

Constructing a Resale Residential Property Price Index for Vancouver using Repeat Sales

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Statistics Canada is developing a Resale Residential Property Price Index (rRPPI) in order to measure the change in house and condominium apartment prices for the cities of Montréal, Ottawa, Toronto, Calgary, Vancouver and Victoria. With access to land registry data, Statistics Canada faces the challenge of creating a price index using only select variables such as *sales date*, *building type* (house or condo) and *sales price*. The best option given this limited data is to use a repeat-sales approach to calculating price indexes. The repeat-sales method exploits multiple sales for the same properties over time as a means to control for time-invariant property characteristics that can confound identifying a constant-quality price index. In practice, there are a number of methodological choices to make when implementing a repeat-sales index. In order to determine which repeat-sales methodology to ultimately use, Statistics Canada went through the series of choices using Vancouver housing data from 1998 to 2018. Here are the choices faced and the ultimate decision made by Statistics Canada.

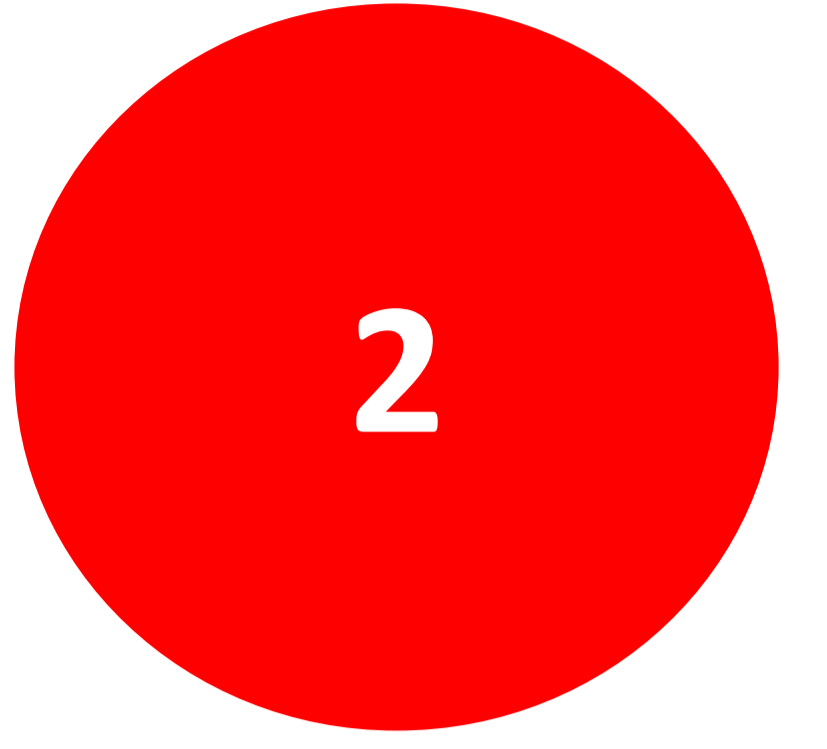


Arithmetic versus Geometric

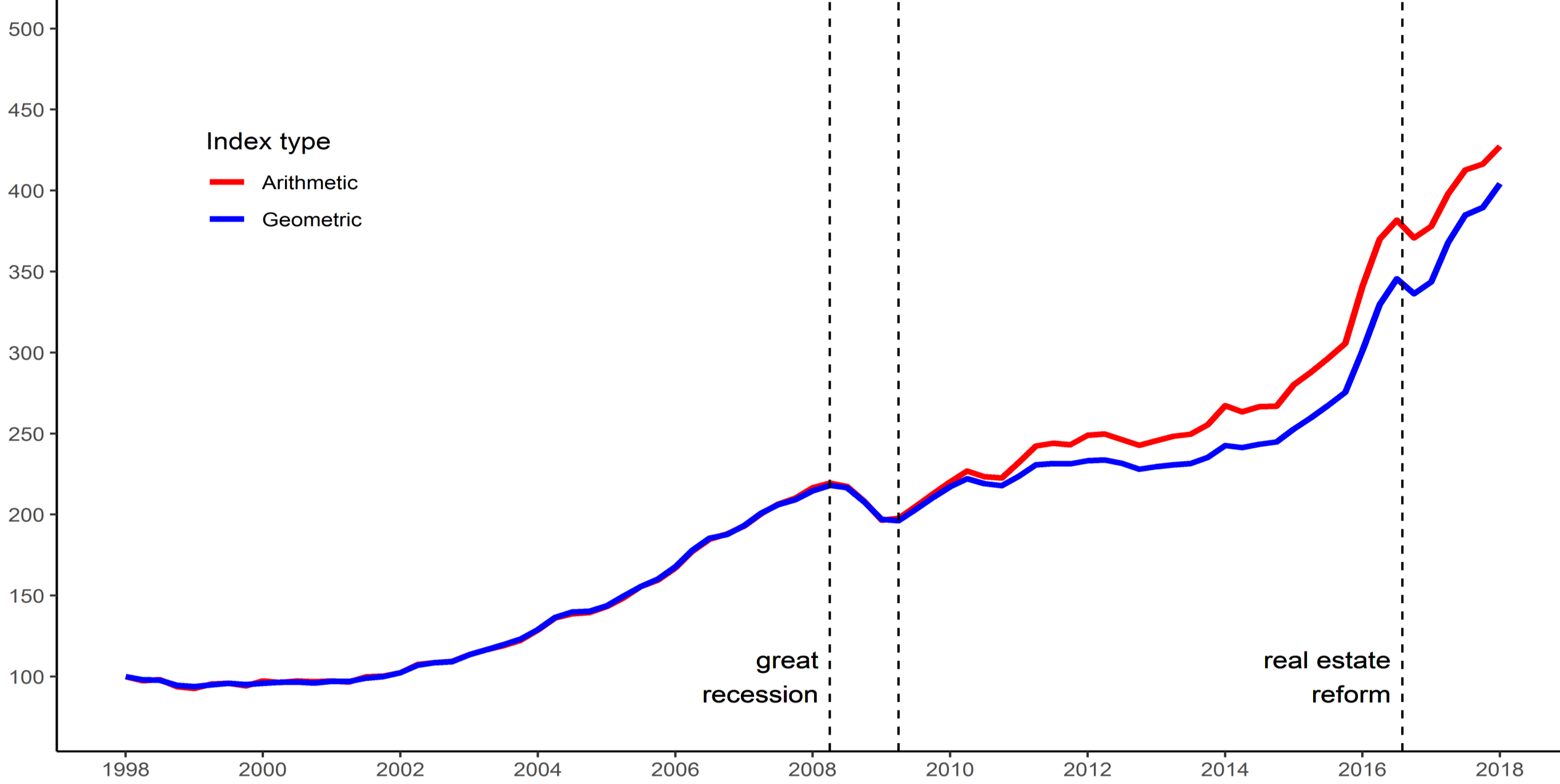
There are two broad classes of repeat-sales price indices—the Jevons-like geometric repeat-sales index proposed by Bailey et al. (1963) and the Laspeyres-like arithmetic repeat-sales index proposed by Shiller (1991).

Weighted versus Unweighted

Inverse-variance weights can be used in the repeat-sales method to correct for differences in the variance in transactions prices for properties with different holding periods that can complicate constructing confidence intervals for the index.

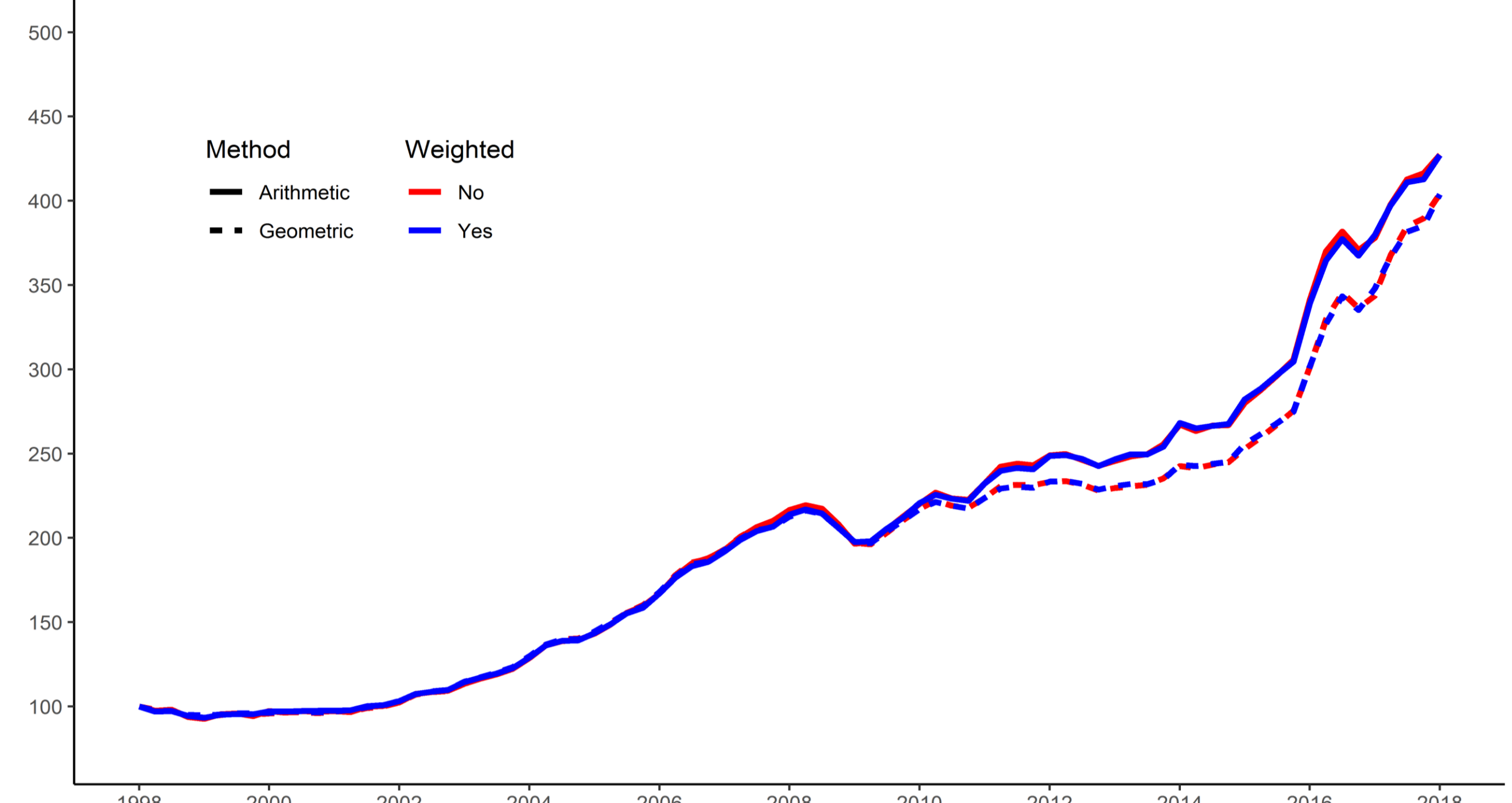


Quarterly rRPPI for Vancouver, houses only (1998 Q1 = 100)

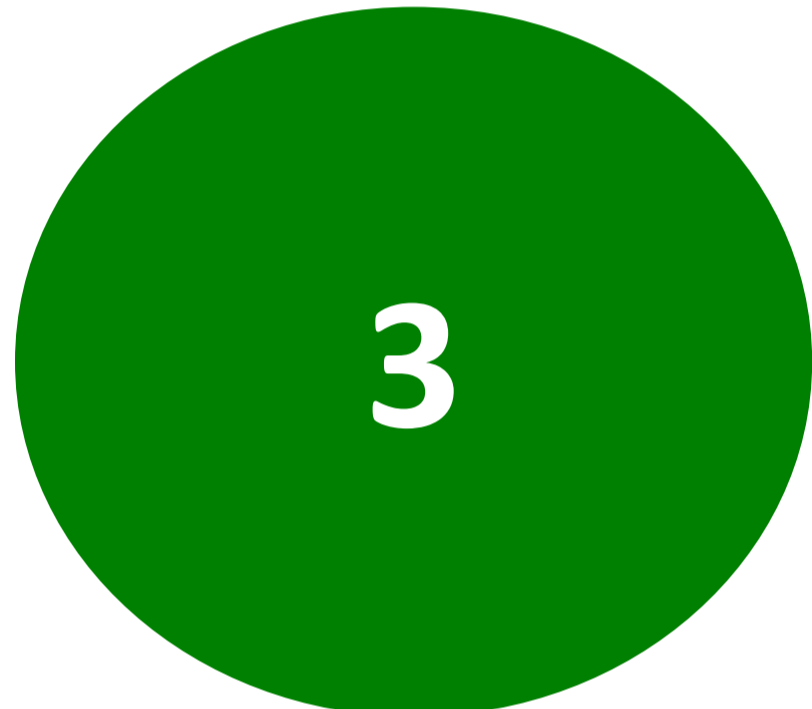


Note: Calculated using 2018 BC property assessment data from 1998 Q1 to 2018 Q1.

Weighted vs. unweighted rRPPI for Vancouver, houses only (1998 Q1 = 100)



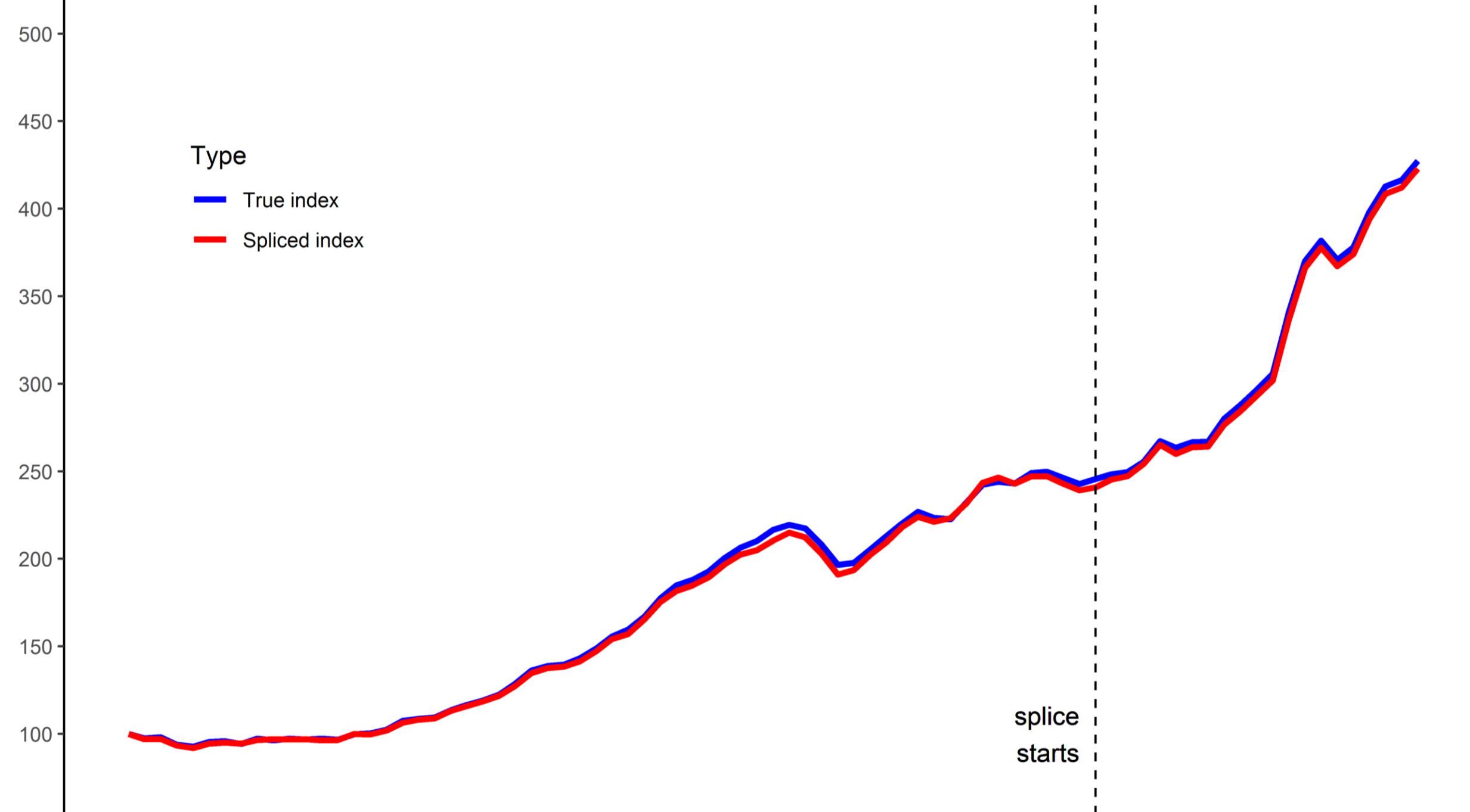
Note: Calculated using 2018 BC property assessment data from 1998 Q1 to 2018 Q1, using weights from Calhoun (1996).



How to Handle Revision

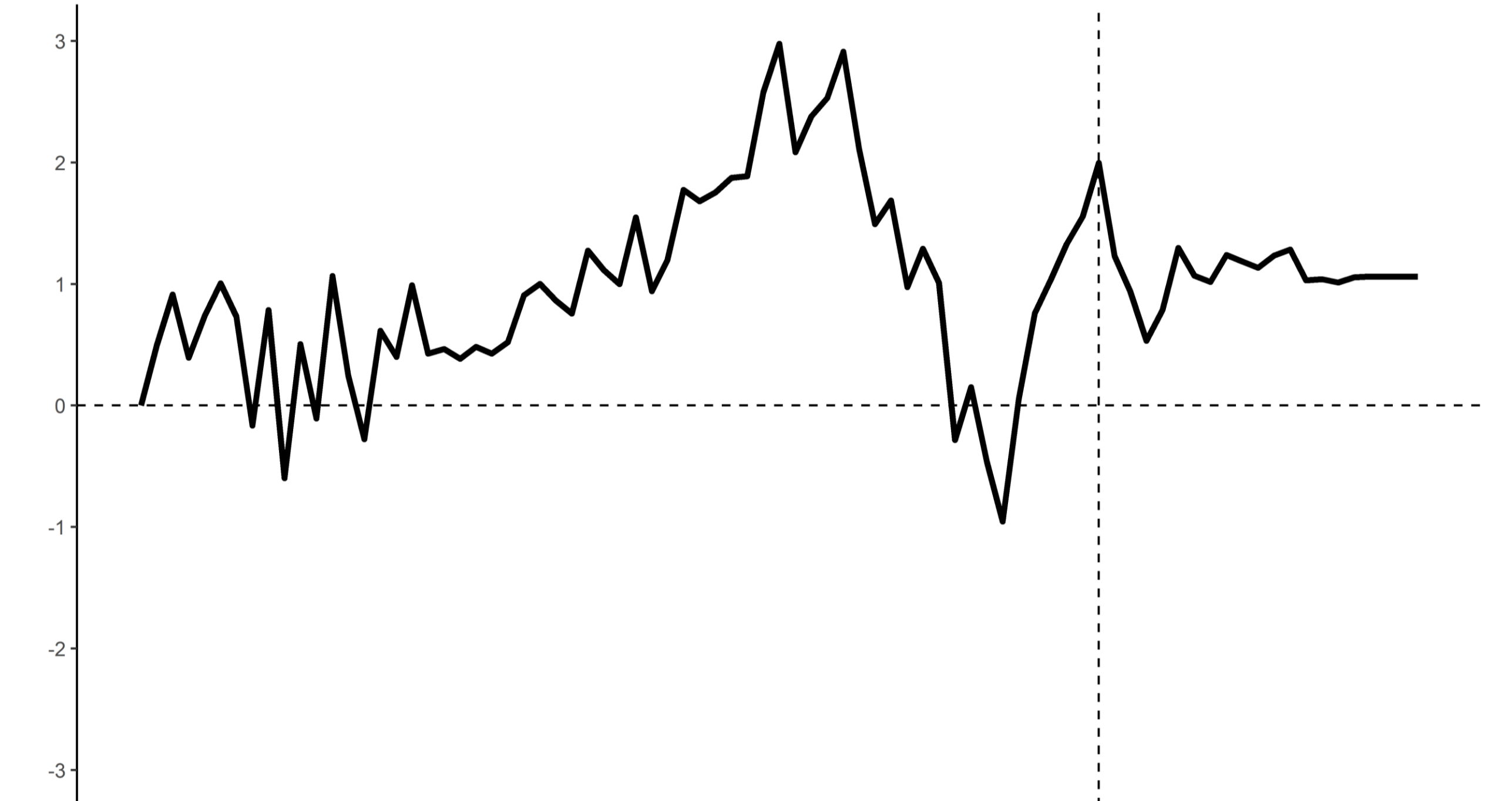
The repeat-sales method is subject to perpetual revision. Statistics Canada will use a movement splice to update the index when new periods of data become available.

Spliced vs. true quarterly rRPPI for Vancouver, houses only (1998 Q1 = 100)



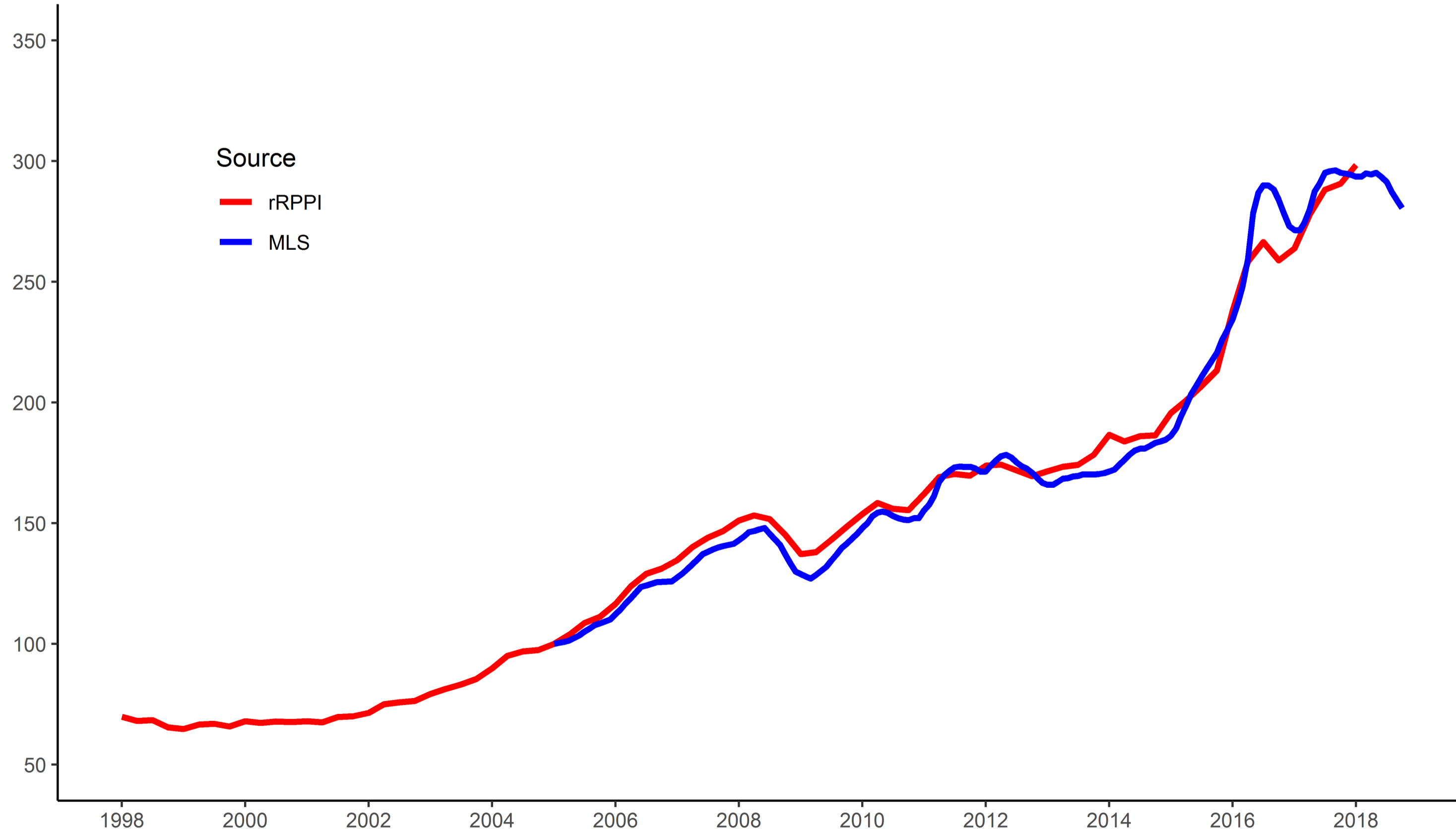
Note: Quarterly movement splice, starting in 2013.

Percent difference between true and spliced index, houses only (1998 Q1 = 100)



Note: Quarterly movement splice, starting in 2013.

Comparison between rRPPI and MLS index for Vancouver, houses only



Note: Monthly single family MLS index for Vancouver from Jan 2005 (= 100) to Oct 2018, and quarterly rRPPI from 1998 Q1 to 2018 Q1 (2005 Q1 = 100).

The rRPPI is calculated using an unweighted arithmetic repeat-sales methodology. Statistics Canada chose to use a movement splice to update the index without revising the entire series.

The repeat-sales method is often compared to its hedonic counterpart. In Canada, the Multiple-Listing Service (MLS) has a hedonic index for Vancouver that exhibits similar trends to that of the rRPPI.



References

Bailey, M., Muth, R., and Nourse, H. (1963). A regression method for real estate price index construction. *Journal of the American Statistical Association*, 58(304): 933-942.

Calhoun, C. (1996). *OFHEO House Price Indexes: HPI Technical Description*. Office of Federal Housing Enterprise Oversight. Retrieved from http://www.ofheo.gov/Media/Archive/house/hpi_tech.pdf.

Shiller, R. (1991). Arithmetic repeat sales price estimators. *Journal of Housing Economics*, 1(1): 110-126.