



House Price Index
TERANET AND NATIONAL BANK OF CANADA

Whitepaper

Tracking Housing Prices In Canada:

Why Methodology Matters



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Tracking Housing Prices In Canada: Why Methodology Matters

House Price Indices (HPIs) are widely used by public and private organizations across Canada to estimate and monitor economic activity, prosperity, and systemic financial well-being.

This white paper describes the purpose of House Price Indices; commonly used methods for index calculation; and the datasets and sources available. The paper concludes with a description of the Teranet-National Bank HPI, its common use cases, and its benefits.



HPIs: A Critical Tool for Over a Century

A House Price Index (HPI) measures the changes in residential house prices over time in a specific geographic market. HPIs indicate broad housing trends and can be used to analyze or inform monetary and financial systems stability, government policy and market regulation, and economic issues including stock market shifts. For lenders, HPIs are invaluable tools for monitoring key risk metrics associated with movement in house prices.

HPIs have been in use since the 1920s and gained global prominence following the financial crisis in 2008. At that time, G-20 countries identified real-estate price indices as important measures of financial soundness.



DID YOU KNOW?

An HPI is a composite index: a statistical tool that groups data to create an overall representation of market or sector performance.



HPIs in Practice

Portfolio Health and Risk Management: IFRS 9 Compliance

International Financial Reporting Standards (IFRS) are accounting rules required for record-keeping and public reporting and created by the International Accounting Standards Board. IFRS provides consistency, transparency and integrity for financial data – and the global markets that rely on reported financial data – and is the standard mandated for use in over 120 countries.

IFRS 9 refers to the standards that relate to the classification and measurement of financial assets. These rules are used to predict future losses. Institutions are required to forecast a certain level of losses in their portfolio, including their real-estate holdings, and then write down a portion of their loans – whether or not the future losses occur.

HPIs are used to stress-test portfolios across several scenarios towards ensuring capital adequacy and compliance with IFRS 9 calculations.

Macro-Economic Assessment and Economic Growth Evaluation: Housing Market Assessment

Government agencies, such as the Canada Mortgage and Housing Corporation (CMHC), contribute to market stability by providing information on potential imbalances that could affect Canadian housing markets. CMHC's Housing Market Assessment (HMA) offers information and analysis that can help Canadians make informed decisions; contributes to understanding of housing market imbalances (e.g., overheating, price acceleration, overvaluation and excess inventories); and signals potential vulnerabilities in the housing market.

An HPI is a critical input to housing-market assessment calculations. The reliability of HPI data used in calculations by CMHC helps to provide a more accurate, holistic view of actual market conditions.

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There is a lot of noise in the system on real estate data.

If you really want to understand what's going on in the market you must dig deep into the micro data. The Teranet-National Bank HPI is uniquely positioned to provide this information through its neighborhood-level indices rooted in land registry data.

– **Benjamin Tal**,
Deputy Chief Economist,
CIBC Capital Markets

Regulatory and Policy Development: Projection and Policy Analysis

The Bank of Canada uses HPIs as an input to help calculate its Terms-of-Trade Economic Model ([ToTEM](#)). The model is used to analyze the Canadian economy – specifically, to:

- conduct economic projections for Canada
- quantify the impact of risks to the domestic outlook
- assess the effects of economic developments on the Canadian economy
- evaluate economic policies

ToTEM includes analysis of the structure of the housing market; the impact of house prices on household debt; and estimates the impact of borrowers on overall housing demand by allowing mortgage debt and home-equity line of credits to influence house prices. The real house price is calculated by dividing the nominal HPI by core Consumer Price Index.





Comparing Methodologies

There are a variety of methods for calculating HPIs (also called Residential Property Price Indices – RPPIs):

- **Simple mean or media methods** track, most often, the median price of a property sold from one period to the next.
- **Hedonic regression methods** estimate the extent to which the characteristics of the property (e.g., size, appearance) and the characteristics of the surrounding environment (e.g., neighbourhood) affect the market price of the property.
- **Appraisal methods** use the sale price as the base price; a new value (and increase ratio) is calculated based on an appraisal price for the property.
- **Repeat sales methods** use information on properties that have sold more than once, comparing the sale price at two (or more) periods in time.

Each of these methods is subject to uncertainties, including:

- Unpredictable transaction times or cycles
- Differences across geographic locations and structures
- Unknowns related to depreciation and renovation

Proprietary HPIs generally include mathematical models that are designed to address the natural uncertainty arising from these issues as well as the quality and availability of data.



DID YOU KNOW?

Find out more about HPI methodologies

The Organisation for Economic Co-operation and Development (OECD) provides a comprehensive overview of methodologies, strategies for overcoming uncertainty, and practical applications in the *“Handbook on Residential Property Price Indices”*, OECD et al. (2013) Eurostat, Luxembourg.



HPI Data Integrity

Developers of HPIs rely on public and/or private data collection and data sets, because house-by-house or owner-based, housing-sale price surveys over time are unreasonable in terms of cost, time and/or accuracy.

In Canada, HPIs are based on two different data sets:

- 1 Land-registry data: Administrative and legal data collected, stored and shared via government-managed systems.
- 2 Non-registry data: Data collected, stored and shared by a private entity.

An example of non-registry data is the sales data provided by the Multiple Listings Service® (MLS®). MLS data provides information on properties sold by accredited members of the Canadian Real Estate Association.

Though no dataset is perfect, studies show that the use of land-registry data provides a more complete and accurate picture of transactional data.

Comparing datasets

Land registry data

- ✓ Accuracy in the final recorded price
- ✓ A complete transaction record for all property types
- ✓ Impact of depreciation and renovation are assumed

Non-registry data

- ✓ Timely recording and availability of data
- ✓ Incomplete data (i.e., no private, exclusive or builder-to-homeowner transaction data)
- ✓ Impact of depreciation and renovation are assumed



DID YOU KNOW?

Land registries

A land registration repository contains information on the location of the land, who owns it and what – if any – charges are against it (e.g., a mortgage or lien). Changes in ownership, including sales and transfers, are included in land registries.

The Teranet-National Bank HPI solution

The Teranet-National Bank House Price Index™ is an independent representation of the rate of change of single-family home prices across Canada. It uses the repeat-sales method of price measurement – a globally accepted standard for the measurement of changes in housing prices.



Methodology

The Teranet-National Bank HPI is based on methodology developed by Bailey, Muth and Nourse and extended by K.E. Case and R.J. Shiller. Indices are estimated by tracking sale prices from land-registry data over a designated time frame.

A minimum of two sales of a specified property are required for inclusion in index calculations. These “sales pairs” measure the linear increase or decrease of the property value. Any property sold at least twice is considered in the index calculation, except properties that are affected by internal factors (e.g., non-arms-length sales, change of type of property, data error, or high turnover frequency.)



DID YOU KNOW?

Teranet-National Bank HPI data integrity

Accurate, precise portrayal of shifts in real-estate trends is the fundamental strength of the Teranet-National Bank HPI.

- The data comes directly from the property records of public land registries without any third-party involvement.
- The HPI collates over 30 years of historical information from key residential markets across property types.
- All complete transactions located within land registry systems – including private and published MLS sales – are included.



DID YOU KNOW?

Other repeat-sales indices in use globally include:

- Standard & Poor’s/ Case-Shiller HPI, US
- Federal Housing Finance Agency, US
- UK Land Registry, UK
- Residex, AU



Applications

In addition to wide usage by financial institutions in underwriting, business strategy development, portfolio valuation and stress testing, the proprietary Teranet-National Bank HPI methodology has application across sectors as a reliable benchmark.

Teranet-National Bank HPI data is made available in a number of ways, including publicly, by subscription, and through custom data and analytics.

Public data: Each month, Teranet-National Bank publishes a national index comprised of weighted statistics from the 11 indices (Victoria, Vancouver, Calgary, Edmonton, Winnipeg, Hamilton, Toronto, Ottawa-Gatineau, Montreal, Quebec and Halifax) that form the [Composite 11 Index](#). This data is available to the public via [monthly newsletter](#) or downloaded from the House Price Index website. The Composite 11 Index provides users with visibility into Canada's rapidly changing major housing markets. Over 30 years of data from public Census Metropolitan Areas (CMAs) are incorporated and provide a rich history that makes the Teranet-National Bank HPI a reliable metric for financial and statistical modelling.

Subscription data: A subscription to the Teranet-National Bank HPI delivers the 11 indices from the Composite 11, plus monthly and historical files covering a total of 32 Canadian CMAs. Additional CMAs will be added as they become available.

The subscription also includes the quarterly Teranet-National Bank HPI Sub-Indices, which report on price changes in specific regions, markets, and 486 neighbourhoods across Canada by property type. The subscription provides visibility into ~85% of all Forward Sortation Areas (FSAs) (a geographical unit based on the first three postal code characters) in Canada and ~97% of residential property assessed value. Inclusion of additional FSAs and assessed property values continues to improve and evolve.

The detailed neighbourhood data allows users to examine authoritative land-registry data in specific pockets of the market and provides critical insight into the risk exposure of a lending portfolio.

Product Innovation: 5-Year HPI Forecast

The Teranet-National Bank HPI is extending its functionality to provide industry-leading, reliable forecasts for 11 Canadian CMAs.

Forecasts leverage the existing HPI models and provide users with various scenarios for use in strategic planning. The product increases the efficacy of modelling required by IFRS 9 guidelines; enables housing professionals to better advise clients; and provides critical business planning data for organizations in real estate, urban planning, construction and retail.

The five-year HPI forecast data will be available on a subscription basis in 2022.





A Range of Advantages

The Teranet-National Bank HPI offers several significant benefits in contrast to other HPIs. Among them:

- Neighbourhood data provided by FSA provides insight into specific markets, alleviates some of the uncertainty related to location inherent in other HPI methodologies, enables identification of new opportunities and/or risk, and reduces the risk exposure of a lending portfolio.
- Longitudinal data stretching back over 30 years increases the reliability of repeat-sales based HPIs, lends itself to analytics, and enables modelling of economic cycles.
- Access to authoritative land-registry and/or land-title data ensures completeness and accuracy of data for all property and sale types including private sales and builder-direct sales.
- The correlation of CMA and FSA data sets helps provide an estimate of neighbourhood valuation when compared to all repeat sales from a given CMA and/or FSA. This function provides some indication of the value of the neighbourhood (or relative value and condition of a home within the neighbourhood) which helps reduce errors related to location-based heterogeneity and property-based renovation/depreciation.

Confirming the Value of Land-Registry Data

In 2019, Teranet Inc. engaged McKinsey & Company to conduct a comparative study between its land-registry data and other non-registry HPIs. This study was conducted in Ottawa (Ottawa Real Estate Board trading area) with the support of the Ontario Real Estate Association (OREA).

A head-to-head data comparison was conducted to evaluate the completeness and correctness of data for legal description, ownership and sales history. The study pointed to several benefits of an HPI rooted in land-registry data.

For example, using listing sales data resulted in:

- An 8% error in sales value accuracy
- 16% of residential transactions being unaccounted for

In contrast, the use of land-registry data included private (and other) sales details, greater pricing accuracy, and 20% more residential transactions.



Teranet-National Bank HPI Use Cases

Broadly, the Teranet-National Bank HPI is used by private and public entities for:

- 1 Portfolio health and risk management: estimating the value of secured-lending portfolios and the financial stability or soundness of those portfolios.
- 2 Macro-economic assessment and economic growth evaluation: contributing to market stability through the analysis of, and communication about, issues and trends affecting housing markets, monetary systems and the economy.
- 3 Regulatory and policy development: analyzing economic stability and activity to inform the development of policies, programs and regulations intended to enhance economic stability.

Here are just a few specific examples of how the Teranet-National Bank HPI is deployed today.

Portfolio Health and Risk Management: Covered Bonds

Covered bonds are debts issued by a lender that are secured by a separate group of assets, also known as covered bond collateral. The Teranet-National Bank HPI is used by all covered bonds issuers in Canada (HSBC, RBC, CIBC, Scotiabank, Desjardins, BMO, National Bank, Equitable Bank and TD) for valuation of covered bond collateral.

In addition, the accuracy, reliability and richness of historical data are used by lenders to develop business strategy, plan and evaluate risk exposure and capital, assess scenarios through stress testing and for adherence to international accounting standards.



Macro-Economic Assessment and Economic Growth Evaluation: BCFSA

The BC Financial Services Authority (BCFSA) is a regulatory agency responsible for regulating the pension, financial services and real estate industries in British Columbia. The Teranet-National Bank HPI was the basis for development of a customized set of indices based on eight economic regions in British Columbia. BCFSA uses a provincial index as well as these eight indices for macroeconomic assessment and forecasting.

Regulatory and Policy Development: OSFI

The Office of the Superintendent of Financial Institutions (OSFI) is an independent federal government agency that regulates and supervises more than 400 federally regulated financial institutions and 1,200 pension plans to determine whether they are in sound financial condition and meeting their requirements. OSFI routinely reviews and updates their guidelines or issues new standards to ensure there are adequate risk management controls in mortgage underwriting standards.

The Teranet-National Bank HPI Composite 11 Index is referenced by OSFI as a an input for modelling thresholds and triggers for supplemental capital requirements. Mortgage insurers are instructed to hold supplemental capital for files originating from 11 CMAs when set triggers are breached.



DID YOU KNOW?

Tracking Affordability

The Teranet-National Bank HPI is also a key input in National Bank's [Housing Affordability Monitor](#), which is used in a variety of ways, most notably by researchers and the media.



Getting started with The Teranet-National Bank House Price Index

House Price Indices play a significant role in policy development, market and financial regulation. The Teranet-National Bank HPI was developed to provide best-in-class housing market intelligence to Canadian and international users in order to facilitate robust, evidence-based economic activity and decision-making.

Publicly available data includes:

- Monthly indices covering eleven CMAs
- A national composite index – the C11 – based on the 11 CMAs
- Access to HPI monthly (by CMA) and C11 historical data

Subscription data includes:

- Historical monthly reports showing prices changes in 32 CMAs since 1990
- Nearly 500 sub-indices showing price change in specific regions, markets and neighbourhoods by house types (e.g., single detached or condo) and covering 85% of all Canadian FSAs
- Collateral indices based on actual transaction prices for use in portfolio valuation, collateral value and exposure
- Custom datasets and index solutions

The Teranet-National Bank HPI subscription solution monitors price changes and trends by neighbourhood, region and housing types. Greater detail enables customers to assess and adjust risk exposure as well monitor market movements, measure market penetration and develop profitable campaigns.



For licenses covering all index-linked products, public or commercial solution inquiries please contact:

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About Teranet

Teranet is Canada's leader in the delivery and transformation of statutory registry services with extensive expertise in land and commercial registries. The company also markets insightful property intelligence and data solutions to thousands of customers in the real estate, financial services, government, utilities, and legal markets. Founded in 1991, Teranet operates the Electronic Registration System for the Province of Ontario, the Land Titles and Personal Property registries end-to-end for the Province of Manitoba, and Collateral Management Solutions—the market leader in Canadian lien registration and search, asset recovery services, and insolvency management.

About National Bank

National Bank of Canada provides integrated financial services to consumers, small and medium-sized enterprises (SMEs) and large corporations in its domestic market while also offering specialized services internationally. It operates in four business segments—Personal and Commercial, Wealth Management, Financial Markets, and U.S. Specialty Finance and International—with total assets of \$358 billion as at July 31, 2021.

Through more than 26,000 employees, National Bank offers a complete range of financial services that include: banking and investment solutions for individuals and businesses as well as securities brokerage, insurance and wealth management services.



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