

Results are only published where a minimum of 30 sales are available within the analysis population.

This threshold is intended to reduce excessive volatility and support statistical reliability.

Quality assurance

Quality assurance is undertaken throughout the production process.

Checks include:

- validation of source data loads
- monitoring of sales volumes
- review of outlier rates
- comparison with previous releases
- review of unexpected movements
- comparison with alternative market indicators where appropriate.

Automated processing and analyst review are both used prior to publication.

Limitations

Dependence on capital values

The methodology relies on CVs as the appraisal component of the SPAR calculation.

The quality of the index therefore depends on the quality and consistency of underlying valuation data.



Variation in valuation dates

CVs are revised on different schedules across TAs.

Although indexing addresses comparability issues, differences in valuation timing remain an inherent feature of the New Zealand valuation system.

Revisions

Historical values are revised as new information becomes available.

Users should expect some differences between successive releases.

Small-area volatility

Indices based on relatively small numbers of sales may be more volatile than those calculated for larger populations.

Minimum publication thresholds reduce but do not eliminate this issue.

Data availability

Administrative sales data are not immediately complete following settlement.

For this reason, the most recent periods may be more susceptible to revision.

References

Armstrong, J., Dunstan, A., & Irrcher, T. (2017). *Evaluating alternative monthly house price measures for New Zealand*. Reserve Bank of New Zealand Analytical Note Series AN2017/02.

de Vries, P. (2009). *A house price index based on the SPAR method*. Journal of Housing Economics, Vol. 18, Issue 3, pp. 214–223.

Eurostat. (2013). *Handbook on Residential Property Price Indices (RPPIs)*. Luxembourg: Publications Office of the European Union.

Office of the Valuer-General. *Rating Valuations Rules 2008 (LINZS30300)*. Land Information New Zealand.



Appendix A: Mathematical formulation

Calculate individual SPARs

$$SPAR = \frac{\text{Sales Price}}{\text{Capital Value}}$$

Calculate TA Level SPARs

$$SPAR(TA) = \frac{\text{sum}(SPAR1, SPAR2, SPAR3 \dots)}{n}$$

Calculate Index values for each time period:

$$Index_t = \frac{SPAR(TA)_t}{SPAR(TA)_b} \times 1000$$

Appendix B: Processing workflow

1. Load District Valuation Roll data.
2. Select eligible residential properties.
3. Select eligible sales.
4. Calculate property-level SPARs.
5. Identify and remove outliers.
6. Calculate territorial authority SPARs.
7. Convert SPARs to indexed series.
8. Aggregate territorial authority results to larger geographies.
9. Apply quality assurance checks.
10. Publish outputs.

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