

ANALYSIS
OCTOBER 2022

Prepared by

Abhilasha Singh
Abhilasha.Singh@moodys.com
Economist

Contact Us

Email
help@economy.com

U.S./Canada
+1.866.275.3266

EMEA
+44.20.7772.5454 (London)
+420.224.222.929 (Prague)

Asia/Pacific
+852.3551.3077

All Others
+1.610.235.5299

Web
www.economy.com
www.moodysanalytics.com

Canada Housing Market Outlook: Chill in the Air: Surging Interest Rates and the Housing Market's Coming Lull

The rapid price appreciation over the past two years is symptomatic of a housing market where demand is outstripping supply by large margins. Ultra-low mortgage interest rates offset some of the increase in prices, keeping monthly mortgage payments affordable for many households. However, with the rapid increase in mortgage interest rates since the start of 2022, the underlying dynamics of the housing market are changing, putting homeownership outside the reach of millions of would-be first-time homebuyers.

The combination of increased borrowing costs, elevated inflation, and a softening labour market spells the end for the housing boom. We project house prices will suffer a peak-to-trough decline of about 10% by early 2024. Although the reduction in demand due to affordability will lead price declines in the near term, demographics will provide a sizable tailwind in the medium and long run as many members of the millennial generation are now in their prime years for starting families and buying homes.

Canada Housing Market Outlook: Chill in the Air: Surging Interest Rates and the Housing Market's Coming Lull

BY ABHILASHA SINGH

The rapid price appreciation over the past two years is symptomatic of a housing market where demand is outstripping supply by large margins. Ultra-low mortgage interest rates offset some of the increase in prices, keeping monthly mortgage payments affordable for many households. However, with the rapid increase in mortgage interest rates since the start of 2022, the underlying dynamics of the housing market are changing, putting homeownership outside the reach of millions of would-be first-time homebuyers.

The combination of increased borrowing costs, elevated inflation, and a softening labour market spells the end for the housing boom. We project house prices will suffer a peak-to-trough decline of about 10% by early 2024. Although the reduction in demand due to affordability will lead price declines in the near term, demographics will provide a sizable tailwind in the medium and long run as many members of the millennial generation are now in their prime years for starting families and buying homes.

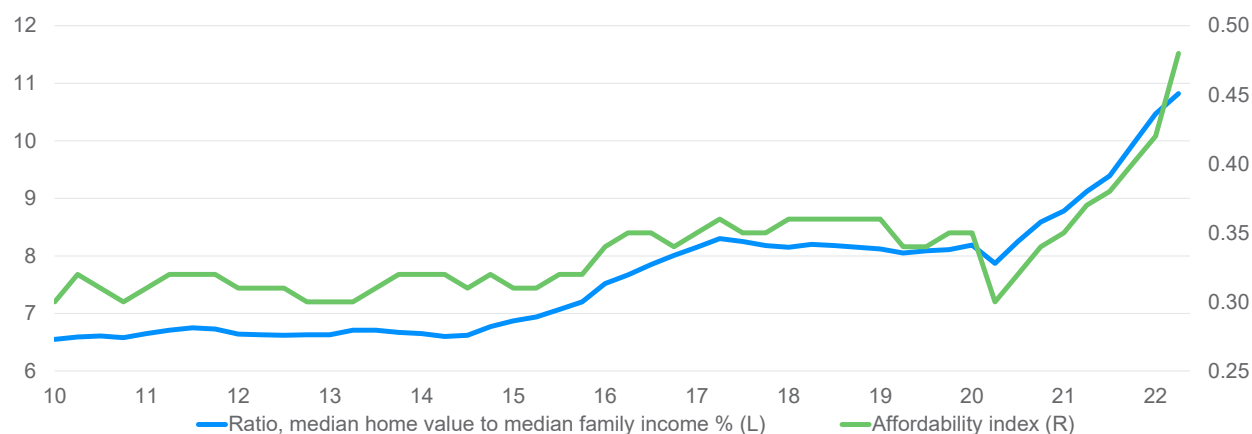
Recent Performance

The pace of Canadian house price appreciation over the past two years has been nothing short of spectacular. Low interest rates, an undersupplied market, and shifting preferences toward more space amid the work-from-home era made it incredibly easy for demand to outstrip supply. Homebuyers have been forced to contend with less selection than in the previous housing cycle.

There is little doubt that house prices are elevated, and that affordability is crimping the ability of buyers—especially first-time homebuyers—to come up with down payments and make monthly payments. The ratio of average homeownership costs—of which mortgage debt service is the largest component—to average household disposable income, as measured by the Bank of Canada's affordability ratio, has recently risen to its highest level since the late 1990s (see Chart 1). The five-year mortgage rate has spiked to 5.6%, up more than 200 basis points since the start of 2022, its highest level since January 2009. Meanwhile, higher energy prices caused by Russia's invasion of Ukraine are having a more profound impact on households' budgets and their ability to pay.

The RPS Metropolitan Composite index—a weighted average of 13 major metropolitan areas—fell for the second consecutive month in August, causing the year-over-year appreciation in house prices to decelerate

Chart 1: Housing Increasingly Out of Reach



Sources: CMHC, Bank of Canada, Moody's Analytics

to 13.8%, its slowest pace in a year and a half. Other indexes have had a similar slowdown. Falling affordability and increasing mortgage rates over the year have translated into more elevated housing finance costs and contributed to slower house price appreciation shackling demand. Existing-home sales have dropped over the past six months and are now at their slowest pace since summer 2020, according to the Canadian Real Estate Association.

The decline in sales has been largest in Vancouver and Toronto (see Chart 2). The effects first of falling affordability and then of higher mortgage rates have taken their toll in these large metro areas. Between early 2021 and August of this year, total sales have fallen by nearly two-fifths in Vancouver and by close to one-third in Toronto. The decline in sales has been steady but much more gradual in Montreal. The smaller provinces have also been affected, but home sales have so far remained above pre-pandemic levels in the Prairie Provinces and most of Atlantic Canada as buyers in relatively affordable markets are less sensitive to interest rate hikes.

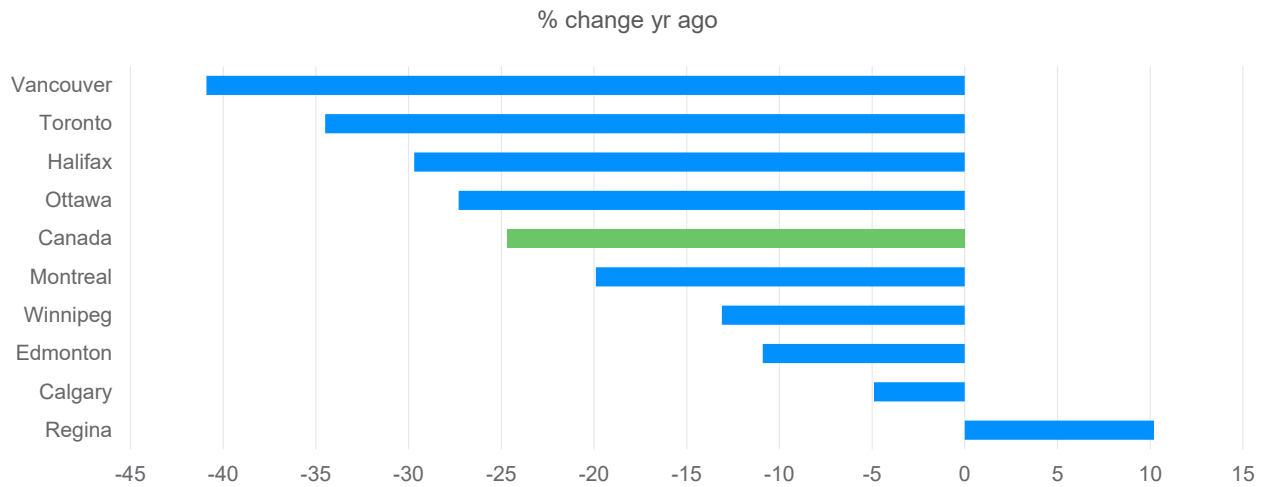
Despite the recent decrease in homebuyer demand, supply-side constraints on the housing market remain tight. The existing-home market remains relatively undersupplied, with the inventory-to-sales ratio at 3.5 months of sales in August, up from 1.6 months in January. A balanced market is generally considered to be five to six months of inventory.

Construction activity yet to recede meaningfully

Homebuilding activity remains robust unlike the resale market—but this segment of the market lags. Though the pace of new housing starts has slowed, it remains elevated by historical levels. According to the Canada Mortgage and Housing Corp., housing starts registered 267,443 units at a seasonally adjusted annualized rate in July, barely down from last year's average. The number of homes under construction now tops 340,000, which is a historic high.

Supply-side challenges remain, however. The ratio of permits to starts suggests that projects are being postponed or delayed. Permits are not being readily converted into starts, implying that crews are delaying

Chart 2: Sales Activity Takes a Big Hit in Toronto and Vancouver



Sources: CREA, Moody's Analytics

or abandoning projects because of unfavorable economic outlooks or supply-side constraints. Permits are useful leading indicators of economic swings, but because they have not materially declined lately, the climbing ratio may be more indicative of residual building-material bottlenecks.

The ratio of starts to completions provides further insight. Across single-family and multifamily projects, starts are noticeably outpacing completions, particularly single-family units (see Chart 3). This is mainly because projects are breaking ground but taking longer to finish. According to the Canadian Home Builders' Association, construction timelines were delayed by 10 weeks on average because of supply-chain issues in the first quarter of 2022—and this number has likely increased.

Chart 3: Starts Outpace Completions



Sources: CMHC, Moody's Analytics

House price appreciation coming off the boil

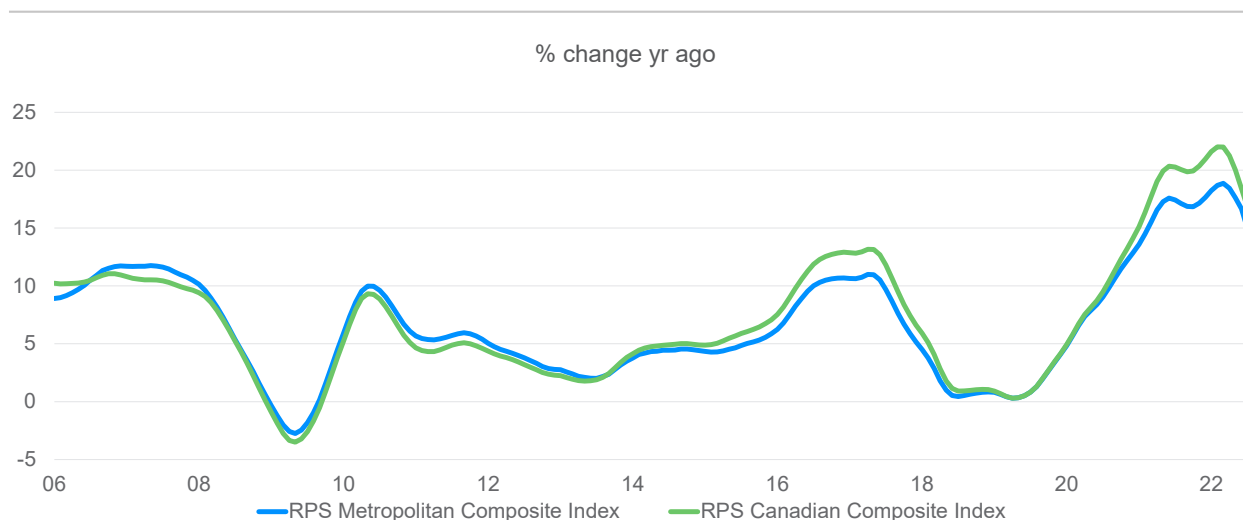
The pandemic sent demand for single-family housing through the roof, with price growth of more than 41% in the span of the last two years, according to the RPS Metropolitan Composite index. The causes are both structural and cyclical. Demographic trends supported increased demand as the millennial generation entered their 30s, prime years for starting families and buying homes. Simultaneously, baby boomers showed no sign of downsizing.¹ Remote work has also shifted the relative value of residential real estate versus commercial offices.

In addition, demand was pulled forward by record-low interest rates. Buyers rushed into the market, attracted by the cheap financing or the need for more space for remote work and learning during the pandemic, while others turned to real estate given the paltry returns offered by savings accounts and bonds. These forces conspired to create a large imbalance between supply and demand.

Not only was the pace of house price appreciation remarkable, the breadth of increases across provinces and metropolitan areas was equally breathtaking. Over the past year, out of 33 metro areas, prices rose by more than 10% in 29 metro areas while it rose by more than 20% in 18 metro areas. This contrasts with the 10 metro areas that grew by more than 10% and two metro areas that grew by more than 20% during the 2006 housing boom.

This was mainly because the pandemic greatly accelerated migration in Canada, with many people moving from the densest parts of cities to the suburbs and rural areas. This migration has supercharged growth in many smaller metropolitan areas and led some markets to astronomical valuations compared with a few years ago. This is evident from the faster house appreciation seen in the RPS Canadian Composite Index, which is a median average of 1,500 forward sortation areas and the broader national picture (see Chart 4).

Chart 4: Prices Rose at a Faster Pace in Smaller Markets



Sources: RPS, Moody's Analytics

¹ <https://www.chba.ca/CHBADocs/CHBA/HousingCanada/Information-Statistics/CHBA-Performance-Trends-2017.pdf>

House price growth remains strong by historical standards but is cooling rapidly in many markets, and more downward pressure has been added following the BoC's move to raise its target for the overnight rate by 100 basis points in July and 75 basis points again in September.

The slowdown is even more evident when examining house price dynamics in the seven months between January and August 2022, as shown in Charts 5 and 6. In January, several metro areas still had current annualized house price growth that equaled or exceeded year-over-year growth. By August, only Saskatoon and Regina fit that category. Halifax, Victoria and Ottawa house price appreciation has slowed but is still making solid gains.

Chart 5: Good HPI Growth Early This Year...

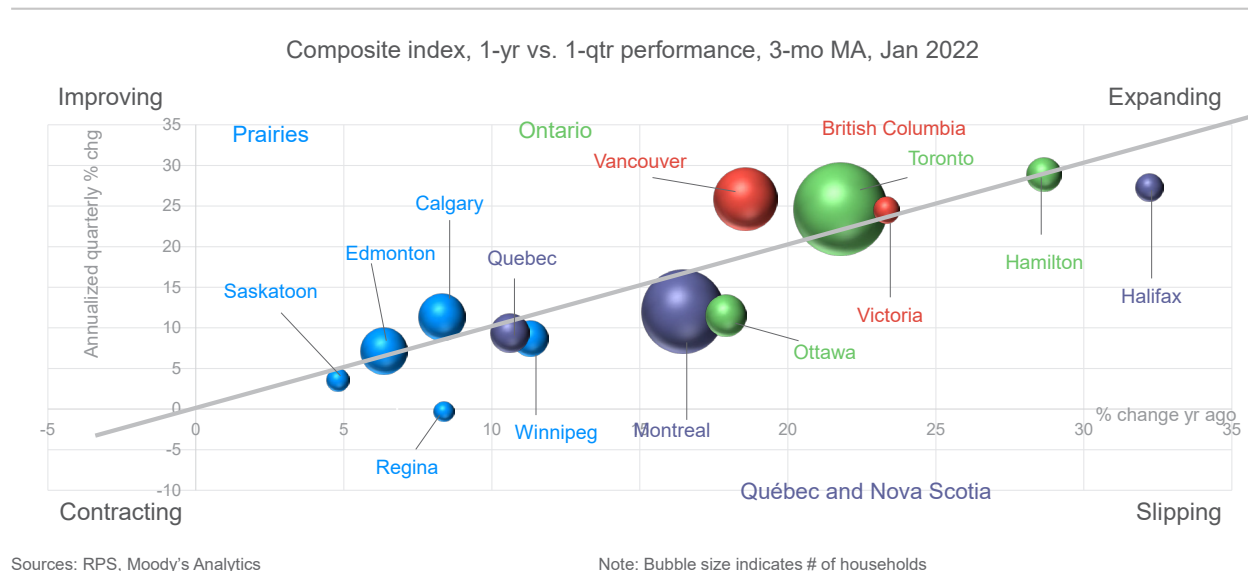
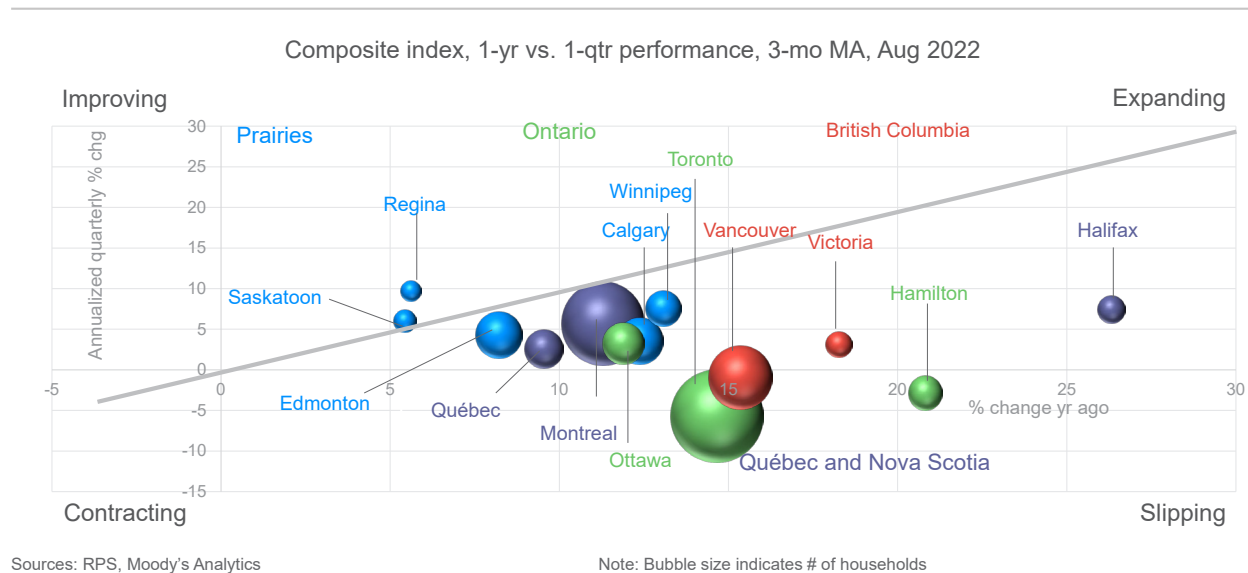


Chart 6: ...But It Is Starting to Slow Down

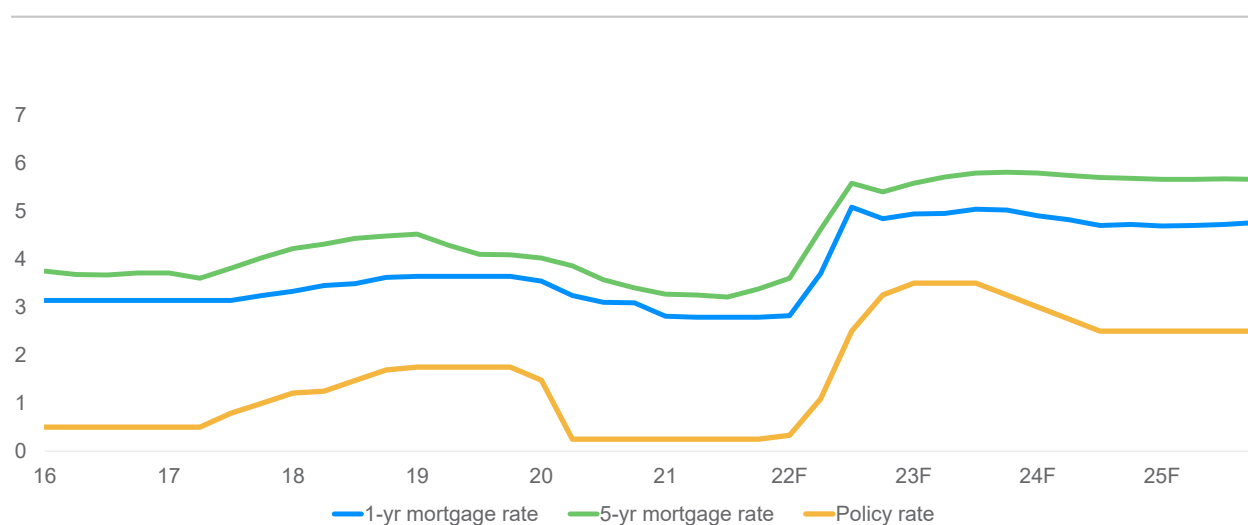


Rates will rise further

After two years of rock-bottom interest rates, the BoC is rapidly raising its target for the overnight policy rate. We anticipate that the bank will likely end its tightening cycle at the end of 2022 when the overnight rate reaches 3.5% and goes no further as global conditions deteriorate and inflation decelerates. At this level, interest rates cause demand destruction and should put significant downward pressure on prices. We expect that in the second half of 2023, the BoC will begin slowly trimming its policy rate back to the neutral level of 2.5%—the rate that neither stimulates nor constrains economic growth.

The rising policy rate entails implications for the entire yield curve and, perhaps most crucially, the five-year mortgage rate (see Chart 7). Higher rates and the significant deterioration in housing affordability will reduce the number of potential new buyers. Moreover, mortgages taken out during the pandemic boom will begin resetting at higher rates, given that the standard Canadian mortgage product resets every five years.

Chart 7: Interest Rates Will Rise



Sources: BoC, CMHC, Moody's Analytics

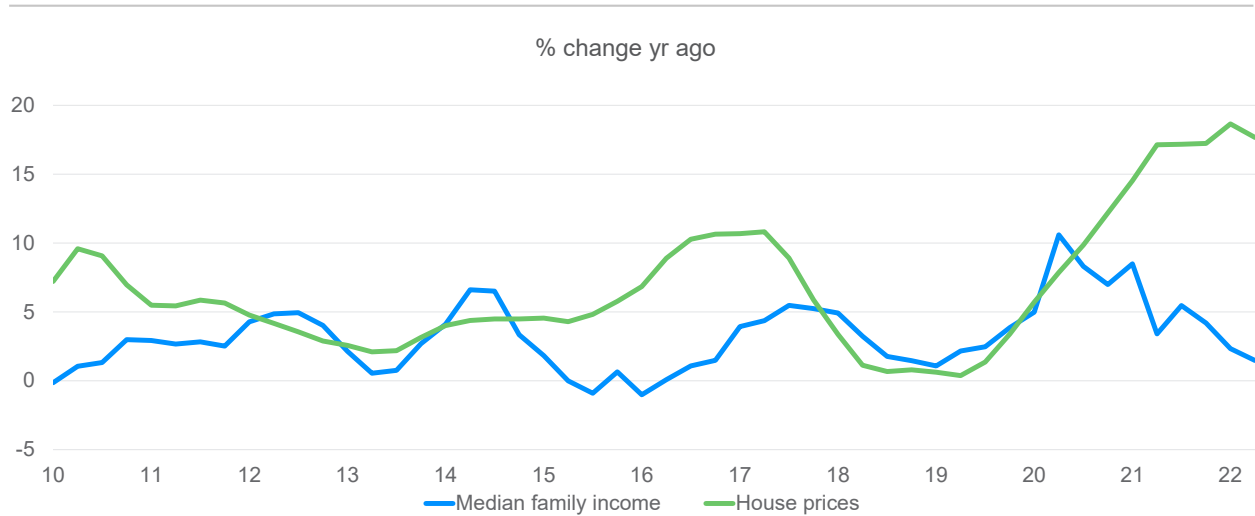
The baseline forecast

The housing market is poised for a rougher landing in the next few years but will begin to recover in late 2024. The ultra-low interest rates that juiced up demand during the pandemic have now become the mostly higher interest rates that are slamming the brakes on home sales. Inflation is also eroding purchasing power as monthly budgets get tighter.

As businesses see flatlining demand, hiring will pause. The labour market will likely muddle through the remainder of 2022 and the first half of 2023 with a mix of small gains and losses that amount to next-to-zero net employment growth. Problematically, demographics and a growing labour force mean that more workers will be spending a longer time looking for jobs, sending the unemployment rate drifting back closer to 6% next year.

Problematically, investment is going to be unable to pick up the slack. Residential investment is highly sensitive to interest rates. Prices have far outpaced the fundamentals of income (see Chart 8) and demographics and Canadians are carrying dangerously high debt loads, which make them relatively more sensitive to fluctuations in interest rates.

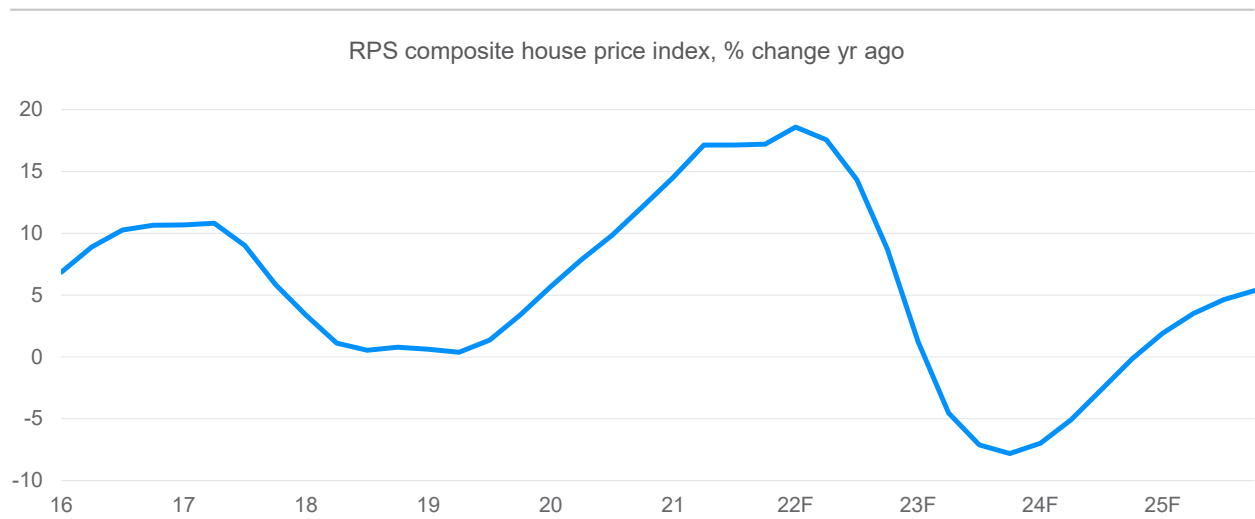
Chart 8: House Price Appreciation Far Exceeds Fundamentals



Sources: RPS, Statistics Canada, Moody's Analytics

The combination of increased borrowing costs, elevated inflation, and a softening labour market spells the end for the housing boom. Affordability issues have been mounting—and they will likely worsen in the near term. Demand is expected to soften as a result while supply-chain bottlenecks continue to weigh on housing completions and sales in the short term. We project house prices will suffer a peak-to-trough decline of about 10% by the early 2024 (see Chart 9). However, it is important to recall that house prices surged during the pandemic. The pullback is part of the economy's normalization.

Chart 9: House Prices Will Pull Back



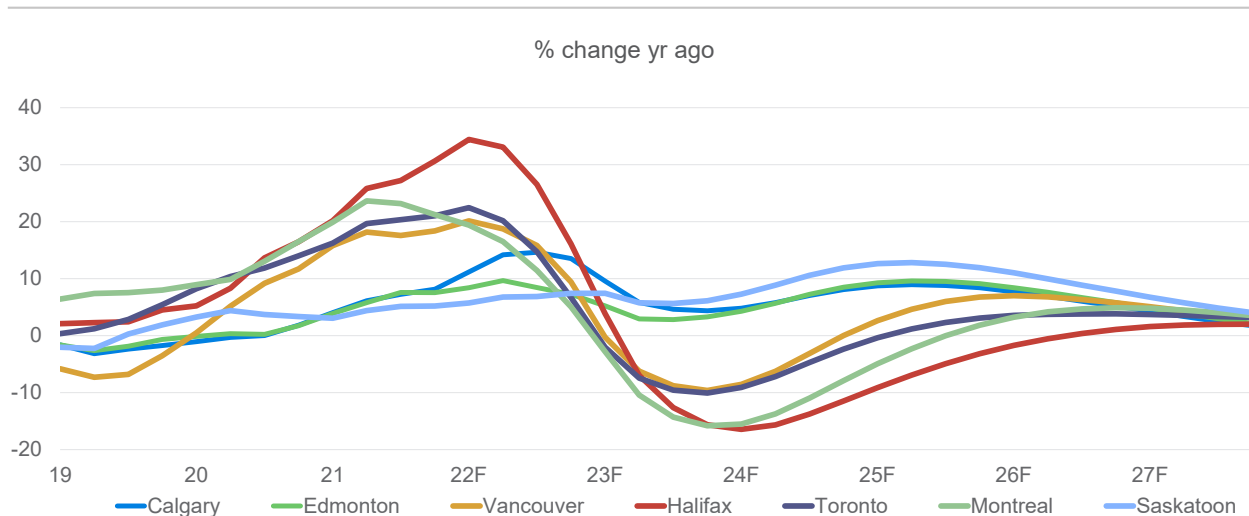
Sources: RPS, Moody's Analytics

Supply-chain bottlenecks are easing but will weigh on housing starts in the intermediate term. Completions will rise in the coming year given the number of homes under construction.

The regional forecast

The macroeconomic forecast implies a deceleration of national house price growth as higher mortgage rates weigh on demand. Some of the undervalued housing markets, especially in Alberta and Saskatchewan, will do better despite weaker economic fundamentals precisely because they have retained better affordability, while Montreal will see downward pressure on house prices for at least the next year (see Chart 10).

Chart 10: Montreal, Halifax Hit the Most



Sources: RPS, Moody's Analytics

Table 1 presents the dynamics of the short-term forecast for detached single-family house prices. The second column shows the rate of over- or undervaluation for all metro areas. In geographies with highly overvalued housing, house price growth would normally start to slow because of a combination of reduced affordability, excess construction, and a possible decline in mortgage debt performance leading to distress sales.² It is worth noting that nationally, mortgages in arrears are 0.15% as of May, compared with an average of 0.3% for the past 10 years, and are at the lowest levels recorded in the past 30 years, as reported by the Canadian Bankers Association. Highly undervalued metro areas are likely to see more opportunistic purchases, either to flip dwellings or to make them available on the rental market, with resulting appreciation as such purchases start to act on a limited supply of homes.

Serious overvaluation is not limited to Toronto but also includes the surrounding Golden Horseshoe region. However, their house prices have also shown less sensitivity to overvaluation in the historical data since 2005, so they will likely experience less downward price pressure.

British Columbia housing markets are overvalued, not just for Vancouver but for the other three metro areas as well. Given their overvaluation, the British Columbia metro areas will continue to have downward pull on their house prices due to reduced affordability.

By contrast, overvaluation is not a problem in the Prairie regions. In fact, the Calgary, Edmonton, Regina and Saskatoon metro areas are all seriously undervalued despite recent price increases and would thus face

² The usual caveat for measuring overvaluation continues to apply: A high degree of overvaluation is not a surefire guarantee that house prices will start to correct in the near future, especially if wealth inflows affecting local housing markets continue unabated.

an upward push after the period of mortgage rate increases is over. Winnipeg is the only metro area in the Prairies that is valued fairly.

Quebec presents important contrasts. Montreal, Sherbrooke and Trois-Rivieres are the only metropolitan areas in Quebec not in the “correctly valued” range of plus or minus 10% and will continue to experience a downward pull on their house prices due to reduced affordability. House prices in Montreal have also shown greater sensitivity to overvaluation in the historical data since 2005. They will likely experience more downward price pressure compared with Toronto or Vancouver.

The third and fourth columns of Table 1 show annualized single-family house price appreciation in the first and second quarters of 2022. The strongest appreciation rates were observed in smaller Ontario metro areas, including Greater Sudbury, Kingston, London, Barrie and Windsor, as well as Saint John in New Brunswick, Sherbrooke in Quebec, Kelowna in British Columbia, and Halifax in Nova Scotia. None of the metropolitan areas reported declines in the second quarter of 2022. However, the pace of appreciation has decelerated in most metro areas except Regina, Saskatoon, Edmonton, Sherbrooke, Kelowna and Greater Sudbury.

The fifth column of Table 1 shows the forecast of single-family homes in the second quarter of 2023 on a year-ago basis. The largest corrections will be in those metro areas that have a combination of recent deceleration in house price appreciation and high overvaluation. In line with slowing national appreciation, most of the metro areas are expected to undergo a price correction. Of the large metro areas, we expect that only Montreal will see the steepest decline in prices. Meanwhile, house price appreciation will strengthen in Calgary, Edmonton and Saskatoon, advancing at the fastest rate along with Kelowna and Winnipeg. This reflects affordability conditions that are solid by historical standards.

The last column shows house price growth in the second quarter of 2024, where the inertial effects from historical house price growth are no longer expected to be as strong and forecasts are driven mainly by reversion to trend and by sensitivity to changes in mortgage rates. The correction for most of the metro areas will continue; house prices will not recover until late 2024. House price appreciation will strengthen in Calgary, Edmonton and Saskatoon, advancing at a faster rate.

On average, the Canada metro areas will experience significantly slower house price growth over the next five years, though the decelerations will be sharper for Montreal, while the Prairie metro areas will undergo price increases. The more pessimistic house price forecast is consistent with intended policy effects of the BoC to improve affordability and reduce mortgage risks, which will have at least partial success in the medium term.

Risks

Declining affordability caused by rising interest rates remains the most important risk to housing demand as current home valuations are fragile. Gains during the pandemic far exceeded fundamentals and rising interest rates are eroding demand. While it is true that house price appreciation has eased, concerns remain because prices are resting on a much higher base. Further, the pace at which we got here is also jarring considering average household income growth has continued to fall behind.

Inflation shock is next in line. If energy and agricultural prices flare back up, then the clock resets on inflation's pivot, interest rates will go even higher, and the prospect of recession becomes more likely. The inflation shock would likely also lead to layoffs as sentiment weakens. The combination of higher interest rates and rising unemployment would amplify the stress in the housing market.

Canadian households' elevated debt levels would not only exacerbate the downturn; the persistence of these burdens would restrain the pace of recovery.

Downside risks include supply-side constraints, which will drive up prices in the short term and could cause frustrated buyers to sour on the prospects of homeownership.

Favorable demographics and an improving labour market provide the most significant upside risks. Household balance sheets are strong overall, with savings exceeding pre-pandemic levels for many households. Many young adults continue to aspire to become homeowners, provided they can find homes to buy within their price range.

Overall, the risks are equally balanced, with demographics providing structural strength and interest rates and supply-chain bottlenecks presenting cyclical challenges.

Table 1: Canada Subnational Forecast, Detached Single-Family House Price Value

	% deviation from trend price, 2022Q2	% change annualized, 2022Q1	% change annualized, 2022Q2	% change yr ago, 2023Q2	% change yr ago, 2024Q2
Alberta	-20.80	15.18	15.06	4.65	5.75
Calgary, census metropolitan area	-26.42	20.77	19.69	5.82	5.80
Edmonton, census metropolitan area	-30.50	10.85	12.27	2.94	5.68
British Columbia	8.76	31.30	16.09	-5.57	-6.31
Abbotsford, census metropolitan area	65.27	48.23	14.57	-11.72	-12.47
Kelowna, census metropolitan area	16.53	30.77	32.16	4.78	-1.92
Vancouver, census metropolitan area	33.42	31.88	14.71	-6.24	-6.25
Victoria, census metropolitan area	32.30	31.20	22.12	-3.26	-6.75
Manitoba	-1.25	17.63	16.45	0.85	0.24
Winnipeg, census metropolitan area	2.15	18.45	17.62	0.85	0.24
New Brunswick	19.27	38.39	32.82	0.04	-9.47
Moncton, census metropolitan area	5.42	34.97	21.89	1.46	-4.67
Saint John, census metropolitan area	29.92	43.01	33.71	-1.45	-14.64
Newfoundland and Labrador	-11.04	15.20	10.42	0.06	2.80
St. John's, census metropolitan area	-16.09	15.49	10.43	0.06	2.80
Nova Scotia	42.74	34.67	28.10	-6.96	-15.66
Halifax, census metropolitan area	29.17	37.93	30.87	-6.96	-15.66
Ontario	25.43	29.35	14.47	-6.69	-7.31
Barrie, census metropolitan area	84.71	45.05	16.43	-6.48	-7.60
Brantford, census metropolitan area	86.76	42.81	17.48	-6.40	-8.27
Greater Sudbury, census metropolitan area	48.84	41.97	44.49	5.78	-4.78
Guelph, census metropolitan area	75.83	29.88	15.14	-6.55	-7.64
Hamilton, census metropolitan area	97.35	38.62	16.85	-6.85	-8.84
Kingston, census metropolitan area	52.89	20.52	20.97	-3.21	-6.37
Kitchener, census metropolitan area	66.51	39.98	14.86	-6.79	-7.36
London, census metropolitan area	87.87	39.74	20.13	-5.17	-7.96
Ottawa-Gatineau, census metropolitan area	27.40	18.30	18.15	-3.60	-5.26
Oshawa, census metropolitan area	79.45	40.89	12.20	-7.98	-7.46
Peterborough, census metropolitan area	123.56	31.66	8.35	-11.15	-10.55
St. Catharines-Niagara, census metropolitan area	127.26	30.15	17.83	-6.68	-9.66
Thunder Bay, census metropolitan area	32.85	26.64	19.29	-4.95	-7.70
Toronto, census metropolitan area	57.26	26.90	12.03	-7.45	-7.17
Windsor, census metropolitan area	127.02	37.83	30.90	-1.16	-8.37
Prince Edward Island	36.92	13.14	18.37	-8.53	-12.97
Quebec	23.48	18.75	16.82	-8.51	-11.20
Montreal, census metropolitan area	39.17	17.45	15.87	-10.43	-13.72
Quebec, census metropolitan area	0.27	16.99	16.67	1.53	0.95
Saguenay, census metropolitan area	6.96	14.75	5.97	-5.21	-1.30
Sherbrooke, census metropolitan area	22.92	30.20	30.35	-0.44	-8.23
Trois-Rivieres, census metropolitan area	19.90	28.65	15.44	-6.46	-7.89
Saskatchewan	-22.03	2.38	9.02	3.09	7.39
Regina, census metropolitan area	-22.97	-1.60	2.71	-0.69	5.15
Saskatoon, census metropolitan area	-34.80	5.35	12.45	5.76	8.85

Sources: RPS, Moody's Analytics

About the Author

[Abhilasha Singh](#) is an economist at Moody's Analytics, where she leads model development, validation, and forecasting for global subnational economies. She is responsible for coverage of emerging markets as well as U.S. and metropolitan area economies. She is also a regular contributor to Economic View. Abhilasha completed her PhD in economics at the University of Houston, where she taught microeconomics. She holds a master's degree in finance from Pune University in India.

About RPS Real Property Solutions



RPS Real Property Solutions is a leading Canadian provider of outsourced appraisal management, mortgage-related services, and real estate business intelligence to financial institutions, real estate professionals, and consumers. The company's expertise in network management and real estate valuation, together with its innovative technologies and services, has established RPS as the trusted source for residential real estate valuation services.

RPS is wholly owned by Brookfield Business Partners L.P., a public company with majority ownership by Brookfield Asset Management Inc. Brookfield Business Partners L.P. is Brookfield's flagship public company for its business services and industrial operations of its private equity group, which is co-listed on the New York and Toronto stock exchanges under the symbol BBU and BBU.UN, respectively. Brookfield Asset Management Inc. is a Canadian company with more than a 100-year history of owning and operating assets with a focus on property, renewable power, infrastructure and private equity. Brookfield is co-listed on the New York, Toronto and Euronext stock exchanges under the symbol BAM, BAM.A and BAMA, respectively. More information is available at www.rpsrealsolutions.com.

About the RPS – Moody's Analytics House Price Forecasts

The RPS – Moody's Analytics House Price Forecasts are based on fully specified regional econometric models that account for both housing supply-demand dynamics and long-term influences on house prices such as unemployment and changes in mortgage rates. Updated monthly and providing a 10-year forward-time horizon, the forecasts are available for the nation overall, its 10 provinces and for 33 metropolitan areas, and cover three property style categories, comprising single-family detached, condominium apartments and aggregate, in a number of scenarios: a baseline house price scenario, reflecting the most likely outcome, and six alternative scenarios.

About Moody's Analytics

Moody's Analytics provides financial intelligence and analytical tools supporting our clients' growth, efficiency and risk management objectives. The combination of our unparalleled expertise in risk, expansive information resources, and innovative application of technology helps today's business leaders confidently navigate an evolving marketplace. We are recognized for our industry-leading solutions, comprising research, data, software and professional services, assembled to deliver a seamless customer experience. Thousands of organizations worldwide have made us their trusted partner because of our uncompromising commitment to quality, client service, and integrity.

Concise and timely economic research by Moody's Analytics supports firms and policymakers in strategic planning, product and sales forecasting, credit risk and sensitivity management, and investment research. Our economic research publications provide in-depth analysis of the global economy, including the U.S. and all of its state and metropolitan areas, all European countries and their subnational areas, Asia, and the Americas. We track and forecast economic growth and cover specialized topics such as labor markets, housing, consumer spending and credit, output and income, mortgage activity, demographics, central bank behavior, and prices. We also provide real-time monitoring of macroeconomic indicators and analysis on timely topics such as monetary policy and sovereign risk. Our clients include multinational corporations, governments at all levels, central banks, financial regulators, retailers, mutual funds, financial institutions, utilities, residential and commercial real estate firms, insurance companies, and professional investors.

Moody's Analytics added the economic forecasting firm Economy.com to its portfolio in 2005. This unit is based in West Chester PA, a suburb of Philadelphia, with offices in London, Prague and Sydney. More information is available at www.economy.com.

Moody's Analytics is a subsidiary of Moody's Corporation (NYSE: MCO). Further information is available at www.moodyanalytics.com.

DISCLAIMER: Moody's Analytics, a unit of Moody's Corporation, provides economic analysis, credit risk data and insight, as well as risk management solutions. Research authored by Moody's Analytics does not reflect the opinions of Moody's Investors Service, the credit rating agency. To avoid confusion, please use the full company name "Moody's Analytics", when citing views from Moody's Analytics.

About Moody's Corporation

Moody's Analytics is a subsidiary of Moody's Corporation (NYSE: MCO). MCO reported revenue of \$6.2 billion in 2021, employs more than 13,000 people worldwide and maintains a presence in more than 40 countries. Further information about Moody's Analytics is available at www.moodyanalytics.com.

© 2022 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S CREDIT RATINGS AFFILIATES ARE THEIR CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MATERIALS, PRODUCTS, SERVICES AND INFORMATION PUBLISHED BY MOODY'S (COLLECTIVELY, "PUBLICATIONS") MAY INCLUDE SUCH CURRENT OPINIONS. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT OR IMPAIRMENT. SEE APPLICABLE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S CREDIT RATINGS. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS, NON-CREDIT ASSESSMENTS ("ASSESSMENTS"), AND OTHER OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. AND/OR ITS AFFILIATES. MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS DO NOT COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS, ASSESSMENTS AND OTHER OPINIONS AND PUBLISHES ITS PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS, AND PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS OR PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing its Publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY CREDIT RATING, ASSESSMENT, OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any credit rating, agreed to pay to Moody's Investors Service, Inc. for credit ratings opinions and services rendered by it fees ranging from \$1,000 to approximately \$5,000,000. MCO and Moody's Investors Service also maintain policies and procedures to address the independence of Moody's Investors Service credit ratings and credit rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold credit ratings from Moody's Investors Service and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moody's.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any credit rating, agreed to pay to MJKK or MSFJ (as applicable) for credit ratings opinions and services rendered by it fees ranging from JPY100,000 to approximately JPY550,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.